Motorized Travel Management Final Environmental Impact Statement February 2010

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Abstract: This Final Environmental Impact Statement (FEIS) describes the environmental effects of a proposal by the Shasta-Trinity National Forest to:

(1) Prohibit cross-country motor vehicle travel off designated National Forest Transportation System (NFTS) roads, motorized trails, and areas by the public except as allowed by permit or other authorization (excluding snowmobile use).

(2) Amend the Shasta-Trinity National Forest Land and Resource Management Plan (Forest Plan) with a non-significant amendment to be consistent with the Travel Management Rule (36 CFR Part 212, Subpart B) in prohibiting cross-country motor vehicle travel;

(3) Add 44.20 miles of unauthorized routes to the current NFTS for public motor vehicle use. Approximately 36.51 miles of unauthorized routes would be added as roads classified open to all vehicles classes (highway-legal and nonhighway-legal), and approximately 7.69 miles of unauthorized routes would be added as motorized trails. Of the motorized trails proposed, about 0.85 miles would be open to "all trail class vehicles," 1.44 miles would be classified as "motorcycle only" and 5.40 miles would be open to "vehicles 50 inches or less in width." Seasonal restrictions would apply to approximately 0.15 miles of the proposed roads and trails.

(4) Add areas open to motor vehicle travel below the high-water mark at Shasta Lake (28,403 acres) and Trinity Lake (15,644 acres) within the Whiskeytown-Shasta-Trinity National Recreation Area. These

areas would be open to highway-legal vehicles with a maximum speed limit of 15 miles per hour to protect cultural resources.

(5) Amend the Forest Plan to allow six specific routes in or near cultural sites identified in the Forest Plan under Prescription XI: Heritage Resource Management.

These actions are needed in order to implement the 2005 Travel Management Rule while providing for a diversity of motor vehicle recreation opportunities and motorized access to dispersed recreation areas on the STNF. The non-significant Forest Plan amendment to prohibit cross-country motor vehicle travel is needed to bring the Forest Plan into compliance with the Travel Management Rule. The non-significant Forest Plan amendment to allow motorized use near Prescription XI heritage sites is needed to provide valuable recreation access and opportunity. If the proposed action or an action alternative is not implemented, the continued unmanaged and unregulated cross-country motor vehicle travel would further harm natural and cultural resources, and continue to cause conflict with other uses across the landscape and in the reservoir open areas. The FEIS discloses environmental impacts associated with the proposed action, a no-action alternative, and four additional action alternatives developed to meet the purpose and need and to respond to issues raised by the public.

An action alternative (Modified Alternative 2) was developed between publication of the Draft Environmental Impact Statement and this FEIS in response to public comments and new analysis. Modified Alternative 2 is identified in the FEIS as the Preferred Alternative. Mitigations to minimize environmental effects are proposed and evaluated, and monitoring assigned. The interdisciplinary team identified unavoidable adverse effects to recreation due to the elimination of cross-country motor vehicle travel, cultural resources due to the addition of two particular routes to the NFTS, and public safety as a result of the motorized mixed-use proposals. The responsible official considered an array of legal, environmental, economic, and social factors in deciding upon a course of action. The selected alternative is described in the accompanying record of decision.

Administrative Review or Appeal Opportunities

A separate Record of Decision will be published that identifies the Selected Alternative. That decision is subject to administrative appeal under 36 CFR 215. Instructions for filing an appeal will be provided in the Record of Decision.

Implementation Date

If no appeals are filed within the 45-day appeal period, implementation of the decision may occur on, but not before, five business days from the close of the appeal filing period. When appeals are filed, implementation may occur on, but not before, the 15th business day following the date of the last appeal disposition.

Summary of the Final Environmental Impact Statement

Introduction

Over the past few decades, the availability and capability of motor vehicles, particularly off-highway vehicles (OHVs) and sport utility vehicles (SUVs), has increased tremendously. Nationally, the number of OHV recreationists has climbed sevenfold in the past 30 years, from approximately 5 million in 1972 to 36 million in 2000. California is experiencing the highest level of OHV use of any state in the nation.

On the Shasta-Trinity National Forest and on national forest system lands across the nation, unmanaged motor vehicle use has resulted in miles of unplanned roads and trails, erosion, watershed and habitat degradation, and impacts to cultural resources. These routes do not have the same status as National Forest Transportation System (NFTS) roads and trails. In 2003, the Pacific Southwest Region of the Forest Service entered into a memorandum of intent with the California Off-Highway Motor Vehicle Recreation Commission and the Off-Highway Motor Vehicle Recreation Division of the California Department of Parks and Recreation to begin an effort to inventory, designate, and map OHV roads, trails, and open areas for the 18 national forests in California.

In 2005, the Forest Service published final travel management regulations (Travel Management Rule 36 CFR 212) prohibiting cross-county motor vehicle travel and requiring all national forests to designate roads, trails, and areas that are open to motor vehicle use on national forest system lands. In order for an unauthorized route or area to be designated for motor vehicle travel, it must first be added to the NFTS.

The STNF began the multi-step process of implementing the Travel Management Rule in 2005 by identifying approximately 5,219 unauthorized routes totaling 1,252 miles. These routes and the use occurring below the high-water marks in the reservoirs formed the basis for the subsequent detailed analysis, using an interdisciplinary process to identify proposals for limited additions to the NFTS. This process included a review of applicable law, regulation, and policy, input from the public, and preliminary effects analyses conducted by an earth science team. The action alternatives propose additions of various miles and acres in accordance with the 2005 Travel Management Rule at 36 CFR Part 212, Subpart B.

Also in accordance with Subpart B of the Travel Management Rule (36 CFR §212.56), following a decision on this proposal, the STNF will publish a motor vehicle use map (MVUM) identifying all NFTS roads, trails, and areas that are designated for motor vehicle use. The MVUM shall specify the classes of vehicles and season of use for which motor vehicle use is designated. Upon publication of the MVUM, possession or operation of a motor vehicle on NFS lands will be prohibited other than in accordance with those designations.

The STNF currently manages and maintains approximately 5,329 miles of NFTS roads and 87 miles of NFTS motorized trails with a variety of standards. This analysis does not revisit previous decisions that resulted in the current National Forest Transportation System. The current proposal is just one of many in

the Shasta-Trinity National Forest's continuing effort to manage the transportation system in a sustainable and cost-effective manner.

What Action is proposed?

The Shasta-Trinity National Forest (STNF) proposes the following actions:

(1) Prohibit cross-country motor vehicle travel off designated National Forest Transportation System (NFTS) roads, motorized trails, and areas by the public except as allowed by permit or other authorization (excluding snowmobile use). The Forest is currently open to cross-country travel across 1,632,316 acres, including more than 1,200 miles of unauthorized routes and open areas below the high-water marks of Shasta Lake, Trinity Lake, and Iron Canyon Reservoir. This use is currently unregulated.

(2) Add approximately 44 miles of unauthorized routes (roads and trails) to the existing NFTS for public motor vehicle use, with seasonal and vehicle class restrictions assigned to some routes. The Forest is considering limited additions to the NFTS to improve motorized recreation opportunity and access. The routes would be selected based on their capability to benefit motorized recreation with minimal environmental impact.

(3) Add open areas below the high-water mark on Shasta Lake and Trinity Lake, with vehicle class restricted to highway-legal vehicles and a maximum speed limit of 15 miles per hour to protect cultural resources. The motor vehicle use in the reservoir open areas provides access to the shoreline for day use activities and camping. The many cultural resources below the high-water marks would be protected with a speed limit and vehicle class restriction. Seasonal restrictions in the Trinity Lake open area were studied in the DEIS and subsequently removed from the proposed action.

(4) Amend the STNF's Land and Resource Management Plan (Forest Plan) to be consistent with the Travel Management Rule in prohibiting cross-country travel. The Forest Plan currently allows motor vehicle travel off designated roads, trails, and areas. The Forest Plan would be amended to prohibit cross-country travel in compliance with the Travel Management Rule (36 CFR 212).

(5) Amend the Forest Plan to be consistent with motor vehicle use on six specific routes in or near cultural sites identified in the Forest Plan under Prescription XI: Heritage Resource Management. The routes are proposed because they provide valuable motorized recreation opportunity and access. Resource protection measures for the heritage sites are assigned and evaluated in this analysis.

Why is the Action being proposed?

1) All national forests are required to implement the 2005 Travel Management Rule (36 CFR 212). This action is intended to implement Subpart B, which prohibits cross-country motor vehicle travel off designated roads, trails, and areas in order to reverse the trend of resource damage that occurs with cross-country travel and the use and proliferation of unauthorized routes. Unmanaged motor vehicle

travel on the STNF has resulted in damage to natural and cultural resources across the landscape and below the high-water marks in the reservoirs. Motor vehicle travel must be addressed with a new and environmentally sound approach that meets the need for motorized recreation and access while protecting resources. The proposed action meets the requirements of the Travel Management Rule by prohibiting cross-country motor vehicle travel while adding roads, trails, and areas to the NFTS to provide motorized recreation access and opportunity. In particular, this action will provide access for dispersed recreation activities and will enhance the NFTS by providing additional loops, extended rides, and opportunities for diverse experiences for a variety of vehicle classes. The proposed routes and areas were selected for study because they address recreation needs for access and opportunity and expand the NFTS with minimal environmental impact.

2) In addition to prohibiting cross-country motor vehicle travel and expanding the NFTS, there is a need for consistency between the Forest Plan and the Travel Management Rule, CFR Part 212, Subpart B. A review of the Forest Plan has found that it is not fully consistent with the new Travel Management Rule. The current Forest Plan allows some public motor vehicle travel off designated routes. This use conflicts with the Travel Management Rule at 36 CFR 212.50(a) which states, "Motor vehicle use off designated roads and trails and outside designated areas is prohibited by 36 CFR 261.13."

3) A second non-significant Forest Plan amendment is needed for consistency with the Forest Plan where it prohibits off-highway vehicle use in prescription XI cultural management areas (pages 4-50 - 4-51). Several NFTS routes in this area are important routes for OHV users and are currently in conflict with the prohibition of prescription XI. The proposed routes benefit motorized recreation by providing access to dispersed recreation sites or serving as part of an extended loop ride. Protection measures would be assigned to Prescription XI heritage resources to ensure the long-term integrity of these sites.

The underlying need to which the Shasta-Trinity National Forest is responding with this action is to protect natural and cultural resources from further damage by unmanaged motor vehicle travel across the landscape and in the reservoir open areas while providing for continued motorized recreation access and opportunity.

What would it mean not to meet the Needs?

The no-action alternative (alternative 1) was analyzed to disclose the effects of continuing the current management, which does not meet the needs described above.

If the proposed action or an action alternative is not selected and implemented, the continued unmanaged and unregulated cross-country motor vehicle travel would further harm natural and cultural resources, and continue to conflict with other uses. The cultural resources in the reservoirs and across the landscape would be subject to continued adverse effects from motorized recreation activities. Watersheds and aquatic habitats would continue to be at risk from the proliferation and use of routes created without

the benefit of engineering design or maintenance. The potential disturbance and trampling of wildlife and plants (including threatened, endangered, and sensitive species) would continue with unregulated year-round motor vehicle use. Conflicts with other uses, including non-motorized recreation and permitted uses in the reservoirs, would continue.

If the need for motorized recreation access and opportunity on the NFTS is not met, there will likely be increased violations as the public travels off the NFTS to pursue dispersed recreation activities.

If the proposed action or an action alternative is not selected to implement provisions of the 2005 Travel Management Rule (codified at 36 CFR Part 212, Subpart B), the Shasta-Trinity National Forest will be non-compliant with the federal regulatory mandate codified in the Travel Management Rule at 36 CFR 212.

Would Other Alternatives meet the Need?

The process of scoping for this project included the investigation of concerns among Forest Service and other agency resource specialists as well as interaction with interested and affected individuals and organizations. Scoping identified the following significant issues which were used in developing the action alternatives:

Table S-1. List of significant issues

Issue # and Topic		
#1	Reduced Motorized Access and Recreation Opportunity	The proposed action will adversely affect the quality of motorized recreation and provides insufficient public access to STNF lands. The prohibition on cross-country travel, restrictions below the high-water mark of the reservoirs, and the addition of only 44 miles of routes to the NFTS unfairly limits motorized recreation.
#2	Impacts on Nonmotorized Recreation	Public motorized use of roads, trails, and open areas as described in the proposed action will adversely affect nonmotorized recreation experiences due to noise, damage to roads and resources, and user conflicts.
#3	Motor Vehicle Resource Impacts	Public motorized use of roads, trails, and areas as described in the proposed action will adversely affect natural resources including soils, water quality, vegetation, air quality, scenery, aquatic habitat and populations, and wildlife habitat and populations, and may increase sedimentation, erosion, and the spread of noxious weeds. Resources and experiences found in designated special areas in the national forest will be adversely affected as well.

In addition to the Proposed Action, the STNF developed and studied four additional action alternatives to meet the purpose and need and to respond to the significant issues listed above. The six alternatives (the proposed action, the no-action, and the four action alternatives) considered in detail for this analysis are listed in Table S-2. The alternatives are described fully in chapter 2 of this document. In addition, many alternatives were considered but eliminated from detailed analysis. These are also described in chapter 2.

Table S-2. List of alternatives considered in detail

Alternative 1: No-action Alternative	The no-action alternative provides a baseline for comparing the other alternatives. This alternative maintains the status quo. Under the no-action alternative, current management plans would continue to guide management of the Shasta-Trinity National Forest. No changes would be made to the current NFTS (approximately 5,329 miles of roads and 87 miles of trails open to wheeled motor vehicle travel) and no cross-country travel prohibition would be implemented in areas that are currently open to cross-country summertime use. The Travel Management Rule would not be implemented, and no motor vehicle use map (MVUM) would be produced. Motor vehicle travel by the public would not be limited to designated routes and would continue on the existing unauthorized routes (1,252 miles). Cross-country travel could continue on 1,632,316 acres of national forest lands outside of designated wilderness. Unrestricted motor vehicle use below the high-water marks on the reservoirs would continue. The agency would take no affirmative action on any unauthorized routes or open areas.
Alternative 2: Proposed Action	Alternative 2 is the proposed action described in the notice of intent (NOI) published in the Federal Register on August 8, 2008 (Vol. 73, No.154), with some modifications. It was designed to meet the purpose and need for travel management as described in the NOI and includes additions to the NFTS that provide access to dispersed recreation sites. It was developed by the Forest's interdisciplinary team and included field surveys of many unauthorized routes. Alternative 2: • Prohibits cross-country motor vehicle travel. • Adds 36.51 miles of NFTS roads and 7.69 miles of NFTS motorized trails, with seasonal and vehicle class restrictions assigned to some routes. • Adds open areas below the high-water marks of Shasta Lake (28,403 acres) and Trinity Lake (15,644 acres)[a] with vehicle class restricted to highway-legal vehicles and a maximum speed limit of 15 miles per hour to protect cultural resources. • Amends the Forest Plan with a non-significant amendment to be consistent with the Travel Management Rule in prohibiting cross-country motor vehicle travel. • Amends the Forest Plan to allow six specific routes in or near cultural sites identified in the Forest Plan under Prescription XI: Heritage Resource Management.
Modified Alternative 2 (Preferred Alternative)	Modified Alternative 2 was developed in response to public comments on the DEIS and upon further study by the interdisciplinary team. This alternative is based on Alternative 2 and provides a balanced response to all significant issues. Modified Alternative 2: • Prohibits cross-country motor vehicle travel. • Adds 21.34 miles of NFTS roads and 14.34 miles of NFTS motorized trails, with seasonal and vehicle class restrictions assigned to some routes. • Adds open areas below the high-water marks of Shasta Lake (28,403 acres) and Trinity Lake (15,644 acres)[a] with vehicle class restricted to highway-legal vehicles and a maximum speed limit of 15 miles per hour to protect cultural resources. • Proposes motorized mixed-use on 21.31 miles of existing NFTS maintenance level 3 roads, • Amends the Forest Plan with a non-significant amendment to be consistent with the Travel Management Rule in prohibiting cross-country motor vehicle travel.
Alternative 3: Cross Country Travel Prohibition Only	Alternative 3 responds to issues related to quiet, nonmotorized recreation and impacts to natural resources (significant issues #2 and #3) by prohibiting cross-country motor vehicle travel off of designated roads, trails, and areas. No facilities would be added to the NFTS. This alternative provides a baseline for comparing the impacts of other alternatives that propose additions to the NFTS. Alternative 3: • Prohibits cross-country motor vehicle travel • Amends the Forest Plan with a non-significant amendment to be consistent with the Travel Management Rule in prohibiting cross-country motor vehicle travel.

Alternative 4: Minimize Impacts to Natural Resources and Roadless Areas	Alternative 4 responds to the nonmotorized recreation and resource issues (significant issues #2 and #3) by limiting additions to the NFTS and increasing restrictions to reduce conflicts and to provide additional resource protection. This alternative prohibits cross-country travel and avoids additions and changes to the NFTS in areas where resource concerns were raised externally and internally. Alternative 4: • Prohibits cross-country motor vehicle travel • Adds 0.88 miles as NFTS roads and 14.68 miles as NFTS motorized trails, with seasonal and vehicle class restrictions assigned to some routes. • Adds open areas below the high-water marks of Shasta Lake (28,403 acres), Trinity Lake (15,644 acres), and Iron Canyon Reservoir (429 acres)[a] with vehicle class restricted to highway-legal vehicles and a maximum speed limit of 10 miles per hour to protect cultural resources. • Proposes motorized mixed-use on 30.41 miles of existing NFTS maintenance level 3 roads, pending a mixed-use analysis and decision by the responsible official. • Amends the Forest Plan with a non-significant amendment to be consistent with the Travel Management Rule in prohibiting cross-country motor vehicle travel.
Alternative 5: Improved Access and Motorized Recreation Opportunities	Alternative 5 responds to the motorized recreation access and opportunities issue (significant issue #1) by providing additional routes and reducing restrictions. Route additions and motorized mixed-use road segments were chosen to provide loops and extended rides. This alternative would maximize motorized recreation opportunities, including those accessing dispersed recreation activities. Alternative 5 incorporates many additions to the NFTS suggested by the public and intended to enhance access and motorized recreation opportunities. Alternative 5: • Prohibits cross-country motor vehicle travel • Adds 43.49 miles as NFTS roads and 62.62 miles as NFTS motorized trails, with vehicle class and seasonal restrictions assigned to some routes. • Adds open areas below the high-water marks of Shasta Lake (28,403 acres), Trinity Lake (15,644 acres), and Iron Canyon Reservoir (429 acres)[a] with all vehicle classes allowed, and a maximum speed limit of 10 miles per hour to protect cultural resources. • Proposes motorized mixed-use on 30.41 miles of existing NFTS maintenance level 3 roads, pending a mixed-use analysis and decision by the responsible official. • Amends the Forest Plan with a non-significant amendment to be consistent with the Travel Management Rule in prohibiting cross-country motor vehicle travel • Amends the Forest Plan to allow seven specific routes in or near cultural sites identified in the Forest Plan under Prescription XI: Heritage Resource Management.

a - Actual acres of open areas below the high-water mark on the reservoirs vary depending on water levels and season of use restrictions. Topography further limits access by motor vehicles.

What are the Effects of the Alternatives?

The interdisciplinary team and staff of the Shasta-Trinity National Forest gave a hard look at the six alternatives to predict the environmental impacts associated with each. Resource evaluations include recreation, watersheds, aquatic resources, wildlife, cultural resources, botanical resources, non-native invasive plants, visual resources, inventoried roadless areas, socio-economics, transportation management, geology, and air quality. Each resource area used multiple and detailed measurement indicators to evaluate and disclose the estimated environmental effects. These are described along with data sources and methodology in each resource section in chapter 3.

The resource specialists evaluated the results of each analysis and ranked the environmental impact of each alternative by indicator. Table S-3 summarizes the environmental consequences by providing an average ranking of each alternative by resource area. Detailed information is in chapter 3. Rankings are scored on a scale of 1 to 6 from most (1) to least (6) impact. The effects of modified alternative 2 are discussed in chapter 3.

Table S-3. Relative comparison of environmental consequences

Resource Area	Relative rankings of alternatives, averaged across indicators					
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
Nonmotorized Recreation	1	3	4	6	5	2
Motorized Recreation	6	4	3	1	2	5
Watersheds	1	3	4	6	5	2
Aquatic Resources	1	3	4	6	5	2
Herpetofauna	1	3	4	6	5	2
Wildlife	1	3	4	6	5	2
Cultural Resources	1	3	4	6	5	2
Botany	1	4	3	6	5	2
Nonnative Invasive Species	1	3	4	6	5	2
Visuals	1	3	4	6	5	2
Roadless Areas	1	3	4	6	5	2
Public Safety	1	4	4	6	4	2
Affordability	6	2	4	5	3	1
Air Quality	1	4	4	6	4	2
Geology	1	4	3	6	5	2

Are there any ways to mitigate adverse effects?

Implementation of the action alternatives were evaluated with mitigation measures incorporated to preclude adverse effects as follows:

Wildlife – season of use restrictions for goshawks and bald eagles and retention of felled hazard trees in late-successional reserves.

Cultural resources – site avoidance, linear protection, padding, barriers, signage, education, vegetative screening, and closures on routes; speed limits, barriers, vehicle class restrictions, and closures in reservoir open areas.

Non-native invasive plants – hand treatment of known weed sites on designated routes.

Watersheds - best management practices and season of use restrictions as indicated through monitoring.

Air quality – capping inclusions of naturally occurring asbestos on routes where it occurs prior to designation in the Motor Vehicle Use Map.

Even with the above mitigation measures applied, the analyses indicate that adverse effects are expected as follows:

Prohibiting cross-country travel – While no biologically relevant adverse effects are expected from this action, social impacts would occur due to restricted motor vehicle access as discussed in the recreation analysis in this chapter. Mitigation measures have not been identified.

Additions to the NFTS – The potential exists for adverse effects to one cultural resource site accessed by two proposed routes included in the Proposed Action and alternative 5. No effective protection measure allowing motor vehicle use in these routes is available in the Motorized Recreation Programmatic Agreement with the State Historic Preservation Officer (SHPO). Further consultation with SHPO is required if the routes are designated. In addition, Alternative 5 permits all vehicle classes including non-highway-legal vehicles in the open areas below the high water marks of Shasta Lake, Trinity Lake, and Iron Canyon Reservoir. This will allow access to a larger area of the lake bottoms than if vehicle class was restricted to highway legal only, and increases the potential for adverse effects to cultural resources. Although these effects will be monitored and mitigated according to the protection measures outlined in appendix E of the Motorized Recreation PA, alternative 5 may require further SHPO consultation to insure site protection.

Changes to the existing NFTS – Motorized mixed-use on the NFTS segments proposed and analyzed could result in adverse public safety concerns as discussed in appendix C. Mitigation measures were considered but safety concerns are not easily mitigated at this time and are predicted to be unavoidable if the routes are designated for motorized mixed-use.

Alternative 1 – Unavoidable adverse effects are expected due to continued cross-country motor vehicle travel and use of unauthorized routes, including those known to be adversely affecting forest resources. No mitigations would be proposed to reduce, avoid, or eliminate those effects.

What Factors will be used in making the Decision?

The Shasta-Trinity National Forest Supervisor is the responsible official for this project and will sign the record of decision to implement the proposed action, an alternative to the proposed action, or take no action.

The responsible official will consider how the alternatives meet the purpose and need for action; and will evaluate a combination of environmental, economic, social, and legal factors in deciding upon a course of action. Important considerations include:

- The legal requirement to adopt the Travel Management Rule and how the alternatives implement Subpart B of the Rule.
- The size of the Shasta-Trinity National Forest's current transportation system and the recreation access and opportunities it supports.
- How proposed additions may diversify recreation opportunities on the NFTS.
- The Forest's ability to address the current road maintenance and administrative needs based on the availability of resources and funding.

- The environmental impacts of the current NFTS to national forest resources as well as the effects of proposed additions to the NFTS. The responsible official will carefully consider any unavoidable adverse effects and irretrievable or irreversible commitment of resources.

What Monitoring is Necessary that is not included in the Proposed Action or Alternatives?

Monitoring will continue in accordance with Forest Service policy and existing requirements directed by the Shasta-Trinity National Forest Land and Resource Management Plan. In addition, monitoring needs for particular resources are described in Appendix D (Mitigation and Monitoring) and Appendix L (Cultural Resources Management).

Which Alternative is Preferred?

Based on consideration of the environmental consequences and other factors as noted above the decision maker has identified modified alternative 2 as the Preferred Alternative.

Errata

This section describes needed changes, errors or omissions that were discovered after the analysis for the FEIS was completed.

Mileage differences in the NFTS: When the analysis was done to describe the existing NFTS, it included approximately 203 miles of Level 2 roads on private lands that had a Forest Service road number in the INFRA database, but for which the Forest Service did not have an easement. The maps provided with the DEIS and FEIS correctly show these roads as other jurisdictions and not part of the NFTS; however the narrative in the FEIS incorrectly included them as NFTS system miles. While it is not technically correct to describe these road segments as part of the NFTS, this discrepancy does not change or undermine the outcomes or rankings of the analysis or public access because:

- Including road mileages in private jurisdiction as part of the NFTS affects only descriptions of the existing NFTS. It does not affect the site specific conclusions supporting the proposed additions and changes to the NFTS. No unauthorized routes proposed for addition to the NFTS, or proposed changes in the NFTS in any of the action alternatives are directly connected to these erroneously identified road segments. This discrepancy does not affect any loop ride or motor vehicle recreational opportunity currently being considered through site-specific analysis in this FEIS for addition to the NFTS.

- This discrepancy in Level 2 routes is very small portion of the NFTS on the Shasta-Trinity National Forest. These private roads that are incorrectly identified as NFTS routes comprise less than 5% of the Level 2 routes on the Forest. The effect of this discrepancy is to slightly overstate the size and environmental consequence of the existing NFTS by an average of about 0.07 miles (less than 400 feet) per square mile at the watershed scale.

- The FEIS analysis describes relative values between alternatives, not absolute rankings, and the discrepancy affects all alternatives equally. The only place this discrepancy occurs is in descriptions of the total NFTS Level 2 routes. This discrepancy did not affect the decisionmakers's ability to discern differences between the action alternatives or evaluate their relative merits.

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Chapter 1: Purpose of and Need for Action

Document Structure

The Forest Service has prepared this environmental impact statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This environmental impact statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

- **Chapter 1.** Purpose and Need for Action: This chapter briefly describes the proposed action, the need for that action, and other purposes to be achieved by the proposal. This section also details how the Forest Service informed the public of the proposed action and how the public responded.
- **Chapter 2**. Alternatives, including the Proposed Action: This chapter provides a detailed description of the agency's proposed action, as well as alternative actions that were developed in response to comments raised by the public during scoping. The end of the chapter includes a summary table ranking the proposed action and alternatives with respect to their environmental impacts.
- **Chapter 3.** Affected Environment and Environmental Consequences: This chapter describes the environmental impacts of the proposed action and alternatives.
- **Chapter 4.** Consultation and Coordination: This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement; lists of Federal, State, local, and federally recognized tribal governments, and individuals and organizations that will be receiving this Final EIS; a glossary of terms; references cited; and a document index.
- **Appendices:** The appendices provide detailed information to support the analyses presented in the environmental impact statement. Appendix A includes specific information about each route proposed in the alternatives.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Shasta-Trinity National Forest headquarters.

Background

Over the past few decades, the availability and capability of motor vehicles, particularly off-highway vehicles (OHVs) and sport utility vehicles (SUVs), has increased tremendously. Nationally, the number of OHV recreationists has climbed sevenfold in the past 30 years, from approximately 5 million in 1972 to 36 million in 2000. California is experiencing the highest level of OHV use of any state in the nation. There were 786,914 all terrain vehicles (ATVs) and OHV motorcycles registered in 2004, up 330 percent since 1980. Annual sales of ATVs and OHV motorcycles in California were the highest in the U.S. for the last 5 years, and four-wheel drive vehicle sales in California also increased by 1500 percent to 3,046,866 from 1989 to 2002.

Figure 1-1. Gully erosion from OHV use, Chappie-Shasta area.

On the Shasta-Trinity National Forest, unmanaged motor vehicle use has resulted in many hundreds of miles of unauthorized roads and trails, erosion, watershed and habitat degradation and impacts to cultural resource sites. Compaction and erosion are the primary effects of motor vehicle use on soils. Riparian areas and aquatic dependent species are particularly vulnerable to motor vehicle use. Unmanaged recreation, including impacts from OHVs, is one of "Four Threats to the Health of the Nation's Forests and Grasslands" (USDA Forest Service, October, 2006).

On August 11, 2003, the Pacific Southwest Region of the Forest Service entered into a memorandum of intent (MOI) with the California Off-Highway Motor Vehicle Recreation Commission and the Off-Highway Motor Vehicle Recreation Division of the California Department of Parks and Recreation. That MOI set in motion a five step region-wide effort to "Inventory and Designate OHV roads, trails, and any specifically defined open areas for motor vehicle travel on maps of the 18 National Forests in California by 2007."

On November 9, 2005, the Forest Service published final travel management regulations in the Federal Register (FR Vol. 70, No. 216-Nov. 9, 2005, pp 68264-68291). Subpart B (36 CFR 212) of the final Travel Management Rule requires designation of those roads, trails, and areas that are open to motor vehicle use on National Forests. Only roads and trails that are part of a National Forest Transportation System (NFTS) may be designated for motorized use. Designations are made by class of vehicle and, if appropriate, by time

Figure 1-2. Two unauthorized routes near Dobkin Lake. OHV use has destroyed vegetation and caused soil erosion on this designated system foot trail (05W03). This is a non motorized recreation area in the Shasta-Trinity National Forest Land and Resource Management.

of year. Part 261 – Prohibitions, Subpart A (36CFR 261.13) of the final rule, prohibits the use of motor vehicles off designated roads, trails and areas, as well as use of motor vehicles on roads and trails that is not consistent with the designations.

On National Forest System (NFS) lands, unmanaged repetitive motor vehicle travel has resulted in unplanned, unauthorized routes and areas. In many cases, these roads, trails and areas were developed without agency authorization, environmental analysis, or public involvement and do not have the same status as NFTS roads and NFTS trails. Nevertheless, some unauthorized routes may be well-sited, provide excellent recreation opportunities for motorized and nonmotorized recreationists, and enhance the NFTS. Other unauthorized routes are poorly-sited and cause unacceptable environmental impacts. Only NFTS roads, NFTS trails and discrete, specifically delineated open areas can be designated for motor vehicle use. In order for an unauthorized route to be designated for motor vehicle travel, it must first be added to the NFTS. In order for areas to be designated for motor vehicle travel, a discrete, specifically delineated space that is smaller, and in most cases much smaller, than a ranger district must be identified.

The 1995 Shasta-Trinity National Forest Land and Resource Management Plan includes areas open and closed to cross-country motor vehicle travel. The LRMP also refers to an OHV Management Plan. A map depicting areas open and closed to cross-country motor vehicle travel was included with the draft environmental impact statement for the STNF LRMP. However, the map was not modified to reflect changes in management direction between the draft and final LRMP. Additionally, the specific direction regarding areas open and closed to cross-country motor vehicle travel were not formally adopted with Forest Orders. As a result, cross-country motor vehicle travel has been occurring on national forest lands outside of designated wilderness areas (where it is legally prohibited). Prior to this analysis, the STNF completed an extensive inventory of unauthorized routes on NFS lands. Approximately 5,219 unauthorized routes totaling 1,252 miles were identified. The STNF then used an interdisciplinary process to review the inventory of unauthorized routes and identify proposals for limited additions to the NFTS. This process included a review of the STNF Land and Resource Management Plan, and applicable laws, regulations, and policy. It also included internal and external validation of the locations of unauthorized routes using the inventory maps. The travel management regulations provide for the incorporation of previous decisions regarding travel management. Existing NFTS roads currently open to motor vehicle travel will remain designated for such use except as described under the action alternatives. The action alternatives propose to add a range of mileages of roads and trails as well as open areas below the high-water mark on three reservoirs (Shasta Lake, Trinity Lake, and Iron Canyon Reservoir). In addition, motorized mixed-use on a limited number of miles of existing NFTS roads would be allowed. These changes are in accordance with the 2005 Travel Management Rule at 36 CFR Part 212, Subpart B.

Also in accordance with Subpart B of the Travel Management Rule (36 CFR §212.56), following a decision on this proposal, the STNF will publish a motor vehicle use map (MVUM) designating all NFTS roads, trails, and areas that are available for motor vehicle use. The MVUM shall specify the classes of vehicles and, if appropriate, the time of year for which motor vehicle use is designated. Upon publication

of the MVUM, possession or operation of a motor vehicle on NFS lands is prohibited other than in accordance with those designations. These maps will be made available to the public on the internet and at the Shasta-Trinity National Forest headquarters and ranger station offices. The unauthorized routes not included in this proposal are not precluded from future consideration for either removal from the landscape and restoration to a natural condition, or addition to the NFTS and inclusion on a future MVUM. Future decisions associated with changes to the NFTS and MVUM are dependent on available staff and resources and may trigger the need for additional environmental analysis, public involvement, and documentation.

Travel Management on the Shasta-Trinity National Forest

The STNF currently manages and maintains approximately 5,329 miles of NFTS roads and 87 miles of NFTS motorized trails. The NFTS was developed over many decades to meet a variety of needs including timber management, fuel treatment, access to private inholdings, fire control, utility management, special uses management and recreation. Harvesting of special forest products such as greenery, firewood, mushrooms and plants are among the many opportunities afforded by the NFTS. The NFTS is managed and maintained to various road and trail standards, ranging from paved roads to roughly graded high clearance roads, and motorized trails with a range of standards allowing all trail-class vehicles to those for motorcycles only, depending on the type of access necessary. Details concerning the management of individual roads and trails are maintained in the Forest infrastructure database (INFRA).

In 1997, the STNF populated the INFRA database by transferring the route data from the existing stand alone database to the corporate INFRA database. Since that time, the forest has been maintaining the INFRA database; documenting changes in the transportation system, correcting errors, and capturing deferred maintenance needs. Roads or trails with no record of being mapped or maintained for a specific use were not included in the NFTS.

The NFTS is displayed on the Forest Transportation Atlas. The Forest Transportation Atlas consists of the maps, inventories and plans for forest transportation facilities and associated information available as of January 12, 2001 (FSM 7711.2).

The current Transportation System and Road Atlas identify the existing NFTS and management objectives for each transportation facility. The NFTS is always changing depending on resource needs and management concerns.

The current proposal is just one of many in the Shasta-Trinity National Forest's continuing effort to manage the transportation system in a sustainable and cost-effective manner. Previous decisions may have reduced or added to the number of miles of NFTS roads and NFTS trails available for motor vehicle use. These decisions have resulted in road closures, seasonal restrictions, and decommissioning of selected routes. This has been accomplished through vegetation management projects, watershed restoration projects, fuels treatment projects, trail construction projects and trail management decisions. Watershed

analyses and the Shasta-Trinity Forest Roads Analysis Process (RAP) were used to inform the decisions. All of these efforts have contributed to sustainable management of the Shasta-Trinity NFTS.

Ongoing efforts include: 1) project-specific efforts to reduce the impacts associated with system and unauthorized routes (see appendix B for a list of present and reasonably foreseeable actions), 2) addressing impacts associated with the current NFTS through the Forest's road operation and maintenance program, and 3) researching and correcting jurisdiction of roads and motorized trails in INFRA. Implementation of this project is only one step in the overall management of motor vehicle travel on the Shasta-Trinity National Forest.

Scope of the Analysis

This proposal is not intended to revisit previous decisions that resulted in the current National Forest Transportation System. This proposal is narrowly focused on the addition and designation of roads, trails and areas for motor vehicle use in accordance with 36 CFR Part 212, Subpart B, through publication of a motor vehicle use map (MVUM). Only roads, trails, and areas that are part of a National Forest Transportation System (NFTS) may be designated for motorized use.

Consistent with Forest Service policy for travel analysis, the STNF has identified issues, assessed benefits and risks, and, through the alternatives analyzed in this EIS, described and documented opportunities to address those risks. Only those actions within the capability of the Forest have been brought forward by the responsible official and proposed in accordance with the purpose and need for action.

Figure 1-3. Unauthorized OHV track near Dobkin Lake on a designated foot trail (05W03). There are no water bars to prevent soil erosion from moving water. This is a non motorized recreation area in the Shasta-Trinity National Forest Land and Resource Management Plan.

Project Location

The Shasta-Trinity National Forest is located in northern California, encompassing 2.1 million acres of national forest system lands. The area analyzed for travel management includes all Shasta-Trinity National Forest System lands outside of designated wilderness, an area covering approximately 1.6 million acres. Private, state, county, other Federal lands, or other ownerships are excluded from the project area.

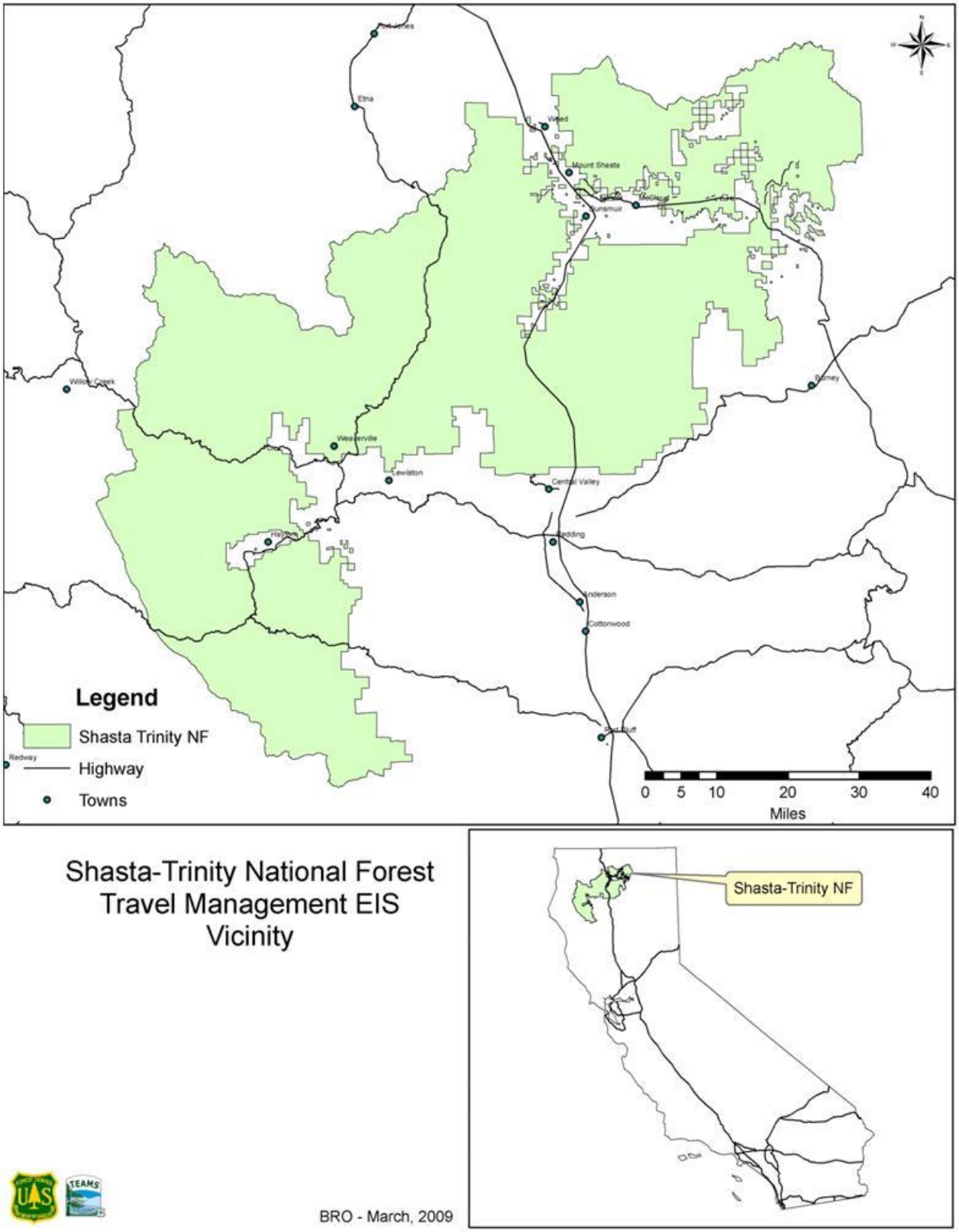


Figure 1-4. Shasta- Trinity National Forest Travel Management EIS vicinity map

Purpose and Need

The following needs have been identified for this proposal:

1) OHVs impact cultural and natural resources (FEIS Chapter 3.0-3.14). The number of user-created routes continues to grow each year and many routes have environmental impacts and safety concerns that have not been addressed. To protect the cultural and natural resources of the STNF from damage by OHV use and to meet the goals of the Forest Plan for protection of resources and biodiversity (LRMP 4-4), there is a need to regulate motor vehicle travel by the public. The proliferation of unplanned, unauthorized, non-sustainable roads, trails and areas adversely affects the environment. The 2005 Travel Management Rule, 36 CFR Section 212, Subpart B, is intended to prevent resource damage caused by unmanaged motorized travel by the public.
2) Motorized recreation is an important public use of the Forest. Implementation of Subpart B of the Travel Management Rule will reduce acres and miles of motorized recreation opportunities relative to current levels. As a result, there is a need to consider limited changes to the NFTS such as additional routes, changes in vehicle class and season of use to meet the recreation goals in the Forest Plan (Forest Plan page. 4-5) for a variety of high quality outdoor recreation experiences.
   a) Maintain motor vehicle access to dispersed recreation activities that historically have been accessed by motor vehicles. A portion of known dispersed recreation activities are not located directly adjacent to an existing NFTS road or NFTS motorized trail. Some dispersed recreation activities depend on foot or horseback access, and some depend on motor vehicle access. Those activities accessed by motor vehicles consist of short spurs that have been created and maintained primarily by the passage of motor vehicles. Many such user-created routes are not currently part of the NFTS. Without adding them to the NFTS, the regulatory changes noted above would prohibit access to many of these dispersed recreation activities.

   b) Continue to provide a diversity of wheeled motorized recreation opportunities (4x4 vehicles, motorcycles, ATVs, passenger vehicles, highway-legal recreational camping vehicles, etc.). It is Forest Service policy to provide a diversity of road and trail opportunities for experiencing a variety of environments and modes of travel consistent with the national forest recreation role and land capability (FSM 23 53.03(2)). Implementation of Subpart B of the Travel Management Rule will reduce motorized recreation opportunities relative to current levels. As a result, there is a need to consider limited changes and additions to the type of use permitted on existing NFTS roads as well as potential additions to the NFTS.

   c) Prevent cultural and natural resource damage caused by unrestricted motor vehicle use below the high-water marks on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir, while providing opportunities for recreational activity and access.

3) There is a need for consistency between the Forest Plan and the new Travel Management Rule, CFR Part 212, Subpart B. A review of the Forest Plan has found that it is not fully consistent with the new

Travel Management Rule. Motorized vehicle travel by the public is authorized off designated routes in some areas of the Forest. The Forest Plan currently states (page 3-16), "The Forests' OHV Plan designates 239,175 acres to cross-country travel. An additional 1,383,596 acres restrict OHV use to existing roads and trails because of highly erodible soils, steep terrain, critical wildlife habitat, or other resource conflicts. About 500,000 acres on the Forests are closed to OHVs, primarily because of wilderness designation." In addition, management direction in the Standards and Guidelines for Recreation 16(e) on page 4-24 of the Shasta-Trinity National Forest LRMP states in part, "Manage off-highway vehicle (OHV) use according to direction specified in the OHV Management Plan…"

4) There is a need for consistency with the Forest Plan where it prohibits off-highway vehicle use in prescription XI cultural management areas (Forest Plan, pages 4-50 – 4-51). Routes are proposed for addition to the NFTS in Alternatives 2 and 5 that would require amendment of the Forest Plan to allow addition of certain routes in prescription XI management areas.

In making any limited changes to the National Forest Transportation System, the Shasta-Trinity National Forest will be considering criteria contained in Subpart B of the Travel Management Rule, which include the following:

- Impacts to natural and cultural resources.
- Public safety.
- Access to public and private lands.
- Availability of resources for maintenance and administration of roads, trails, and areas that would arise if the uses under consideration are designated.
- Minimizing damage to soil, watershed, vegetation, and other forest resources.
- Minimizing harassment of wildlife and significant disruption of wildlife habitat.
- Minimizing conflicts between motor vehicles and existing or proposed recreational uses of NFS lands or neighboring federal lands.
- Minimizing conflicts among different classes of motor vehicle uses of NFS lands or neighboring federal lands.
- Compatibility of motor vehicle use with existing conditions in populated areas, taking into account noise, emissions, and other factors.

When making any limited changes to National Forest System Roads, the Shasta-Trinity National Forest will also consider the following:

- Speed, volume, composition and distribution of traffic on roads.

- Compatibility of vehicle class with road geometry and road surfacing
- Maintaining valid existing rights of use and access (rights-of-way)

Proposed Action

The proposed action is designed to address the need to regulate unmanaged motor vehicle use, provide motor vehicle access to existing dispersed recreation opportunities, and provide a diversity of motorized recreation opportunities. The proposed action was published in the Federal Register on August 8, 2008, initiating this environmental analysis and seeking public comment.

The proposed action was developed using a five-step process.

1. First, district rangers made recommendations on unauthorized routes to add to the Forest transportation system based on known recreation use. Routes requested for addition by the public during review of the inventory maps were also considered.
2. All unauthorized routes were reviewed for consistency with land management plan direction and applicable laws, regulations, and policy. There is management direction for wilderness areas, nonmotorized recreation areas, wildlife habitat, old growth forests, and riparian areas among others.
3. Field surveys were conducted on most routes recommended by the district rangers to collect site-specific data regarding the physical condition of the route, proximity to water bodies, apparent uses, and suitability for public use. Not all recommended routes were surveyed due to time constraints, wildfires, and weather conditions. If a route was not surveyed, it was not included in the proposed action.
4. The Forest interdisciplinary team conducted preliminary effects analysis on routes recommended by rangers. The team analyzed such things as: fish habitat, threatened and endangered wildlife, cultural resources, sensitive plants, unstable areas and water quality concerns. Some routes were screened out because of resource concerns.
5. Finally, district rangers reviewed the routes and preliminary effects analysis with the interdisciplinary team and made the final choices on the proposed action. Some routes were included even if resource concerns were noted because of high recreation use; for example, access to the Trinity River through riparian reserves.

The proposed action would:

- Prohibit cross-country motor vehicle travel off designated NFTS roads, motorized trails, and areas by the public except as allowed by permit or other authorization (excluding snowmobile use).
- Amend the Forest Plan to be consistent with the Travel Management Rule (36 CFR Part 212, Subpart B) prohibiting cross-country motorized vehicle travel off designated NFTS roads and trails outside of

designated areas by removing reference to OHV cross-country travel in the Forest Plan and adding the following sentences to Standards and Guidelines for Recreation 16(e) on page 4-24 of the Shasta-Trinity National Forest LRMP to make the Forest Plan consistent with Subpart B of the Travel Management Rule: "Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest Motor Vehicle Use Map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest Motor Vehicle Use Map is prohibited unless otherwise part of a permitted activity or administrative use."

- Add routes to the NFTS: The STNF currently manages and maintains approximately 5,329 miles of NFTS roads open to public travel, and 87 miles of NFTS motorized trails (excluding snowmobile trails). Based on the stated purpose and need to provide motorized access to dispersed recreation sites and to provide a diversity of experience, the STNF proposes to add 36.51 miles to its NFTS roads and 7.69 miles to its NFTS motorized trails, bringing the total of NFTS roads open to public motor vehicle travel to approximately 5,365 miles and NFTS motorized trails to approximately 95 miles. These routes are proposed because they provide important access to dispersed recreation sites and allow for diverse riding experiences. The NFTS road and trail additions are listed in appendix A and under "alternative 2" along with the permitted vehicle class and, if applicable, season of use.

- Add open areas below the high-water marks of Shasta Lake (28,403 acres) and Trinity Lake (15,644 acres) with vehicle class restricted to highway-legal vehicles and a maximum speed limit of 15 miles per hour. Seasonal restrictions and cultural resource protection measures would be applied to portions of both open areas. This action will address the need to prevent resource damage caused by unmanaged motor vehicle use by the public. These areas would be considered part of the NFTS and managed as facilities. Topography limits access to some acres in these open areas as does water level which can vary depending on the season and drought conditions.

- Amend the Forest Plan to allow addition of six specific unauthorized routes to the NFTS in or near cultural sites identified in the Forest Plan under Prescription XI: Heritage Resource Management. The non-significant amendment to the Forest Plan would state "Off-highway vehicle use will be permitted, within Prescription XI: Heritage Resource Management, on the following roads and trails to provide dispersed recreation access and connectivity for motorized recreation opportunities: SE314, SE476, SE477, SFMU13, SW256, and U42N18A." The amendment and added routes will meet the purpose and need to enhance motorized access and the motorized riding experience.

A detailed description of the proposed action can be found in chapter 2 of this EIS. Maps depicting the proposed action can be viewed on the CD included with this FEIS, on the STNF website at http://fs.usda.gov/stnf/ or at Forest headquarters and ranger stations.

Principle Laws and Regulations that Influence the Scope of this EIS

The National Environmental Policy Act of 1969 (NEPA) requires that all major Federal actions significantly affecting the human environment be analyzed to determine the magnitude and intensity of those impacts and that the results be shared with the public and the public given opportunity to comment. The regulations implementing NEPA further require that to the fullest extent possible, agencies shall prepare environmental impact statements concurrently with and integrated with environmental analyses and related surveys and studies required by the Endangered Species Act of 1973, the National Historic Preservation Act of 1966, and other environmental review laws and executive orders. Principle among these are the Multiple Use and Sustained Yield Act of 1960, the National Forest Management Act of 1976 as expressed through the STNF Land and Resource Management Plan, the Clean Air Act of 1955, the Clean Water Act of 1948, and the Forest and Rangeland Renewable Resources Planning Act of 1974.

The Travel Management Rule (36 CFR 212, 251, 261, and 295): The STNF Travel Management EIS is designed specifically to implement the requirements of the November 5, 2005, Rule for Travel Management, Subpart B.

Decision Framework

The responsible official will decide whether to adopt and implement the proposed action, an alternative to the proposed action, or take no-action to prohibit cross-country motor vehicle travel by the public off the designated system, or make limited changes to the existing NFTS.

Responsible Official

The Forest Supervisor for the Shasta-Trinity National Forest is the deciding official and will sign the Record of Decision.

This proposal does not revisit previous administrative decisions that resulted in the current NFTS. This proposal is focused on implementing 36 CFR 212 Subpart B of the Travel Management Rule. Previous administrative decisions concerning road construction, road reconstruction, trail construction, and land suitability for motorized use on the existing NFTS are outside of the scope of this analysis.

Public Involvement

Public involvement has been on-going throughout the steps of travel management planning. The Forest has remained engaged with the general public, local county government, and many individuals and organizations as the analysis process continues.

Information about the STNF travel management planning process was posted on the Forest's website in February 2005 and has been periodically updated since. The analysis was first listed on the Schedule of Proposed Actions in April 2008.

Public Collaboration Workshops

Public meetings held early in the process were designed to share information about the five-step OHV route designation process and the Travel Management Rule, the steps necessary to implement the Rule, and to develop an inventory of the unauthorized routes across the Shasta-Trinity National Forest. The Forest Service recognized that a thorough inventory of unauthorized routes would be a desirable starting point for travel management planning and that the knowledge provided by the public would be important in its development. Open houses held in 2005 sought the public's help in identifying unauthorized routes that would be included in the inventory. The public was asked to provide information about routes, especially in remote or lesser-known locations, and vehicle types used. Collaborative sessions and meetings were held in various locations as travel management planning continued, with the objectives of sharing information, providing updates in the process, reviewing timelines, and identifying future opportunities for public involvement. Public collaboration and information-sharing sessions continue as the Forest Service seeks to hear concerns and perspectives by all interested and affected individuals, organizations, agencies, and local governments. A list of public involvement sessions related to travel management planning follows.

- **February 2005**: Introductory OHV route designation public meetings; provided an overview of the five-step process.
- **June and October 2005**: Open houses in Redding and Weaverville, CA; provided an opportunity for the public to provide input on route locations and vehicle types used on specific routes for the forest's inventory.
- **August 2005**: Joint public meeting with the Lassen National Forest; provided an overview of the five-step process for OHV route designation and an opportunity to view the Lassen National Forest's draft inventory maps and provide public comments.
- **April and September 2006**: Joint public meetings with Lassen National Forest to announce the Lassen National Forest's completion of step 2, the issuance of a Temporary Forest Order restricting motorized wheeled vehicle travel off existing roads, trails, and areas and to provide feedback on the Lassen National Forest's unauthorized routes.
- **August and November 2006**: Mixed-use discussion group meetings with Redding Dirt Riders and Cal 4-Wheel Drive representatives; provided information on the travel management process, discussed mixed-use.
- **June 2006**: Attendance at Sierra Club Wilderness Committee meeting; provided an update on the travel management process and the implementation timeline.
- **March 2007**: Environmental discussion group meeting; provided an update on the travel management process and the implementation timeline.

- **April 2007**: Attendance at Red Bluff Rotary meeting; provided an overview of the travel management process and the timeline.
- **August 2007**: Public meetings; provided draft inventory maps and process for providing public comments.
- **August 2008**: Meeting with motorized user group representatives; provided proposed action information and suggested a process for providing comments to share with their groups.
- **September 2008**: Meeting with environmental community to discuss the proposed action and public comment period.
- **November 2008**: Meeting with OHV community to clarify scoping comments.
- **December 2008**: Meeting with environmental community to describe alternative development.

In addition to the above collaboration, STNF staff met regularly with local county governments to inform, listen, and respond to concerns regarding travel management planning on the Shasta-Trinity National Forest.

- **February 2008**: Meeting with the new Natural Resource Policy Advisor for Siskiyou County.
- **March 2008**: Meeting with Siskiyou County Board of Supervisors; joint meeting with Klamath National Forest to provide an update on the travel management process and timelines.
- **October 2008**: Shasta County Board of Supervisors.
- **September 2008**: Meeting with Trinity County Resource Conservation District Board Members; provided proposed action information and suggested a process for providing comments to share with their Board of Directors.
- **Winter 2008**: Siskiyou County Board of Supervisors (public forum).
- **January 2009**: Attendance at meeting hosted by Shasta County with counties in northern California and the OHV community to discuss Forest Service travel management.
- **February 2009**: Trinity County Board of Supervisors meeting to summarize the travel management planning alternatives.

30-day Public Scoping Period for the Proposed Action

On August 8, 2008 the Forest Service published a Notice of Intent to Prepare an Environmental Impact Statement in the Federal Register (FR Volume 73, Number 154) for the Shasta-Trinity National Forest Motorized Travel Management EIS, including a description of the proposed action. A Legal Notice requesting public comment was placed in the local papers (Record Searchlight 08/08/08, Mount Shasta

Herald – 08/13/08, and Trinity Journal 08/13/08). The public comment period ended September 6, 2008. A notice of public scoping was mailed to approximately 590 groups and individuals on the Forest's mailing list, and the opportunity to comment was posted on the Forest's website. Approximately 210 individuals and organizations responded, including approximately 37 individuals, one Federal agency (EPA), four County representatives (Shasta and Trinity Counties), members of a local homeowners association, members of off-highway vehicle recreation groups, and members of environmental organizations. The commenting organizations represent a variety of local, state, and national perspectives. Along with narrative comments expressing support, opposition, or requests for revisions and new alternatives, many respondents included lists of routes requested to be designated for motor vehicle use or excluded from designation. Comments were submitted via letter, email, FAX, phone calls, and office visits. All comments were analyzed to identify significant issues associated with the proposed action, and to ensure analysis of a full range of alternatives to address those issues.

The Forest continued public collaboration in subsequent months, meeting in November 2008 with scoping respondents to clarify specific route requests included in their written comments submitted during the scoping period. Another meeting was held in December 2008 at the request of environmental organizations to learn about the criteria being used to develop alternatives to the proposed action. As noted above, Forest staff also attended meetings hosted by county governments to share the analysis process, alternatives, answer questions, and hear the specific requests and concerns of those in attendance.

Public Comment on the DEIS

The comment period for the DEIS began with the publication of the Notice of Availability in the Federal Register (Vol. 74, No. 122) on Friday, June 26, 2009, with the announcement of a 45-day comment period. In response to public requests for additional time, the STNF extended the comment period to allow for 60 days total (Federal Register Vol. 74, No. 146, July 31, 2009). In addition to the Federal Register notices, the Forest published legal ads in three local newspapers: the Mount Shasta Herald, the Redding Record Searchlight, and the Trinity Journal. The Forest's public involvement efforts also included publication of the DEIS and maps on the internet, and assigning staff dedicated to ensuring that the public's information requests during the comment period were addressed promptly. The Forest Service also hosted four public informational meetings at locations around the Forest, and met with groups and individuals as needed to clarify the analysis and accept comments on the DEIS.

Appendix I describes the process used to assess and consider the public comments on the DEIS and includes the Forest Service's responses to public concerns.

Tribal Consultation

Comments from and consultation with federally recognized and other local tribes associated with the Shasta-Trinity National Forest have been sought during travel management planning. The STNF has memoranda of understanding (MOUs) with the Pit River Tribe and Hoopa Valley Tribe to establish government-to-government consultation. They also have an MOU with the Winnemem Wintu Tribe to

establish "a framework for cooperation, communication, and consultation between the Forest Service and the Tribe…" In August 2005 a meeting was held with the Pit River Tribe to provide an overview of the OHV route designation process and provide public comments.

The following nine tribal organizations received information and the opportunity to comment on the proposed action:

- Pit River Tribe
- Quartz Valley Indian Reservation
- Hoopa Tribe
- Redding Rancheria
- Colusa Indian Community Council
- Winnemen Wintu Tribe
- Shasta Indian Nation
- The Shasta Tribe, Inc.
- Nor-Rel-Muk Nation

Following the public comment period for the Proposed Action, meetings were held with the Pit River Tribe and the Winnemem Wintu Tribe to discuss travel management planning and provide preliminary information on the alternatives being considered.

Coordination with Local Governments

The Travel Management Rule (TMR) requires the Forest Service to coordinate with State and county government when designating National Forest System roads, trails and areas (36 CFR 212.53). National Forests are managed according to the provisions of the National Forest Management Act (NFMA). The Forest Service, as provided by Congress under the NFMA, has ultimate responsibility for decisions regarding management of the National Forests (Federal Register, Vol. 70, No. 216 p. 68272). While county plans and resolutions by Boards of Supervisors express intent of local governments and the Forest Service has actively sought input from the respective counties, nothing in the Travel Management Rule can relieve the Forest Service of the ultimate responsibility for decisions regarding management of national forest system lands (Federal Register, Vol. 70, No. 216 p. 68279). To fulfill the coordination requirements of the Travel Management Rule and the CEQ regulations, Shasta-Trinity National Forest staff met regularly with local county governments to inform, listen, and respond to concerns regarding travel management planning on the Shasta-Trinity National Forest.

- **February 2008**: Meeting with the new Natural Resource Policy Advisor for Siskiyou County.
- **March 2008**: Meeting with Siskiyou County Board of Supervisors; joint meeting with Klamath National Forest to provide an update on the travel management process and timelines.
- **October 2008**: Shasta County Board of Supervisors.

- **September 2008**: Meeting with Trinity County Resource Conservation District Board Members; provided proposed action information and suggested a process for providing comments to share with their Board of Directors.
- **Winter 2008**: Siskiyou County Board of Supervisors (public forum).
- **January 2009**: Attendance at meeting hosted by Shasta County with counties in northern California and the OHV community to discuss Forest Service travel management.
- **February 2009**: Shasta County Board of Supervisors meeting to summarize the travel management planning alternatives.

Comment letters were received from Shasta and Trinity Counties. Responses to comments are documented in Appendix I. A Board Resolution was received from Siskiyou County and was considered in the design of alternatives for this project.

Issues

Comments from the public and other agencies were used to formulate issues concerning the proposed action. An issue is a matter of public concern regarding the proposed action and its environmental impacts. The Forest Service summarized the many issues into public concern statements and from them identified significant and non-significant issues. Significant issues are those that identify a point of disagreement, debate, or dispute based on the predicted effects of the proposed action. These issues are directly related to the proposed action and may be incorporated into the environmental analysis and addressed by (1) developing one or more alternatives to the proposed action, or (2) developing design features, mitigation measures, and/or monitoring tasks that are incorporated in the alternatives.

Non-significant issues are generally (1) outside the scope of the proposed action; (2) already decided by law, regulation, Forest Plan, or other higher level decision; (3) irrelevant to the decision to be made; or (4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A scoping report describing the many comments received and listing of issues may be found in the project record located at the Shasta-Trinity National Forest Headquarters.

Significant Issues

Significant Issue #1 – Reduced Motorized Access and Recreation Opportunity

The proposed action will adversely affect the quality of motorized recreation and provides insufficient public access to STNF lands. The prohibition on cross-country travel, restrictions below the high-water mark of the reservoirs, and the addition of only 44 miles of routes to the NFTS unfairly limits motorized recreation.

Many respondents express concern that the proposed action does not offer enough connectivity for loops and extended riding times and does not provide enough opportunity for different vehicle types, skill levels, and year-round use. They also feel that by reducing the miles available for motorized recreation, motor vehicle use will be concentrated and crowded on fewer miles of roads and trails. All of these factors combine to affect the quality of the motorized recreation experience on the STNF.

Respondents specifically mention access to areas for dispersed camping, fishing, hunting (including big game retrieval), sightseeing, birding, and a myriad of other recreational pursuits. Another concern is that limiting non-highway-legal use will limit the ability of certain people to access the national forest. In a similar way, prohibiting non-highway-legal vehicles below the high-water mark on lake bottoms will restrict access to docks and other activities.

Significant Issue #2 – Impacts on Nonmotorized Recreation

Public motorized use of roads, trails, and open areas as described in the proposed action will adversely affect nonmotorized recreation experiences due to noise, damage to roads and resources, and user conflicts.

Respondents express concern that the proposed action will not adequately alleviate the adverse effects of current motorized recreation use. Concerns include effects to public health and safety and disruption of the recreation experiences sought by hikers, equestrians, and other nonmotorized users. In particular, respondents value the type of quiet and primitive recreation found in agency- and citizen-inventoried roadless areas and state that the Forest Service has a responsibility to minimize conflict among recreationists and preserve the characteristics contributing to potential wilderness designation in these areas.

Agency-inventoried (Forest Service) roadless areas were first classified under the RARE II (Roadless Area Review and Evaluation) study in 1978, which identified roadless study areas subject to evaluation for potential wilderness designation. Of these, all or parts of four study areas were designated wilderness by the California Wilderness Act of 1984. All or parts of 29 other study areas were made available for non-wilderness uses.

In 2001, the California Wilderness Coalition (CWC) completed its own inventory of potential wilderness areas on California public lands. For the purpose of this analysis, these areas are referred to as Citizen-Inventoried Roadless Areas (CIRAs).

Significant Issue #3 – Motor Vehicle Resource Impacts

Public motorized use of roads, trails, and areas as described in the proposed action will adversely affect natural resources including soils, water quality, vegetation including all botanical resources (plants and habitat), air quality, scenery, aquatic habitat and populations, and wildlife habitat and populations, and may increase sedimentation, erosion, and the spread of noxious weeds. Resources and experiences found in designated special areas in the national forest will be adversely affected as well.

Figure 1-5. Invasive species, such as Sweet Peas (purple flowers), are often spread by OHVs, or follow the routes that OHVs create. This is unauthorized route (TRMU6) on the Trinity River Management Unit.

Respondents are concerned about the potential effects to natural resources and the character of roadless areas that may result from the addition of routes to the NFTS.

Chapter 2: Alternatives

Introduction

This chapter describes and compares the alternatives considered for the Shasta-Trinity National Forest Motorized Travel Management Environmental Impact Statement (EIS). It describes alternatives considered in detail and those eliminated from detailed study. The end of this chapter presents the alternatives in tabular format so that the alternatives and their environmental impacts can be readily compared.

Based on the issues identified through public comment on the proposed action, the Forest Service developed three alternative proposals that achieve the purpose and need differently than the proposed action. In addition, the Forest Service is required to analyze a no-action alternative. The no-action, proposed action, and other action alternatives are described in detail below.

The chapter is divided into four parts:

- How the alternatives were developed
- Alternatives considered in detail
- Alternatives considered but eliminated from detailed analysis
- Comparison of the alternatives

How the Alternatives were Developed

The proposed action (alternative 2) was developed to address the purpose and need identified by the Responsible Official. The full inventory of unauthorized routes was compiled and evaluated in the early phases of travel management planning. Public scoping of the proposed action resulted in comments and suggestions for adding and excluding particular routes from consideration. The routes identified in the scoping process were either brought forward for detailed study in one or more alternatives or eliminated from detailed study. The alternatives were developed by the responsible official based upon the purpose and need, the scope of the EIS, and issues raised by the public and the Interdisciplinary Team (IDT). See appendix G for a detailed discussion of the alternative development process.

Changes Between the DEIS and FEIS

A variety of changes were made between the publication of the Draft EIS (DEIS) and the Final EIS (FEIS). Changes are based on:

- Further analysis accomplished by the interdisciplinary team.
- New information received from the agency and public comments.

- Corrections of displayed values, needed revisions, and reorganization to enhance clarity, accuracy, or provide more detailed information for the reader.

Changes to the Alternative Designs

- Season of use restrictions proposed in the DEIS intended to protect nesting and young northern spotted owls in habitat adjacent to the reservoirs as well as in the vicinity of proposed routes have been removed. Seasonal restrictions removed are as follows: 16.82 miles removed in alternative 2; 25.98 miles removed in alternative 5; 15,644 acres removed in Trinity Lake (alternatives 2,4,5); and 429 acres removed in Iron Canyon Reservoir Area (alternatives 4, 5). Further investigation by the STNF Forest wildlife biologist indicates that such restrictions would not be effective or necessary as directed by the Programmatic Agreement with the USFWS (Region 5 programmatic agreement with the USFWS for threatened and endangered species: "Route Designation: Project Design Criteria for "No Effect" or "May Affect Not Likely to Adversely Affect" determination for threatened and endangered species). See the wildlife report in Chapter 3 for more information.

- The variety of cultural resource protection measures proposed in the Shasta Lake Area, Trinity Lake Area, and Iron Canyon Reservoir Area have been revised to include primarily speed limit restrictions (alternatives 2, 4, 5, and modified alternative 2), vehicle class restrictions (alternatives 2, 4, and modified alternative 2), and area closures if needed.. All cultural resource protection measures directed by the Motorized Recreation Programmatic Agreement are also available for use, however the implementation of speed limits and vehicle class restrictions first is consistent with the amendment which was approved after publication of the DEIS (appendix E of the Motorized Recreation Programmatic Agreement). See the cultural resources report in chapter 3 and appendix L for more information.

- Five very short routes that access a dispersed recreation area on the South Fork Management Unit – IV003, IV004, IV005, IV006, and IV007 -- have been combined to form one route, IV007, with a total length of 0.06 miles. While the total number of routes proposed in alternative 5 is reduced by four (from 223 to 219), the total proposed mileage remains the same. This change in numbers of routes is reflected throughout the document and appendices, however there may be some discussions still referring to the individual routes. Combining the routes is a database change and does not change the effects analyses or conclusions regarding alternative 5.

Additional Alternative - Modified Alternative 2 Analyzed in Detail

- A sixth alternative entitled "Modified Alternative 2" was developed and is described below in this chapter. The environmental consequences of modified alternative 2 are disclosed in chapter 3. This alternative was developed as a result of input from the public and further analysis by the interdisciplinary team.

Changes to Alternatives Considered but Eliminated from Detailed Analysis

- Several additional alternatives suggested in public response to the DEIS were considered but not studied in detail. These are described at end of this chapter.

Changes to Environmental Consequences Analyses

See chapter 3 for more detail on the following information.

Summaries of unavoidable adverse effects, irreversible and irretrievable commitment of resources, short-term uses and long-term productivity, energy requirements, and legal and regulatory compliance have been added.

3.02 Watersheds: A discussion of climate change effects related to soils and water has been added.

3.03 Aquatic Resources: Routes in riparian reserves of designated critical habitat for coho salmon have been updated based on new analysis.

3.04 Herpetological Resources: The analysis of herpetofauna has been expanded and reconfigured into a separate chapter 3 section. It was previously part of the aquatic resources report.

3.05 Wildlife: As described above in the "Changes to the Alternative Designs" section, seasonal restrictions analyzed in the DEIS to protect nesting and young northern spotted owls have been eliminated in the FEIS. This is discussed in the wildlife section in chapter 3. More information, including the effects of the proposed alternatives without these seasonal restrictions, is included in the wildlife analysis in chapter 3. Existing seasonal restrictions would continue to apply to the Shasta Lake Area for nesting bald eagles, and to specific routes to protect northern goshawks and bald eagles.

3.06 Cultural Resources: Field surveys conducted after publication of the DEIS resulted in updates and corrections to data such as number and locations of cultural resources, protection measures assigned, and effects conclusions for particular routes. Also, the protection measures and monitoring in the reservoir open areas were revised with the recently-approved amendment to the Motorized Recreation Programmatic Agreement. For at risk cultural resources in the lake bottoms, measures to be applied first in an adaptive management approach are speed limits and vehicle class restrictions followed by other measures as identified in the PA, or area closures. The number of cultural resources in the open areas below the high-water marks has been updated as a result of further field work and study. Cultural resources determined to be below fluctuation zones are not at risk from the proposed actions and the display of those sites has been removed.

3.14 Air Quality: A discussion of climate change has been added based on new agency information and in response to public comments.

Other Resources: Resource reports in chapter 3 have been updated as a result of alternative design changes such as the removal of seasonal restrictions for northern spotted owls. Where relevant to the resource, effects analyses in chapter 3 reflect the changes in the alternatives.

Changes to the Appendices

- **Appendix A**: Route Specific Data - Route cards have been updated with new field survey data and minor corrections made to resource information. Resource risk ratings were removed from the route cards due to the multiple definitions associated with the terms, depending on the context. The resource risk criteria are defined in chapter 3 resource sections as applicable and in appendix G – Alternative Development. Modified alternative 2 data has been added.

- **Appendix C:** Motorized Mixed Use - The results of motorized mixed-use engineering studies have been added. Modified alternative 2 data has been added.

- **Appendix D**: Mitigation and Monitoring - Cultural resources protection measures and monitoring information have been moved to Appendix L: Cultural Resources Management. Modified alternative 2 data has been added.

- **Appendix F**: Annual Maintenance Cost by Alternative. Modified alternative 2 data has been added.

- **Appendix G: Alternative Development** - The list of routes considered in alternative development has been removed and the explanation of screening and alternative development has been expanded. The list of routes requested during the scoping period and the screening results for specific routes are located in the project file. Those incorporated in alternative designs are listed in appendix A. This change was made because many of the routes requested are existing NFTS roads and therefore not within the scope of this analysis to either add (since they already are part of the NFTS) or remove from the NFTS. Many of the remaining requested routes were eliminated from detailed study due to the screening criteria described in appendix G and therefore not part of the decision supported in this FEIS.

- **Appendix I:** Response to Comments - This new appendix contains the agency's responses to public comments on the DEIS.

- **Appendix J:** Public Uses - This new appendix discloses how the Forest Service manages the NFTS, in particular related to affordability and additions to the NFTS.

- **Appendix K:** Coordination with County Government - This new appendix includes letters, resolutions, and county plans as discussed in Chapter 1 in the section "Coordination with Local Governments."

- **Appendix L:** Cultural Resources Management - this is a new appendix for the cultural resources data which is central to the analysis discussion of environmental consequences in the cultural resources

section in chapter 3. Also, all cultural resources monitoring and mitigation information previously in appendix D was updated and moved to this new appendix.

- **Appendix M:** Comparison of the Proposed Action and Modified Alternative 2: This is a new appendix that compares the measurement indicators for modified alternative 2 with alternative 2, the Proposed Action, in tabular form.

Additional Updates

- Maps - Miscellaneous errors have been corrected and the maps revised to reflect the changes in alternative design. A new map for modified alternative 2 has been added.
- The summary and abstract have been expanded and reorganized.
- The public involvement section in chapter 1 has been updated.

Alternatives Considered in Detail

Five action alternatives (alternatives 2, modified alternative 2, 3, 4, 5) and a no-action alternative (alternative 1) are analyzed in detail in this FEIS. The no-action alternative represents the current condition, including the continuation of cross-country travel. This alternative serves as a baseline for comparison among the alternatives, and is required by the implementing regulations of the National Environmental Policy Act (NEPA).

Descriptions of the Alternatives

This section describes each of the six alternatives considered in detail. Each action alternative is comprised of one or more of the following actions:

1) **Cross-country travel**: Alternatives 2, 3, 4, 5, and modified alternative 2 prohibit motor vehicle travel off designated NFTS roads, motorized trails, and areas by the public except as allowed by permit or other authorization. Prohibiting cross-country travel is included in order to address the need to regulate unmanaged motor vehicle use as required by the Travel Management Rule. Acres of national forest land closed to cross-country travel are displayed for each action alternative. Designated wilderness areas are excluded from these acreages because motor vehicle travel in wilderness is prohibited by law and thereby not included in this analysis.

2) **Additions to the NFTS**: Alternatives 2, 4, 5, and modified alternative 2 propose adding unauthorized routes and open areas to the NFTS, with vehicle class and season of use restrictions as needed. Additions respond to the need for motor vehicle access to dispersed recreation and diverse motorized recreation opportunities. Each of the proposed routes is identified by a unique route number and is listed in appendix A with a corresponding card with route-specific data. The open area additions are delineated by the area of the reservoirs and referred to as Shasta Lake Area, Trinity Lake Area, and Iron Canyon Reservoir Area. Alternative 2 and modified alternative 2 include the Shasta Lake and

Trinity Lake Areas, while alternatives 4 and 5 propose those as well as the Iron Canyon Reservoir Area. The open area additions in each alternative include primarily speed limit and/or vehicle class restrictions, as well as potential area closures for cultural resource protection as described in appendix E of the Motorized Recreation Programmatic Agreement found in the project record. Season of use restrictions are proposed on added routes to protect wildlife and watersheds as needed to mitigate the effects of motor vehicle use.

3) **Changes to the existing NFTS:** Alternatives 4, 5, and modified alternative 2 include changes to the vehicle classes allowed on specific existing maintenance level 3 roads. Maintenance level 3 is assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. The proposed change on selected roads would allow travel by non-highway-legal vehicles along with highway-legal vehicles. The roads proposed for mixed-use provide valuable connections for loops and extended rides for non-highway-legal vehicles. A motorized mixed-use analysis is required to determine the appropriateness of allowing mixed-use on maintenance level 3 roads, followed by a decision by the responsible official. This action responds to the need to provide a diversity of motorized recreation opportunities and access. The NFTS roads proposed for motorized mixed-use are listed in Table 2-10 under alternative 4 and under modified alternative 2. Details about the routes and approval process are in appendix C.

4) **Forest Plan Amendments**: Two non-significant Forest Plan amendments are proposed. Alternatives 2, 3, 4, 5, and modified alternative 2 include a Forest Plan amendment to prohibit cross-country travel which is necessary to bring the Shasta-Trinity National Forest LRMP into compliance with the Travel Management Rule.

   A second Forest Plan amendment is proposed in alternatives 2 and 5 to allow specific routes in or near cultural sites indentified in Forest Plan Prescription XI: Heritage Resource Management. See Table 2-5 under alternative 2 and Table 2-14 under alternative 5 for specific routes and mitigation measures included in this amendment. Further information is included in the cultural resources analysis in chapter 3.

5) **Mitigation Measures:** In addition to applying seasonal and vehicle class restrictions to specific routes and areas if designated as noted above, a variety of resource protection and mitigation measures may be assigned to specific routes to minimize effects to various resources. These are noted in the alternative descriptions in this chapter and described in more detail in the resource analyses in chapter 3 and in appendices D and L. Resource protection and mitigation measures must be implemented if the routes and areas requiring them are designated on the motor vehicle use map.

Resource protection and mitigation measures include:

1. Retain felled hazard trees along specific routes in late-successional reserves to provide habitat for threatened, endangered, and sensitive species and their prey. Specific routes by alternative are listed in appendix D.

2. Implement resource protection measures for cultural resources along particular routes and in the reservoir open areas. Appendix L details the specific measures such as screening, barriers, covers, speed limits, closures, and others with the routes and areas they apply to. The adaptive management approach planned to protect cultural resources is discussed in the Resource Protection Measures for Cultural Resources section later in this chapter.

3. Hand-treat known non-native invasive plant populations on routes selected for addition to the NFTS. Specific routes by alternative are listed in appendix D.

4. Apply best management practices (BMPs) as described in appendix D to designated routes as necessary to protect water and soil resources. Best management practices are assigned for all routes in all alternatives.

5. Test particular routes for presence of naturally occurring asbestos prior to designating on the motor vehicle use map (MVUM). Several proposed routes occur near possible serpentine soils as mapped in the Forest 3rd Order Soil Survey or the Trinity serpentine soil survey of Earl Alexander, but not on the Forest serpentine bedrock map which is a subset of the STNF geomorphology database. As a result, there is uncertainty about whether the routes cross areas with potential naturally occurring asbestos. Specific routes by alternative are listed in appendix D.

More Information about Additions to the NFTS

In addition to the information provided below in the alternative descriptions, details for each proposed road, trail, and open area are located in the appendices and displayed in the map package.

Appendix A: Route-specific Data

The tables in appendix A provide lists of routes including season of use, mileages, and vehicle classes by alternative. Individual route cards include a variety of information about the routes such as resource information, proposed vehicle class, mitigation measures, monitoring requirements, and field review comments.

Appendix C: Motorized Mixed-Use

The existing NFTS maintenance level 3 roads proposed for vehicle class changes to allow motorized mixed-use are listed with details regarding surfacing, mile posts and risks in appendix C. The unauthorized routes to be added to the NFTS as roads would be open to all vehicle classes. More detail on

the mixed-use analysis with required site-specific conditions and conclusions has been added to appendix C in the final environmental impact statement.

Appendix D: Mitigation and Monitoring

The mitigation measures proposed for individual route additions are listed by route, alternative, and resource in appendix D.

Appendix L: Cultural Resources Management

The cultural resource protection measures proposed for individual proposed routes and open areas additions are listed by route, vicinity, and alternative in appendix L.

Maps

Maps depicting each alternative have been distributed with the FEIS on CDs and are available electronically online at http://fs.usda.gov/stnf/ or can be requested from the Shasta-Trinity National Forest Headquarters. Hardcopy maps may be viewed at the Shasta-Trinity National Forest headquarters and ranger district offices.

Alternative 1: No-action

Significant Issue Addressed:

#1 – Reduced Motorized Access and Recreation Opportunity

The National Environmental Policy Act requires the no-action alternative. Under the no-action alternative, no changes would be made to the NFTS and there would be no prohibition of cross-country travel (see Table 2-2). The current Forest Plan would continue to guide the management activities across the STNF. In particular, the Forest Plan designates 239,175 acres to cross-country travel, and the Record of Decision for the Forest Plan allows for 275,250 acres "open to OHV use." This direction was not implemented through a Forest Order, resulting in the current unrestricted cross-country motor vehicle travel across the STNF outside of designated wilderness.

The Forest Service has been managing Bureau of Reclamation lands at Trinity and Shasta Lakes since 1948. The most recent 1986 MOU directs that Shasta and Trinity Lakes:

> "*…be administered by the [Forest] Service in a manner coordinated with other purposes of the Central Valley Project for outdoor recreation, conservation of scenic historic and other values contributing to the public enjoyment…*"

Motor vehicle use on the areas below the high water mark on Trinity and Shasta Lakes, as well as Iron Canyon Reservoir, would continue unrestricted under this alternative.

Under alternative 1, the Travel Management Rule would not be implemented, and no motor vehicle use map (MVUM) would be published. Unauthorized routes and open areas would continue to have no status or authorization as NFTS facilities. Evaluation of the no-action alternative provides a baseline for comparing the other alternatives.

While the no-action alternative does not meet the purpose and need to protect resources by prohibiting unmanaged cross-country motor vehicle travel by the public and allowing implementation of the Travel Management Rule, it does respond to significant issues regarding the quality of the motorized recreation experience and motor vehicle access to the national forest. Existing motorized recreation opportunities for cross-country travel, and access across the Forest, including below the high-water marks on the reservoirs, would continue unless modified in project planning efforts separate from this analysis.

Alternative 1 includes the following:

1) **Cross-Country Travel**: Public motor vehicle travel off designated NFTS roads, trails, and areas would continue except as otherwise prohibited. This alternative would allow cross-country travel on 1,632,316 acres of national forest system lands outside of designated wilderness.

2) **Additions to the NFTS:** No additions would be made to the NFTS under this alternative. Motorized use of all existing unauthorized routes (5,219 routes totaling 1,252 miles) and unrestricted use below the high-water marks on the reservoirs would continue. Unauthorized routes and open areas would not be added to the NFTS and would have no status or authorization as NFTS facilities.

3) **Changes to the NFTS**: No changes would be made to the NFTS. The miles of NFTS roads and trails open to the public for wheeled motor vehicles at the time of this analysis are shown in Table 2-1. Seasonal restrictions on 220 existing NFTS routes and bald eagle closures below the high-water marks on Shasta and Trinity Lakes would continue unchanged. Appendix B lists all existing NFTS season of use periods by route and acres of open areas affected by season of use restrictions.

Table 2-1. Shasta-Trinity National Forest NFTS miles open to the public for wheeled motor vehicle use

Type	Road Operational Maintenance Level or Trail Designed Use	Miles
Road	2 - High Clearance Vehicles (all vehicle types)	4216.55
	3 - Suitable For Passenger Cars (highway-legal only)	785.34
	4 - Moderate Degree Of User Comfort (highway-legal only)	327.55
Total Road		**5329.44**
Trail	ATV – All Terrain Vehicle	87.57
Grand Total		**5417.01**

4) **Forest Plan Amendments**: The Forest Plan would not be amended under alternative 1.

5) **Mitigation Measures**: None would be assigned under this alternative.

Table 2-2. Alternative 1 - summary of actions

Action type		Action proposed
1. Cross-country travel open on 1,632,316 acres		0 acres
2. Additions to the NFTS	Roads and Trails Added	0 miles
	Areas Added	0 acres
3. Changes to the NFTS		None
4. Forest Plan Amendments		None
5. Mitigation Measures		None

Alternative 2: Proposed Action

The proposed action was developed to meet the purpose and need for travel management by prohibiting cross-country motor vehicle travel and designating routes for motorized recreation. The proposed action was designed to provide additional opportunities and to maintain access to popular water access and dispersed recreation, including opportunities below the high-water mark on the reservoirs.

Alternative 2 changes between DEIS and FEIS

Changes to seasonal restrictions are due to the removal of closures in spotted owl habitat. Changes to the cultural resources data are largely due to field surveys conducted after the DEIS was published and new direction approved in an amendment to the Motorized Recreation Programmatic Agreement.

Table 2-3. Alternative 2 changes between DEIS and FEIS

Action	DEIS	FEIS
Seasonal Restrictions	41 routes 16.97 miles	3 routes 0.15 miles
	Trinity Lake Area (15,644 acres)	0 acres – no new seasonal restrictions proposed.
Cultural Resource Protection Measures --Routes	18 routes	7 routes
Cultural Resources Protection Measures and Monitoring in Reservoir Open Areas	75 cultural resources at risk in reservoir open areas.	82 cultural resources at risk in reservoir open areas.
	168 sites accounted for below the fluctuation zones.	Removed display of cultural resources below the fluctuation zones because they are not at risk.
	Protection measures to include primarily barriers, covers, and closures.	Updated to emphasize speed limit and vehicle class restrictions as primary protection measures.
	Monitoring varies by area.	Annual monitoring with threshold for adjusting the protection measures using adaptive management.

The proposed action includes the following:

1) **Cross-Country Travel**: Public motor vehicle travel off designated NFTS roads, trails, and areas would be prohibited, except as allowed by permit or other authorization. This prohibition covers all

National Forest System lands outside of the existing NFTS minus the acres of the proposed route additions, resulting in 1,599,062 prohibited acres.

2) **Additions to the NFTS**: The proposed action would add approximately 44.20 miles to NFTS roads and motorized trails including:

- 71 roads (36.51 miles) of roads open to all vehicles
- 17 motorized trails (7.69 miles) with the following vehicle classes:
    - 7 trails (0.85 miles) open to all trail class vehicles
    - 6 trails (5.40 miles) open to vehicles 50 inches and less in width
    - 4 trails (1.44 miles) open to motorcycles only
- Areas below the high-water mark on Shasta Lake (28,403 acres) and Trinity Lake (15,644 acres) open to highway-legal vehicles only with a maximum speed limit of 15 miles per hour. These acres of open areas include the entire lake bottoms. Actual acres of open areas vary depending on water levels and season of use restrictions. Topography further limits access to motor vehicles.
- Seasonal restrictions would apply to 3 routes (0.15 miles) in alternative 2 to protect wildlife. Table 2-4 provides a list of specific routes, seasons of use and reason for the closure. Table 2-7 summarizes the route closures for alternative 2. Seasonal restrictions will be managed adaptively. If a biologist field verifies habitat and finds its not suitable habitat, seasonal restrictions will be removed. Existing seasonal restrictions (appendix B) would continue to apply to the Shasta Lake Area for nesting bald eagles.

Table 2-4. Season of use on additions to the NFTS by route and alternative

Route No.	Miles	Alts	Season of Use	Closure Reason
JM72	0.06	2, 5, Mod. Alt 2	August 16 - December 31	bald eagle
RM1210	0.07	5	May 1 - October 30	erosion
RM1211	0.12	5	May 1 - October 30	erosion
RM1212	0.15	4, 5	May 1 - October 30	erosion
RM1213	0.08	5	May 1 - October 30	erosion
RM1216	0.39	5, Mod. Alt 2	May 1 - October 30	erosion
EA284	0.68	5	August 16 - January 31	northern goshawk
MC090	0.88	4, 5	August 16 - January 31	northern goshawk
SFMU18	0.03	2, 5, Mod .Alt. 2	August 16 - January 31	northern goshawk
TC1249	0.06	2, 5	August 16 - January 31	northern goshawk
U40N50A	0.51	5	August 16 - January 31	northern goshawk

3) **Changes to the NFTS:** No change would be made to NFTS under this alternative.

4) **Forest Plan Amendments:** Two non-significant Forest Plan amendments would be incorporated:

a) The Forest Plan currently states (page 3-16), "The Forests' OHV Plan designates 239,175 acres to cross-country travel. An additional 1,383,596 acres restrict OHV use to existing roads and trails because of highly erodible soils, steep terrain, critical wildlife habitat, or other resource conflicts. About 500,000 acres on the Forests are closed to OHVs, primarily because of wilderness designation." In addition, the management direction for recreation states, "Manage off-highway vehicle (OHV) use according to direction specified in the OHV Management Plan…" This amendment would revise that standard and guideline for recreation (page 2-24, 16(e)) by replacing the reference to an OHV Management Plan with the following sentences:

> *Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest motor vehicle use map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest motor vehicle use map is prohibited unless otherwise part of a permitted activity or administrative use.*

This amendment would make the Forest Plan consistent with Subpart B of the Travel Management Rule.

b) The Forest Plan currently includes a standard and guide for Prescription XI: Heritage Resource Management (page 4-51) that states "Off-highway vehicle (OHV) use will be prohibited." The Forest Plan would be amended to state, "Motor vehicle use will be prohibited except on the following roads and trails to provide dispersed recreation access and connectivity for motorized recreation opportunities: SE314, SE476, SE477, SFMU13, SW256, and U42N18A." The added routes and protection measures (see Table 2-5) will meet the purpose and need to enhance motorized access and the motorized riding experience. Specifically, SE314, SW256, and SFMU13 provide access for dispersed recreation, and SE476, SE477, and U42N18A serve as segments of loops rides. Resource protection measures would be assigned to protect cultural resources from motor vehicle impacts.

This amendment would allow just those specific routes to be added in or near prescription XI heritage resources for the benefit of the motorized recreation experience on the Shasta-Trinity National Forest. The effects of adding these routes to the NFTS are disclosed in the cultural resources section in chapter 3.

Table 2-5. Alternative 2 added roads and trails in or near Forest Plan Prescription XI heritage resources included in non-significant Forest Plan amendment

Route Number	Protection Measures
SE314	None required, as route will not affect the site. Forest Plan Amendment still required.
SE476	No effective resource protection measure available in the PA. Consultation with SHPO required
SE477	No effective resource protection measure available in the PA. Consultation with SHPO required
SFMU13	Place barriers to protect site integrity outside of existing route.
SW256	Place barriers to protect site integrity outside of existing route.
U42N18A	Use vegetative screening to protect site integrity outside of existing route.

5) Mitigation Measures:

1. Retain felled hazard trees along portions of 26 proposed routes (7.63 miles) in late-successional reserves to provide habitat for threatened, endangered, and sensitive wildlife species and their prey. Specific routes are listed in appendix D.

2. Cultural resource protection measures would be required for 7 routes and approximately 82 exposed sites in the reservoirs. Appendix L details the specific measures. The adaptive management approach planned to protect cultural resources is discussed in the "Resource Protection Measures for Cultural Resources" section later in this chapter and in appendix L.

3. Hand-treat 11 known non-native invasive plant populations on 8 routes if selected for addition to the NFTS. See appendix D for a list of routes.

4. Apply best management practices as described in appendix D to designated routes as necessary to protect water and soil resources.

The following table displays a summary of the actions proposed in this alternative. Appendix A provides a complete listing of roads and trails proposed to be added to the NFTS, including the vehicle class and seasonal use restrictions by route. Appendices D and L list all route mitigation measures by route, area, alternative, and resource.

Table 2-6. Alternative 2 - summary of actions

Action type		Action proposed	
1. Cross-country travel prohibition		1,599,062 acres	
2. Additions to the NFTS	Roads Added Open to All Vehicles	71 routes	36.51 miles
	Trails Added Open to All Trail Class Vehicles	7 routes	0.85 miles
	Trails Added Open to Vehicles 50" or Less in Width	6 routes	5.40 miles
	Trails Added Open to Motorcycles Only	4 routes	1.44 miles
	Total	**88 routes**	**44.20 miles**
	Areas added open to highway-legal vehicles with a maximum speed limit of 15 miles per hour	Shasta Lake Area	28,403 acres
		Trinity Lake Area	15,644 acres
	Total		**44,047 acres**
3. Changes to the NFTS		None	

Action type		Action proposed
4. Forest Plan Amendments	**Current Forest Plan Direction to be Amended** Standards and Guidelines for Recreation 16(e) on page 4-24 of the LRMP: "Manage off-highway vehicle (OHV) use according to direction specified in the OHV Management Plan…"	**Amended Forest Plan** "Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest Motorized Vehicle Use Map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest Motor Vehicle User Map is prohibited unless otherwise part of a permitted activity or administrative use."
	Current Forest Plan Direction to be Amended Prescription XI Heritage Resource Management, Standards and Guides #8: "Off-highway vehicle (OHV) use will be prohibited."	**Amended Forest Plan** "Motor vehicle use will be prohibited except on the following roads and trails to provide dispersed recreation access and connectivity for motorized recreation opportunities: SE314, SE476, SE477, SFMU13, SW256, and U42N18A."
5. Mitigation Measures	Retain felled hazard trees along routes added in late-successional reserves.	26 routes
	Implement cultural resource protection measures along added routes and in the reservoir open areas.	7 routes 82 exposed sites in reservoir open areas
	Hand-treat known non-native invasive plant populations	11 populations on 8 routes
	Apply best management practices	All proposed routes and areas

Table 2-7 summarizes the seasonal restrictions proposed under alternative 2.

Table 2-7. Alternative 2 – summary of proposed season of use on additions to the NFTS

Season of Use	Reason for the Restriction			Total
August 16 to January 31	To prevent traffic noise disturbance of nesting goshawks and young	Roads	1	0.03 miles
		Trails	1	0.06 miles
August 16 to December 31	To prevent traffic noise disturbance of eagle nest	Roads	1	0.06 miles
		Trails	0	0 miles

Alternative 3: Cross-County Travel Prohibition Only – No Additions to the Existing NFTS

Significant issues derived from public comments addressed by alternative 3:

#2 – Impacts on Nonmotorized Recreation

#3 – Motor Vehicle Resource Impacts

No changes were made to alternative 3 between the DEIS and the FEIS.

Alternative 3 is consistent with the Travel Management Rule and meets the purpose and need to protect resources by prohibiting unmanaged cross-country motor vehicle travel by the public. Cross-country travel would be prohibited across the Forest as well as below the high-water mark on Shasta

Lake, Trinity Lake, and Iron Canyon Reservoir. This prohibition of cross-country motor vehicle travel below the high-water mark is intended to protect cultural resources which are adversely affected by increasing motorized use.

No additions to the NFTS in the form of new facilities (roads, trails, and areas) are proposed. No unauthorized routes or areas would be added to the NFTS under this alternative.

Alternative 3 primarily addresses the significant issues of resource protection and impacts to nonmotorized recreation by reducing the existing opportunities for motor vehicle travel across the national forest. The prohibition of cross-country travel would protect resources by minimizing motor vehicle travel in sensitive areas, and would also reduce interactions between motorized and nonmotorized recreationists.

This alternative provides a baseline for comparing the impacts of other alternatives that propose additions or other changes to the NFTS.

Alternative 3 includes the following:

1) **Cross-Country Travel**: Public motor vehicle travel off designated NFTS roads, trails, and areas would be prohibited, except as allowed by permit or other authorization. This prohibition covers all National Forest System lands outside of the existing NFTS resulting in 1,599,471 prohibited acres.
2) **Additions to the NFTS**: No additions would be made to the NFTS under this alternative.
3) **Changes to the NFTS**: No change would be made to the NFTS under this alternative.
4) **Forest Plan Amendments**: The Forest Plan currently states (page 3-16), "The Forests' OHV Plan designates 239,175 acres to cross-country travel. An additional 1,383,596 acres restrict OHV use to existing roads and trails because of highly erodible soils, steep terrain, critical wildlife habitat, or other resource conflicts. About 500,000 acres on the Forests are closed to OHVs, primarily because of wilderness designation." In addition, the management direction for recreation states, "Manage off-highway vehicle (OHV) use according to direction specified in the OHV Management Plan…" This amendment would revise that standard and guideline for recreation (page 2-24, 16(e)) by replacing the reference to an OHV Management Plan with the following sentences:

   Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest motor vehicle use map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest motor vehicle use map is prohibited unless otherwise part of a permitted activity or administrative use.

This amendment would make the Forest Plan consistent with Subpart B of the Travel Management Rule.

5) **Mitigation Measures**: None would be assigned under this alternative.

The following table displays a summary of the actions proposed in this alternative.

Table 2-8. Alternative 3 - summary of actions

Action type		Action proposed
1. Cross-country travel prohibition		1,599,471 acres
2. Additions to the NFTS	Roads and Trails Added	0 miles
	Areas Added	0 acres
3. Changes to the NFTS	Vehicle Class or Season of Use Restrictions	None
4. Forest Plan Amendments	**Current Forest Plan Direction to be Amended** Standards and Guidelines for Recreation 16(e) on page 4-24 of the LRMP: "Manage off-highway vehicle (OHV) use according to direction specified in the OHV Management Plan…."	**Amended Forest Plan** "Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest Motorized Vehicle Use Map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest Motor Vehicle User Map is prohibited unless otherwise part of a permitted activity or administrative use."
5. Mitigation Measures		None

Alternative 4: Minimize Impacts to Natural Resources and Roadless Areas

Significant issues derived from public comments addressed by alternative 4:

#2 – Impacts on Nonmotorized Recreation

#3 – Motor Vehicle Resource Impacts

Alternative 4 changes between DEIS and FEIS

Changes to seasonal restrictions are due to the removal of closures in spotted owl habitat. Changes to the cultural resources data are largely due to field surveys conducted after the DEIS was published and new direction approved in an amendment to the Motorized Recreation Programmatic Agreement.

Table 2-9. Alternative 4 changes between DEIS and FEIS

Action	DEIS	FEIS
Seasonal Restrictions	Trinity Lake Area (15,644 acres) Iron Canyon Reservoir Area (429 acres)	0 acres – no new seasonal restrictions proposed.
Cultural Resources Protection Measures and Monitoring in Reservoir Open Areas	84 cultural resources at risk in reservoir open areas.	91 cultural resources at risk in reservoir open areas.
	168 sites accounted for below the fluctuation zones.	Removed display of cultural resources below the fluctuation zones.
	Protection measures to include barriers, covers, and closures.	Updated to emphasize speed limit and vehicle class restrictions as primary protection measures.
	Monitoring varies by area.	Annual monitoring with threshold for adjusting the protection measures using adaptive management.

Alternative 4 emphasizes natural and cultural resource protection and avoidance of inventoried roadless areas (IRAs). In response to public comment, this alternative adds no motorized routes to agency or citizen-inventoried roadless areas. The routes and areas proposed for addition to the NFTS would provide access for dispersed recreation and connections for loop rides. This alternative responds to the significant issues of protecting resources and minimizing impacts to the nonmotorized recreation experience.

The initial routes considered were those requested by the public during the comment period for the proposed action. None of the requested routes proposed in alternative 4 are located in areas where they would be prohibited by law, regulation, or policy. Routes were screened for resource concerns raised internally and externally, including criteria suggested by the public such as avoidance of routes in late-successional reserves, riparian reserves, inventoried roadless areas, citizen-inventoried roadless areas, key watersheds, habitat for threatened, endangered, and sensitive species, and other areas that could be considered environmentally sensitive including cultural resources. Routes were also avoided if they access private lands or are located on serpentine soils, unstable areas, or near abandoned mines.

In addition, some of the requested routes have already been studied in other project analyses with decisions or proposals to add, close, abandon, or decommission them and so were not considered for alternative 4. Of the routes remaining, those that would enhance the motorized recreation experience by connecting routes for loops and extended rides, or those that access water and dispersed recreation sites, were proposed for study in this alternative.

Motorized mixed-use is proposed on 23 segments totaling 30.41 miles of existing NFTS maintenance level 3 roads. These road segments were selected because they provide important connections between existing or proposed routes that allow all vehicle types, creating opportunities for loops and extended rides. These routes are listed in Table 2-10.

Alternative 4 includes the following:

1) **Cross-Country Travel:** Public motor vehicle travel off designated NFTS roads, trails, and areas would be prohibited, except as allowed by permit or other authorization. This prohibition covers all National Forest System lands outside of the existing NFTS minus the acres of the proposed additions, resulting in 1,599,277 prohibited acres.

2) **Additions to the NFTS:** Alternative 4 would add approximately 15.56 miles of new NFTS roads and motorized trails and include:

- One road (0.88 miles) open to all vehicle classes
- 25 motorized trails totaling 14.68 miles with the following vehicle classes:
    - 20 trails (14.14 miles) open to vehicles 50 inches and less in width

- 5 trails (0.54 miles) open to motorcycles only

- Areas below the high-water mark on Shasta Lake (28,403 acres), Trinity Lake (15,644 acres), and Iron Canyon Reservoir (429 acres) open to highway-legal vehicles only with a maximum speed limit of 10 miles per hour to protect cultural resources. These acres of open areas include the entire lake bottoms. Actual acres of open areas vary depending on water levels and season of use restrictions. Topography further limits access to motor vehicles.

- Seasonal restrictions would apply to portions of two routes (1.03 miles) to protect wildlife and watersheds. Table 2-4 provides a list of specific routes, seasons of use and reason for the closure. Table 2-12 summarizes the route closures for alternative 4. Seasonal restrictions will be managed adaptively. If a biologist field verifies habitat and finds it's not suitable habitat, seasonal restrictions will be removed. . Existing seasonal restrictions (appendix B) would continue to apply to the Shasta Lake Area for nesting bald eagles.

3) **Changes to the NFTS:** Motorized mixed-use is proposed on 23 road segments totaling 30.41 miles. These segments are existing NFTS operational maintenance level 3 roads selected for their connections with roads and trails allowing all vehicle classes and their contribution to creating loops and extended rides for motorized recreation and access opportunities. All vehicle operators on these roads, including those driving non-highway legal vehicles, must possess a valid driver's license in accordance with Forest Service Manual 7700, Chapter 7730, Section 7731.2(5). The operational maintenance level will remain unchanged. See Table 2-10 for a list of roads proposed for motorized mixed-use.

Table 2-10. Operational maintenance level 3 roads proposed for motorized mixed-use in alternatives 4 and 5

Route No.	Road Name	Miles
40N64	Toad Lake	1.82
34N17	Fenders Ferry	0.99
1N12	Copper Mine	0.85
4N08	Miners Creek	2.91
4N08	Miners Creek	0.16
33N52	Hayfork Bally	1.13
33N47	Soldier Creek	0.24
33N47	Soldier Creek	1.47
5N04	Big Mtn.	1.38
2N10	Indian Valley	1.88
2N07	Post Mtn.	1.09
1N12	Copper Mine	0.99
1S14	Bear Wallow	0.40

Route No.	Road Name	Miles
29N28	String Bean Cr	0.31
27N06	Tomhead Mtn.	1.97
30N29	Bramlet	1.91
40N45	Bear Creek	2.59
28N10	Stuart Gap	0.83
30N29	Bramlet	1.93
29N75	Upper Smokey	1.39
41N36	Lava Spur aka Porcupine Butte	1.35
40N45	Bear Creek	1.25
34N17	Fenders Ferry	1.57
Total		**30.41**

4) **Forest Plan Amendments:** The Forest Plan currently states (page 3-16), "The Forests' OHV Plan designates 239,175 acres to cross-country travel. An additional 1,383,596 acres restrict OHV use to

existing roads and trails because of highly erodible soils, steep terrain, critical wildlife habitat, or other resource conflicts. About 500,000 acres on the Forests are closed to OHVs, primarily because of wilderness designation." In addition, the management direction for recreation states, "Manage off-highway vehicle (OHV) use according to direction specified in the OHV Management Plan. …" This amendment would revise that standard and guideline for recreation (page 2-24, 16(e)) by replacing the reference to an OHV Management Plan with the following sentences:

> *Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest motor vehicle use map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest motor vehicle use map is prohibited unless otherwise part of a permitted activity or administrative use.*

This amendment would make the Forest Plan consistent with Subpart B of the Travel Management Rule.

5) Mitigation Measures:

1. Cultural resource protection measures would be required for approximately 91 exposed sites in the reservoirs. Appendix L details the specific measures. The adaptive management approach planned to protect cultural resources is discussed in the "Resource Protection Measures for Cultural Resources" section later in this chapter and in appendix L.

2. Apply best management practices as described in appendix D to designated routes as necessary to protect water and soil resources.

3. Cap inclusions of naturally occurring asbestos prior to designating on the motor vehicle use map.

The following table displays a summary of the actions proposed in this alternative. Appendix A provides a complete listing of roads and trails to be added into the NFTS, including the vehicle class and seasonal use restrictions. Appendices D and L list all route mitigation measures by route, area, alternative, and resource.

Table 2-11. Alternative 4 - summary of actions

Action type		Action proposed	
1. Cross-country travel prohibition		1,599,277 acres	
2. Additions to the NFTS	Roads Added Open to All Vehicles	1 route	0.88 miles
	Trails Added Open to All Trail Class Vehicles	0	0
	Trails Added Open to Vehicles 50" or Less in Width	20 routes	14.14 miles
	Trails Added Open to Motorcycles Only	5 routes	0.54 miles
	Total	**26 routes**	**15.56 miles**
	Areas Added Open to highway-legal vehicles with a maximum speed limit of 10 miles per hour	Shasta Lake Area	28,403 acres
		Trinity Lake Area	15,644 acres
		Iron Canyon Reservoir Area	429 acres
	Total	**44,476 acres**	
3. Changes to the NFTS	Vehicle class changes on maintenance level 3 roads to allow motorized mixed-use (highway-legal and non-highway legal allowed)	23 segments	30.41 miles
4. Forest Plan Amendments	**Current Forest Plan Direction to be Amended** Standards and Guidelines for Recreation 16(e) on page 4-24 of the LRMP: "Manage off-highway vehicle (OHV) use according to direction specified in the OHV Management Plan…."	**Amended Forest Plan** "Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest Motorized Vehicle Use Map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest Motor Vehicle User Map is prohibited unless otherwise part of a permitted activity or administrative use."	
5. Mitigation Measures	Implement cultural resource protection measures in the reservoir open areas.	91 exposed sites in reservoir open areas.	
	Apply best management practices	All proposed routes and areas	
	Test routes for presence of naturally occurring asbestos prior to designating on MVUM	1 route	

Table 2-12. Alternative 4 – Summary of proposed season of use on additions to the NFTS

Season of Use	Reason for the Restriction	Number of Routes		Total
August 16 to January 31	To prevent traffic noise disturbance of nesting and young goshawks	Roads	1	**0.88 miles**
		Trails	0	**0**
May 1 – October 30	Erosion Control	Roads	0	**0**
		Trails	1	**0.15 miles**

Alternative 5: Improved Access and Motorized Recreation Opportunities

Significant issues derived from public comments addressed by alternative 5:

#1- Reduced Motorized Access and Recreation Opportunity

Alternative 5 emphasizes access and motorized recreation opportunity. This alternative was designed to provide the maximum number of routes requested by the public and to respond to the significant issues regarding recreation access and diverse motorized recreation experiences.

The initial routes considered for alternative 5 were those requested by the public during the public comment period for the proposed action in the fall of 2008. The public requested more than 1,000 routes which included unauthorized routes as well as NFTS roads and trails. Appendix G lists the process used to consider these route requests and develop the alternatives. The additions to the NFTS proposed in alternative 5 were identified using screening criteria with a focus on adding as many miles of unauthorized routes as possible. Routes were excluded if they were located in areas prohibited by law, regulation, or policy; if they access private lands; or are located on unstable areas, or near abandoned mines. Routes with previous decisions to add, close, or decommission made in other project analyses were not considered for alternative 5. Routes located in environmentally sensitive areas such as late-successional reserves and riparian areas were considered if they would enhance the motorized recreation experience by connecting routes for loops and extended rides, or those that access water and documented dispersed recreation sites. Some routes were excluded from further study if field surveys indicated they are unsuitable for public travel. Additionally, all routes included in alternative 2 are also included in this alternative.

Motorized mixed-use is proposed on 23 segments totaling 30.41 miles of existing NFTS maintenance level 3 roads. These road segments were selected because they provide important connections between existing or proposed routes that allow all vehicle types, creating opportunities for loops and extended rides. These routes are listed in Table 2-10 under alternative 4.

Alternative 5 changes between DEIS and FEIS

Changes to seasonal restrictions are due to the removal of closures in spotted owl habitat. Changes to the cultural resources data are largely due to field surveys conducted after the DEIS was published and new direction approved in an amendment to the Motorized Recreation Programmatic Agreement.

Table 2-13. Alternative 5 changes between DEIS and FEIS

Action	DEIS	FEIS
Seasonal restrictions	75 routes 28.99 miles	11 routes 3.01 miles
	Trinity lake Area (15,644 acres) Iron Canyon Reservoir Area (429 acres)	0 acres – no new seasonal restrictions proposed.
Cultural Resource Protection Measures - Routes	43 routes	24 routes
Cultural Resources Protection Measures and Monitoring in Reservoir Open Areas	84 cultural resources at risk in reservoir open areas. 168 sites accounted for below the fluctuation zones.	91 cultural resources at risk in reservoir open areas. Removed display of cultural resources below the fluctuation zones because they are not at risk.
	Protection measures to include primarily barriers, covers, and closures.	Updated to emphasize speed limit restrictions as primary protection measure.
	Monitoring varies by area	Annual monitoring with threshold for adjusting the protection measures using adaptive management.

Alternative 5 includes:

1) **Cross-Country Travel:** Public motor vehicle travel off designated NFTS roads, trails, and areas would be prohibited, except as allowed by permit or other authorization. This prohibition covers all National Forest System lands outside of the existing NFTS minus the acres of the proposed route additions, resulting in 1,598,619 prohibited acres.

2) **Additions to the NFTS:** Alternative 5 would add 219 routes totaling 106.12 miles of new NFTS roads and motorized trails and include:

- 96 roads (43.49 miles) open to all vehicles
- 123 motorized trails (62.62 miles) with the following vehicle classes:
    - 111 trails (59.91 miles) open to vehicles 50 inches and less in width
    - 12 trails (2.71 miles) open to motorcycles only
- Areas below the high-water mark on Shasta Lake (28,403 acres), Trinity Lake (15,644 acres), and Iron Canyon Reservoir (429 acres) open to all vehicles with a maximum speed limit of 10 miles per hour to protect cultural resources. These acres of open areas include the entire lake bottoms. Actual acres of open areas vary depending on water levels and season of use restrictions. Topography further limits access to motor vehicles.

Seasonal restrictions would apply to 11 routes (3.01 miles) to protect wildlife and watersheds. Table 2-4 provides a list of specific routes, seasons of use and reason for the closure.

- Table 2-16 summarizes the route closures for alternative 5. Seasonal restrictions will be managed adaptively. If a biologist field verifies habitat and finds it's not suitable habitat, seasonal restrictions will be removed. Existing seasonal restrictions (appendix B) would continue to apply to the Shasta Lake Area for nesting bald eagles.

3) **Changes to the NFTS:** Motorized mixed-use is proposed on 23 road segments totaling 30.41 miles. These segments are existing NFTS operational maintenance level 3 roads selected for their connections with roads and trails allowing all vehicle classes, and their contribution to creating loops and extended rides for motorized recreation and access opportunities. All vehicle operators on these roads, including those driving non-highway legal vehicles, must possess a valid driver's license in accordance with Forest Service Manual 7700, Chapter 7730, Section 7731.2(5). The operational maintenance level will remain unchanged. See Table 2-10 under alternative 4 for a list of roads proposed for motorized mixed-use.

4) **Forest Plan Amendments:** Two non-significant Forest Plan amendments would be incorporated:

   a) The Forest Plan currently states (page 3-16), "The Forests' OHV Plan designates 239,175 acres to cross-country travel. An additional 1,383,596 acres restrict OHV use to existing roads and trails because of highly erodible soils, steep terrain, critical wildlife habitat, or other resource conflicts. About 500,000 acres on the Forests are closed to OHVs, primarily because of wilderness designation." In addition, the management direction for recreation states, "Manage off-highway vehicle (OHV) use according to direction specified in the OHV Management Plan. …" This amendment would revise that standard and guideline for recreation (page 2-24, 16(e)) by replacing the reference to an OHV Management Plan with the following sentences:

> *Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest motor vehicle use map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest motor vehicle use map is prohibited unless otherwise part of a permitted activity or administrative use.*

This amendment would make the Forest Plan consistent with Subpart B of the Travel Management Rule.

   b) The Forest Plan currently includes a standard and guide for Heritage Resource Management (page 4-51) that states "Off-highway vehicle (OHV) use will be prohibited." The Forest Plan would be amended to state, "Motor vehicle use will be prohibited except on the following roads and trails to provide dispersed recreation access and connectivity for motorized recreation opportunities: SE314, SE476, SE477, SFMU13, SW256, U42N18A, and U42N18B." The added routes and protection measures (see Table 2-14) will meet the purpose and need to enhance motorized access and the motorized riding experience. Specifically, SE314, SW256, and

SFMU13 provide access for dispersed recreation, and SE476, SE477, U42N18A, and U42N18B serve as segments of loops rides. Mitigation measures would be assigned to protect cultural sites from motor vehicle use.

This amendment would allow just those specific routes to be added in or near prescription XI heritage sites for the benefit of the motorized recreation experience on the Shasta-Trinity National Forest. The effects of adding these routes to the NFTS are disclosed in the cultural resources section in chapter 3.

Table 2-14. Alternative 5 added roads and trails in or near Forest Plan Prescription XI cultural sites included in non-significant Forest Plan amendment

Route Number	Protection Measures
SE314	None required, as route will not affect the site. Forest Plan amendment still required.
SE476	No effective resource protection measure available in the PA. Consultation with SHPO required.
SE477	No effective resource protection measure available in the PA. Consultation with SHPO required.
SFMU13	Place barriers to protect site integrity outside of existing route.
SW256	Place barriers to protect site integrity outside of existing route.
U42N18A	Use vegetative screening to protect site integrity outside of existing route.
U42N18B	Place barriers to protect site integrity.

5) Mitigation Measures:

1. Retain felled hazard trees along portions of 26 proposed routes (7.63 miles total) in late-successional reserves to provide habitat for threatened, endangered, and sensitive wildlife species and their prey. See appendix D for a list of routes.

2. Cultural resource protection measures would be required for 24 routes and approximately 91 exposed sites in the reservoirs. Appendix L details the specific measures and the adaptive management approach planned to protect cultural resources is discussed in the “Resource Protection Measures for Cultural Resources” section later in this chapter.

3. Hand-treat 14 known non-native invasive plant populations on 11 routes if selected for addition to the NFTS. See appendix D for a list of routes.

4. Apply best management practices as described in appendix D to designated routes as necessary to protect water and soil resources.

5. Cap inclusions of naturally occurring asbestos prior to designating on the motor vehicle use map.

The following table displays a summary of the actions proposed in this alternative. Appendix A provides a complete listing of roads and trails to be added into the NFTS, including the vehicle class and seasonal use restrictions. Appendices D and L list all mitigation measures by route, area and resource.

Table 2-15. Alternative 5 - summary of actions

Action type		Action proposed	
1. Cross-country travel prohibition		1,598,619 acres	
2. Additions to the NFTS	Roads Added Open to All Vehicles	96 roads	43.49 miles
	Trails Added Open to All Trail Class Vehicles	0	0
	Trails Added Open to Vehicles 50" or Less in Width	111 trails	59.91 miles
	Trails Added Open to Motorcycles Only	12 trails	2.71 miles
	Total	**219 routes**	**106.12 miles**
	Areas Added Open to all vehicles with a maximum speed limit of 10 miles per hour	Shasta Lake Area	28,403 acres
		Trinity Lake Area	15,644 acres
		Iron Canyon Reservoir Area	429 acres
	Total	**44,476 acres**	
3. Changes to the NFTS	Vehicle Class changes on maintenance level 3 roads to allow motorized mixed-use (both highway-legal and non-highway legal allowed)	23 segments	30.41 miles
4. Forest Plan Amendments	**Current Forest Plan Direction to be Amended** Standards and Guidelines for Recreation 16(e) on page 4-24 of the LRMP: "Manage off-highway vehicle (OHV) use according to direction specified in the OHV Management Plan…"	**Amended Forest Plan** "Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest Motorized Vehicle Use Map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest Motor Vehicle User Map is prohibited unless otherwise part of a permitted activity or administrative use."	
	Current Forest Plan Direction to be Amended Prescription XI Heritage Resource Management, Standards and Guides #8: "Off-highway vehicle (OHV) use will be prohibited."	**Amended Forest Plan** "Motor vehicle use will be prohibited except on the following roads and trails to provide dispersed recreation access and connectivity for motorized recreation opportunities: SE314, SE476, SE477, SFMU13, SW256, and U42N18A and U42N18B."	
5. Mitigation Measures	Retain felled hazard trees along routes added in late-successional reserves.	26 routes	
	Implement cultural resource protection measures along added routes and in the reservoir open areas.	24 routes 91 exposed sites. In reservoir open areas	
	Hand-treat known non-native invasive plant populations	14 populations on 11 routes	
	Apply best management practices	All proposed routes and areas	
	Test routes for presence of naturally occurring asbestos prior to designating on MVUM	13 routes	

Table 2-16. Alternative 5 – Summary of proposed season of use on additions to the NFTS

Season of Use	Reason for the Restriction	Number of Routes		Total
August 16 to January 31	To prevent traffic noise disturbance of nesting and young goshawks.	Roads	2	**0.90**
		Trails	3	**1.24**
August 16 to December 31	To prevent traffic noise disturbance of eagle nest.	Roads	1	**0.06**
		Trails	0	**0**
May 1 – October 30	Erosion Control	Roads	0	**0**
		Trails	5	**0.80**

Modified Alternative 2

Modified Alternative 2 meets the purpose and need for travel management by prohibiting cross-country motor vehicle travel and designating routes and areas for motorized recreation and access. This alternative was developed upon further study and in response to public comments on the DEIS. All routes, areas, and actions proposed in this alternative have been studied in the FEIS as part of alternatives 2 or 5. No new routes, areas, or actions are proposed in Modified Alternative 2 that were not been previously analyzed.

Modified Alternative 2 was developed using Alternative 2 as a foundation. After reviewing public comments on the DEIS and new information developed after the publication of the DEIS, the Forest Service developed modified Alternative 2 by making the following changes to the original Alternative 2:

- Added 37 routes from Alternative 5 requested by the public that primarily provide loop rides or provide access for dispersed recreation opportunities as shown in Table 2.17.

Table 2.17. Alternative 5 routes added in Modified Alternative 2 to provide motorized recreation opportunities

Route	Proposed Type	Miles	Recreation Benefit
pm211	50” and less in width	1.43	loop, disperse recreation and camping
pm216	50” and less in width	0.34	connector
rm1101	50” and less in width	0.29	connector
rm145	50” and less in width	0.37	connector
rm146	50” and less in width	0.56	connector
rm720	50” and less in width	0.27	loop
SFMU9	50” and less in width	0.02	dispersed recreation and camping, water
TC508	50” and less in width	0.24	loop
TC851	50” and less in width	0.07	dispersed recreation and camping, water
TC855	50” and less in width	0.32	dispersed recreation and camping, water
TC856	50” and less in width	0.04	dispersed recreation and camping, water
TC860	50” and less in width	0.05	dispersed recreation and camping, water
U29N31H	50” and less in width	0.26	loop
U29N33B	50” and less in width	0.91	loop
U29N73E	50” and less in width	0.14	disperse recreation and camping
U30N36B	50” and less in width	0.86	loop
rm1216	motorcycle	0.39	loop
rm1603	motorcycle	0.29	loop
TC1489	motorized trail	1.78	connector
U29N73G	motorized trail	0.98	connector
IV001	Road	0.02	dispersed recreation and camping, water

Route	Proposed Type	Miles	Recreation Benefit
IV002	Road	0.01	dispersed recreation and camping, water
IV007	Road	0.06	dispersed recreation and camping, water
IV008	Road	0.01	dispersed recreation and camping, water
IV009	Road	0.07	dispersed recreation and camping, water
IV010	Road	0.07	dispersed recreation and camping, water
IV011	Road	0.03	dispersed recreation and camping, water
IV012	Road	0.02	dispersed recreation and camping, water
IV013	Road	0.04	dispersed recreation and camping, water
IV014	Road	0.06	dispersed recreation and camping, water
IV015	Road	0.07	dispersed recreation and camping, water
IV016	Road	0.04	dispersed recreation and camping, water
IV017	Road	0.02	dispersed recreation and camping, water
IV018	Road	0.05	dispersed recreation and camping, water
IV020	Road	0.06	dispersed recreation and camping, water
IV021	Road	0.04	loop
TC857	Road	0.49	dispersed recreation and camping, water

- Added 16 segments for motorized mixed use to provided connectivity to other routes on existing maintenance level 3 roads as shown in Table 2.21.
- Deleted 37 routes to provide additional resource protection as shown in Table 2.18:

Table 2.18. Alternative 2 routes deleted in Modified Alternative 2 to address resource concerns

Route Number	Class	Length (Miles)	Resource Concern
SE314	Road	0.07	Unconnected Route
TRMU3	Road	0.15	coho habitat protection
TRMU5	Road	0.22	coho habitat protection
TRMU6	Road	0.15	coho habitat protection
SE476	Road	0.16	heritage management area Prescription XI protection
SE477	Road	0.15	heritage management area Prescription XI protection
SFMU13	Road	0.26	heritage management area Prescription XI protection
U42N18A	Road	3.89	heritage management area Prescription XI protection
SE194	Road	0.04	Limited recreation contribution
U35N05A	Road	1.74	Inventoried Roadless Area
U27N02G	Road	0.09	limited recreation contribution
RM706	Road	0.07	watershed protection
U41N18AAD	Road	0.82	watershed protection
U41N55D	Road	1.21	watershed protection
U41N55E	Road	1.60	watershed protection
JG30	Road	0.18	Critical Habitat for Northern Spotted Owl
JG31	Road	0.21	Critical Habitat for Northern Spotted Owl
JM244	Road	0.96	Critical Habitat for Northern Spotted Owl
JM44	Road	0.15	Critical Habitat for Northern Spotted Owl
pm2004	Road	0.32	Critical Habitat for Northern Spotted Owl
pm702	Motorized trail	0.04	Critical Habitat for Northern Spotted Owl
SFMU4	Road	0.02	Critical Habitat for Northern Spotted Owl
TC1004	Road	0.12	Critical Habitat for Northern Spotted Owl
TC1098	Road	0.05	Critical Habitat for Northern Spotted Owl

Route Number	Class	Length (Miles)	Resource Concern
TC1238	Road	0.04	Critical Habitat for Northern Spotted Owl
TC828	Road	0.08	Critical Habitat for Northern Spotted Owl
U29N28C	Motorcycle only	0.51	Critical Habitat for Northern Spotted Owl
U31N02Q	50” and less in width	0.28	Critical Habitat for Northern Spotted Owl
U35N85A	Road	0.19	Critical Habitat for Northern Spotted Owl
UT29N30HA	50” and less in width	0.80	Critical Habitat for Northern Spotted Owl
SFMU6	Road	0.02	Critical Habitat for Northern Spotted Owl; Non-native invasive species vector
U4N12D	50” and less in width	3.38	Critical Habitat for Northern Spotted Owl; Non native invasive species vector
U40N88XE	Road	0.25	Non-native invasive species vector
TRMU2	Road	0.54	private land issue
TC1249	motorized trail	0.06	Northern Spotted Owl Core Area
JM25	Road	0.19	Unconnected Route (parent route in critical habitat for Northern Spotted Owl)
UT29N30HAB	50” and less in width	0.25	Unconnected Route (parent route in critical habitat for Northern Spotted Owl)

Table 2.19 displays an overview of the differences between alternative 2 and modified alternative 2. Details regarding environmental consequences are in chapter 3.

Table 2-19. Changes from alternative 2 to modified alternative 2

		Alternative 2	Modified Alternative 2	Change
Prohibition of Cross-Country Motor Vehicle Travel		1,599,062 acres	1,599,122	+60 acres
Route Additions to the NFTS	Roads Open to all Vehicle Classes	71 routes 36.51 miles	48 routes 21.34 miles	-23 routes -15.17 miles
	Trails open to all Trail Class Vehicles	7 routes 0.85 miles	17 routes 5.88 miles	+10 routes +5.03 miles
	Trails Open to Vehicles 50” and less in Width	6 routes 5.4 miles	19 routes 7.21 miles	+13 routes +1.81 miles
	Trails Open to Motorcycles Only	4 routes 1.44 miles	4 routes 1.25 miles	No change in number of routes -0.19 miles
	Total	**88 routes 44.2 miles**	**88 routes 35.69 miles**	**No change in number of routes -8.51 miles**
Area Additions to the NFTS	Areas Added Open to highway-legal vehicles with a maximum speed limit of 15 miles per hour	Shasta Lake Area (28,403 acres) Trinity Lake Area (15,644 acres)	Shasta Lake Area (28,403 acres) Trinity Lake Area (15,644 acres)	No Change

	Alternative 2	Modified Alternative 2	Change
Changes to the NFTS (Motorized Mixed Use on Level 3 Roads)	No changes proposed	16 road segments 21.31 miles	+16 road segments + 21.31 miles
Season of Use Restrictions	3 routes .15 miles	3 routes 0.48 miles	+ 0.33 miles
Forest Plan Amendments	Prohibit Cross-Country Motor Vehicle Travel	Prohibit Cross-Country Motor Vehicle Travel	No Change
	Allow added routes near Prescription IX cultural resource sites	No routes allowed near Prescription XI cultural resources sites.	No amendment needed.
Late-successional reserve mitigation	26 routes 7.63 miles	5 routes 1.01 miles	-21 routes -6.62 miles
Cultural Resource Protection Measures	17 routes 82 reservoir sites	1 route 82 reservoir sites	-16 routes
Hand-treat known non-native invasive plant populations	11 populations on 8 routes	8 populations on 6 routes	-3 populations -2 routes
Apply best management practices	All routes and areas	All routes and areas	No change
Test routes for presence of naturally occurring asbestos prior to designating on MVUM	0 routes	9 routes	+ 9 routes

Modified Alternative 2 includes the following:

1) **Cross-Country Travel**: Public motor vehicle travel off designated NFTS roads, trails, and areas would be prohibited, except as allowed by permit or other authorization. This prohibition covers all National Forest System lands outside of the existing NFTS minus the acres of the proposed route additions, resulting in 1,599,122 prohibited acres.

2) **Additions to the NFTS: Modified alternative 2 would add approximately 35.69 miles to NFTS roads and motorized trails including:**

- 48 roads (21.34 miles) of roads open to all vehicles
- 40 motorized trails (14.34 miles) with the following vehicle classes:
    - 17 trails (5.88 miles) open to all trail class vehicles
    - 19 trails (7.21 miles) open to vehicles 50 inches and less in width
    - 4 trails (1.25 miles) open to motorcycles only
- Areas below the high-water mark on Shasta Lake (28,403 acres) and Trinity Lake (15,644 acres) open to highway-legal vehicles only with a maximum speed limit of 15 miles per hour. These acres of open areas include the entire lake bottoms. Actual acres of open areas vary depending on water levels and season of use restrictions. Topography further limits access to motor vehicles.

- Seasonal restrictions would apply to 3 routes (0.48 miles) to protect wildlife and reduce erosion. Table 2.20 provides a list of specific routes, season of use and reason for the closure. Table 2.23 summarizes the route closures for modified alternative 2. Seasonal restrictions will be managed adaptively. If a biologist field verifies habitat and finds it's not suitable habitat, seasonal restrictions will be removed.

Table 2-20. Modified alternative 2 season of use on additions to the NFTS by route

Route No.	Miles	Type	Season of Use	Closure Reason
JM72	0.06	Road	August 16 - December 31	bald eagle
RM1216	0.39	Trail	May 1 - October 30	erosion
SFMU18	0.03	Road	August 16 - January 31	northern goshawk
Total	**0.48**			

3) **Changes to the NFTS:** Motorized mixed-use is proposed on 16 road segments totaling 21.31 miles. These segments are existing NFTS operational maintenance level 3 roads selected for their connections with roads and trails allowing all vehicle classes and their contribution to creating loops and extended rides for motorized recreation and access opportunities. All vehicle operators on these roads, including those driving non-highway legal vehicles, must possess a valid driver's license in accordance with Forest Service Manual 7700, Chapter 7730, Section 7731.2(5). The operational maintenance level will remain unchanged. See Table 2.21 for a list of roads proposed for motorized mixed-use.

Table 2-21. Operational maintenance level 3 roads proposed for motorized mixed-use in modified alternative 2

Route No.	Name	Miles
1N12	Copper Mine	0.99
27N06	Tomhead Mountain	1.97
28N10	Stuart Gap	0.83
29N28	String Bean Creek	0.31
29N75	Upper Smokey	1.39
2N07	Post Mountain	1.09
30N29	Bramlet	1.93
33N47	Soldier Creek	0.24
33N47	Soldier Creek	1.47
33N52	Hayfork Bally	1.13

Route No.	Name	Miles
34N17	Fenders Ferry	1.57
40N45	Bear Creek	2.59
41N36	Lava Spur aka Porcupine Butte	1.35
4N08	Miners Creek	2.91
4N08	Miners Creek	0.16
5N04	Big Mountain	1.38
Total		**21.31**

4) **Forest Plan Amendments:** One non-significant Forest Plan amendment would be incorporated: The Forest Plan currently states (page 3-16), "The Forests' OHV **Plan designates 239,175** acres to cross-country travel. An additional 1,383,596 acres restrict OHV use to existing roads and trails because of highly erodible soils, steep terrain, critical wildlife habitat, or other resource conflicts. About 500,000 acres on the Forests are closed to OHVs, primarily because of wilderness designation." In addition, the management direction for recreation states, "Manage off-highway vehicle (OHV) use according to

direction specified in the OHV Management Plan. …" This amendment would revise that standard and guideline for recreation (page 2-24, 16(e)) by replacing the reference to an OHV Management Plan with the following sentences:

> *Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest motor vehicle use map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest motor vehicle use map is prohibited unless otherwise part of a permitted activity or administrative use.*

This amendment would make the Forest Plan consistent with Subpart B of the Travel Management Rule.

5) Mitigation Measures:

- Retain felled hazard trees along portions of five proposed routes (1.01miles total) in late-successional reserves to provide habitat for threatened, endangered, and sensitive wildlife species and their prey. Specific routes are listed in appendix D.
- Cultural resource protection measures would be required for 1 route and approximately 82 exposed sites in the reservoirs. Appendix L details the specific measures. The adaptive management approach planned to protect cultural resources is discussed in the "Resource Protection Measures for Cultural Resources" section later in this chapter and in appendix L.
- Hand-treat eight known non-native invasive plant populations on six routes if selected for addition to the NFTS. See appendix D for a list of routes.
- Apply best management practices as described in appendix D to designated routes as necessary to protect water and soil resources.
- Cap inclusions of naturally occurring asbestos.

The following table displays a summary of the actions proposed in this alternative. Appendix A provides a complete listing of roads and trails proposed to be added to the NFTS, including the vehicle class and seasonal use restrictions by route. Appendices D and L list all route mitigation measures by route, area, alternative, and resource.

Table 2-22. Modified Alternative 2 - summary of actions

Action type		Action proposed	
1. Cross-country travel prohibition		1,599,122 acres	
2. Additions to the NFTS	Roads Added Open to All Vehicles	48 routes	21.34 miles
	Trails Added Open to All Trail Class Vehicles	17 routes	5.88 miles
	Trails Added Open to Vehicles 50" or Less in Width	19 routes	7.21 miles
	Trails Added Open to Motorcycles Only	4 routes	1.25 miles
	Total	**88 routes**	**35.69 miles**
	Areas Added Open to highway-legal vehicles with a maximum speed limit of 15 miles per hour	Shasta Lake Area	28,403 acres
		Trinity Lake Area	15,644 acres
	Total		**44,047 acres**
3. Changes to the NFTS	Vehicle Class changes on maintenance level 3 roads to allow motorized mixed-use (both highway-legal and non-highway legal allowed)	16 road segments	21.31 miles
4. Forest Plan Amendments	**Current Forest Plan Direction to be Amended** Standards and Guidelines for Recreation 16(e) on page 4-24 of the LRMP: "Manage off-highway vehicle (OHV) use according to direction specified in the OHV Management Plan…."	**Amended Forest Plan** "Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest Motorized Vehicle Use Map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest Motor Vehicle User Map is prohibited unless otherwise part of a permitted activity or administrative use."	
5. Mitigation Measures	Retain felled hazard trees along routes added in late-successional reserves.	5 routes	
	Implement cultural resource protection measures along added routes and in the reservoir open areas.	1 route 82 exposed sites in reservoir open areas	
	Hand-treat known non-native invasive plant populations		
	Apply best management practices	All proposed routes and areas	
	Test routes for presence of naturally occurring asbestos prior to designating on MVUM	9 routes	

Table 2-23. Modified Alternative 2 – Summary of proposed season of use on additions to the NFTS

Season of Use	Reason for the Restriction	Number of Routes		Total
August 16 to January 31	To prevent traffic noise disturbance of nesting and young goshawks.	Roads	1	**0.03**
		Trails	0	**0**
August 16 to December 31	To prevent traffic noise disturbance of eagle nest.	Roads	1	**0.06**
		Trails	0	**0**
May 1 – October 30	Erosion Control	Roads	0	**0**
		Trails	1	**0.39**

Preferred Alternative

The responsible official has identified modified alternative 2 as the preferred alternative.

Elements Common to all Alternatives

- Each alternative assumes that other adjacent Federal lands will be managed according to their existing management plans and applicable Federal laws. Each alternative also assumes that activities on State, county, and private lands will meet applicable State and Federal land use regulations.
- None of the alternatives would change season of use on the existing NFTS roads or trails.
- None of the alternatives would change maintenance levels on existing NFTS roads or designed use on existing NFTS motorized or non-motorized trails.
- **Permitted Uses**: The Travel Management Rule (36 CFR 212.51) allows exemptions from route designations including "motor vehicle use that is specifically authorized under a written authorization issued under Federal law or regulations." This exemption refers to activities and access authorized with special use permits and other types of authorizations. Examples of permitted uses on the STNF that are exempt from the Travel Management Rule that will continue under all alternatives include range allotment management, maintenance of power lines and the use of roads accessing private property. In addition, permitted uses on the lake bottoms of Shasta Lake, Trinity Lake, and Iron Canyon Reservoir include access to:
    - Resorts, marinas, and boat docks under special use permits.
    - Moorage slips for privately owned houseboats under special use permits.
    - The boat ramp for an organized camp (Kamaloops) under special use permit.

Monitoring and Condition Surveys

Appendix D, Monitoring and Mitigation, has specific information regarding the assignment of mitigation measures and monitoring requirements for individual routes and areas by resource. Monitoring is critical for evaluating the effectiveness of management decisions and the accuracy of analysis assumptions and conclusions. Monitoring of road, trail, and area conditions is required each year. Road and trail condition surveys are conducted using a random sample and must meet national standards. If monitoring or road and trail condition surveys determine motor vehicle use on a National Forest is directly causing or will directly cause considerable adverse effects on public safety or soil, vegetation, wildlife, wildlife habitat, or cultural resources associated with that road, trail, or area, the responsible official, in accordance with 36 CFR 212.52(2) of the Travel Management Rule shall immediately close that road, trail or area to motor vehicle use until the official determines that such adverse effects have been mitigated or eliminated and that measures have been implemented to prevent future reoccurrence.

The Motorized Recreation PA requires monitoring of use levels on routes that have had deferred survey strategy applied or that have had cultural resource protection measures proposed. Monitoring will also be a key component for managing vehicle use on the areas below high water on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir to determine if previously unidentified impacts to cultural resources are occurring and if cultural resource specific protection measures are effective. Direction to monitor the reservoir open areas have been identified in an amendment to the Motorized Recreation Programmatic Agreement (PA).

Common to Alternatives 2, 4, 5, and Modified Alternative 2

1) Additions to the NFTS

In accordance with Forest Service policy (FSM 7716.1), route additions which are designated on the MVUM include "all terminal facilities, trailheads, parking lots, and turnouts associated with the road or trail. The designation also includes parking a motor vehicle on the side of the road when it is safe to do so without causing damage to NFS resources or facilities, unless prohibited by state law, a traffic sign, or an order (36 CFR 261.54)." All route additions studied in this analysis include parking within one vehicle length of the route.[1]

2) Best Management Practices

Best management practices to protect soils and water will be implemented as per the Regional Water Quality Management Plan (USDA Forest Service, Pacific Southwest Region, 2000). Best management practices are listed in appendix D.

3) Resource Protection Measures for Cultural Resources

All cultural resources protection measures and monitoring plans are listed in appendix L by route, area, and alternative.

Vehicle Classes and Speed Limits for Shasta Lake, Trinity Lake, and Iron Canyon Reservoir Areas

In developing the proposed action for motorized use in the areas below the high-water mark, vehicle class was limited to highway-legal vehicles only. The rationale of limiting vehicle class to highway-legal vehicles is to be consistent with the Memorandum of Understanding (MOU) with the Bureau of Reclamation dated December 31, 1986 for Shasta and Trinity Lakes to:

> *"…be administered by the [Forest] Service in a manner coordinated with other purposes of the Central Valley Project for outdoor recreation, conservation of scenic historic and other values contributing to the public enjoyment…"*

[1] See Forest Service Manual 7716.1.

The proposed open areas are not intended to be used by vehicles for hill climbing, jumping, fast turns, high speed, etc., but to provide access to recreation activities on the lake shore while conserving natural and cultural resources. Alternatives 2 (proposed action), modified alternative 2, and alternative 4 include only highway-legal vehicles to minimize the likelihood of vehicles primarily designed for off-road uses being operated in a manner that is inconsistent with the MOU. Public comments received in scoping indicate that some members of the public use non-highway-legal vehicles solely as a means to access recreation opportunities on the lake shore. To respond to public scoping comments, alternative 5 includes both highway-legal and non-highway-legal vehicles in the areas below the high-water mark.

Alternatives 2, 4, 5, and modified alternative 2 propose speed limits for motor vehicles of either 15 mph (alternative 2 and modified alternative 2) or 10 mph (alternatives 4, 5). The proposal for a speed limit is based on the function of the proposed open areas, and as in vehicle classes discussed above, is intended to comply with the MOUs with the Bureau of Reclamation and protect resources.

Since there are numerous recorded cultural resource sites on all of the lake bottoms, reducing the speed of any vehicle minimizes the risk of damage to any of these sites by effectively preventing hill climbing, jumping, fast turns, and mud bogging. The difference between 10 and 15 mph is to provide a greater level of protection and risk management.

The use of vehicle speed limits, when combined with additional proposed protection measures at some sites, will meet access needs while mitigating potential impacts.

A programmatic agreement among the Forest Service, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation provides specific stipulations for compliance with Section 106 of the National Historic Preservation Act in this analysis (The Motorized Recreation PA). The agreement includes standard resource protection measures (see chapter 3 and appendix L) that are assigned under all action alternatives. Where protection measures are assigned to particular routes, they will apply to all alternatives in which the route is proposed.

The USDA Forest Service Region 5 Regional Office and the California SHPO have developed an amendment to the Motorized Recreation Programmatic Agreement (appendix E of the programmatic agreement) to address motor vehicle use below the high-water mark in the reservoirs. Proposed cultural resource protection measures to be applied open reservoir areas are listed in chapter 3 and appendix L.

Adaptive Management of Cultural Resources

The Motorized Recreation PA, including the amendment addressing motor vehicle use in the reservoir open areas, allows for the use of adaptive management to effectively protect cultural resources. The PA identifies adaptive management as “protocol that proceeds through stages managed to reduce or eliminate any effect” that includes monitoring, education, signage, and closure in a sequential process. The PA adds speed limits and vehicle class restrictions as standard protection measures in the reservoir open areas, stating, “Speed limits provide a means to reduce activities that pose a risk to cultural resources (e.g. mud

bogging) and can be used by law enforcement to reduce risk. Speed limits may be employed, as well as restricting use to highway legal vehicles (excluding ATVs and dirt bikes for example)." In applying these approved protection measures to at risk cultural resources using adaptive management, the STNF will implement initial protection measures, monitor for impacts and effectiveness, and modify the protection measures to respond to the impacts if necessary. This is a flexible approach necessary to protect cultural resources that are exposed with receding waters and to respond to impacts as they are discovered through regular monitoring.

Adaptive management requires the identification of the adjustment(s) that may be made when monitoring during project implementation indicates that the action is not having its intended effect, or is causing unintended and undesirable effects. Monitoring schedules are required to inform the responsible official whether the action is having its intended effect. (36 CFR 220.7(b)(2)(iv)).

For the protection of **at risk** cultural resources in the reservoir open areas, the STNF will monitor the cultural resource sites annually if they are exposed, and record conditions with a determination of whether or not there is a change to any part of the site related to or contributing to the eligibility of the site for the National Register of Historic Places. If adverse effects are evident or likely to occur then further protection measures identified in the PA would be employed. If the protection measures identified in the PA are not successful or feasible, then it may be necessary to close the area and conduct site evaluations and mitigation. This determination will be made in consultation with SHPO.

The Motorized Recreation PA also requires monitoring to detect condition change at the sites on routes added to the NFTS, and additional standard protection measures (or closures) would be applied if site conditions were found to have deteriorated.

Potential resource protection measures include:

- Standard Resource Protection Measures (Appendix B of the Motorized Recreation Programmatic Agreement) as appropriate.
- Speed limit restrictions
- Vehicle class restrictions
- Closing areas as needed while appropriate protection measures (but currently not available in the programmatic agreement) are developed and implemented in consultation with SHPO.

The cultural resources section in chapter 3 and appendix L (Cultural Resources Management) provides specific information about the cultural resources that are known to be affected or have the potential to be affected by motor vehicle use. There are additional cultural resources in the reservoirs that are located below water level and are unlikely to be exposed during normal years or management levels. These cultural resources are not considered to be at risk.

Alternatives Considered but Eliminated from Detailed Analysis

Federal Agencies are required by NEPA to rigorously explore and objectively evaluate reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 15.02.14). The following comments were submitted in response to the Notice of Intent and Proposed Action published in August 2008.

Close all existing unauthorized routes not added to the NFTS to prevent illegal use in the future

This alternative would physically close the 5,219 unauthorized routes (1,252 miles) with a berm, gate, or other barrier.

Rationale for elimination from detailed study: The enforcement tool will be the motor vehicle use map (MVUM). If the public is using motor vehicles off-roads and motorized trails identified on the MVUM, they can be cited. The STNF has a law enforcement plan and is prepared to enforce the laws and regulations related to travel management. As with any change in a regulation on National Forest System lands, there will likely be a transition period as the public becomes familiar with the new NFTS as published on the MVUM. Agency personnel will patrol and approach implementation of the Travel Management Rule with a focus on education and enforcement to protect resources and public safety.

Add the entire inventory of unauthorized routes or the majority of routes receiving motor vehicle use to the NFTS

This alternative would add all or the majority of unauthorized routes to the NFTS. Several respondents felt that the existing level of motorized access and recreation across the STNF is a reasonable alternative. We also heard from several respondents that the STNF should maximize the number of routes available for motor vehicle use. The public requested a range of alternatives that would add all of the routes in the proposed action as well as the majority of "important and historic user-created routes" identified by the public. They requested that the Forest Service attempt to mitigate any considerable adverse effect, and focus closures on redundant routes or routes causing a considerable adverse effect or routes having little recreational value.

Rationale for elimination from detailed study: Subpart B of the Travel Management Rule requires that impacts to natural and cultural resources be minimized. In particular, damage and disruption to soils, watersheds, vegetation, wildlife, wildlife habitat, and other forest resources should be minimized. Field surveys and preliminary effects analyses conducted by the STNF indicated that some unauthorized routes would contribute unacceptable environmental impacts if added to the NFTS. Alternative 5 responds to the request for the maximum number of route additions while reducing impacts to natural and cultural resources. In order to bring a route into the NFTS, it must be brought up to Forest Service standards for safety and resource protection. Additionally, maintenance of these routes would be required. It would be very costly to do this for all the unauthorized routes on the Forest, especially since there are currently over 5,000 miles of roads in the existing NFTS open to motor vehicle travel.

Evaluate all existing NFTS roads and trails and unauthorized routes for designation or closure. Close unneeded NFTS roads to reduce road density, maintenance and roads causing resource damage

This alternative would evaluate the entire NFTS and inventory of unauthorized routes to address resource concerns as well as any conflicts with nonmotorized recreationists. Some members of the public requested that all routes be evaluated in this analysis, stating that the "Travel Management Rule has identified the need to 'provide the minimum transportation system needed for safe and efficient travel by the public and for administration, utilization, and protection of NFS lands.' They feel this need cannot be met without considering changes within the entire transportation system." Six organizations submitted lists of NFTS roads and motorized trails they recommend for closure to motor vehicle use and restoration to a more natural condition. They requested road closures in proposed wilderness areas, semi-primitive nonmotorized areas, research natural areas, Pacific Crest Trail, proposed or existing wild and scenic river corridors, agency-inventoried roadless areas, and citizen-inventoried roadless areas. Other organizations also requested that the entire existing transportation network be evaluated, with requests such as closing or restricting use of existing routes that are causing resource damage or conflicts with other recreational users and experiences, and to "consider closure and decommissioning of authorized and non-authorized routes that may no longer be needed for management objectives, are a significant source of resource impairment, and/or which cannot be adequately maintained within budgets and resource capabilities."

Rationale for elimination from detailed study: The scope of this forest-wide motorized travel management analysis is confined to implementing Subpart B of the Travel Management Rule (36 CFR Part 212), and as such proposes only limited changes to the NFTS for vehicle type and season of use that respond to specific components of the purpose and need. The scope of this analysis does not include Subpart A of the Travel Management Rule directing the identification of the minimum transportation system, which would require the evaluation of the entire NFTS as requested in this alternative. This approach is in accordance with 36 CFR 212.50(b) which states,

> *The responsible official may incorporate previous administrative decisions regarding travel management made under other authorities, including designations and prohibitions of motor vehicle use, in designating National Forest System roads, National Forest System trails, and areas on National Forest System lands for motor vehicle use under this subpart.*

The Shasta-Trinity National Forest regularly evaluates the existing NFTS roads and trails as part of other planning efforts and environmental analyses for vegetation management, watershed restoration, fuel treatment, and other projects. These site-specific analyses evaluate existing transportation system and unauthorized routes in the project area, and may propose and decide to close or decommission system roads and trails, or add routes to the transportation system. These decisions are based on the purpose and need for the projects, the project-level travel analysis planning conducted in the project areas, and the conclusions reached in evaluating environmental effects. In addition, repair and maintenance of the

existing NFTS is routine and ongoing across the national forest and is not part of the purpose and need for this analysis. It is important to note that NFTS roads serve many purposes besides public enjoyment. They provide access for vegetation management, fire control, prescribed burning, reforestation, management and use of special forest products, special uses, mining, logging, and a variety of other management activities. These uses need to be considered with respect to NFTS road closures or decommissioning and such activities are clearly outside the scope of this proposal.

While this analysis does not close existing NFTS roads and trails in the areas requested by the respondents, the STNF addressed the request, in part, by using those areas as a screen to exclude proposed additions to the NFTS in alternative 4.

Open or convert existing closed NFTS roads and decommissioned roads to allow motorized recreation by non-highway legal vehicles

This alternative would:

- Convert some existing NFTS maintenance level 2 roads to maintenance level 1 roads and open these roads for use by non-highway legal motor vehicles.
- Convert some existing NFTS maintenance level 1 roads to motorized trails, including some as single track trails (less than fifty inches in width) and some greater than fifty inches in width.
- Open decommissioned roads to allow motorized recreation.

Rationale for elimination from detailed study: With respect to making changes to the NFTS other than additions, season of use, and vehicle class of unauthorized routes, the responsible official has narrowed the scope of this analysis to limit changes to vehicle class. Vehicle class changes are proposed only to allow limited motorized mixed-use on ML 3 roads where there is a clear opportunity to enhance motorized recreation with connections for loops and extended rides. ML 2 roads are open to both street-legal and non-street legal vehicles; therefore, converting ML 2 roads to ML 1 roads would not provide additional motorized recreation. ML 1 roads are roads that have been closed to reduce maintenance costs and resource impacts but may be needed in the future for administrative access. Converting them to motorized trails would not meet that need. They are in storage and not intended for use either by the public or for administrative purposes at this time.

Roads are decommissioned to reduce resource impacts, particularly sedimentation. Roads are considered the principle cause of accelerated erosion in forests. The decision to decommission these roads was made in a site-specific project level analysis. Sometimes, decommissioning is necessary in order to manage vegetation and stay within the sediment constraint within the watershed. To reverse the decision and “undecommission” the roads in order to designate them as motorized trails would remove this benefit of sediment reduction in the watershed now and in the future. Also, the potential work needed to bring them to a standard suitable for public travel would require additional analysis and expense.

Include motor vehicle routes that end at or transect private property

This alternative would include routes requested by the public that end at or transect private property.

Rationale for elimination from detailed study: Since the routes being considered are unauthorized routes, the Forest has not obtained an easement or right-of-way from the private property owner to allow for public use on these routes on private lands. Without an easement or right-of-way, the Forest has no legal authority to designate these routes.

Develop a procedure to temporarily close routes or areas based on monitoring resource conditions

This alternative would develop a monitoring program to determine when temporary closures are necessary based on resource conditions and would include fixed dates for seasonal closures. Several respondents requested specific approaches to assigning seasonal closures, such as using a rainfall-based wet weather closure plan. Others support "motorized closures where necessary to protect wildlife during the spring calving season and hunting season." These respondents requested a reasonable level of access and avoidance of long closures.

Rationale for elimination from detailed study: The proposed season of use restrictions on additions to the NFTS are based on the need to minimize impacts to wildlife and watersheds, and are timed to avoid motorized use on roads and motorized trails during periods of nesting and raising young for threatened, endangered, and sensitive species, as well as periods needed for erosion control. These dates are well-documented and easily incorporated on the motor vehicle use map. Season of use restrictions for wildlife were based on nesting and roosting habitat databases. Season of use restrictions for wildlife may be modified if biologists field verify that this habitat does not exist.

Designate OHV areas

This alternative would designate OHV areas where use is currently occurring. Several respondents requested the designation of OHV areas where historic use is occurring, such as the Wildwood area. They note that such areas could be managed primarily for motorized recreation, with concentrated ATV or motorcycle use limited to the existing route network, but prohibiting cross-country travel. The areas would be similar to the Chappie-Shasta OHV area where motor vehicles must remain on the designated trails.

Rationale for elimination from detailed study: The STNF collaborated with user groups and others to identify unauthorized routes that should be considered for addition to the NFTS, and considered all individual routes requested by the public during scoping (although not all requests were brought forward for analysis in detailed study). These represent a diversity of access and experience. Alternative 5 proposes to add the maximum number of routes and miles possible while still complying with law, regulation, policy, and other direction required in selecting routes for addition to the NFTS. Alternative 5 provides for higher concentrations of routes in some areas of the STNF, but doesn't include an

administrative designation of the area as an OHV area. During this phase of the process the Forest is considering adding routes to the NFTS but not designating OHV areas. In the future, we may consider designating additional OHV areas.

Designate Open OHV Play Areas

This alternative would designate an open OHV area on the lake bottom of Shasta Lake. The Forest received verbal requests to consider an open OHV play area below the high-water mark on Shasta Lake for OHV recreationists.

Rationale for elimination from detailed study: Alternatives 2, 4 and 5 include open areas below the high-water mark on Shasta Lake; however, motor vehicle use is restricted in these alternatives to minimize the impacts to cultural resources and to comply with the National Historic Preservation Act. Analysis of cultural resources in the areas below the high-water mark on Shasta Lake showed numerous cultural resource sites that are being impacted by current motor vehicle use. The National Historic Preservation Act provides direction to Federal agencies about their historic preservation responsibilities, including the responsibility to protect historic properties and avoid unnecessary damage to them. Additionally, the Travel Management Rule requires that the effects on cultural resources be considered, with the objectives of minimizing damage, when designating roads, trails, and areas for motor vehicle use.

The Forest also considered other recreational uses occurring below the high-water mark and at the perimeter of Shasta Lake. While some of the motor vehicle use below the high-water mark is from people pursuing fishing, boating, and other recreational activities; some use is from people using the area as an OHV play area where people are riding for the pleasure of riding and are looking for challenges. This type of motor vehicle use includes hill climbs, spinning donuts, motocross riding, and mud bogging, which threaten resources and oppose the management direction provided by the Memorandum of Understanding with the Bureau of Reclamation. In addition, other visitors and business owners have indicated this use is causing conflicts.

Share nonmotorized trails with mountain bikes and motorcycles

This alternative would involve converting nonmotorized trails to motorized trails.

Rationale for elimination from detailed study: Mountain bikes and motorcycles can be conflicting uses because the speed and noise of the motorcycle is frequently not compatible with the experience desired by mountain bikers. The public has reported a number of conflicts among equestrians, mountain bikes, and motorcycles on trails. The forest recreation program is designed to provide diverse opportunities for a variety of users and it is important that we continue to provide a mix of nonmotorized and motorized opportunities. Granted, the purpose and need is for limited changes to the existing NFTS to the type of use permitted and changing a trail from nonmotorized use to motorized use is a change in the type of use. However, changing trails from nonmotorized to motorized use could potentially require

reengineering and other construction to meet trail standards and we consider that more than limited changes.

Construct new trails

This alternative would include construction of new motorized trails to connect motorized roads and trails to provide more diversity in motorized recreation through loop opportunities.

Rationale for elimination from detailed study: Constructing new motorized trails would require designing and constructing the trail. During this phase of process, since there are over 1,200 miles of unauthorized routes to consider, the focus is on making limited changes in vehicle type to the existing NFTS and adding routes to the NFTS. In the future, the Forest may be willing to consider proposals for constructing new segments of roads and motorized trails on a case-by-case basis. The timeline and resources available for implementing the Travel Management Rule precludes the Forest from further examining in detail constructing new trails at this time.

Allow dispersed vehicle camping within 100 feet of the surface of NFTS roads and trails

The respondents requested the ability to park motor vehicles off of NFTS roads and trails for the purpose of enjoying dispersed camping in areas where existing unauthorized routes will not be added to the NFTS, thereby reducing recreational access by motor vehicles. They state that the motor vehicle use map (MVUM) can provide specific criteria for allowing motor vehicles areas within 100 feet of a designated road or trail. They believe that law enforcement would not be increased nor would wildlife be harassed due to the close proximity of this use to the existing NFTS roads and trails.

Rationale for elimination from detailed study: The interdisciplinary team considered camping within 100 feet of roads and trails; however, the responsible official found that corridors would not meet the intent of the Travel Management Rule because it would leave thousands of acres open to cross-country travel and would require extensive additional analysis. To meet the intent of the Travel Management Rule would involve surveying thousands of acres where motor vehicles would be allowed to travel off NFTS roads. Potential impacts to cultural resources, threatened and endangered species, wildlife and other resources would need to be analyzed. Based on recent evaluations of timeline, budget, and organization capacity constraints, it is not feasible for the Forest to complete the required site-specific analysis needed to implement a travel corridor. To address dispersed recreation activities, the forest focused on identifying routes that access dispersed recreation opportunities (including camping) and included these routes in alternatives 2, 4, and 5 if they were not excluded for other concerns, for example, resource impacts, jurisdiction, law, regulation, or policy. As a result there is opportunity for dispersed recreation access and a roadside corridor is not needed.

Evaluate county roads to allow motorized mixed-use

This alternative would evaluate county roads in order to designate segments of appropriate county roads for motorized mixed-use.

Rationale for elimination from detailed study: Management of county roads is outside of the Forest Service's jurisdiction; therefore, it is outside the scope of this analysis.

Alternatives Submitted in Response to the Draft Environmental Impact Statement

Several respondents requested that the responsible official analyze additional alternatives in this Final Environmental Impact Statement (FEIS). In some cases, the requested alternatives were identical or very similar to alternatives considered when developing the Draft Environmental Impact Statement (DEIS) and are already discussed above. In many cases, respondents offered suggestions to revise the alternatives already studied; these revisions were considered and are addressed in appendix I (Response to Comments) and in the Changes between the DEIS and FEIS section near the start of this chapter. In addition, the new alternative, Modified Alternative 2, responds to public input by addressing a variety of concerns expressed on the DEIS.

The Forest Service considered new alternative suggestions as described below with rationale as to why they were not analyzed in detail in this FEIS. Appendix I (Response to Comments) provides additional information about suggested alternatives.

Add specific routes and areas to the NFTS

Some respondents requested routes and areas be added to the NFTS under this analysis and decision. These included routes that were already requested in response to the Notice of Intent for the proposed action, and some that were not requested earlier.

Rationale for elimination from detailed study: Routes requested during public scoping for the proposed action were considered for inclusion or exclusion in an alternative. Please see appendix G for details regarding the Forest Service's considerations when developing the proposed action and the alternatives. Along with extensive data and scientific analysis, local managers with knowledge of the resources and on-the-ground recreation uses and needs were integral in designing the proposed action and the selected alternative.

The Forest Service did not include routes and areas beyond those considered in the DEIS in this FEIS because the alternatives studied address the significant issues adequately and provide the responsible official with a reasonable range of actions and their effects to consider at this time. Response from the public indicates that there are potential additional routes and areas that may be appropriate for inclusion in the NFTS in the future. The Shasta-Trinity National Forest would like to emphasize that this decision is just the first step in implementing the Travel Management Rule, and that continued collaboration will be

necessary and desired to identify the minimum road system and to build a road and trail network that provides the quality and experiences sought by motorized recreationists. The Travel Management regulations at 36 CFR 212.54 provide for revision of designations as needed to meet changing conditions, including the potential to add new routes following public involvement and site specific environmental analysis.

Reduce the proposed number and mileage of new motorized roads and trails that will be added to the STNF travel system

Some respondents requested fewer miles of additions to protect resources such as fish and fish habitat and to protect the attributes of designated Inventoried Roadless Areas. Also mentioned is that few Forest visitors would benefit from additional motorized routes and that the economic benefits from OHV use is relatively small when compared to other uses.

Rationale for elimination from detailed study: This new alternative was not studied in detail because alternative 4 was developed and studied to respond to the significant issue of resource impacts caused by motor vehicles while providing for a small increase, 15.6 miles, in additions to the NFTS, Protection of sensitive areas and resources was a criterion in the alternative design. As with all proposed additions in all action alternatives, the routes were chosen because they serve a motorized recreation benefit by offering a loop or extended ride, or access to water, or a documented dispersed recreation site. Routes proposed in alternative 4 avoid the most sensitive riparian areas in order to protect watersheds, fish, fish habitat, and other aquatic organisms or riparian-related species. No routes are proposed in IRAs. The socio-economic and recreation analyses in chapter 3 include the visitor numbers for a wide array of uses in the STNF, including motorized recreation. National Forests are managed for a range of uses and experiences, some of which may include lower numbers of users.

Change the scope of the analysis to management units

One respondent thought that using management units as the basis for study would better focus on affected communities, user groups, those who fund projects, and partners, and that there are collaborative models on the STNF that demonstrate effective use of such a strategy.

Rationale for elimination from detailed study: District Rangers and their staff have participated throughout this process, and multiple public meetings have been held on the various management units to solicit input for implementation of the Rule. Implementation of the Travel Management Rule is an iterative and ongoing process, so rather than step back to reconfigure this analysis, the Forest looks forward to continuing collaboration with the public where it aligns with the objectives of the STNF Forest Plan. Collaboration with all interested parties representing a variety of perspectives is an integral part of defining the Forest's recreation niche and the success of a travel management plan.

Close roads and motor vehicle use pertinent to the licensing of the McCloud-Pit Project

Two respondents emphasized the current relicensing efforts related the McCloud-Pit project, requesting an alternative that evaluates specific road closures and develops mandatory mitigation and enhancement measures to protect water quality.

Rationale for elimination from detailed study: This process does not affect facilities and roads that are part of the FERC relicensing of a hydropower facility. Any road or facility that is part of the license would be governed by the terms of the license. Alternatives 2, modified alternative 2, and 3 do not propose to designate Iron Canyon Reservoir as an open area and therefore would eliminate unmanaged vehicle use below the high-water mark in Iron Canyon Reservoir.

Create a system for non-highway legal vehicles that recognizes California Vehicle Code provisions allowing OHV use on unpaved NFTS roads

This requested alternative would include coordination among the counties, the public, and the STNF to develop a network of motorized mixed-use routes on unpaved NFTS roads,

Rationale for elimination from detailed study: Although other state laws are based on road surface type, the California Vehicle Code is not. At the beginning of this planning effort, maintenance level 3, 4, and 5 roads under the jurisdiction of the STNF were restricted to highway-legal vehicles only. To better provide for "legal" non-highway-legal vehicle access and accommodate the associated public interest, a limited subset of passenger car road segments was proposed to be designated for motorized mixed use and studied under alternatives 4 and 5. The engineering study is summarized in appendix C (Motorized Mixed-Use). The STNF may consider changes to maintenance levels on some NFTS roads to provide desired motorized recreation and access in future planning efforts outside of this analysis.

Address climate change by minimizing soils disturbance caused by motor vehicle use

This alternative would focus on minimizing the effects of climate change on resources by protecting soils. The respondent suggested coordination with the Environmental Protection Agency (EPA) to adjust current practices or develop new strategies to address the effects of climate change on natural resources.

Rationale for elimination from detailed study: The US Forest Service is engaged in many inter-agency discussions regarding the effects of climate change on natural resources. Developing an alternative in this analysis that would protect natural resources from the effects of climate change is impossible due to the inability to measure the effects of the alternative. The relationship between soil disturbance and climate change cannot be measured on a project level such as this. Also, because greenhouse gases from vehicle emissions mix readily into the global pool of greenhouse gases, it is not currently possible to discern the effects of this project from the effects of all other greenhouse gas sources worldwide, nor is it expected that attempting to do so would provide a practical or meaningful analysis of

project effects. However, there is scientific consensus in CA that climate change is affecting the weather, and could cause reduced snow pack, earlier runoff, and more frequent rain-on-snow events. Roads and trails that disrupt hydrologic flow could potentially exacerbate the impacts of climate change. The air quality and watershed analyses in chapter 3 discuss climate change based on information provided by the EPA and other agencies involved in this emerging science.

Comparison of Alternatives

The following tables summarize key differences in actions and effects among the alternatives. Chapter 3 describes the environmental consequences of the alternatives in detail.

Alternatives 1 and 3 proposed no additions to the NFTS.

Table 2-24. Summary comparison of alternatives

Item	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Modified Alt 2
Cross-Country Travel Prohibition (acres)	0	1,599,062	1,599,471	1,599,277	1,598,619	1,599,122
Roads Added Open to All Vehicles (miles)	0	36.51	0	0.88	43.49	21.34
Trails Added Open to All Trail Class Vehicles (miles)	0	0.85	0	0	0	5.88
Trails Added Open to Vehicles 50" or Less in Width	0	5.40	0	14.14	59.91	7.21
Trails Added Open to Motorcycles Only	0	1.44	0	0.54	2.71	1.25
Total Miles Of Roads And Trails Added To NFTS	0	44.20	0	15.56	106.12	35.69
Area Added-Shasta Lake Area (acres)	0	28,403	0	28,403	28,403	28,403
Area Added-Trinity Lake Area (acres)	0	15,644	0	15,644	15,644	15,644
Area Added-Iron Canyon Reservoir Area (acres)	0	0	0	429	429	0
Total Acres of Open Areas Added to NFTS	0	44,047	0	44,476	44,476	44,047
Seasonal Restrictions on additions to the NFTS (number of routes)	0	3	0	2	11	3
Seasonal Restrictions on additions to the NFTS (acres of open areas)	0	0	0	0	0	0
Vehicle Class changes on specific existing NFTS to allow motorized mixed-use	0	0	0	23 segments 30.41 miles	23 segments 30.41 miles	16 segments 21.31 miles
Forest Plan Amendment: Prohibit Cross-Country Motor Vehicle Travel	No	Yes	Yes	Yes	Yes	Yes
Forest Plan Amendment: Add Specific Routes in or near Forest Plan Prescription XI cultural sites (number of routes)	No	6	0	0	7	0

Item	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Modified Alt 2
Retain leave trees on routes in late-successional reserves (number of routes)	0	26	0	0	26	5
Added Routes affected by Cultural Resource Protection Measures (number of routes)	0	17	0	0	33	1
Cultural resource protection measures for sites in added open areas (number of exposed sites)	0	82	0	91	91	82
Number of added routes to be treated for NNIS	0	8	0	0	11	6
Apply best management practices	0	All proposed routes and areas	0	All proposed routes and areas	All proposed routes and areas	All proposed routes and areas
Number of added routes tested for potential naturally occurring asbestos	0	0	0	1	13	9

Summary Comparison of Alternatives by Environmental Effects

In the following table, relative rankings are scored on a scale of 1 to 5 from greatest (1), to least (5) impact.

Table 2-25. Relative comparison of alternatives by environmental effect

Resource Area		Rankings of alternatives, averaged across indicators				
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
Nonmotorized Recreation	1	3	4	6	5	2
Motorized Recreation	6	4	3	1	2	5
Watersheds	1	3	4	6	5	2
Aquatic Resources	1	3	4	6	5	2
Herpetofauna	1	3	4	6	5	2
Wildlife	1	3	4	6	5	2
Cultural Resources	1	3	4	6	5	2
Botany	1	4	3	6	5	2
Nonnative Invasive Species	1	3	4	6	5	2
Visuals	1	3	4	6	5	2
Roadless Areas	1	3	4	6	5	2
Public Safety	1	4	4	6	4	2
Affordability	6	2	4	5	3	1
Air Quality	1	4	4	6	4	2
Geology	1	4	3	6	5	2

The environmental consequences for modified alternative 2 as compared to alternative 2 are discussed in Chapter 3.15.

Chapter 3: Affected Environment and Environmental Consequences

Introduction

This chapter summarizes the physical, biological, social, and economic environments that are affected by the proposed action and alternatives "affected environment" and the effects on that environment that would result from implementation of any of the alternatives "environmental consequences." This chapter also presents the scientific and analytical basis for comparison of the alternatives presented in Chapter 2: Alternatives. The environmental consequences discussion centers on direct, indirect, and cumulative effects, along with applicable mitigation measures. These terms are defined as follows:

- Direct effects are caused by the action and occur at the same place and time as the action.
- Indirect effects are caused by the action and are later in time, or further removed in distance, but are still reasonably foreseeable.
- Cumulative effects are those that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

Analysis Process

The environmental consequences presented in chapter 3 address the impacts of the actions proposed under each alternative for the Shasta-Trinity National Forest. This effects analysis was done at the site-specific and forest scales. Resource specialists have reviewed each affected road, trail, and area proposed in the alternatives. These findings are summarized in appendix A. Readers seeking information associated with a specific road or trail are directed to appendix A.

For ease of documentation and understanding, the effects of the alternatives are described separately for three discrete actions and then combined to provide the total direct and indirect effects of each alternative (see below). The combination of the effects of these discrete actions is then added to effects of the past, present, and reasonably foreseeable actions in the cumulative effects analysis. The three discrete actions common to all action alternatives are:

1) **Prohibition of cross-country motor vehicle travel.** The direct and indirect effects of this action are described generally in each alternative, considering both current conditions and projected trends. Both short (1 year) and long-term (approximately 20 years) effects are presented.

2) **Addition of new facilities (roads, trails, and areas) to the National Forest Transportation System (NFTS)**. As described above, the impacts of new facilities are addressed in sum total in this chapter, and include the impacts of any associated seasonal or vehicle class restrictions proposed. For most resources, one or more resource indicators are used to measure the direct and indirect effects of each alternative. Both short (1 year) and long-term (approximately 20 years) impacts are presented.

3) **Changes to vehicle class on the existing NFTS**. Impacts caused by changes to vehicle class on the existing NFTS are described generally by alternative. The STNF is proposing vehicle class changes to allow motorized mixed-use on particular segments of NFTS maintenance level 3 in two alternatives. Motorized mixed-use allows for a mix of highway legal and non-highway legal vehicles.

The following analysis includes two additional items: Forest Plan amendments and mitigation measures. The Forest Plan amendment to prohibit cross-country motor vehicle travel will bring the Forest Plan into compliance with the Travel Management Rule and is examined under the prohibition of cross-country travel (action item #1 above). The amendment to allow specific routes in Forest Plan Prescription XI heritage areas is examined under the action to add new facilities to the NFTS (action item #2 above). Mitigation measures to benefit wildlife and cultural resources are associated with added routes and areas and examined under the action to add new facilities to the NFTS (action item #2 above).

Cumulative Effects

According to the Council on Environmental Quality (CEQ) NEPA regulations, "cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7).

The cumulative effects analysis area includes the entire STNF including private and other public lands that lie within the Forest boundary unless otherwise specified in individual resource sections. Past activities are considered part of the existing condition and are discussed in the "affected environment" and "environmental consequences" section under each resource.

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human action risks ignore the important residual effects of past natural events, which may

contribute to cumulative effects just as much as human action. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." Past actions are treated similarly in the recently published Forest Service Regulations for implementing the National Environmental Policy Act (36 CFR 220). For these reasons, the analysis of past actions in this section is based on current environmental conditions.

Cumulative effects analyses included investigation of the projects listed on the STNF's Schedule of Proposed Actions to determine present and reasonably foreseeable future projects which may have some effect on the resources studied in this EIS. These projects are listed in appendix B. From that list, resource specialists identified which types of management actions could affect (either by adding to, mitigating, or modifying) the predicated environmental effects on their resource when added to the actions in the alternatives. Every resource is not affected by every action. For example, a future project may affect wildlife but not affect water quality. The cumulative effects discussions in the resource sections in this chapter are general but are based on the specific projects and activities listed and summarized in appendix B.

Modified Alternative 2 Environmental Consequences Analysis

A sixth alternative was developed by the interdisciplinary team at the direction of the Forest Supervisor in response to public input on the DEIS. This alternative, Modified Alternative 2, is described in detail in Chapter 2. It uses alternative 2 as a foundation but refines the actions (adding to or removing proposals studied in alternative 2) to better meet the purpose and need for this project while responding to the public's input to enhance the motorized recreation experience while protecting valuable natural and cultural resources.

The environmental effects of modified alternative 2 are displayed comprehensively at the end of this chapter rather than within each resource section as are the other alternatives. All routes, areas, and actions proposed in this new alternative have been studied in the FEIS as part of alternatives 2 or 5. No new routes, areas, or actions are proposed in modified alternative 2. The environmental consequences of modified alternative 2 are discussed in comparison to alternative 2 and included in relative rankings of all alternatives in Table 2-25.

Affected Environment Overview

There are many aspects of the affected environment that are shared by all resources. In order to avoid repeating these shared elements of the affected environment in each resource section, the following general elements of the affected environment are provided.

Unmanaged motor vehicle use has resulted in unplanned routes, erosion, watershed and habitat degradation, and impacts to cultural resource sites. On some Shasta-Trinity National Forest System lands managed as open to cross-country motor vehicle travel, repeated use has resulted in unplanned, unauthorized routes. These routes were generally developed without environmental analysis or public involvement, and do not have the same status as NFTS roads and NFTS trails included in the forest transportation system.

The Shasta-Trinity National Forest's inventory of unauthorized routes includes 5,219 routes totaling 1,252 miles across the forest landscape. The majority are less than one mile in length. A multi-step screening process conducted by resource specialists determined that most of the inventoried unauthorized routes are unsuitable for study in this analysis because they either are not consistent with law, regulation, or policy; the route location poses a substantive threat of increased sedimentation and interruption of the hydrologic regime and riparian reserve integrity; or preliminary effects analyses conducted by resource specialists determined unacceptable effects to forest resources. Some of those routes eliminated in the early screening process were requested for addition to the NFTS during public scoping on the proposed action, and were re-evaluated in this analysis. See appendix G for details regarding the screening criteria and process used in developing the alternatives.

Motor vehicle use below the high-water mark on the reservoirs serves a variety of access and recreation purposes including small boat launching, motor vehicle riding, dispersed camping, and day use for fishing, swimming, and picnicking. On Shasta Lake during the high use period (May 1 to October 31), the number of vehicles per day ranges from approximately 10 on the west side of Shasta Dam to more than 100 at Jones Valley. On Trinity Lake during the high use period (June 1 to October 31), the number of vehicles per day range from approximately 10 at Rattlesnake to more than 50 at East Fork and Stuarts Fork. On Iron Canyon Reservoir during the high use period (June 1 to October 31), the number of vehicles per day ranges from approximately 25 at Deadlun Campground to more than 50 at Hawkins Flat boat ramp. The motorized use restrictions proposed in the alternatives and evaluated in the resource discussions in this chapter are designed to manage this use while protecting cultural resources.

Roads and Lands in Other Ownerships

Approximately 577,770 acres of land in other ownerships exist within the administrative boundary of the Shasta-Trinity National Forest. Several of the large landowners were contacted to determine current land uses, public access policies, and future management plans. As discussed in appendix B, landowners have a range of policies regarding public access. The prevalent approach is to allow public motor vehicle use on un-gated roads with no cross-country travel, and allow nonmotorized public use on gated roads.

Roads in other jurisdictions within the boundary of the STNF total approximately 2,295 miles as follows:

Table 3.00-1. Roads within other jurisdictions on the Shasta-Trinity National Forest

Bureau of Land Management	5.46
Bureau of Reclamation	3.24
County, Parish, Borough	794.23
Local	26.24
National Park Service	29.52
Private	186.42
State Highway	1242.47
State Lands	6.91
Grand Total	**2294.59**

For the purpose of estimating environmental effects, this analysis assumes that private roads will not be available for public motorized use. Unauthorized routes with direct access to private land were eliminated from study in the alternatives considered in detail, and the actions considered do not affect private roads or motor vehicle use on private property.

Assumptions and Limitations

1) Previous decisions regarding the national forest transportation system (NFTS) do not need to be revisited to implement 36 CFR 212, Subpart B of the Travel Management Rule (36 CFR 212.50(b)). The roads and trails in the current NFTS either underwent environmental analysis or predate the requirement for analysis under the National Environmental Policy Act (NEPA) of 1969. Allowing continued motor vehicle use of the facilities in the NFTS in accordance with existing laws and regulations does not require NEPA.

2) NEPA analysis is required for any change to current restrictions or prohibitions regarding motorized travel by the public (e.g., prohibiting cross-country travel, changing vehicle class, or season of use, and any additions or deletions of facilities (roads, trails, or areas) to the NFTS. User-created roads, trails, and areas are not NFTS facilities and require a NEPA analysis and decision prior to adding them to the NFTS.

3) Temporary roads, trails, and areas that are constructed to support emergency operations or temporarily authorized in association with contracts, permits, or leases are not intended for public use. They are not NFTS facilities (e.g., they are unauthorized for public use). Any proposal to add these temporary roads to the NFTS will require a NEPA analysis and decision.

4) The unauthorized routes not included in the proposed action are not precluded from future consideration for either addition to the NFTS or removal from the landscape and restoration to the natural condition.

5) Use levels for unauthorized routes have been estimated based on the professional judgment and experience of field-going personnel familiar with the area. Use levels are based on the peak season of use for the route. Documentation supporting use level estimates is available in the planning record.

6) Effects of various vehicle types – whether highway-legal or non-highway-legal – are similar in type and intensity for most resources.

7) Dispersed recreation activities (i.e., activities that occur after the motor vehicle stops such as camping, hunting, fishing, hiking, etc.) are not within the scope of this analysis. The analysis focuses on motor vehicle use.

8) In accordance with Forest Service policy (FSM 7716.1), route additions which are designated on the MVUM include "all terminal facilities, trailheads, parking lots, and turnouts associated with the road or trail. The designation also includes parking a motor vehicle on the side of the road when it is safe to do so without causing damage to NFS resources or facilities, unless prohibited by state law, a traffic sign, or an order (36 CFR 261.54)." All route additions studied in this analysis include parking within one vehicle length of the route.

9) Best management practices to protect soils and water will be implemented as per the Regional Water Quality Management Plan (USDA Forest Service, Pacific Southwest Region, 2000). Best management practices are listed in appendix D.

10) The system will be maintained to standard and all additions or changes to the NFTS will meet standards prior to availability for public use.

11) As noted in many of the following resource discussions under the no-action alternative, attempting to quantify effects associated with continued cross-country travel is speculative because it is impossible to predict exactly where, when, or how such use would occur.

12) Any activity associated with contract, permit, lease or other written authorization is exempt from designation under the Travel Management Rule (36 CFR 212.51 (a) (8) and is not part of the proposal (e.g., fuelwood permits, special use permits, mining activity, recreation residences, etc.). Such actions are subject to separate NEPA analysis.

13) The range of actions considered in the proposed action and alternatives are listed in chapter 2. These actions are evaluated in the following resource sections where the possibility of either adverse or beneficial effects exists. Some of the actions would have no effect on particular resources (for example, motorized mixed-use on wildlife), and assumptions and rationales for no effects are included in the resource discussions.

14) The planning record for this analysis includes supporting information such as data sets, scientific studies, field survey results, and individual resource reports that are summarized and referenced in

this chapter. The planning record is located at the Shasta-Trinity National Forest headquarters in Redding.

Appendix A

Appendix A lists each route proposed for addition to the NFTS and identifies the alternatives under which the route is proposed, the type of vehicles allowed, and the season when the route would be open. In addition, appendix A identifies any resource concerns and necessary mitigation measures. These mitigations measures must be implemented if the routes and areas requiring them are designated on the Motor Vehicle Use Map.

Law Enforcement Assumptions Common to Effects Analyses

- The laws and regulations related to travel management will be enforced equally in authority and weight as with all other Federal laws and regulations.
- As with any change in a regulation on NFS lands, there is usually a transitional period for the public to understand the changes. It is anticipated there will be a higher number of violations to the Travel Management Rule the first few years and the number of violations will decline as the users understand and comply with the rules.
- Once the motor vehicle use map is published, the implementation of the established dedicated network of roads, trails, and areas with signs and user education programs, will reduce the number of motor vehicles traveling off of designated routes.
- Providing motorized recreation opportunities in popular, key areas will help relieve pressure to travel off of designated routes.

For more information about law enforcement, see appendix E.

Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

This EIS has been prepared in accordance with all required law, regulation, and policy. The following is an overview of the major laws, regulations, and policies directing this analysis.

National Environmental Policy Act (NEPA)

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with …other environmental review laws and executive orders.” Each resource section includes a list of applicable laws, regulations, policies, and Executive Orders that are relevant to that resource. Surveys, analyses, and findings required by those laws are addressed in those sections.

National Forest Management Act (NFMA)

The National Forest Management Act of 1976 directs national forests to prepare land management plans to guide their management. The Shasta-Trinity National Forest Land and Resource Management Plan (Forest Plan) provides this management direction.

Shasta-Trinity National Forest Land and Resource Management Plan (Forest Plan)

The Forest Plan addresses OHV use and refers to an OHV Management Plan for further direction regarding managing motorized use. The OHV plan and map were not finalized, but direction for OHV use exists in forest-wide standards and guidelines, management prescriptions, and management area direction. The interdisciplinary team also examined Forest Plan direction for roads, trails, open areas, and motorized use. Each resource discussion includes the relevant Forest Plan direction and a determination of whether or not the proposed action and alternatives are consistent with the direction.

2005 Travel Management Rule 36 CFR 212

Title 36, Code of Federal Regulations, Part 212 (36 CFR 212) is the implementing regulation for the Travel Management Rule (70 Federal Register 216, November 9, 2005; p. 68264-68291). Part 212 provides criteria for designation of roads and trails. The alternatives are designed specifically to implement the requirements of the travel management rule. In particular, it addresses the requirements of 36 CFR 212 Designation of roads, motorized trails, and motorized areas which states in part "Motor vehicle use on National Forest System roads, on National Forest System trails, and in areas on National Forest System lands shall be designated by vehicle class and, if appropriate, by time of year by the responsible official on administrative units or Ranger Districts of the National Forest System."

National Historic Preservation Act (NHPA) of 1966

Section 106 of the NHPA of 1966 requires federal agencies to consider the potential effects of an action on historic, architectural, or archaeological resources that are eligible for inclusion on the National Register of Historic Places and to afford the President's Advisory Council on Historic Preservation an opportunity comment. Section 110 of the Act requires federal agencies to identify, evaluate, inventory, and protect National Register of Historic Places resources on properties they control. Potential impacts to archaeological, historic, and paleontological resources have been evaluated in compliance with Section 106 of the NHPA.

Executive Order 11644 – ORV Management

Executive Order 11644 – Use of Off-Road Vehicles on Public Lands (issued February 8, 1972) – provides for the establishment of policies and procedures that will ensure that the use of OHVs on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. Agency heads are

directed to provide for administrative designations of the specific areas and trails on public lands on which the use of OHVs may be permitted, and areas in which the use of OHVs may not be permitted.

Executive Order 11989 – ORV Management

Executive Order 11989 – Use of Off-Road Vehicles on Public Lands (issued May 24, 1977) – clarifies agency authority to define zones of use by ORVs on public lands. Agency heads, when they determine that the use of ORVs will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat, or cultural or historic resources to immediately close such areas or trails to the type of ORV causing such effects, until such time that it is determined that such adverse effects have been eliminated and that measures have been implemented to prevent further recurrences.

Executive Order 12898 – Environmental Justice

Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (issues February 11, 1994) – requires that each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high or adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

Clean Water Act

The Clean Water Act, as amended, regulates the dredging and filling of freshwater and coastal wetlands. Section 404 (33 USC 1344) of the Clean Water Act prohibits the discharge of dredged or fill material into waters (including wetlands) of the United States without first obtaining a permit from the U.S. Army Corps of Engineers. Wetlands are regulated in accordance with federal Non-Tidal Wetlands Regulations (Sections 40). No dredging or filling is part and of the travel management alternatives on the Shasta-trinity National Forest and no permits are required. Portions of the Clean Water Act are administered by the State of California under the Porter Cologne Water Quality Control Act

Porter-Cologne Water Quality Control Act

The Porter Cologne Water Quality Control Act is a California statute that establishes the State Water Resources Control Board and nine Regional Water Quality Control Boards. The Forest Service works collaboratively with the Regional Water Quality Control Boards to achieve the objectives of the Clean Water Act on National Forest lands. For management actions on National Forest System lands, the Forest Service Pacific Southwest Region (Region 5) entered into a 1981 management agency agreement with the State of California requiring the Forest Service to institute a water quality management program to meet applicable water quality objectives and protect beneficial uses. Under the agreement, implementation of State-approved and EPA-certified BMPs is considered sufficient to protect water quality (see project file: ST_Watershed_BMP.doc).

Activities on the STNF are monitored regularly to confirm implementation and effectiveness of BMPs. Annual BMPEP monitoring reports are located in the project files and on the internet at http://fs.usda.gov/goto/stnf/planningdocs.

Clean Air Act of 1970

The Clean Air Act of 1970 and its amendments provide for the protection and enhancement of the nation's air resources as measured by federal and state ambient air quality standards.

Endangered Species Act (ESA) of 1973

The Endangered Species Act of 1973 (16 USC 1531 et seq.) requires that any action authorized by a federal agency not be likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the ESA, as amended, requires the responsible federal agency to consult the USFWS and the National Marine Fisheries Service concerning endangered and threatened species under their jurisdiction. Biological assessments and evaluations (BA/BEs) for Threatened, Endangered, and Sensitive (TES) species have been prepared for wildlife, fish, and plants, and agency consultations conducted as required.

Wilderness Act of 1964

The actions proposed are in compliance with wilderness designations and the Wilderness Act of 1964. Motorized activity is prohibited in wilderness under all the alternatives per the Wilderness Act of 1964.

Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). All action alternatives have the potential to improve the long-term productivity of the landscape by reducing the number of existing unauthorized routes on the landscape. Routes not designated for public motor vehicle use will have the potential to revert to vegetated conditions, gradually reducing adverse effects on forest resources related to motorized use of these routes.

Alternatives 2, 4, and 5 propose to add existing unauthorized routes to the Forest transportation system and designate those routes for public motor vehicle use. Although these designations may be revised in the future in response to changing conditions, the designation of routes is considered to be a long-term use of the environment, with long-term impacts on productivity within the travel tread. However, as described in the section below on unavoidable impacts, mitigations are proposed as needed in the action alternatives to ensure adverse effects to the productivity of the environment are avoided, eliminated, or minimized.

Unavoidable Adverse Effects

Unavoidable adverse effects are expected with implementation of Alternative 1 due to the continued use of unauthorized routes, including those known to be adversely affecting forest resources. Unmanaged cross-county motor vehicle travel would continue with the potential for additional adverse effects in sensitive areas, including those cultural resources managed pursuant to the National Historic Preservation Act. No mitigations or protection measures would be proposed to reduce, avoid, or eliminate those effects.

Implementation of Alternatives 2, 4, 5 and Modified Alternative 2, would result in some unavoidable adverse environmental effects resulting from the proposed actions as discussed below; however, where feasible, mitigations are proposed as needed to ensure effects are avoided or minimized to acceptable levels in all alternatives.

Prohibiting Cross-Country Travel – While no biologically relevant adverse effects are expected from this action, social impacts would occur due to restricted motor vehicle access as discussed in the recreation analysis in this chapter.

Additions of Routes and Areas to the NFTS – The potential for adverse effects in sensitive watersheds and to particular cultural resources exists as described in those resource analyses in this chapter. Mitigation measures and cultural resource protection measures assigned would reduce or eliminate those effects except in the case of two routes proposed in alternatives 2 and 5 affecting cultural resource sites. Those effects are not easily mitigated and so are predicted to be unavoidable and adverse if the routes are designated for public motor vehicle use at this time. **Season of Use Restrictions and Vehicle Class Assignment** – These actions are intended to mitigate potential adverse effects and assign the most appropriate vehicle classes for on-the-ground conditions to enhance the motorized recreation experience. No unavoidable adverse effects are predicted for the added routes. However, Alternative 5 permits all vehicle classes including non-highway-legal vehicles in the open areas below the high water marks of Shasta Lake, Trinity Lake, and Iron Canyon Reservoir. This will allow access to a larger area of the lake bottoms than if vehicle class was restricted to highway legal only, and increases the potential for adverse effects to cultural resources. Although these effects will be monitored and mitigated according to the protection measures outlined in appendix E of the Motorized Recreation PA, alternative 5 may require further SHPO consultation to insure site protection.

Changes to the Existing NFTS – Motorized mixed use on the NFTS segments proposed and analyzed could result in adverse safety concerns as discussed in Appendix C. Safety concerns are not easily mitigated at this time and so are predicted to be unavoidable if the routes are designated for motorized mixed use.

Overall, adverse environmental effects were eliminated during alternative development through careful consideration of site-specific information regarding the nature and location of sensitive natural

and cultural resources. Routes with unavoidable adverse effects known at the time of alternative development were not proposed for addition to the NFTS.

Alternative 3 would have no unavoidable adverse effects as no unauthorized routes or areas are added to the NFTS and all cross-country motor vehicle use is prohibited, including in the reservoir open areas below the high-water marks. The environmental consequences section for each resource area discusses these effects in more detail.

Irreversible and Irretrievable Commitment of Resources

Irreversible commitments of resources are those that cannot be regained in the future, such as extinction of a species, destruction of cultural resources, or the removal of mined ore. The actions proposed and analyzed in the alternatives were designed to prevent any irreversible commitment of resources including natural and cultural resources. Subsequent analysis indicates that if routes SE476 and SE477 are selected there is potential for irreversible commitment of resources with continued unmitigated motor vehicle through a recorded cultural resource, as described in the cultural resources section in this chapter. For the remaining routes, the action of adding unauthorized routes and areas to the NFTS as low standard roads, motorized trails, or open areas below the high water mark on reservoirs would not result in any commitment of resources that cannot be regained in the future.

Irretrievable commitments of resources are those that are lost for a period of time, such as the temporary loss of timber productivity or habitat in forested areas cleared as a power line right-of-way or road. Dedication of land as a transportation facility represents a commitment of the soil resource and any vegetation or habitat it would normally support. As a result, designation of roads, trails, and areas for motor vehicle use is expected to result in an irretrievable commitment of resources. These resource commitments are considered irretrievable for as long as the route or area is designated for public motorized use. If designated routes and areas are closed to motor vehicle use in future travel management decisions (the action is reversed), the committed resources would gradually recover to pre-disturbance conditions as described in the resource effects analyses in this chapter.

Energy Requirements

Energy is consumed in the administration of the Shasta-Trinity National Forest. The primary energy sources potentially affected by implementation of the alternatives would be gasoline and diesel fuel expended to complete required mitigations, monitoring, and maintenance of the selected roads, trails, and areas as described in the Record of Decision.

Changes in Proposed Routes between DEIS and FEIS

Five very short routes that access a dispersed camping area on the South Fork Management Unit – IV003, IV004, IV005, IV006, and IV007 - have been combined to form one route, IV007, with a total length of 0.06 miles. While the total number of routes proposed in Alternative 5 is reduced by four (from 223 to

219), the total proposed mileage remains the same. This change is reflected throughout the document and appendices; however there are likely some discussions in the following resources analyses still referring to the individual routes. Combining the routes is a database change and does not change the effects analyses or conclusions regarding alternative 5.

3.01. Recreation Resources

Introduction

Nearly all forest visitors, regardless of the purpose for their visit, use the motorized transportation system to reach their destination. Making changes to the existing National Forest Transportation System (NFTS) (e.g. adding facilities, prohibiting or allowing motor vehicle use by vehicle class or season of use) changes the diversity of motorized and nonmotorized opportunities on the forest. These visitors may be participating in motorized recreation, or using motor vehicles to access trailheads, facilities, destinations, or geographic areas for nonmotorized recreational activities. This section of the motorized travel management analysis examines the extent to which the diversity of recreation opportunities are affected by the proposed action and alternatives, and the extent to which alternatives are consistent with direction established in the Shasta-Trinity National Forest Land and Resource Management Plan (LRMP or Forest Plan) and the Travel Management Rule.

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Regulatory direction relevant and specific to the proposed action as it affects recreation resources includes the following.

National Forest Management Act (NFMA)

NFMA sets forth requirements for development of forest plans. The Shasta-Trinity National Forest Land and Resource Management Plan includes standards and guidelines for management of recreation including motor vehicle use.

Travel Management Rule, Subpart B (36 CFR 212.50-57)

(Criteria that incorporated E.O. 11644 and E.O. 11989)

1) The responsible official shall consider the effects of designated roads, trails, and areas on the provision of recreational opportunities, access needs, and conflicts among uses of National Forest System lands (36 CFR 212.55 (a)).
2) The responsible official shall consider effects on the following, with the objective of minimizing: conflicts between motor vehicle use and existing or proposed recreational uses of National Forest System lands or neighboring federal lands; conflicts among different classes of motor vehicle uses of National Forest System lands or neighboring federal lands; and the compatibility of motor vehicle uses with existing conditions in populated areas, taking into account sound, emissions, and other factors (36 CFR 212.55 (b)).

Shasta-Trinity National Forest Land and Resource Management Plan (LRMP)

The Land and Resource Management Plan provides goals for the recreation resource and requires a broad range of developed and dispersed recreation opportunities in balance with existing and future demand. For management and conceptual convenience, possible mixes or combinations of activities, settings, and probable experience opportunities have been arranged along a spectrum, or continuum. This continuum is called the recreation opportunity spectrum (ROS), and planning for recreation opportunities using the ROS is conducted as part of land and resource management planning. The ROS provides a framework for defining the types of outdoor recreation the public might desire, and identifies that portion of the spectrum a given national forest might be able to provide. The Recreation Opportunity Spectrum is divided into six classes: primitive, semi-primitive nonmotorized, semi-primitive motorized, roaded natural, rural, and urban. Each class is defined in terms of its combination of activity, setting, and experience opportunities (USDA Forest Service 1986.) The intent is to use the Recreation Opportunity Spectrum and its associated settings to provide recreation input into LRMPs which in turn may be incorporated into LRMP management prescriptions or used in project-level planning beyond the programmatic planning used to develop the LRMP. For the purposes of travel management actions, the term OHVs (off-highway vehicles) is applied to public motor vehicle use (highway legal and non-highway legal). How the Recreation Opportunity Spectrum applies to the LRMP depends on how (or if) it was integrated into the management prescriptions and associated standards and guidelines in the forest LRMP. On the Shasta-Trinity National Forest, the Recreation Opportunity Spectrum is integrated into the management prescription and associated standards and guidelines in the forest LRMP and guides decisions and resource management activities. The Recreation Opportunity Spectrum is applied forest-wide to specific developed recreation sites found in appendix F of the forest LRMP. In addition to the forest-wide standards and guidelines, each management prescription is assigned a single or a range of ROS classes to guide decisions and resource management activities. See the LRMP for standards and guidelines specific to each management prescription (USDA Forest Service 1995).

Management Prescriptions (Chapter 4 – Standards and Guidelines, page 4-31 to 4-91)

Management prescriptions guide decisions and resource management activities. Some are assigned a Recreation Opportunity Spectrum classification or provide direction for OHV use and other recreation management. Route additions are proposed in the following management prescription areas. Management prescription areas not listed below have no actions proposed in them or do not offer standard and guidelines for the Recreation Opportunity Spectrum, OHV use, or other recreation subjects related to motorized use.

2. **Late-Successional Reserves**

VII. Late-Successional Reserves

D. Standards and Guidelines

3. Management activities should be compatible with Semi-Primitive Nonmotorized or Semi-Primitive Motorized Recreation Opportunity Spectrum (ROS) guidelines (LRMP 4-44)

4. Off-highway vehicle (OHV) use may occur only on designated trails. This use will be located and scheduled to avoid conflicts with wildlife objectives. Refer to the OHV management plan map for specific use areas (4-44).

3. **Administratively Withdrawn Areas**

II. Limited Roaded Motorized Recreation

D. Standards and Guidelines

2. Trails should be located, designed, constructed, and maintained so that they are suitable for their intended purpose. Trail density and use will be limited to ensure low to moderate frequency of user contact. Those trails qualifying under item 9 will be open to motor vehicles (LRMP 4-47).

8. Management activities will be compatible with Semi-Primitive Motorized Recreation Opportunity Spectrum (ROS) guidelines (LRMP 4-47)

9. Designate suitable trails and areas for OHV use. Such use should be located and scheduled to minimize conflicts with other recreation use and wildlife needs. Refer to OHV management plan map for special use areas (LRMP 4-47).

5. **Matrix Lands**

III. Roaded Recreation

D. Standards and Guidelines

1. Roads and trails should be located, designed, constructed, and maintained to so that they are compatible with Roaded Natural Recreation Opportunity Spectrum (ROS) activities. These activities include hiking, auto touring, wildlife viewing, OHV use, cross-country skiing, snowmobiling, and horseback riding (LRMP 4-65).

7. Designate trails and areas for OHV use. Such use should be located and scheduled to minimize conflicts with other recreation use and deer winter range. Refer to OHV management plan for specific use areas (LRMP 4-65).

8. Plan, design, and implement management activities that are compatible with Roaded Natural ROS guidelines (LRMP 4-65).

VI. Wildlife Habitat Management

D. Standards and Guidelines

2. Off-highway vehicle (OHV) use may occur only in designated areas and on trails. Use will be located and scheduled to minimize conflicts with wildlife objectives. Refer to the OHV management plan map for specific use areas (LRMP 4-66).

3. Management Activities should be compatible with Roaded Natural Recreation Opportunity Spectrum (ROS) guidelines. (LRMP 4-66).

VIII. Commercial Wood Products Emphasis

D. Standards and Guidelines

3. Recreation Opportunity Spectrum (ROS) experiences will be compatible with timber objectives. In most cases, this will be the Roaded Natural Recreation ROS class (LRMP 4-67).

Management Guide for the Shasta and Trinity Units of the Whiskeytown-Shasta-Trinity National Recreation Area

The purpose of the National Recreation Area (NRA) management guide is to integrate past decisions that are still pertinent for managing the NRA today with standards, guidelines, and management prescriptions incorporated from the April 1995 Forest LRMP. Direction from the NRA guide as it relates to proposed open areas below the high-water marks on Shasta Lake and Trinity Lake is listed below. Direction regarding recreation special uses is outside the scope of this analysis and not included here.

Chapter IV – Recreation Land Based

Shasta and Trinity Units

The feasibility of developing recreational facilities to increase recreation opportunities with fluctuating lake levels, such as floating picnic and/or camp sites will be explored (NRA Guide, IV-9).

Shasta Unit

Use will be monitored at dispersed camping locations below high water to see if sanitation problems suggest closing of the areas. The feasibility of providing level 1 facilities at traditional dispersed camping areas below high water (Jones Valley, Gregory Beach, Sugarloaf and Beehive) will be explored. If any or all sites are feasible, funding to construct facilities will be pursued (NRA Guide, IV-10).

Trinity Unit

On Trinity Lake, dispersed overnight camping is allowed from Carrville Pond to Jackass Springs above the high water-line unless posted. No overnight vehicle camping below the high water-line

is permitted anywhere else on the lake. Dispersed boat-access overnight camping is allowed above the high-water mark unless posted for wildlife (NRA Guide, IV-11).

Access to lakeshore for day-use activities during low lake levels will be studied to improve vehicle access where feasible. Priority locations are Hayward Flat, Tannery, Bowerman, Stuart Fork and Trinity Center (NRA Guide, IV-11).

Off-Highway vehicle use will be allowed on all open roads unless signed closed. Signs will be posted prohibiting off-highway vehicle use within restoration and wildlife enhancement project areas (NRA Guide, IV-12).

Impacts Relevant to Recreation Include

1) The compatibility of proposed changes to the NFTS with LRMP recreation and OHV management prescriptions and ROS.
2) The impact of proposed changes to the NFTS on nonmotorized (i.e., quiet) recreation (dust, noise, use conflicts).
3) The amount and diversity of motorized recreation opportunity by alternative.
4) The amount of motorized access to dispersed recreation by alternative.
5) The impact of proposed changes to the NFTS on neighboring private and Federal lands (dust, noise, use conflicts).

Assumptions Specific to Recreation Analysis

1) The prohibition of cross-country travel is not a change to ROS (semi-primitive motorized for example). It is simply a prohibition within that ROS 'zone' to travel off of designated routes.
2) The change from an **open to cross-country travel** condition to a **cross-country travel prohibited** condition will reduce the availability of acreage for both motorized recreation as well as motorized access to dispersed recreation activities.
3) The change from an open to cross-country travel condition to a cross-country travel prohibited condition will increase the availability of acreage for nonmotorized recreation as well as nonmotorized access to dispersed recreation activities.
4) Proposed additions to the NFTS will have a beneficial effect on motorized recreation opportunities by providing a variety of trail riding experiences and increasing the amount of motorized recreation opportunities (loops, connectors).
5) Proposed changes and additions to the NFTS will have a beneficial effect on the amount of motorized access to dispersed recreation opportunities available.
6) The forest's National Visitor Use Monitoring (NVUM) report accurately expresses the most popular motorized and nonmotorized recreation activities for use in this analysis.

7) The area of influence (dust, noise) of motorized use on populated areas or 'quiet recreation' opportunities is 0.5 mile from associated boundaries (e.g., wilderness, Research Natural Area, property line, urban limit line).
8) Data is lacking regarding use analysis of the unauthorized routes (traffic counts, etc.); therefore, it would be highly speculative to make assumptions of use levels on the unauthorized routes.
9) The majority of the motorized public use occurring on NFS land is occurring within the existing NFTS based on observation and NVUM data.
10) For each unauthorized route added to the NFTS as a road or trail for the purpose of accessing dispersed recreation, a minimum of one site is accessed. In many instances, multiple sites may be accessed through the addition of these routes to the system, but this number acts as a surrogate to determine how many dispersed areas are accessed under each alternative.

Data Sources

1) The Shasta-Trinity National Forest LRMP for distribution of ROS Class.
2) The forest's NVUM results for most popular recreation activities and marketing data.
3) Local knowledge of forest recreation staff for qualitative research information and background.
4) The forest's GIS database for existing roads, trails, and management areas for private and Federal boundaries, and/or quiet recreation measurement indicator determinations.
5) 2007 Shasta-Trinity National Forest map.
6) Management Guide for NRA

Recreation Indicator Measures

Indicator measures are intended to address how each alternative as the sum total of its proposed actions conforms to the LRMP, significant issues identified in scoping, and subpart B of the Travel Management Rule: whether the motorized recreation opportunity conflicts with other recreation opportunities, specifically nonmotorized opportunities, the proximity of motor vehicle use to populated areas or neighboring private and Federal lands; the quality of the motorized recreation experience; and the quality of motorized access to dispersed areas for both motorized and nonmotorized uses. It also responds to the amount of motorized access available on the unit. Conflicts with other resources are examined in other resource sections. Public safety is addressed in the transportation section.

Indicator measures were used to analyze the effects of changes to the NFTS by vehicle class as well as the addition of unauthorized routes to the NFTS as roads or trails. Mileage available for each class of vehicle is useful in analyzing the ability of forest users to not only travel around the forest and enjoy motorized recreation opportunities, but also to access nonmotorized recreation opportunities, such as trailheads, hunting, and dispersed recreation sites for activities such as fishing and camping, which the forest has determined are important based on both NVUM data and public scoping for this project. Mileage for motorized recreation is an indicator of the number and types of experiences available for

motorcycles, ATVs, and four-wheel drives in each alternative. The changes to motorized mileages can be used to interpret the level of change in opportunities for motorized and nonmotorized users. The details of the proposed seasonal closures relate to both the months that motorized recreation will not be allowed to use designated roads and trails and, conversely, the time of year that conflicts between motorized and nonmotorized uses will be minimized. Also, the effect on nonmotorized recreation activities that are accessed by native surface roads is considered. Number of acres located 0.5 mile away from roads, trails, and boundaries are used to analyze the opportunity for nonmotorized and 'quiet' recreation on the forest. Finally, to determine the amount of dispersed recreation access provided under each alternative, a method was applied that a minimum of one site is accessed by each route (in many instances multiple sites are accessed, but one site is used as a proxy).

Measurement Indicator 1

Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan

Description

As explained in the Land and Resource Management Plan Final EIS Chapter III Recreation, page III-66, the Recreation Opportunity Spectrum is a system that inventories National Forest lands for a variety of existing and potential recreation opportunities based on the size, distance from roads, and degree of development. This measurement indicator looks at the impact of proposed changes to the NFTS on the Recreation Opportunity Spectrum.

Method

The range of Recreation Opportunity Spectrum class settings under each alternative and number of required non-significant Recreation Opportunity Spectrum plan amendments (and or any associated changes to LRMP recreation and OHV management prescriptions) displayed by associated acreage changes in the LRMP by alternative. Recreation Opportunity Spectrum class settings were determined using management prescriptions in the LRMP. The action alternatives do not propose route additions in primitive or semi-primitive nonmotorized recreation settings. Route additions are proposed only in semi-primitive motorized and roaded natural settings. Therefore, the range of available Recreation Opportunity Spectrum settings would remain the same in each alternative and no Recreation Opportunity Spectrum plan amendments would be needed for any alternatives.

Defined below are the Recreation Opportunity Spectrum classifications for areas where proposed motorized routes are located. The definitions given are from Chapter VII Glossary of the LRMP final EIS.

Semi-Primitive Motorized (SPM): An area 1/2 mile from roads and trails with motorized use and generally 2,500 to 5,000 acres in size. May have moderately dominant alterations to an essentially natural setting with motorized use of roads and trails.

Roaded Natural (RN): An area 1/2 mile or less from roads and trails and open to motorized use. Resource modifications and utilization practices are evident but harmonize with the natural environment.

Measurement Indicator 2

Nonmotorized Recreation Opportunity

Description

This measurement indicator looks at the impact of proposed changes to the NFTS on nonmotorized recreation (dust, noise, use conflicts). It also addresses the effects on quiet recreation.

Method

Number of acres within one half mile of an area where motorized use is allowed (designated roads, trails, and areas in the NFTS miles that would result under each alternative). This method was determined through a literature review of sound studies and reports listed in chapter 4.

For Table 3.01-1, effects as a result of acreage within 0.5 mile distance of route additions will be discussed under direct and indirect effects of the Environmental Consequences section. The resulting effects to nonmotorized recreation, when combined with all routes per alternative, will be discussed under cumulative effects.

Measurement Indicator 3

Motorized Recreation Opportunity

Description

This measurement indicator looks at the impact of proposed changes to the NFTS to wheeled motorized recreation opportunities by alternative.

Method

Roads: Number of miles available by vehicle class and season of use.

Trails: Number of miles available by vehicle class and season of use.

Areas: Number acres in open areas by vehicle class and season of use.

Quality of Trail Experience: Number of miles by trail class and degree of difficulty

Table 3.01-1. Acreage within ½ mile of routes proposed for public use under each alternative as a measurement indicator of % acreage available for quiet recreation and nonmotorized activities without the potential for use conflicts with motor vehicles

Routes Analyzed	Alt 1		Alt 2		Alt 3		Alt 4		Alt 5	
	Acreage within ½ Mile Zone	% of Total Forest Acreage Considered Quiet [d]	Acreage within ½ Mile Zone	% of Total Forest Acreage Considered Quiet	Acreage within ½ Mile Zone	% of Total Forest Acreage Considered Quiet	Acreage within ½ Mile Zone	% of Total Forest Acreage Considered Quiet	Acreage within ½ Mile Zone	% of Total Forest Acreage Considered Quiet
Unauthorized route additions only	0 [a]	N/A	52,655	N/A	0 [a]	N/A	12,165	N/A	97,207	N/A
All routes combined in alternative [b]	1,347,153 [b]	36.72%	1,285,157	39.63%	1,273,212 [c]	40.19%	1,275,510	40.04%	1,290,500	39.38%

a Alternatives 1 and 3 do not propose route additions.
b Analysis of All routes combined for Alternative 1 includes the inventoried unauthorized motorized roads and trails, existing motorized NFTS roads and trails, and motorized routes owned by others within Forest boundaries.
c Analysis of All routes combined for Alternative 3 includes existing motorized NFTS roads and trails and motorized routes owned by others within Forest boundaries. This figure serves as the base for which Alternatives 2, 4, and 5 add their acreages that are within 0.5 mile of their proposed additions. The totals factor in noise area overlaps when additions are applied.
d % Total of Forest Acreage Considered Quiet is not applied to the direct or indirect effects discussion, but is under cumulative effects.

3a. Roads

Table 3.01-2 lists miles of proposed road additions by vehicle class and season of use. All roads proposed in Alternatives 2, 4, and 5 would be added as level 2 roads allowing use by all vehicle classes (highway-legal and non-highway legal). Seasonal restrictions vary by particular routes based on site-specific resource concerns as listed in appendix A and appendix D.

For Tables 3.01-2 through 3.01-7, effects as a result of changes to the NFTS in terms of road, trail, and area additions (along with their associated vehicle classes and seasons of use) will only be discussed under direct and indirect effects of the Environmental Consequences section. The effects, when combined with the total miles or acres, will be discussed under Cumulative Effects.

Table 3.01-2. Road mileage open to the public forest-wide by alternative (class of vehicle and season of use); changes to vehicle class in NFTS in alternatives 4 and 5 (30.41 miles of mixed-use on level 3 roads)

Class of Vehicle[c]	Season of Use	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
		Miles Proposed				
Highway-Legal Motorcycle	Varies by route and resource needs	0	36.51	0	0.88 new and 30.41 miles of existing level 3 roads proposed to allow mixed-use	43.49 new and 30.41 miles of existing level 3 roads proposed to allow mixed-use
Highway-Legal 4WD						
Passenger Car						
Non-Highway-Legal 4WD						
Non-Highway-Legal ATV	Aug 16 - Dec 31[c]					
Non-Highway-Legal Motorcycle	Aug 16 – Jan 31[d]					
Total Proposed Roads Open to Non-Highway-Legal Use		**0**	**36.51**	**0**	**31.29[b]**	**73.90[b]**
Total Proposed and Existing NFTS Roads Available to Varying Vehicle Classes		**5,329[a]**	**5,365**	**5,329[a]**	**5,330**	**5,373**

a There are 5,329 miles of existing NFTS roads .
b All vehicle classes can use proposed route additions and existing NFTS roads proposed for mixed-use.
c Season of Use applies to 0.06 miles of proposed road additions under alternatives 2 and 5 for bald eagle nests.
d Season of Use applies to 0.28 miles of proposed road additions under alternative 2, 0.87 miles under alternative 4 and 0.9 miles under alternative 5 for northern goshawk.

3b. Trails

Degree of difficulty is a measure of the motorized recreation experience, and is assigned using criteria such as trail condition, alignment, steepness of grades, gain and loss of elevation, natural barriers that must be crossed, and potential for change due to weather. In this analysis, identifying the degree of difficulty is a subjective exercise based on comparing the experiences found on roads versus trails. It is assumed that travel on motorized trails is more difficult due to the likelihood of encountering the greater pitch variations, tighter turns, and natural obstacles inherent in trail travel.

Table 3.01-3. Trail mileage open to the public forest-wide by alternative (class of vehicle and season of use)

Class of Vehicle	Season of Use	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
		Proposed Miles				
Highway-Legal High Clearance 4WD	N/A	0	0	0	0	0
Dual Sport Highway-Legal Motorcycle	May 1–Oct 30 [c]		7.69		14.68	62.62
Non-Highway-Legal 4WD	N/A		0		0	0
Non-Highway-Legal ATV – 50" in width or less	Aug 16–Jan 31 [b] May 1–Oct 30 [c]		6.25		12.72	59.91
Non-Highway-Legal Motorcycle	May 1–Oct 30 [c]		7.69		14.68	62.62
Total Proposed and Existing NFTS Trails Available for Varying Vehicle Classes		**87[a]**	**94.69**	**87 [a]**	**101.68**	**149.62**

a There are 87 miles of existing NFTS motorized trails.
b Applies to 0.06 miles of vehicles 50" or less in width proposed trail additions under alternative 2 and 1.24 miles under alternative 5 for northern goshawk.
c Applies to 0.15 miles of motorcycle only trails in alternative 4 and 0.07miles of vehicles 50" or less in width and 0.74 miles of motorcycle only trails under Alternative 5.

3c. Open Areas

The proposed open areas are located below the high-water marks on three reservoirs, Shasta Lake, Trinity Lake, and Iron Canyon Reservoir. Alternative 2 proposes to designate open areas on two of the lake bottoms (Shasta-and Trinity Lakes), while alternatives 4 and 5 propose open areas on all three. Alternative 3 proposes no open areas. Under alternative 1, motor vehicle use on the reservoirs would continue with only the existing bald eagle seasonal restrictions, 2,205 acres on Shasta Lake and 649 acres on Trinity Lake.

The Forest co-manages the Chappie-Shasta OHV Area with the BLM and Bureau of Reclamation. Motorized use in the Chappie-Shasta OHV Area is on designated trails only–there is no cross-country travel allowed. The open areas proposed below the high-water marks would not include designated routes, but would allow managed motor vehicle travel between the high-water mark and the waterline.

Table 3.01-4. Proposed open area acreage forest-wide by alternative by vehicle class

Vehicle Class	Season of Use [c]	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
		Acreage	Acreage	Acreage	Acreage	Acreage
Total Open to Non-Highway Legal Use [b]	No proposed restrictions. See [C].	**0**	**0**	**0**	**0**	**16,073** **2,854** **25,549**
Total Open to Highway Legal Use [b]		**0**	**15,644** **2,854** **25,549**	**0**	**16,073** **2,854** **25,549**	**16,073** **2,854** **25,549**
Total Acreage in Alternative		**1,632,316 [a]**	**44,047**	**0**	**44,476**	**44,476**

a Total acreage for alternative 1 is all national forest system lands outside wilderness.
b Acreage additions for alternatives 2, 4, and 5 represent lake bottom area additions.
c Existing season of use restrictions to protect nesting bald eagles apply (2,205 acres on Shasta Lake and 649 acres on Trinity Lake). These are from August 16 – December 31

Measurement Indicator 4

Type of Motorized Access to Dispersed Recreation

Description

This measurement indicator looks at the impact of proposed changes to the NFTS to motorized access to dispersed recreation opportunities by alternative.

Method

Roads: Number of routes available.

Quality of Road/Dispersed Experience: Number of facilities provided as surrogate for number of dispersed sites accessed. One site per route addition for the purposes of access to dispersed recreation will be used as a proxy (although in some instances multiple sites are accessed via a single route addition).

Trails: Number of routes available.

Quality of Trail Experience: Number of facilities provided as surrogate for number of dispersed sites accessed. One site per route addition for the purposes of access to dispersed recreation will be used as a proxy (although in some instances multiple sites are accessed via a single route addition).

For Table 3.01-5, effects to changes to the NFTS as a result of unauthorized route additions will only be discussed under direct and indirect effects in the Environmental Consequences section. The effects of these changes, when combined with the sites accessed will be discussed under cumulative effects.

Table 3.01-5. Number of dispersed recreation sites accessed by routes proposed for addition to the NFTS under each alternative

Route Additions	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	Number of Dispersed Sites Accessed	Number of Dispersed Sites Accessed	Number of Dispersed Sites Accessed	Number of Dispersed Sites Accessed	Number of Dispersed Sites Accessed
Unauthorized Road Additions	0	71	0	1	100
Unauthorized Trail Additions	0	17	0	25	123
Total Sites Accessed in Alternative	**5,219** [a]	**88**	**0**	**26**	**223**

a For Alternative 1 the number of dispersed sites accessed was determined using the proxy of one site per route section of the total unauthorized motorized routes inventoried.

Measurement Indicator 5

Impact of Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflicts)

Description

This measurement indicator looks at the impact of proposed changes to the NFTS on neighboring private and Federal lands (dust, noise, use conflicts) by alternative.

Method

Number of miles of new routes proposed within 0.5 mile of populated areas, neighboring Federal land boundaries, wilderness boundaries, and private land boundaries. (Acts as surrogate indicating how much conflict off NFTS may occur by alternative.) This method was determined through a literature review of sound studies and reports listed in chapter 4 of this document.

Table 3.01-6. Number of miles of routes proposed for addition to the NFTS under each alternative within 0.5 mile of neighboring private and Federal lands, and wilderness boundaries

Route Additions	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	Mileage	Mileage	Mileage	Mileage	Mileage
Unauthorized Route Additions	0	23	0	1.5	40.6
Total Mileage in Alternative [b]	5,467 [a]	4,020	3,997 [b]	3,999	4,038

a For Alternative 1 the mileage within one-half mile of neighboring private and Federal lands and wilderness areas was determined using the NFTS routes and unauthorized road and trail miles inventoried.
b For Alternatives 2 through 5 the "Total Mileage in Alternative" was determined using the existing NFTS and proposed route additions for that alternative.

For Table 3.01-6, unauthorized route additions will only be discussed under direct and indirect effects in the Environmental Consequences section. The total mileage effects will be discussed under Cumulative Effects.

Affected Environment/Environmental Consequences

Affected Environment

Nearly all forest visitors, regardless of the purpose for their visit, use the motorized transportation system to reach their destination. Imposing changes to traditionally accepted forest practices, such as motorized cross-country travel, will change the diversity of motorized and nonmotorized opportunities on the forest. The use of motor vehicles serves as the prime source of recreation for many, while others use them to access trailheads, facilities, destinations, or geographic areas for nonmotorized recreational enjoyment.

The Shasta-Trinity National Forest is the largest forest in California with diverse landscapes ranging from 1,000 to 14,162 feet in elevation. The 2.1 million acre forest encompasses five wilderness areas, hundreds of mountain lakes, and 6,278 miles of streams and rivers, and shares its boundaries with private, state, and other federal lands. The forest is pivotal to the economies, tourism, and recreational aspects of northern California.

The Shasta-Trinity National Forest offers a wide range of recreational activities and opportunities for motorized and nonmotorized use alike. Nonmotorized opportunities include hiking, backpacking, mountain climbing, mountain biking, horseback riding, camping, fishing, boating, sightseeing, cross-country and downhill skiing, and snowboarding. Motorized opportunities involve use of highway licensed vehicles, motorcycles, and OHVs like ATVs of all varieties, four-wheel drives, and snowmobiles. While designated wilderness areas are closed to all motorized travel, about 1,632,316 acres of land are located outside of wilderness and available for cross-country motorized travel. Forest visitors commonly utilize lake bottoms for both motorized and nonmotorized recreation. Visitors launch watercraft from lake bottoms; camp as individuals or in group settings with tents, RVs, and trailers; drive OHVs, or simply stroll the water's edge.

The Shasta-Trinity National Forest lies within portions of Humboldt, Shasta, Siskiyou, Tehama, and Trinity Counties. The Forest is divided into 7 ranger districts that oversee 12 management areas, and includes portions of 5 designated wilderness areas: Castle Crags, Chanchellula, Mount Shasta, Trinity Alps, and Yolla Bolly-Middle Eel. The New River, North Fork, South Fork, and main branch of the Trinity River, which run through the Forest, are designated wild and scenic. A 154-mile section of the Pacific Crest Trail runs east-west across-the forest. The Trinity Heritage and the Trinity River Scenic Byways are scenic drives in the area. The Whiskeytown-Shasta-Trinity National Recreation Area (NRA) also supports a large variety of recreation opportunities and draws many visitors to the Forest.

The Whiskeytown-Shasta-Trinity NRA is comprised of 246,087 acres divided into three units: Whiskeytown (42,500 acres), Shasta- and Trinity (203,587 acres). Each area encompasses a large manmade lake surrounded by mountainous terrain. The NRA is a draw for outdoor enthusiasts for camping, picnicking, fishing, swimming, paddling, boating, water-skiing, swimming, backpacking, horseback riding, mountain biking, off-roading, hiking, and hunting. Of the 246,087 acres that make up the NRA, 203,587 acres are managed by the Shasta-Trinity National Forest. The Forest Service manages Shasta, Trinity, and Lewiston Lakes; the National Park Service manages Whiskeytown Lake.

Iron Canyon, Lewiston Lake, Lake McCloud, Shasta Lake and Trinity Lake are large lakes and reservoirs in the area for fishing, boating, and camping. Permitted uses in lake-bottom areas include resorts, marinas, private houseboat moorages, and access to boat docks and ramps. Lake bottoms of Shasta Lake, Trinity Lake, and Iron Canyon Reservoir provide terrain that many ATV riders seek. In recent drought years with large areas below the high-water marks exposed, the lake bottoms have attracted motor vehicle users who speed and spin on the flat areas, and drive up and down the steep slopes within the lake bed and at the lakes' edges. This unmanaged use on the lake bottoms has caused conflict among users and has impacted natural and cultural resources.

The Chappie-Shasta OHV area (Chappie-Shasta) is the biggest draw for OHV and ATV use in the area, and is co-managed by the Redding BLM Field Office, the USDA Forest Service, Shasta-Trinity NRA, and the Bureau of Reclamation (BOR). The area also includes a large amount of interspersed

private land. Chappie-Shasta encompasses 52,000 acres, and provides for approximately 250 miles of trails and roads suitable for OHV use. Cross-country travel is prohibited in the Chappie-Shasta OHV area; users must stay on designated trails and roads.

Although areas and trails for the vehicular use listed above are already provided on the Forest, use is still occurring where it was not planned or intended, and resource damage (characterized by unauthorized routes) is evident in locations throughout the forest. In fact, forest inventory records show 1,253 miles of known unauthorized routes across the Shasta-Trinity National Forest. Unplanned motorized routes have the potential to elevate an area's Recreation Opportunity Spectrum from one where motorized use is not expected (e.g., semi-primitive non-motorized) to one where it is visible and occurring like semi-primitive motorized or roaded natural. They also have the potential to encroach upon areas of important heritage value or wildlife sensitivity and cause disruptions that require mitigation. Those potential effects are discussed in the appropriate resource sections elsewhere in this chapter.

Cross-country motorized vehicle travel refers to using motorized transportation on forest lands to access areas on the forest, or beyond, where there are no authorized NFTS routes. This can be open, uncharted terrain or on unauthorized routes that to the casual observer can appear as a legitimate route due to its development from use over time. Some unauthorized routes become established on remnant logging roads or other formerly managed roads that are no longer part of the NFTS, but were never obliterated and remain on the landscape. Unauthorized motorized road and trail networks have proliferated and grown over time, resulting in fewer places for quiet recreational pursuits especially for areas outside of designated wilderness. In 2002 the Shasta-Trinity National Forest completed National Visitor Use Monitoring, a survey designed to assess the existing recreation demand on the forest by asking visitors what they did during their visits. The following tables summarize the results of the survey by activity.

Table 3.01-7. Shasta-Trinity NF visitor activity participation and primary activity as reported in NVUM results (2002)

Activity	Percent Participating	Number of Visitors	Percent as Main Activity	Number of Visitors
Developed Camping	19%	580,556	5%	152,778
Primitive Camping	5%	152,778	0.4%	12,222
Backpacking	6%	183,333	2%	61,111
Resort Use	4%	122,222	1%	30,556
Picnicking	14%	427,778	2%	61,111
Viewing Natural Features	44%	1,344,445	18%	550,000
Visiting Historic Sites	4%	122,222	0.4%	12,222
Nature Center Activities	7%	210,833	2%	45,833
Nature Study	5%	152,778	1%	27,500
Relaxing	41%	1,252,778	11%	336,111
Fishing	27%	825,000	16%	488,889
Hunting	11%	336,111	9%	275,000

Activity	Percent Participating	Number of Visitors	Percent as Main Activity	Number of Visitors
OHV Use	5%	152,778	0.3%	9,167
Driving for Pleasure	11%	336,111	2%	61,111
Snowmobiling	3%	91,667	0%	9,167
Motorized Water Activities	22%	672,223	9%	275,000
Other Motorized Activities	1%	21,389	1%	21,389
Hiking/Walking	28%	855,556	7%	201,667
Horseback Riding	0%	6,111	0%	6,111
Bicycling	5%	152,778	2%	61,111
Nonmotorized Water	6%	183,333	3%	91,667
Downhill Skiing	3%	91,667	2%	64,167
Cross-country Skiing	4%	122,222	2%	70,278
Other Nonmotorized	20%	611,111	4%	122,222
Gathering Forest Products	8%	244,445	1%	30,556
Viewing Wildlife	32%	977,778	2%	61,111
No Activity Reported	19%	577,500	20.3%	620,278

Based on the reported 3,055,557 visits to National Forest System land on the Shasta-Trinity National Forest during fiscal year 2002, this would mean that 336,111 visitors spent some time driving for pleasure, 152,778 used OHVs during their visit; the main activity for 9,167 visitors was OHV use. Based on the 2002 year visits, when primary motorized uses are combined (including OHV use, driving for pleasure, and other motorized activities) approximate visitor numbers were 91,667 versus 953,334 for primary nonmotorized uses combined, including backpacking, fishing, horseback riding, hiking/walking, bicycling and other nonmotorized activities. The figures in Table 3.01-8 (91,667 versus 953,334) indicate that as many as 10 times the number of visitors seek nonmotorized forms of recreation than motorized.

Specific recreation uses or activities are not described in the following analysis, except for vehicle class. The terms motorized and nonmotorized are used instead. Examples of what activities are considered motorized and nonmotorized are given in Table 3.01-8. Dispersed recreation refers to the recreation activities listed above that occur in general forest areas outside of designated sites or developed facilities or areas, and is practiced by motorized and nonmotorized users alike.

Table 3.01-8. Approximate Shasta-Trinity NF visitors by type of main activity

Type of Use	NVUM Activity Category	Percent Participating	Number of Visitors	Percent as Main Activity	Number of Visitors
Camping	Developed Camping	19%	580,556	5%	152,778
	Primitive Camping	5%	152,778	0.4%	12,222
Hunting	Hunting	11%	336,111	9%	275,000
Motorized Uses	OHV Use	5%	152,778	0.3%	9,167
	Driving for Pleasure	11%	336,111	2%	61,111
	Other Motorized Activities	1%	21,389	1%	21,389
Nonmotorized Uses	Backpacking	6%	183,333	2%	61,111
	Fishing	27%	825,000	16%	488,889
	Hiking/Walking	28%	855,556	7%	213,889
	Horseback Riding	0%	6,111	0%	6,111
	Bicycling	5%	152,778	2%	61,111
	Other Nonmotorized	20%	611,111	4%	122,222
Other Activities	Resort Use	4%	122,222	1%	30,556
	Picnicking	14%	427,778	2%	61,111
	Viewing Natural Features	44%	1,344,445	18%	550,000
	Visiting Historic Sites	4%	122,222	0.4%	12,222
	Nature Center Activities	7%	210,833	2%	45,833
	Nature Study	5%	152,778	1%	27,500
	Relaxing	41%	1,252,778	11%	336,111
	Gathering Forest Products	8%	244,445	1%	30,556
	Viewing Wildlife	32%	977,778	2%	61,111
Water Sports	Motorized Water Activities	22%	672,223	9%	275,000
	Nonmotorized Water	6%	183,333	3%	91,667
Winter Sports	Downhill Skiing	3%	91,667	2%	61,111
	Cross-country Skiing	4%	122,222	2%	61,111
	Snowmobiling	3%	91,667	0%	9,167

Environmental Consequences

Short-term Timeframe: 1 year

Long-term Timeframe: 20 years

Spatial Boundary: The forest boundary is the unit of spatial analysis when considering effects associated with changes in the NFTS or season of use.

Rationale for Measurement Indicators: The effects measurement indicators are based on NFMA and Travel Management Rule requirements as well as significant issues raised during internal and public scoping.

- Measurement Indicator 1–Recreation Opportunity Spectrum consistency with the Land and Resource Management Plan
- Measurement Indicator 2–Nonmotorized recreation opportunity
- Measurement Indicator 3–Motorized recreation opportunity
- Measurement Indicator 4–Type of motorized access to dispersed recreation
- Measurement Indicator 5–Impact of proposed changes to NFTS on neighboring private and Federal lands (dust, noise, use conflict)

Alternative 1 – No Action

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Under the no-action alternative, there would be no prohibition of cross-country travel; so there would be no net change in current opportunities to motorized recreation.

1. Direct and Indirect Effects to Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan

Consistency with the Recreation Opportunity Spectrum was explained previously under measurement indicator 1 (page 86). Under the no-action alternative, motorized recreation users would be allowed to travel along any currently unauthorized road or trail or through open areas outside of designated wilderness. As described in the LRMP, management areas have a mix of nonmotorized and motorized Recreation Opportunity Spectrum classifications in their prescriptions. In the long-term, under the no-action alternative, motorized use could inadvertently spread to nonmotorized areas such as administratively withdrawn areas as described in chapter 4 of the LRMP, and change what is supposed to be a nonmotorized ROS class to one that has characteristics of motorized use.

2. Direct and Indirect Effects to Nonmotorized Recreation

The short-term and long-term effects of cross-country motorized travel include the increased potential for conflicts with users seeking a quiet recreation experience. By permitting cross-country motorized travel, routes can be expected to continue proliferating in the short- and long-term, reducing the amount of opportunities for quiet, nonmotorized experiences. Under this alternative, the entire forest, except for designated wilderness areas, would be available for cross-country motorized travel. Portions of areas greater than 0.5 mile from an NFTS or unauthorized motorized route could be considered quiet under this alternative; however, with unrestricted cross-country travel, no acres outside of designated wilderness are guaranteed quiet.

3. Direct and Indirect Effects to Motorized Recreation

Measurement indicator 3, Table 3.01-2 - Table 3.01-4, shows that 5,329 miles of NFTS roads, 87 miles of NFTS trails and 1,632,316 acres of area are available for cross-country motorized use. This includes using motor vehicles as the primary source for recreation; traveling to miscellaneous locations for nonmotorized use; or reaching a destination for dispersed recreation. These figures would remain unchanged in this alternative.

4. Direct and Indirect Effects to Type of Motorized Recreation Access to Dispersed Recreation

Measurement indicator 4 shows that 5,219 dispersed recreation sites are accessed as a result of open cross-country motorized travel (according to the method given for quantifying dispersed recreation sites for this indicator). This figure would remain unchanged in this alternative. Using the method for measurement indicator 4, this alternative provides the most motorized access to dispersed recreation sites.

5. Direct and Indirect Effects of Impact of Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflict)

It is difficult to determine where or when cross-country motorized travel would occur in the short- and long-term. With no prohibition on cross-country motorized travel, the number of motorized routes within 0.5 mile of neighboring private and Federal lands can be expected to increase in the long-term. Along with this increase is an increase in the amount of dust, noise, and use conflict within this zone. With cross-country motorized travel allowed over most of the forest, this alternative would have the greatest impact on neighboring private and Federal lands and wilderness areas in terms of noise, dust, and use conflict.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Alternative 1 does not propose adding roads, motorized trails, or open areas to the NFTS. Therefore, there would be no direct or indirect effects of adding facilities. Motorized opportunities on 6,294 miles of NFTS roads, 87 miles of NFTS motorized trails and 1,632,316 acres open to cross-country motor vehicle travel remains unchanged. Visitors and businesses operating water-based recreation businesses on lake bottoms would hear continuous background noise from OHVs, while motorized recreation enthusiasts and

those accessing boat docks, etc., would continue to have unlimited motorized access from the high-water mark to the waterline.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Alternative 1 does not propose changes to the NFTS so there would be no direct or indirect effects. The current conditions of vehicle classes and seasons of use (see alternative 1 map) regarding loops, extended rides, and motorized access to dispersed recreation would continue.

Cumulative Effects for Alternative 1

The cumulative effects analysis for the recreation resource considers the impact of the alternatives when combined with the following past, present, and foreseeable future actions and events:

- NFTS and unauthorized routes,
- watershed and road projects with decisions or proposals to close, abandon, add, or decommission NFTS or unauthorized roads,
- fuel and vegetation treatment,
- grazing management,
- minerals and geology,
- special uses and lands management,
- recreation, and fish, wildlife and rare plant management.

For a full list of the present and reasonably foreseeable future actions considered in this analysis, see appendix B. The spatial boundary (forest-wide) of the cumulative effects analysis was selected because impacts to the recreation system in one area of the forest can affect the continuity of the system and public access opportunities in other parts of the forest. The temporal scope of 20 years was selected because impacts to recreation and public access can continue over time. The effects anticipated from the projects listed in appendix B could reach 20 years into the future, depending on when the projects are implemented.

The past activities, including the existing NFTS, have shaped the recreation opportunities and Recreation Opportunity Spectrum settings available on the forest. The effects of the present and reasonably foreseeable future activities listed in appendix B would continue to shape the recreation opportunities and ROS settings available. The measurement indicators for this analysis as shown in Table 3.01-1 – Table 3.01-6 describe the existing NFTS, unauthorized motorized routes, and proposed route additions and open areas to determine cumulative effects of the proposed alternatives. Generally, the last row of each table totals the proposed actions with the existing condition by alternative.

No additions or changes to the NFTS are proposed in alternative 1, therefore there are no cumulative effects. Continuation of cross-country travel could result in cumulative effects when considered with present and future actions on the Shasta-Trinity National Forest.

1. Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan

Under alternative 1, the continuation of cross-country motorized travel could affect consistency with the Recreation Opportunity Spectrum in the future as described above. However, it is anticipated that the effects of the present and reasonably foreseeable future actions listed in appendix B would be consistent with the ROS classifications assigned to the management prescriptions in which the actions occur, so no cumulative effects are expected.

2. Nonmotorized Recreation Opportunity

For measurement indicator 2 under this alternative, 1,347,153 acres of the forest would be inside of 0.5 mile from all NFTS and inventoried unauthorized routes. The result is that 36.72 percent of the forest acreage would be considered quiet, the least amount when compared to the other alternatives. The present and foreseeable projects listed in appendix B are typical management activities that occur on the forest with the potential to produce noise, dust, and use conflicts when they are in operation, due to machinery and equipment. The levels and duration of noise, dust, and use conflicts they produce are temporary and not expected to have noticeable effects to the amount of overall quiet recreation experienced under this alternative.

3. Motorized Recreation Opportunity

For measurement indicator 3 (Table 3.01-2 – Table 3.01-4) under this alternative, all unauthorized roads, trails and areas will remain. Over time, by permitting cross-country motorized travel, more unauthorized motor vehicle access routes can be expected to develop, resulting in more access or opportunity for motorized experiences, and motorized access to nonmotorized experiences, including various types of dispersed recreation. Unrestricted use below the high-water marks on the lakes would continue.

On-going road and trail maintenance is essential for creating and managing a cohesive motorized transportation system. The cumulative effect of increasing road and trail use combined with the trend of deferred maintenance could be erosion and deterioration of roads, an increased risk of failure, and subsequent loss of motorized recreation opportunity and quality. In the long-term, a lack of maintenance could result in the closing of routes in order to prevent resource damage. More specifically, present and reasonably foreseeable actions includes adding 5.60 miles of unauthorized roads to the existing NFTS, constructing 0.46 miles and eliminating 186.1miles through abandonment, decommissioning, or closure in transportation projects, resulting in a net loss of 180 miles to the NFTS. Under this alternative, that would reduce the total miles of roads in the NFTS to 5,149 miles as opposed to the existing 5,329 miles of NFTS road shown in Table 3.01-2 for this alternative. There are no present or reasonably foreseeable actions for motorized trails. When combined with other actions, the cumulative effect is a 3.3 percent reduction in motorized recreation opportunity (to include dispersed recreation) on the NFTS routes. None

of the present and reasonably foreseeable future projects described in appendix B would contribute to effects on the lake bottoms.

4. Type of Motorized Access to Dispersed Recreation

With regards to measurement indicator 4 under this alternative, there would be motorized access to a total of 5,219 dispersed recreation sites, according to the method given for determining access to dispersed recreation sites. Although the implementation of present and reasonably foreseeable projects would reduce the miles of NFTS roads, (that would equate under this indicator to a decrease in access to dispersed recreation), the overall effect of continued cross-country motorized use would be unlimited access (outside wilderness areas) for motorized dispersed recreation.

5. Impact of Proposed Changes to NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflicts)

For measurement indicator 5 under this alternative, 5,467 miles of motorized routes, both NFTS and inventoried unauthorized routes, would exist within 0.5 mile of neighboring private and Federal lands and wilderness areas. In permitting cross-country motorized travel, the number of motorized routes within 0.5 mile of neighboring private and Federal lands can be expected to increase over time, and along with it, increase the amount of dust, noise, and use conflict that is currently experienced. When compared to the other alternatives, this alternative would have the greatest foreseeable impact on neighboring private and Federal lands in terms of creating more dust, noise, and use conflict than is currently experienced. However, the present and foreseeable projects listed in appendix B are typical management activities that occur on the Forest with the potential to produce dust and noise when they are in operation, due to machinery and equipment. The levels and duration they produce are not expected to have cumulative effects on neighboring private and Federal lands under this alternative.

Alternative 2 – Proposed Action

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Alternative 2 prohibits cross-country motorized travel on 1,599,062 acres of forest land. The direct and indirect effects of this action, as demonstrated through the measurement indicators used for this analysis, favors nonmotorized recreational users by creating quiet areas on the forest and reducing noise and dust impacts to neighboring private and Federal lands and near wilderness area boundaries. The elimination of cross-country travel by motor vehicles (not affiliated with lake bottoms) and their associated unauthorized route miles would decrease the opportunity for users to access various locations throughout the forest by motorized means for dispersed recreation or other purposes outlined in Table 3.01-8 of the Affected Environment section.

The direct and indirect effects of prohibiting cross-country motorized vehicle travel in regards to user conflicts are different than those described in alternative 1. Roads, motorized trails and open areas would be administratively defined and published on the motor vehicle use map (MVUM). This would offer the

public a means to better plan their recreational pursuits based on the unique expectations of the individual. As a result, the frequency of conflicts between nonmotorized and motorized recreation users should decrease in the short- and long-terms. Some degree of motorized cross-country travel can be expected under this alternative until the public becomes familiar with the MVUM and the requirement to comply with it.

1. Direct and Indirect Effects to Recreation Opportunity Spectrum Consistency with Land and Resource Management Plan

Consistency with the Recreation Opportunity Spectrum was explained under measurement indicator 1 (page 86). Under alternative 2, motorized travel cross-country or along any currently unauthorized road or trail would be prohibited. Motor vehicle travel would be confined to designated routes and open areas, and prohibited in areas with nonmotorized ROS classifications in their prescriptions. Therefore, no potential exists for ROS class changes (i.e., a nonmotorized ROS class to one that has characteristics of motorized) as in alternative 1.

2. Direct and Indirect Effects to Nonmotorized Recreation Opportunity

For measurement indicator 2 under this alternative, the forest would gain 61,996 quiet acres[2] by eliminating motorized use on unauthorized trails and roads currently used for such activity on the forest, except those miles added with the proposed roads and trails. The direct and indirect effects of prohibiting cross-country motorized travel would be an increase in quiet acres, which benefit nonmotorized users of the forest seeking increased solitude and a reduction in modern sights and sounds.

3. Direct and Indirect Effects to Motorized Recreation Opportunity

Measurement indicator 3, Table 3.01-2 and Table 3.01-3, shows that by prohibiting motorized cross-country travel under this alternative, 1,207 miles of unauthorized motorized routes would be eliminated on the forest. The direct and indirect effects would be reduced opportunities for motorized access to distant areas within the forest, and reduced opportunities for dispersed recreation. Cross-country travel below the high-water mark on Iron Canyon Reservoir would be discontinued, but allowed in the Shasta Lake area and Trinity Lake area.

4. Direct and Indirect Effects to Type of Motorized Access to Dispersed Recreation

For this alternative, measurement indicator 4 shows users would experience a reduction of 5,131 dispersed recreation sites as a result of eliminating cross-country motorized travel. While this alternative would provide less opportunity than presently exists for motorized access to dispersed recreation sites, it provides more motorized access to dispersed recreation sites than alternatives 3 and 4.

5. Direct and Indirect Effects of Impact of Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflict)

Measurement indicator 5 shows that by prohibiting motorized cross-country travel under this alternative, motor vehicle use on 1,447 miles of unauthorized routes would be prohibited within 0.5 mile from the

[2] Quiet acres are nonmotorized acres outside a 0.5 mile buffer zone adjacent to a motorized route.

borders of private and Federal lands and wilderness areas, so there would be less conflict in terms of dust, noise, and use in those areas.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Road, trail, and area additions can promote motorized recreation use and provide access to areas where nonmotorized activities can take place. The additions proposed in this alternative were selected to allow motorized access to places outside of the current NFTS which are already used by the public, such as river access points, lake bottoms, and dispersed recreation sites. Some route additions were selected to create loop routes within the NFTS for longer traveling and loop experiences. These specific features are listed by route in appendix A. The published MVUM would show the specific location of these routes. Seasons of use that could affect access during certain times of the year would be disclosed on the MVUM as well.

Such additions also have the potential to increase noise, dust, and user conflicts within quiet areas throughout the forest and on neighboring private and Federal lands, including wilderness boundaries, and affect nonmotorized users.

1. Direct and Indirect Effects to Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan by Adding Facilities

Consistency with the Recreation Opportunity Spectrum is addressed under the description of measurement indicator 1 (page 86). No action alternative, including this alternative, proposes route additions or areas in primitive or semi-primitive nonmotorized recreation settings. Route additions are proposed only in semi-primitive motorized and roaded natural settings as appropriate. Therefore, the range of available ROS settings would remain the same, and there would be no direct or indirect effects to ROS that would require a LRMP amendment for any of the action alternatives.

2. Direct and Indirect Effects to Nonmotorized Recreation Opportunity by Adding Facilities

Measurement indicator 2, Table 3.01-1, reveals that under this alternative 52,655 acres of sound-generating area associated with proposed routes would be added to the NFTS. As a result, nonmotorized recreationists may hear the sound of motors more frequently or persistently from the proposed additions than if they were not added at all. The addition of the Shasta Lake Area adds 100,966 acres of motorized sound generating area within 0.5 mile from its shore line, and the Trinity Lake Area adds 53,759 acres. The direct effects are the same as those given for road and trail additions. However, lake bottom travel does not occur on routes; so it is more difficult to predict the location of motorized sounds.

3a. Direct and Indirect Effects to Motorized Recreation Opportunity for Road Additions Pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty, and Heritage Protection Measures

As measurement indicator 3, Table 3.01-2, indicates, 36.51 miles of roads are proposed for addition to the NFTS under this alternative. Alternative 2 proposes to add 36.51 miles of roads to the NFTS, accessible by all vehicle classes (highway-legal and nonhighway-legal). The direct effect of this action would be an

increase in NFTS mileage for more roaded recreation opportunities, which includes access to dispersed recreation on the NFTS from users of all vehicle classes.

Seasonal restrictions providing wildlife and habitat protections for threatened, endangered, and sensitive species would impact access to some of the road additions proposed in this alternative. These specific road restrictions are disclosed in appendix D. The published MVUM would show where and how these restrictions affect access during certain times of the year. Of the 36.51 miles of roads proposed in this alternative, 0.06 miles would have a season of use from August 16–December 31 for bald eagle nest protection and 0.28 miles would have a season of use from August 16 – January 31 for northern goshawk. These restrictions would reduce motorized opportunities outside the season of use and may have beneficial effects to nonmotorized opportunities by increasing the acreage available for nonmotorized activities during the closure. Habitat mitigation in late successional reserves includes leaving felled hazard trees along the edges of the proposed routes where they are cut. There are 6.70 miles of proposed road additions where this mitigation practice would occur. These protection measures would primarily impact dispersed camping opportunities, by restricting access to dispersed locations and associated parking through seasonal restrictions or physical barriers.

Heritage protection measures would be implemented along 6.51 miles of proposed road additions under this alternative. None of the proposed measures would impede access, but the proposed measures could limit dispersed recreation opportunities within one car length of the proposed routes.

3b. Direct and Indirect Effects to Motorized Recreation Opportunity for Trail Additions Pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty, and Heritage Protection Measures

As measurement indicator 3, Table 3.01-3, indicates, 7.69 miles of trails are proposed for addition to the NFTS under this alternative. Alternative 2 proposes to make 1.44 miles accessible by motorcycle only. The remaining 6.25 miles would be accessed by a variety of ATVs as described in Table 3.01-3. The degree of difficulty is unpredictable because each motorized trail user has an individual comfort level based on experience. A direct effect of this action is that motorcyclists benefit from having a portion of the trail additions to themselves, and with the road additions, increased NFTS mileage would provide increased motor vehicle access to forest lands for dispersed recreation.

Seasons of use restrictions and mitigations would have the same effects to trails as they would to roads as described above. Of the 7.69 miles of trails proposed in this alternative, 0.06 miles have an allowed season of use from August 16-January 31 for Northern Goshawk habitat protection. These would apply to trails designated with a vehicle class of 50 inches or less in width. Habitat mitigations are proposed along 3.87 miles of proposed trail additions. Of this total, 0.65 miles affect motorcycle only trails and 3.87 miles affect those for ATVs. The impacts to dispersed recreation would be the same as described under roads, above.

Heritage protection measures would be implemented along 0.28 miles of proposed motorized trail additions under this alternative. No motorcycle-only trails would be affected. These measures would be the same for roads and their direct and indirect effects would be the same as well.

3c. Direct and Indirect Effects to Motorized Recreation Opportunity for Area Additions Pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty

As measurement indicator 3, Table 3.01-4, indicates, 44,047 acres would be added as areas open to motor vehicle use. These acres would be on the lake bottoms of Shasta Lake (28,403 acres) and Trinity Lake (15,644 acres). Under this alternative, only highway-legal vehicles with a maximum speed limit of 15 miles per hour would be permitted. The direct effect of the vehicle class action would be that no other vehicle classes would be able to use the lake bottoms as they have in the past, including accessing docks. An indirect effect of the vehicle class and speed limit restrictions would be reduced motor vehicle noise which benefits those seeking more solitude or nonmotorized experiences along the lake bottoms.

Proposed seasonal restrictions for wildlife habitat protection would affect motorized use in these areas as follows:

- **Shasta Lake Area**. Existing bald eagle restriction areas comprise 2,205 acres of the total lake bottom area with a season of use for motor vehicles from August 16–December 31. About 26,198 acres of the lake bottom would be open to motorized use year-round.
- **Trinity Lake Area**. Existing bald eagle restriction areas comprise 649 acres of the total lake bottom area with a season of use for motor vehicles from August 16–December 31.

These areas would also be included in the published MVUM to show where and how these restrictions affect access during certain times of the year.

The direct and indirect effects of seasonal restrictions would require timing recreational activities on acres with seasonal restrictions. The season of use restrictions would reduce motorized opportunities and may have beneficial effects to nonmotorized opportunities by increasing the acreage available for nonmotorized activities during the closure. Removing the northern spotted owl restrictions as proposed in the FEIS does not change any effects conclusions in regards to seasonal restrictions, since they overlap with the existing restrictions for the bald eagle.

Revising the site specific heritage measures as indicated in the FEIS would result in greater opportunity and reduced concentration of use for a host of motorized and non-motorized recreational uses or pursuits.

4. Direct and Indirect Effects to Type of Motorized Access to Dispersed Recreation by Adding Facilities

The direct effect of this action would increase available miles by 44.20 miles on the NFTS from which dispersed recreation can take place. Adding 44,476 acres of lake bottom area increases the potential for dispersed recreation even more. Refer to indicator 3, Table 3.01-2 – Table 3.01-4 for details. These

additions would help and encourage a greater distribution of dispersed use and mitigate the effects of concentrated use as described in alternative 3. Those seeking solitude in terms of dispersed recreation would directly benefit from route and area additions because they spread the use and provide more opportunity to escape the crowds. The visual effect to roads or Recreation Opportunity Spectrum classification due to dispersed use along their edges by one vehicle length is mitigated by more dispersed opportunities throughout the forest as well.

5. Direct and Indirect Effects of Impacts to Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflicts) by Adding Facilities

Measurement indicator 5, Table 3.01-6, shows that under this alternative, 23 miles of motorized sound-generating routes would be added to the NFTS within 0.5 mile of neighboring private and Federals lands and wilderness area boundaries. As a result, nonmotorized recreationists may hear the sound of motors more frequently or persistently from the proposed additions than if they were not added at all. However, these routes already exist and are currently used by the public, so the effect from adding them to the NFTS would be similar to what is currently experienced.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

No changes to the existing NFTS are proposed in this alternative, so there would be no direct or indirect effects.

Cumulative Effects for Alternative 2

See the Cumulative Effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered, and other information on how the cumulative effects analysis was conducted.

Past activities, including the existing NFTS, have shaped the recreation opportunities and Recreation Opportunity Spectrum settings available on the Shasta-Trinity National Forest. The effects of the present and foreseeable future activities listed in appendix B would continue to shape the recreation opportunities and ROS settings available on the Shasta-Trinity National Forest, but not to the level of converting a setting to a completely different ROS class. The measurement indicators for this analysis utilize the existing NFTS, unauthorized motorized routes, and proposed route and area additions to compare cumulative effects of the proposed alternatives. Table 3.01-1 – Table 3.01-6 show a full comparison of alternatives regarding the measurement indicators. Generally the last row of each table, which often summarizes total mileage in the alternative, was used in this cumulative effects analysis.

1. Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan

As described in cumulative effects of alternative 1, some management areas have a mix of nonmotorized and motorized Recreation Opportunity Spectrum classifications, and motorized use could inadvertently occur in the nonmotorized areas, changing the ROS class. Under all action alternatives, including alternative 2, ROS class would be unaffected because motorized use would be controlled by prohibiting cross-country motorized travel. It is anticipated that the effects of the present and foreseeable future

actions listed in appendix B would meet ROS classifications for the management prescription in which they occur, so there are no cumulative effects to ROS when combined with the proposed actions of this alternative or any other action alternative. Reference to this section will be made in the upcoming cumulative effects sections for alternatives 3–5.

2. Nonmotorized Recreation Opportunity

With regards to measurement indicator 2 under this alternative, the amount of overall quiet acres[3] on the forest would increase to 39.63 percent (843,712 acres), as opposed to 36.72 percent (781,716 acres) that currently exists. The overall effect would be 61,996 more quiet acres. The present and foreseeable projects listed in appendix B are typical management activities that occur on the forest with the potential to produce noise, dust, and use conflict when they are in operation, due to machinery and equipment. The levels and duration of noise, dust, and use conflict they produce are temporary and not expected to have cumulative effects to the amount of overall quiet recreation experienced under this alternative. Reference to this section will be made in the upcoming cumulative effects sections for alternatives 3–5. The difference in figures regarding the measurement indicator for each alternative will be given as well.

3. Motorized Recreation Opportunity

With regards to measurement indicator 3 under this alternative, proposed road additions and NFTS roads would provide 5,365 miles of motorized recreation opportunity; while proposed trail additions and existing motorized trails would provide 94.69 miles of motorized recreation opportunity. This alternative provides less mileage for motorized recreation than the no-action alternative when considering the closure of unauthorized inventoried routes, but provides more mileage for motorized recreation than alternative 3 because it adds routes to the NFTS. Acreage available for cross-country use would be reduced by 1,589,043 acres, with 44,475 acres open for managed motor vehicle travel from the high-water marks to the waterline in the Shasta Lake area and the Trinity Lake area. The overall effect would be less opportunity for unmanaged motorized travel and dispersed recreation access, but more managed facilities since mileage and areas would be added to the NFTS. The present and foreseeable projects listed in appendix B are typical management activities that occur on the forest with the potential to limit motorized recreation opportunity when they are in operation. Depending on the scale of operation, temporary road closures can be anticipated that could restrict motorized access to certain areas of recreational interest or interrupt travel loops.

Ongoing road and trail maintenance is essential for creating and managing a cohesive motorized transportation system. The cumulative effect of increasing road and trail use combined with the trend of deferred maintenance could be erosion and deterioration of roads, and an increased risk of failure; resulting in loss of motorized recreation opportunity and quality. In the long-term, a lack of maintenance could result in the closing of routes in order to prevent resource damage. However, the forest plans to add 5.60 miles of unauthorized roads to the existing NFTS, construct 0.46 miles; and eliminate through

[3] Quiet acres are nonmotorized acres outside a 0.5 mile buffer zone adjacent to a motorized route.

abandonment, decommissioning, or closure 186.1 miles in transportation projects for a net loss of 180 miles to the NFTS. Under this alternative, that would reduce the total miles of roads in the NFTS to 5,185 miles as opposed to the 5,365 miles shown in Table 3.01-2 for this alternative. The cumulative effect is a 3.3 percent reduction in motorized recreation opportunity (to include dispersed recreation) than this alternative provides.

Reference to this section will be made in the upcoming cumulative effects sections for alternatives 3–5. The difference in figures regarding the measurement indicator and cumulative effects specific to roads projects for each alternative will be given as well.

4. Type of Motorized Access to Dispersed Recreation

With regards to measurement indicator 4 under this alternative, there would be motorized access to a total of 88 dispersed recreation sites (see description of measurement indicator 4 methodology, page 91). The overall effect would be more opportunity for nonmotorized dispersed recreation in these once motorized areas, and for dispersed recreation sites to be better managed and maintained now that they are a part of the NFTS. Although the total number from what is experienced under alternative 1 would be reduced substantially, this alternative provides more motorized access to dispersed recreation sites than alternatives 3 and 4. The cumulative effects to dispersed recreation would be the same given under motorized recreation opportunity regarding potentially limited access. Reference to this section will be made in the upcoming cumulative effects sections for alternatives 3–5. The difference in figures regarding the measurement indicator for each alternative will be given in addition as well.

5. Impact of Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflicts)

With regards to management indicator 5 under this alternative, there would be 547 less miles of routes that are within the 0.5 mile quiet acreage buffer of neighboring private lands, other Federal lands, and wilderness area boundaries. The total miles of existing NFTS roads and proposed route additions within this same distance zone would be 5,019 miles. The overall effect would be less dust, noise, and conflict on these adjacent areas when compared to alternatives 1 and 5. The present and foreseeable projects listed in appendix B are typical management activities that occur on the forest with the potential to produce dust, noise, and use conflicts when they are in operation, due to machinery and equipment. The levels and duration they produce are temporary and not expected to have cumulative effects on neighboring private and Federal lands under this alternative. Reference to this section will be made in the upcoming cumulative effects sections for alternatives 3–5. The difference in figures regarding the measurement indicator for each alternative will be given in addition as well.

Alternative 3- Cross-County Travel Prohibition Only – No Additions to the Existing NFTS

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Alternative 3 prohibits cross-country motorized travel on 1,599,471 acres of Forest land. The direct and indirect effects of this action are the same as for alternative 2.

1. Direct and Indirect Effects to Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan

The same direct and indirect effects would occur as for alternative 2.

2. Direct and Indirect Effects to Nonmotorized Recreation Opportunity

The direct and indirect effects would be the same as for alternative 2. With cross-country motorized travel prohibited, more nonmotorized, quiet recreation opportunities would be provided.

3. Direct and Indirect Effects to Motorized Recreation Opportunity

Measurement indicator 3, Table 3.01-2 and Table 3.01-3, show that by prohibiting motorized cross-country travel under this alternative, 1,251 miles of unauthorized routes would be eliminated from motor vehicle use on the forest. The direct and indirect effects would be reduced opportunities for motorized access to distant areas within the forest where motorized travel to them were once possible, and the reduction of associated dispersed recreation opportunities. Motorized travel below the high-water marks on the reservoirs would also be prohibited (except to access permitted uses).

4. Direct and Indirect Effects to Type of Motorized Access to Dispersed Recreation

Measurement indicator 4 reveals that under this alternative, users would experience the direct and indirect effects associated with the reduction of 5,219 dispersed recreation sites by eliminating cross-country motorized travel. Motor vehicle access to dispersed recreation on the lake bottoms would also be prohibited, so existing levels of day use and camping could decrease. According to the method given for quantifying access to dispersed recreation sites, this alternative provides the least motorized access when compared to the other alternatives.

5. Direct and Indirect Effects of Impact of Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflict)

Measurement indicator 5 reveals that by prohibiting motorized cross-country travel under this alternative, motor vehicle use on 1,470 miles of unauthorized routes would be eliminated within 0.5 mile from the borders of private and Federal lands and wilderness areas, so the direct and indirect effects would be fewer conflicts in terms of dust, noise, and use in those areas.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Similar to alternative 1, alternative 3 does not propose adding roads, motorized trails, or open areas to the NFTS. Therefore, there would be no direct or indirect effects of adding facilities to the forest under this alternative.

1. Direct and Indirect Effects to Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan by Adding Facilities

No routes would be added to the system, so there would be no effects to the Recreation Opportunity Spectrum as a result.

2. Direct and Indirect Effects to Nonmotorized Recreation Opportunity by Adding Facilities

Measurement indicator 2, Table 3.01-1, reveals that under this alternative no acres of sound-generating area would be added to the system, so there would be no effects as a result of this action.

3a.Direct and Indirect Effects to Motorized Recreation Opportunity for Road Additions Pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty, and Heritage Protection Measures

As measurement indicator 3, Table 3.01-2, indicates, there are no miles of roads proposed for addition to the NFTS under this alternative. Therefore, there would be no effects of vehicle class, season of use restrictions, level of difficulty, or effects of heritage protection measures to road access or dispersed recreation.

3b. Direct and Indirect Effects to Motorized Recreation Opportunity for Trail Additions Pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty, and Heritage Protection Measures

As measurement indicator 3, Table 3.01-3, indicates, there are zero miles of trails proposed for addition to the NFTS under this alternative. Therefore, there would be no effects of vehicle class, season of use restrictions, level of difficulty, or effects of heritage protection measures to trail access or dispersed recreation.

3c. Direct and Indirect Effects to Motorized Recreation Opportunity for Area Additions pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty, and Heritage Protection Measures

As measurement indicator 3, Table 3.01-5, indicates, there are no areas proposed for addition to the NFTS under this alternative. Therefore, there would be no effects of vehicle class, season of use restrictions, level of difficulty, or effects of heritage protection measures to area access or dispersed recreation.

4. Direct and Indirect Effects to Type of Motorized Access to Dispersed Recreation

The direct effect of this action would be no increase in available miles on the NFTS or areas on the forest from which dispersed recreation can take place. Without additional miles or open areas, dispersed recreation would occur on existing NFTS roads and trails only. Motor vehicle use on these routes would be concentrated and result in dispersed recreation opportunities that are closer in proximity to others. Those seeking solitude while using motor vehicle access would be affected most as a result. Another effect of concentrated use as a result of no route or area additions is the appearance of roads caused by

increased parking and camping within one vehicle length along their edges for dispersed recreation. Since route mileage will be limited, many suitable sections will become unnaturally worn, eroded looking, and littered in appearance, which could directly affect a semi-primitive motorized area–making it appear more rural or urban.

5. Direct and Indirect Effects of Impacts to Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflicts) by Adding Facilities

Measurement indicator 5, Table 3.01-2, reveals that under this alternative zero miles of motorized sound generating routes or areas would be added to the NFTS within 0.5 mile of neighboring private and Federals lands and wilderness area boundaries. Therefore, there would be no effects as a result of this action.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

No changes to the existing NFTS are proposed in this alternative, so there would be no direct or indirect effects.

Cumulative Effects for Alternative 3

See the Cumulative Effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered and other information on how the cumulative effects analysis was conducted. Also see the Cumulative Effects section under alternative 2 for discussion on past, present and foreseeable future actions and their impact on ROS settings, and how measurement indicators and their tables were applied to this analysis.

1. Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan

Cumulative effects would be the same as given under alternative 2 with respect to the prohibition of cross-country motor vehicle travel. As in all alternatives, present and reasonably foreseeable future actions are expected to be consistent with the Recreation Opportunity Spectrum class in which the actions occur.

2. Nonmotorized Recreation Opportunity

With regards to measurement indicator 2 under this alternative, the amount of overall quiet area to the forest would increase to 40.19 percent (855,002 acres) as opposed to 36.72 percent (781,716) as it currently exists or as shown in alternative 1. The overall effect would be 73,286 more acres of quiet area when the 0.5 mile noise buffer is applied to motorized routes of the NFTS. This alternative provides the most quiet recreation opportunity when compared to the other alternatives. The present and foreseeable projects listed in appendix B are typical management activities that occur on the forest with the potential to produce noise, dust, and use conflicts when they are in operation, due to machinery and equipment. The levels and duration of noise, dust, and conflict they produce are not expected to have cumulative effects to the amount of overall quiet recreation experienced under this alternative.

3. Motorized Recreation Opportunity

With regards to measurement indicator 3 under this alternative, the NFTS roads would provide 5,329 miles of motorized recreation opportunity and existing motorized trails would provide 87 miles of motorized recreation opportunity. This alternative provides the least mileage for motorized recreation when compared to the other alternatives. Motorized travel would be allowed only on the existing NFTS. The overall effect would be less unmanaged motorized travel and access for dispersed recreation. This alternative provides the least motorized recreation opportunity when compared to the other alternatives. The present and foreseeable projects listed in appendix B are typical management activities that occur on the forest with the potential to limit motorized recreation opportunity when they are in operation. Depending on the scale of operation, temporary road closures can be anticipated that could restrict motorized access to certain areas of recreational interest, or interrupt travel loops.

The planned present and foreseeable future projects will add 5.60 miles of unauthorized routes to the existing NFTS, construct 0.46 miles and eliminate through abandonment, decommissioning, or closure 182.69 miles for a net loss of 180 miles to the NFTS. Under this alternative, that would reduce the total miles of roads in the NFTS to 5,149 miles as opposed to the 5,329 miles shown in Table 3.01-2 for this alternative. The cumulative effect is a 3.3 percent reduction in motorized recreation opportunity (to include dispersed recreation) than this alternative provides.

4. Type of Motorized Access to Dispersed Recreation

With regards to measurement indicator 4 under this alternative, access by motor vehicles would be provided to a total of zero dispersed recreation sites, according to the method given for determining access to dispersed recreation sites. The overall effect would be opportunity for only nonmotorized dispersed recreation in these once motorized areas. The total number of sites accessed under alternative 1 would be reduced substantially. The present and foreseeable projects listed in appendix B are typical management activities that occur on the forest with the potential to limit motorized recreation opportunity when they are in operation. Depending on the scale of operation, temporary road closures can be anticipated and could restrict motor vehicle access to certain areas of recreational interest such as dispersed recreation.

5. Impact of Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflicts)

With regards to management indicator 5 under this alternative, there would be 1,470 less miles that are within 0.5 mile of neighboring private lands, other Federal lands, and wilderness area boundaries. The total miles of existing NFTS roads within this distance zone from these areas would be 3,997 miles. The overall effect would be less dust, noise, and use conflict on these adjacent areas when compared to the no-action alternative and the other action alternatives. The present and foreseeable projects listed in appendix B are typical management activities that occur on the forest with the potential to produce dust and noise when they are in operation due to machinery and equipment. The levels and duration of noise and dust they produce are not expected to produce cumulative effects on neighboring private and Federal lands.

Alternative 4- Minimize Impacts to Natural Resources and Roadless Areas

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Alternative 4 prohibits cross-country motorized travel on 1,599,277 acres of Forest land. The direct and indirect effects of this action would be the same as those for alternative 2.

1. Direct and Indirect Effects to Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan

Same effects as for alternative 2.

2. Direct and Indirect Effects to Nonmotorized Recreation Opportunity

Measurement indicator 2 shows that under this alternative, the forest would gain 71,643 quiet acres by prohibiting cross-country motor vehicle use. Though the acres are different, the overall direct and indirect effects would be the same as for alternative 2. With cross-country motorized travel prohibited, more nonmotorized, quiet recreation opportunities would be provided.

3. Direct and Indirect Effects to Motorized Recreation Opportunity

Measurement indicator 3, Table 3.01-2 and Table 3.01-3, shows that prohibiting motorized cross-country travel would eliminate 1,205 miles of unauthorized routes on the forest. Though the figures are different, overall direct and indirect effects would be the same as for alternative 2, but with slightly less motorized recreation opportunity.

4. Direct and Indirect Effects to Type of Motorized Access to Dispersed Recreation

For measurement indicator 4 under this alternative, 5,193 dispersed recreation sites would be eliminated by prohibiting cross-country motorized travel. Therefore, this alternative would provide less motorized access than presently exists to dispersed recreation sites. However, this alternative provides more motorized access to dispersed recreation sites than alternative 3.

5. Direct and Indirect Effects of Impact of Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflict)

Measurement indicator 5 shows that prohibiting motorized cross-country travel would eliminate 1,468 miles of unauthorized routes within 0.5 mile from the borders of private and Federal lands and wilderness areas. Though the acres are different, the overall direct and indirect effects would be the same as for alternative 2, but with less conflict in terms of dust, noise, and use.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Road, trail, and area additions can promote motorized recreation use and provide access to areas where nonmotorized activities can take place. Like alternative 2, the additions of this alternative were selected to allow access to places which are already used by the public, such as river access points, lake bottoms, and dispersed recreation sites. Some route additions were selected to create loop routes within the NFTS for

longer traveling, increased access, and loop experiences. The site-specific information for these route additions are listed in appendix A. The published MVUM would show these routes. Seasons of use that could affect access during certain times of the year would also be shown on the MVUM.

Alternative 4 proposes no route additions within the boundaries of IRAs and CIRAs. See the Inventoried Roadless Areas section 3.10 for the effects of motorized recreation on roadless areas.

As stated in alternative 2, additions to the NFTS also have the potential to increase noise, dust, and user conflicts within quiet areas throughout the forest and on neighboring private and Federal lands, including wilderness boundaries, and affect nonmotorized users.

1. Direct and Indirect Effects to Recreation Opportunity Spectrum Consistency to Land and Resource Management Plan by Adding Facilities

Consistency with the Recreation Opportunity Spectrum is explained under measurement indicator 1 (page 86). As in alternative 2, there would be no direct or indirect effects to ROS classifications from the additions proposed in this alternative.

2. Direct and Indirect Effects to Nonmotorized Recreation Opportunity by Adding Facilities

Measurement indicator 2, Table 3.01-1, shows 12,165 acres of sound-generating area would be added to the NFTS. Though this alternative proposes 40,490 less sound-generating acres than alternative 2, the direct and indirect effect of this would generally be the same, but with more nonmotorized recreation opportunity. The addition of the Shasta Lake Area adds 100,966 acres of motorized sound-generating area within 0.5 mile from its shore line, the Trinity Lake area adds 53,759 acres, and the Iron Canyon Reservoir Area adds 3,250 acres.

3a. Direct and Indirect Effects to Motorized Recreation Opportunity for Road Additions Pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty, and Heritage Protection Measures

As measurement indicator 3, Table 3.01-2, indicates, 0.88 miles of level 2 roads are proposed for addition to the NFTS under this alternative. Vehicles that access level 2 roads on the NFTS are classified as highway and non-highway legal, and include four-wheel drives, passenger cars, ATVs, and motorcycles. The direct effect of this action would be a slight increase in roaded recreation opportunities, which includes dispersed recreation, on the NFTS for users of all vehicle classes.

Seasonal restrictions and mitigations for wildlife and threatened and endangered species habitat would impact access to the road additions proposed in this alternative. The season of use restrictions for this alternative are described in appendix A and D; and the published MVUM would show where and how these restrictions affect access during certain times of the year.

All 0.88 miles of road proposed in this alternative have an allowable season of use from August 16–January 31 for northern goshawk and August 16–December 31 for bald eagle nest habitat protection. The season of use restrictions would seasonally reduce motorized opportunities and may have beneficial

effects to nonmotorized opportunities by increasing the acreage available for nonmotorized activities during the closure. Heritage protection measures would not impact this section of road.

3b. Direct and Indirect Effects to Motorized Recreation Opportunity for Trail Additions Pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty, and Heritage Protection Measures

As measurement indicator 3, Table 3.01-3, indicates, 14.68 miles of trails are proposed for addition to the NFTS under this alternative. Vehicles that access trails on the NFTS are classified as highway and non-highway legal and include four-wheel drives, ATVs, and motorcycles of various kinds. Alternative 4 proposes 2.465 miles of trail accessible by motorcycle only. The remaining 12.73 miles can be accessed by any motor vehicle 50 inches or less in width, including motorcycles. The degree of difficulty is not measureable because each motorized trail user has a different set of criteria. Under this alternative, motorcycle riders would benefit by having a portion of the trail additions to themselves. They would also benefit from the road additions, with increased access for dispersed recreation.

Season of use restrictions and mitigations would have the same effects to trails as they would to roads. Of the 14.68 miles of trails proposed in this alternative, 0.15 miles of motorcycle only trail would have a season of use from May 1–October 30 for erosion control. No habitat mitigations are proposed, and no heritage protection measures would apply. The impacts to dispersed recreation would be the same as described under roads.

3c. Direct and Indirect Effects to Motorized Recreation Opportunity for Area Additions Pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty

As measurement indicator 3, Table 3.01-5, indicates, 44,476 acres of area would be added as open to motor vehicle travel. These acres are comprised of lake bottoms of Shasta Lake (28,403 acres), Trinity Lake (15,644 acres), and Iron Canyon Reservoir (429 acres). Under this alternative, access to these areas would be by highway-legal vehicles only with a maximum speed limit of 10 miles per hour. The direct effects of these restrictions would be the same as those described under alternative 2.

Shasta Lake Area. Existing bald eagle restriction areas cover 2,205 acres of the total lake bottom area with a season of use for motor vehicles from August 16–December 31. About 26,198 acres of the lake bottom would be open to motorized use year-round.

Trinity Lake Area. Existing bald eagle restriction areas cover 649 acres of the total lake bottom area with a season of use for motor vehicles from August 16–December 31.

Iron Canyon Reservoir. No restrictions apply.

The direct and indirect effects of seasonal restrictions would require timing visits and recreational pursuits since certain areas would not be available for use all the time. The season of use restrictions would seasonally reduce motorized opportunities and may beneficially affect nonmotorized opportunities by increasing the acreage available for nonmotorized activities during the closure period. Removing the northern spotted owl restrictions as proposed in the FEIS does not change any effects conclusions in

regards to seasonal restrictions, since they overlap with the existing restrictions for the bald eagle in the Trinity Lake area. More opportunities for motorized and non-motorized recreational access, uses or pursuits would result for Iron Canyon Reservoir.

Revising the site specific heritage measures indicated in the FEIS would result in greater opportunity and reduced concentration of use for motorized and non-motorized recreational uses.

4. Direct and Indirect Effects to Type of Motorized Access to Dispersed Recreation by Adding Facilities

This action would add 15.56 miles of NFTS routes from which dispersed recreation can take place. Adding 44,476 acres of lake bottom area increases the potential for dispersed recreation even more. Refer to indicator 3, Table 3.01-2 – Table 3.01-4 for details. The direct and indirect effects in terms of use distribution and concentrated use are the same as for alternative 2.

5. Direct and Indirect Effects of Impacts to Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflicts) by Adding Facilities

Measurement indicator 5, Table 3.01-2, shows that under this alternative, 1.5 miles of motorized sound-generating routes would be added to the NFTS within 0.5 mile of neighboring private and Federals lands and wilderness area boundaries. The direct and indirect effect is that people in these areas may hear the sound of motors more frequently or persistently from the proposed additions than if they were not added at all. There are fewer miles of proposed route additions in this alternative within this distance zone in comparison to alternatives 2 and 5. As stated in alternative 2, these routes already exist, and are currently used by the public, so adding them to the NFTS would have a similar effect to what is currently experienced.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Measurement indicator 3, Table 3.01-2, shows 30.41 miles of existing NFTS ML 3 roads would be designated for motorized mixed-use (highway-legal and nonhighway-legal). The result would be improved continuity with NFTS roads and trails in the NFTS for use by all vehicles classes. Longer rides and loops would benefit motorized recreationists, as well as providing access to dispersed recreation locations.

Cumulative Effects for Alternative 4

See the Cumulative Effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered and other information on how the cumulative effects analysis was conducted. Also see the Cumulative Effects section under alternative 2 for discussion of past, present, and foreseeable future actions and their impact on ROS settings, and how measurement indicators and their tables were applied to this analysis.

1. Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan

Same as for alternative 2.

2. Nonmotorized Recreation Opportunity

The cumulative effects are the same as for alternative 2. With regards to measurement indicator 2 under this alternative, the amount of overall quiet area on the forest would increase to 40.09 percent (838,369 acres) as opposed to the existing 36.72 percent (781,716 acres). The overall effect would be 56,653 more acres of quiet area when the 0.5 mile noise buffer is applied to motorized routes in the NFTS and proposed route additions. This alternative provides slightly less quiet recreation opportunity than alternative 3, but more quiet recreation opportunity than the other alternatives.

3. Motorized Recreation Opportunity

The cumulative effects are the same as given under alternative 2, expect in terms of road projects listed below. For measurement indicator 3 under this alternative, proposed additions and existing NFTS roads would provide 5,330 miles of motorized recreation opportunity; and proposed trail additions and existing motorized trails would provide 101.68 miles of motorized recreation opportunity. This alternative provides less mileage for motorized recreation than the no-action alternative when considering unauthorized inventoried route mileage, but provides more mileage for motorized recreation than alternative 3 because it adds miles to the NFTS. Open acreage for use would be reduced by 1,588,614 acres with 44,476 acres open for motorized use in the proposed areas. The overall effect would be less opportunity for unmanaged motorized travel and dispersed recreation, but more managed opportunities because mileage and areas would be added to the NFTS.

The present and foreseeable future projects planned will add 5.60 miles of unauthorized roads to the existing NFTS and eliminate through abandonment or closure 182.69 miles in transportation projects for a net loss of 177.09 miles to the NFTS. Under this alternative, that would reduce the total miles of roads in the NFTS to 5,183 miles as opposed to the 5,330 miles shown in Table 3.01-2 for this alternative. The cumulative effect is a 3.30 percent reduction in motorized recreation opportunity (to include dispersed recreation) than this alternative provides.

4. Type of Motorized Access to Dispersed Recreation

The cumulative effects are the same as for Alterative 2. With regards to measurement indicator 4 under this alternative, there would be 26 dispersed recreation sites with motorized access. As a result, there would be increased opportunities for nonmotorized dispersed recreation; and better management and maintenance of motorized NFTS dispersed recreation sites. Although the total number of dispersed motorized recreation sites would be substantially less than what is proposed under alternative 1, this alternative provides more motorized access to dispersed recreation sites than alternative 3.

5. Impact of Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflicts)

The cumulative effects are the same as for Alterative 2. With regards to management indicator 5 under this alternative, there would be 1,468 less miles of routes that are within 0.5 mile of neighboring private lands, other Federal lands, and wilderness area boundaries. A total of 3,999 miles of existing NFTS roads

and proposed route additions would lie within this 0.5 mile distance zone from these areas. The overall effect would be less dust, noise, and conflict on these adjacent areas than experienced under alternatives 1 and 2.

Alternative 5- Improved Access and Motorized Recreation Opportunities

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Alternative 5 prohibits cross-country motorized travel on 1,598,619 acres of forest land. The direct and indirect effects of this action are the same as given in alternative 2.

1. Direct and Indirect Effects to Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan

Same as alternative 2.

2. Direct and Indirect Effects to Nonmotorized Recreation Opportunity

For measurement indicator 2 under this alternative, the Forest would gain 56,653 quiet acres by prohibiting motorized cross-country travel in open areas and unauthorized roads and trails.. Although numbers are different, the direct and indirect effects would be the same as those described for alternative 2. With cross-country motorized travel prohibited, more nonmotorized, quiet recreation opportunities would be available.

3. Direct and Indirect Effects to Motorized Recreation Opportunity

For measurement indicator 3, (Table 3.01-2 and Table 3.01-3), prohibiting motorized cross-country travel under this alternative would close 1,114 miles of unauthorized routes to motorized use on the forest. Though the resulting figures are different, overall direct and indirect effects are the same as for alternative 2, but with additional miles and acres of motorized recreation opportunities.

4. Direct and Indirect Effects to Type of Motorized Access to Dispersed Recreation

For measurement indicator 4 under this alternative, 4,996 dispersed recreation sites would be closed by eliminating cross-country motorized travel. This alternative would provide less opportunity than presently exists for motorized access to dispersed recreation sites. However, this alternative provides more motorized access to dispersed recreation sites than the other action alternatives.

5. Direct and Indirect Effects of Impact of Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflict)

Measurement indicator 5 shows that prohibiting motorized cross-country travel under this alternative would eliminate, 1,429 miles of unauthorized routes from within 0.5 mile from the borders of private and Federal lands and wilderness areas. Though figures are different, overall the direct and indirect effects would be the same as those described for alternative 2, but with slightly more conflict in terms of dust, noise, and use.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

As mentioned in alternatives 2 and 4; road, trail, and area additions can promote motorized recreation use and provide access to areas where nonmotorized activities can take place. This alternative includes all routes under alternative 2 and proposes additional routes specifically recommended for addition to the NFTS by the public. The additions of this alternative were selected to allow motorized access to popular or traditional places outside of the current NFTS, including river access points, lake bottoms, and dispersed recreation sites. Some route additions were selected to provide loop routes within the NFTS for longer travel routes and increased access to dispersed sites. The route additions in this alternative have site-specific information listed in appendix A. The published MVUM would show the location of these routes. Seasons of use that could affect access during certain times of the year would be shown on the MVUM as well.

Such additions also have the potential to increase noise, dust, and user conflicts within quiet areas throughout the forest and on neighboring private and Federal lands, including wilderness areas; and affect nonmotorized users.

1. Direct and Indirect Effects to Recreation Opportunity Spectrum Consistency to the Land and Resource Management Plan by Adding Facilities

Consistency with the Recreation Opportunity Spectrum was explained under measurement indicator 1 (page 86). As indicated in alternative 2, there would be no direct or indirect effects to ROS classifications by the proposed additions in this alternative.

2. Direct and Indirect Effects to Nonmotorized Recreation Opportunity by Adding Facilities

Measurement indicator 2, (Table 3.01-1), shows that under this alternative, 97,207 acres of sound-generating area would be added to the NFTS. As a result, nonmotorized recreationists may hear the sound of motors more frequently or persistently from the proposed additions than if they were not added at all. The addition of the Shasta Lake Area adds 100,966 acres of motorized sound-generating area within 0.5 mile from its shore line, the Trinity Lake Area adds 53,759 acres, and the Iron Canyon Reservoir Area adds 3,250 acres. The effects of these additions to the overall forest experience are disclosed under cumulative effects for this alternative.

3a. Direct and Indirect Effects to Motorized Recreation Opportunity for Road Additions Pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty, and Heritage Protection Measures

As measurement indicator 3, Table 3.01-2, indicates, 43.49 miles of roads are proposed for addition to the NFTS as ML 2 roads, allowing all vehicle classes. The direct effect of this action would be increased roaded recreation opportunities, including dispersed recreation on the NFTS from users of all vehicle classes.

Seasonal restrictions and mitigations providing wildlife and habitat protections for threatened and endangered species would impact access to some of the road additions proposed in this alternative. These

specific road additions are displayed in appendix A and D. The MVUM would show where and how these restrictions affect access during certain times of the year. Of the 43.49 miles of roads proposed in this alternative, 0.9 miles have an allowable season of use from August 16-January 31 for northern goshawk habitat protection. About 0.06 miles have an allowable season of use from August 16–December 31 for bald eagle nest protection. The season of use restrictions would reduce motorized opportunities outside the season of use and may have beneficial effects to nonmotorized opportunities by increasing the acreage available for nonmotorized activities during the closure. Habitat mitigation includes leaving felled hazard trees along the edges of the proposed routes where they are cut. There are 7.4 miles of proposed road additions where this mitigation would occur. These protection measures would likely most impact dispersed camping opportunities because access to such locations and parking opportunities for them would be restricted at times and in various, undetermined places.

Heritage protection measures would be implemented along 4.54 miles of proposed road additions under this alternative. None of the proposed measures would impede access, but would limit dispersed recreation opportunities to locations along of the proposed road additions that are free of protection barriers.

3b. Direct and Indirect Effects to Motorized Recreation Opportunity for Trail Additions Pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty, and Heritage Protection Measures

As measurement indicator 3, Table 3.01-3, indicates, 62.62 miles of trails are proposed for addition to the NFTS under this alternative. Alternative 5 would make 2.71 miles accessible by motorcycle only. The remaining 59.91 miles could be accessed by ATVs that are 50 inches or less in width, including motorcycles. The degree of difficulty is not measureable because each motorized trail user has a different set of criteria. Under this alternative, motorcycle riders would benefit by having a portion of the trail additions to themselves. They would also benefit from the road additions, with increased access for dispersed recreation.

Seasons of use restrictions and mitigations would have the same effects to trails as they would to roads. Of the 62.62 miles of trails proposed in this alternative, 1.24 miles have an allowable season of use from August 16-January 31 for northern goshawk habitat protection. About 0.8 miles have an allowable season of use from August 16–December 31 for erosion control. This affects 0.74 miles of trail designated as motorcycle. Habitat mitigations are proposed along 4.37 miles of proposed ATV trail additions. The resulting effects or impacts to dispersed recreation would be the same as described under roads.

Heritage protection measures would be implemented along 1.44 miles of proposed motorized trail additions under this alternative. No motorcycle only trails would be affected. These measures would be the same for roads and their direct and indirect effects would be the same as well.

3c. Direct and Indirect Effects to Motorized Recreation Opportunity for Area Additions Pertaining to Vehicle Class, Seasons of Use, Levels of Difficulty

As measurement indicator 3, Table 3.01-5, indicates, 44,476 acres of area would be added as open acreage to the forest system. Similar to alternative 4, these acres would be comprised of lake bottoms of Shasta Lake (28,403 acres), Trinity Lake (15,644 acres), and Iron Canyon Reservoir. As with alternative 4, a maximum speed limit of 10 miles per hours is proposed, but unlike alternatives 2 or 4, all vehicle classes would be allowed. The direct effect of the vehicle class action would be that non-highway vehicles would continue using the lake bottoms as they do now, but not in a manner that creates noise, other extreme disturbances, or resource damage. This directly and indirectly benefits those seeking more solitude or nonmotorized experiences along the lake bottoms. Seasonal restrictions for wildlife habitat protection and mitigations apply here, and would be the same as in alternative 4. The direct and indirect of these restrictions and mitigations would be the same as those described under alternative 4 as well.

4. Direct and Indirect Effects to Type of Motorized Access to Dispersed Recreation by Adding Facilities

This alternative would increase motorized access for dispersed recreation with highway-legal and non-highway legal vehicles by 106 miles on the NFTS. The addition of 44,476 acres of lake bottom area increases the potential for dispersed recreation even more (see indicator 3, Table 3.01-2 – Table 3.01-4). In general, direct and indirect effects in terms of use distribution and concentrated use are same as described in alternative 2. However, in addition, alternative 5 offers the most benefits in terms of increasing solitude while also permitting motorized recreation and distributing use to mitigate the effects of concentration as described in alternative 3.

5. Direct and Indirect Effects of Impacts to Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflicts) by Adding Facilities

Measurement indicator 5, Table 3.01-2, shows that under this alternative, 40.6 miles of motorized sound-generating routes would be added to the NFTS within 0.5 mile of neighboring private and Federals lands and wilderness area boundaries. As a result, nonmotorized recreationists may hear the sound of motors more frequently or persistently from the proposed additions than if they were not added at all. However, these routes already exist, and are currently used by the public, so adding them to the NFTS would have a similar effect as what is currently experienced in these areas.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

This alternative proposes the same road mileage for allowing motorized mixed-use on existing ML 3 roads as is proposed under alternative 4. The direct and indirect effects of this action under this alternative would be the same as those described under alternative 4.

Cumulative Effects for Alternative 5

See the Cumulative Effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered and other information on how the cumulative effects analysis was conducted. Also see the Cumulative Effects section under alternative 2 for discussion on past, present, and

foreseeable future actions and their impact on ROS settings, and how measurement indicators and their tables were applied to this analysis.

1. Recreation Opportunity Spectrum Consistency with the Land and Resource Management Plan

Cumulative effects would be the same as given under alternative 2.

2. Nonmotorized Recreation Opportunity

The cumulative effects are the same as given under alternative 2.With regards to measurement indicator 2 under this alternative, the amount of overall quiet area to the forest would increase to 39.38 percent (838,369 acres) as opposed to the existing 36.72 percent (781,716 acres). The overall effect would be 56,653 more acres of quiet area when the 0.5 mile noise buffer is applied to existing and proposed NFTS routes. This alternative provides the least amount of quiet area of any action alternative, but more than alternative 1 the no-action alternative.

3. Motorized Recreation Opportunity

The cumulative effects are the same as those for alternative 2, except in terms of road projects given below. With regards to measurement indicator 3 under this alternative, proposed and existing NFTS routes would provide 5,373 miles of motorized road opportunities; while proposed and existing motorized trails would provide 149.62 miles of motorized recreation opportunity. This alternative provides less mileage for motorized recreation than the no-action alternative when considering unauthorized inventoried route mileage, but provides more mileage for motorized recreation than the other action alternatives. Open acreage for unmanaged use would be reduced by 1,588,614 acres. However, 44,476 acres would be added to the NFTS as managed open areas for motorized use.

The planned present and foreseeable future projects will add 5.60 miles of unauthorized roads to the existing NFTS, construct 0.46 miles and eliminate through abandonment or closure 186 miles of NFTS roads for a net loss of 180 miles to the NFTS. Under this alternative, that would reduce the total miles of roads in the NFTS to 5,193 miles as opposed to the 5,373 miles shown in Table 3.01-2 for this alternative. The cumulative effect is a 3.3 percent reduction in motorized recreation opportunity (to include dispersed recreation) than this alternative provides.

4. Type of Motorized Access to Dispersed Recreation

The cumulative effects are the same as those for alternative 2. With regards to measurement indicator 4 under this alternative, there would be motorized access to a total of 223 dispersed recreation sites. As a result, there would be increased opportunities for nonmotorized dispersed recreation; and better management and maintenance of motorized NFTS dispersed recreation sites. Although the total number of dispersed motorized recreation sites would be substantially less than what is proposed under alternative 1, this alternative provides more motorized access to dispersed recreation sites than the other action alternatives.

5. Impact of Proposed Changes to the NFTS on Neighboring Private and Federal Lands (Dust, Noise, Use Conflicts)

The cumulative effects are the same as those for alternative 2. For management indicator 5 under this alternative, there would be 1,429 less miles within 0.5 mile of neighboring private lands, other Federal lands, and wilderness area boundaries; for a total of 4,038 miles of existing and proposed NFTS routes. The overall effect would be less dust, noise, and use conflict on these adjacent areas than currently exists as portrayed in alternative 1, but more dust, noise, and use conflict on these adjacent areas than experienced under the other action alternatives.

Summary of Effects Analysis across All Alternatives

In the following table, rankings are scored on a scale of 1 to 5 from greatest (1) to least (5) impact.

Table 3.01-9. Nonmotorized recreation summary

Indicator	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Nonmotorized recreation opportunity	1	3	3	3	2
Impact of proposed changes to the NFTS on neighboring private and Federal lands (dust, noise, use conflicts)	1	3	5	4	2
Average ranking for nonmotorized values	1	3	4	3.5	2

Table 3.01-10. Motorized recreation and access summary

Indicator	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Motorized recreation opportunity	5	3	1	2	4
Type of motorized access to dispersed recreation	5	3	1	2	4
Average ranking for motorized values	5	3	1	2	4

Compliance with the Forest Plan and Other Direction

Alternatives 2, 3, 4, and 5 comply with Forest Plan standards and guidelines and other State or Federal regulatory direction listed under the Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction section.

All action alternatives comply with Recreation Opportunity Spectrum settings as designated by the LRMP including: specific developed recreation sites found in appendix F of the LRMP, the Pacific Crest Trail (LRMP, page 4-23), and the Management Prescriptions (LRMP, pages 4-31–4-69). The above sections of the LRMP were referenced for compliance during the motorized route addition selection process as well.

Alternatives 2 and 5 propose route additions that access scenic and recreation sections (not wild) of the Trinity River, a designated wild and scenic river. Road access to such sections would be consistent with their use description and would meet standards and guidelines of the LRMP for wild and scenic rivers (LRMP, page 4-28).

The National Recreation Area guide is an analysis of direction from the LRMP, a summary of existing conditions, and a strategy of management recommendations, opportunities, and mitigating measures that

will be used to implement the direction in the forest LRMP. The National Recreation Area guide was referenced for compliance during the area addition selection process as well.

Figure 3.01-1. Gully erosion caused by OHV use on unauthorized route OHV 50

3.02. Watersheds

Introduction

Protection of water quantity and quality is an important part of the mission of the Forest Service (Forest Service Strategic Plan for 2007 to 2012, July 2007). Management activities on National Forest System (NFS) lands must be planned and implemented to protect the hydrologic functions of forest watersheds, including the volume, timing, and quality of stream flow. The use of roads, trails, and other areas on national forests for public operation of motor vehicles has potential to affect these hydrologic functions through interception of runoff, compaction of soils, and detachment of sediment (e.g., Foltz 2006). Management decisions to eliminate cross-county motor vehicle travel, add new routes and areas to the National Forest Transportation System (NFTS), and make changes to the existing NFTS must consider effects on watershed functions.

Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the proposed action as it affects water resources includes the following.

Clean Water Act

Clean Water Act of 1948 (as amended in 1972 and 1987) is Federal policy to control point and non-point pollution, and assigns the States the primary responsibility for control of water pollution. National forests in California work with State and regional water boards to meet the Federal policy.

Non-point source pollution on national forests is managed through the Water Quality Management for Forest System Lands in California (USDA Forest Service 2000), which relies on implementation of prescribed best management practices (BMPs). There is one BMP for OHV use (4-7) and 28 BMPs related to road construction and maintenance (2-1 to 2-28) (appendix D). All NFTS roads and trails are required to comply with these BMPs.

Of particular relevance for motor vehicle travel management, BMP 4-7 requires each forest to: (1) identify areas or routes where OHV use could cause degradation of water quality, (2) identify appropriate mitigation and controls, and (3) restrict OHV use to designated routes. This BMP further requires forests to take immediate corrective actions if considerable adverse effects are occurring or are likely to occur.

California Water Code

The California Water Code consists of a comprehensive body of law that incorporates all State laws related to water, including water rights, water developments, and water quality. The laws related to water quality (sections 13000 to 13485) apply to waters on the national forests and are directed at protecting the beneficial uses of water. Of particular relevance for the proposed action is section 13369, which deals with non-point source pollution and BMPs.

Porter-Cologne Water-Quality Act

The Porter-Cologne Water-Quality Act, as amended in 2006, is included in the California Water Code. This act provides for the protection of water quality by the State Water Resources Control Board and the Regional Water Quality Control Boards, which are authorized by the EPA to enforce the Clean Water Act in California.

Direction relevant to the proposed action as it affects the soil resource includes the following.

National Forest Management Act

The National Forest Management Act of 1976, Renewable Resource Program; "(C) recognize the fundamental need to protect and where appropriate, improve the quality of soil, water, and air resources."

Forest Service Handbook and Manual

The National Soil Management Handbook (USDA 1991) is a national soils handbook that defines soil productivity and components of soil productivity, establishes guidance for measuring soil productivity, and establishes thresholds to assist in forest planning.

The Region 5 Soil Management Handbook Supplement (R5 FSH Supplement 2509.18-95-1) establishes regional soil quality analysis standards. The analysis standards address three basic elements for the soil resource: (1) soil productivity (including soil loss, porosity; and organic matter), (2) soil hydrologic function, and (3) soil buffering capacity. The analysis standards are to be used for areas dedicated to growing vegetation. They are not applied to lands with other dedicated uses, such as developed campgrounds, administrative facilities, or in this case, the actual land surface authorized for travel by the public using various kinds of vehicles.

Regional Forester's Letter (dated February 5, 2007) provided clarification to forest supervisors on the appropriate use of the R5 Soil Management Handbook Supplement (R5 FSH Supplement 2509.18-95-1). It states in part:

> *Analysis or evaluation of soil condition is the intended use of the thresholds and indicators in R5 FSH Supplement 2509.18-95-1. They are not a set of mandatory standards or requirements. They should not be referred to as binding or mandatory requirements in NEPA documents. Standards and guidelines in Forest Land and Resource Management Plans provide the relevant substantive standards to comply with NFMA.*

The thresholds and indicators represent desired conditions for the soil resource. Utilization of the thresholds and indicators provides a consistent method to analyze, describe and report on soil condition throughout the region.

Shasta-Trinity National Forest Land and Resource Management Plan

The Shasta-Trinity National Forest Land and Resource Management Plan (LRMP) lists specific direction for protecting riparian areas, soil, and water resources (LRMP, pages 4-24 to 4-25). The aquatic conservation strategy (ACS) provides standards and guidelines for protecting watershed resources as related to road management (LRMP, pages 4-53 to 4-55). Additional direction is given for key watersheds (LRMP, pages 4-58 to 4-60). The LRMP (page 4-25, appendix, page E-2 to E-3) also reiterates standard BMPs from USDA Forest Service, Pacific Southwest Region, 2000.

For key watersheds, existing system and unauthorized route mileage should be reduced. For each mile of new road constructed, at least one mile of road should be decommissioned with priority given to roads that pose the greatest risks to riparian and aquatic ecosystems. No new roads are to be built in remaining unroaded portions of inventoried roadless areas (IRAs) within key watersheds.

The Aquatic Conservation Strategy (ACS) standards and guidelines require that a watershed analysis be completed that determines the influence of each road on ACS objectives, and that roads be designed to minimize impacts on riparian and aquatic resources. Construction of new roads in wetlands is prohibited. Adding unauthorized routes to the NFTS in meadows or wetlands constitutes road construction, and should be avoided. New stream crossings are required to be designed to pass a 100-year flood and allow for passage of aquatic fauna.

Effects Analysis Methodology

Analysis for watershed effects was in two phases. The analysis concentrated on the unauthorized routes that were considered for addition to the National Forest Transportation System (NFTS) although it also included NFTS roads and trails.

The first phase used geographic information system inventory data to screen watershed concerns. In particular, soils and geology inventory and watershed condition data were used to identify roads with high soil and water concerns. Factors considered included:

- Unstable soils
- Serpentine soils
- Watersheds exceeding threshold of concern (see Equivalent Roaded Acre Methodology, USDA 1990), and
- Key watersheds (LRMP 1995).

The soils instability layer (GIS) identifies unstable landmass and inner gorge features along streams that provided the first screen to identify routes with risk for mass wasting and offsite erosion. The serpentine soils pose a potential health risk to motor vehicle users and also have a risk for compaction,

erosion and rutting from the fine texture. Regional direction regarding management practices within areas having naturally occurring asbestos (serpentine soils) was released in June of 2008. Routes that passed the original screens that were on serpentine soils were then dropped from further analysis. Later analysis revealed some proposed routes may indeed be located on or near serpentine soils. See the "Air Quality" section in this chapter for more information and effects associated with serpentine soils.

The second phase of the analysis focused on reviewing survey information collected by the forest geologist and soil scientist during development of the proposed action. Unauthorized routes were evaluated for soil instability, proximity to streams, and signs of erosion. This information corroborated issues flagged in the first phase of the analysis. Routes that are being considered in the alternatives that were not previously surveyed will be surveyed prior to the final environmental impact statement.

Assumptions Specific to Watershed Effects Analysis

1) Traffic volume, wet weather use, and dispersed use patterns are the predominant causes of sediment production for native-surface routes (Foltz 2006; Luce 2001b; Sheridan 2005).
2) Soil compaction, or elimination; altered hill slope drainage; and elimination of vegetation on travel routes are effects that will persist; generally, 30 + years following prohibition of public motor vehicle use. Soil recovery will vary depending on site setting and productivity potential.
3) Spatial boundary for the effects analysis is the HUC 7 watersheds which drain from the National Forest System lands. Within the forest boundary, specific areas that require analysis include hydrologically sensitive areas with inventoried unauthorized routes. Cumulative watershed effects are analyzed for HUC 7 watersheds.
4) Hydrologically sensitive areas include all designated riparian protection areas, such as riparian reserves, streamside exclusion zones, streamside management zones, and riparian conservation areas. All areas of perennial and seasonal standing or running surface water and areas of perennially or seasonally saturated soil are included. Examples of hydrologically sensitive areas include streams, lakes, reservoirs, springs, fens, wet meadows, marshes, and unstable hill slopes.

Data Sources

1) Route-specific data collected in the field using established protocols for road erosion inventories.
2) Route inventories and associated tabular data sets.
3) GIS analyses of route miles and stream crossings in hydrologically sensitive areas, including the STNF forest-wide road analysis.
4) Forest Service specific information sources including Soil Resource Inventory (Lanspa 1994), Shasta-Trinity National Forest Land and Resource Management Plan (1995), and the Northwest Forest Plan (1994).
5) Water resource information including Clean Water Act 303d listed streams, The North Coast Regional Water Quality Board, and the Central Valley Regional Water Control Board Basin Plans.

6) Anecdotal information from forest staff documenting the time required for passive restoration of routes closed to motor vehicle traffic (recovery time may vary based on precipitation, elevation, aspect, and other factors).

Watershed Resources Indicators

- Miles of unauthorized routes in hydrologically sensitive areas and maximum erosion hazard ratings (maximum erosion hazard potential [MEHR], see USDA [1990]).
- Road stream crossings with high erosion potential (high and very high MEHR).
- Sum of the average annual erosion potential in tons from existing stream crossings on unauthorized routes and routes and areas proposed for addition to the NFTS in hydrologically sensitive areas within Watersheds of Concern.
- Routes with high runoff potential using hydrologic function class (HFC) and erosion potential using MEHR. HFC is based on soil properties that determine how a native surface road or trail will mechanically rut and erode with traffic. Hydrologic function classes are adapted from Region 5 soil interpretations (USDA 1999).
- Recovery potential of unauthorized routes using maximum erosion hazard potential as the indicator for limited recovery potential. Areas with lower recovery potential, steep granitic and limited growth serpentine soils correlate well with high and very high MEHR ratings.
- Density of route miles within HUC 7 watersheds.
- Miles of routes proposed in key watersheds, or routes proposed in watersheds with established total maximum daily loads (EPA: South Fork Trinity and Hayfork Creek Watersheds) described per Clean Water Act and have high risk factors for impaired water quality (cumulative effects).

Watershed Resources Methodology by Action

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Considerations: The principle effects of cross-country motor vehicle travel are increased partial year peak flows (Wright et al. 1990; Thomas and Megahan 1998; Jones 2000) for small watersheds only, and fine sediment (<0.4 millimeters diameter particles) transported from runoff from running surfaces (Bilby et al. 1989; Forsyth et al. 2006; Sheridan et al. 2006). The effect of the prohibition on cross-country motor vehicle travel would be to end traffic on routes and areas beyond the authorized NFTS. In the short-term, there would be a significant decrease in sediment production from unauthorized routes (Reid and Dunne 1984). Benefits from OHV routes would be muted as the response to runoff and sediment yield is much more variable and problematic (Foltz 2006). In the long-term, some or all unauthorized routes and areas would probably revegetate and regain some of their hydrologic and

geomorphic functions, although use of these routes by nonmotorized traffic could delay or prevent recovery.

Short-term Timeframe: 1 year.

Long-term Timeframe: > 30 years, based on observation of recovery of routes by Klamath NF Soils Scientist (Laurent 2009).

Spatial Boundary: The HUC 7 watersheds which drain from National Forest System lands.

Indicator(s): Miles of unauthorized routes in hydrologically sensitive areas and maximum erosion hazard ratings (maximum erosion hazard potential [MEHR], (2))

Methodology: A comparison of unauthorized routes open for use within riparian reserves is utilized to evaluate high risk road densities within near-stream areas (Ziegler et al. 2006). Also, these routes are compared using MEHR and HFC. Finally, road density for all routes including unauthorized, compared against resulting densities in disturbed watersheds.

Rationale: Published studies (Hann et al. 1994; Reid and Dunne 1984; Bilby et al. 1989; Forsyth et al. 2006; Sheridan et al. 2006) have documented that erosion of native-surface roads is increased by traffic. Watershed impacts of roads documented in Gucinski et al. (2001) and Trombulak and Frissel (2000).

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Short-term Timeframe: 1 year.

Long-term Timeframe: > 30 years.

Spatial Boundary: The HUC 7 watersheds which drain from National Forest System lands.

Indicator(s): (1) Mileage of unauthorized routes incorporated into system within hydrologically sensitive areas by alternative, (2) sum of the miles of routes with high and very high EHR ratings within hydrologically sensitive areas by alternative, (3) stream crossings with high erosion potential (based on adjacent EHR ratings) which are considered for system status, (4) sum of the average annual erosion potential in tons from existing stream crossings on unauthorized routes and areas proposed for addition to the NFTS in hydrologically sensitive areas within Watersheds of Concern (5) acres of impacts to soil productivity in lake bottom areas.

Methodology: Unauthorized routes added to the system are displayed over GIS layers which describe erosion hazard risk and hydrologic function. Route miles within erosion hazard risk areas are calculated and summarized by areas of erosion hazard risk and hydrologically sensitive areas. Estimates of average annual tons of sediment at stream crossings in hydrologically sensitive areas

within watersheds of concern are calculated utilizing the Watershed Erosion Prediction Project Roads Interface for Predicting Forest Road Runoff, Erosion and Sediment Delivery (USDA Forest Service, 1999)

Rationale: Forest roads alter hill slope drainage by extending the drainage network and concentrating runoff on erosion-prone surfaces (forest roads). This in turn affects the timing and magnitude of peak flows and sediment delivery to downstream waterbodies.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Short-term Timeframe: 1 year

Long-term Timeframe: > 30 years.

Spatial Boundary: The HUC 7 watersheds which drain from National Forest System lands.

Indicator(s): (1) Sum of route miles and areas proposed for changes in hydrologically sensitive areas (riparian reserves), (2) sum of route miles with located on soils with high erosion ratings.

Methodology: GIS database query of routes, route length, length of route overlying sensitive hydrologic areas, and length of route overlying soils with high erosion ratings,.

Rationale: Changes in traffic volume and type could affect production of fine sediment from running surfaces. Miles of routes in riparian reserves and other areas "hydrologically connected" is an index to potential effects. Hydrologic measures show the greatest effect for watershed indicators.

Cumulative Effects

Short-term Timeframe: 1 year

Long-term Timeframe: > 30 years.

Spatial boundary: The HUC 7 watersheds which drain from National Forest System lands.

Indicator(s): (1) Density of route miles by 7th field HUC watersheds, (2) recovery potential for unauthorized routes by disturbed watersheds and key watersheds, (3) acres of impacts to soil productivity on lake bottoms.

Methodology: Action alternative route densities are compared to existing route densities along with future foreseeable changes to routes (alternative 1) using project GIS database for disturbed watersheds HUC 7th field watersheds affected.

Rationale: Regional cumulative effects methods index disturbed ground on a watershed basis by normalizing each affected area (past, proposed, and future) to a severely compacted forest road, in units called equivalent roaded acres (ERA). Management effects are not foreseen that would change

the status of disturbed watersheds within the foreseen future (5 years), other than unexpected large-scale wildfire; therefore, only long-term effects are analyzed. Since roads are permanent features, changes in NFTS route density are a reasonable presentation of changes to long-term effects.

Amount of disturbed ground required to change peak flow, at the limit of detection, was found by Grant et al. (2008) to be the equivalent of 3 to 4 miles of roaded area per square mile. Limit of detection was considered to be ± 10 percent which is the standard error for standard instrumentation to measure flow. For the purposes of this analysis cumulative effects will be considered significant when there is 10 percent or more change in route density in a HUC 7th field watershed.

Finally, the potential recovery of unauthorized routes has important ramifications, especially in the context of broader watershed disturbance–in this case, assessed using road density instead of the ERA methodology. Long-term recovery of watersheds is tempered against the varying recovery of the soils disturbed by cross-country travel.

Affected Environment/Environmental Consequences

Affected Environment

Watershed

The STNF is relatively large covering approximately 2.1 million acres within northern California. The forest lies within two major river systems, the Klamath River Basin via the Trinity River and the Sacramento River. The forest overlays all or portions of nine 4th code Hydrologic Unit Code (HUC) watersheds, 54 5th code HUCs, 175 6th code HUCs, and 464 7th code HUCs. Climate on the STNF is geographically affected by the presence of the California Coastal Mountain range, the southern extent of the Cascade Mountain Range, and the California Central Valley. Temperature and precipitation values vary greatly over the Forest due to the large size of the STNF and the broad ranges in elevation and strong orographic influences. Precipitation is dominated by rainfall in the elevations below 3000 feet. Above those elevations, snowfall provides most of the annual precipitation.

Global climate change is expected to substantially affect California over the next 50 years (http://www.water.ca.gov/climatechange/docs/062807factsheet.pdf). Precipitation is likely to become more variable from year to year. Warmer temperatures will reduce the proportion of precipitation that falls as snow and increase the proportion that falls as rain. This shift will result in higher peak flows, more frequent flooding, increased erosion, reduced summer baseflows, more frequent droughts, and increased summertime stream temperatures.

As floods become more frequent and of greater magnitude, roads and trails will be subjected to greater stresses from higher runoff. Erosion of route surfaces and route-stream crossings will become more common. Ephemeral channels will carry water more frequently than in the past. The role of roads and trails in increasing runoff and peak flows (Ziemer, 1981; Jones and Grant, 1996) is likely to increase.

Cumulative watershed effects in watersheds near their thresholds of concern may become more common. Therefore, the protection and restoration of meadows and other riparian areas that extend the duration of baseflows will be increasingly important as snowpack diminishes. Routes through riparian areas that are currently not causing resource damage could cause damage in the future as runoff becomes more extreme. The seasons of use for routes may need to be modified as precipitation and temperature patterns change. Routes normally closed by snow may remain accessible to users but may be damaged by OHV use when wet.

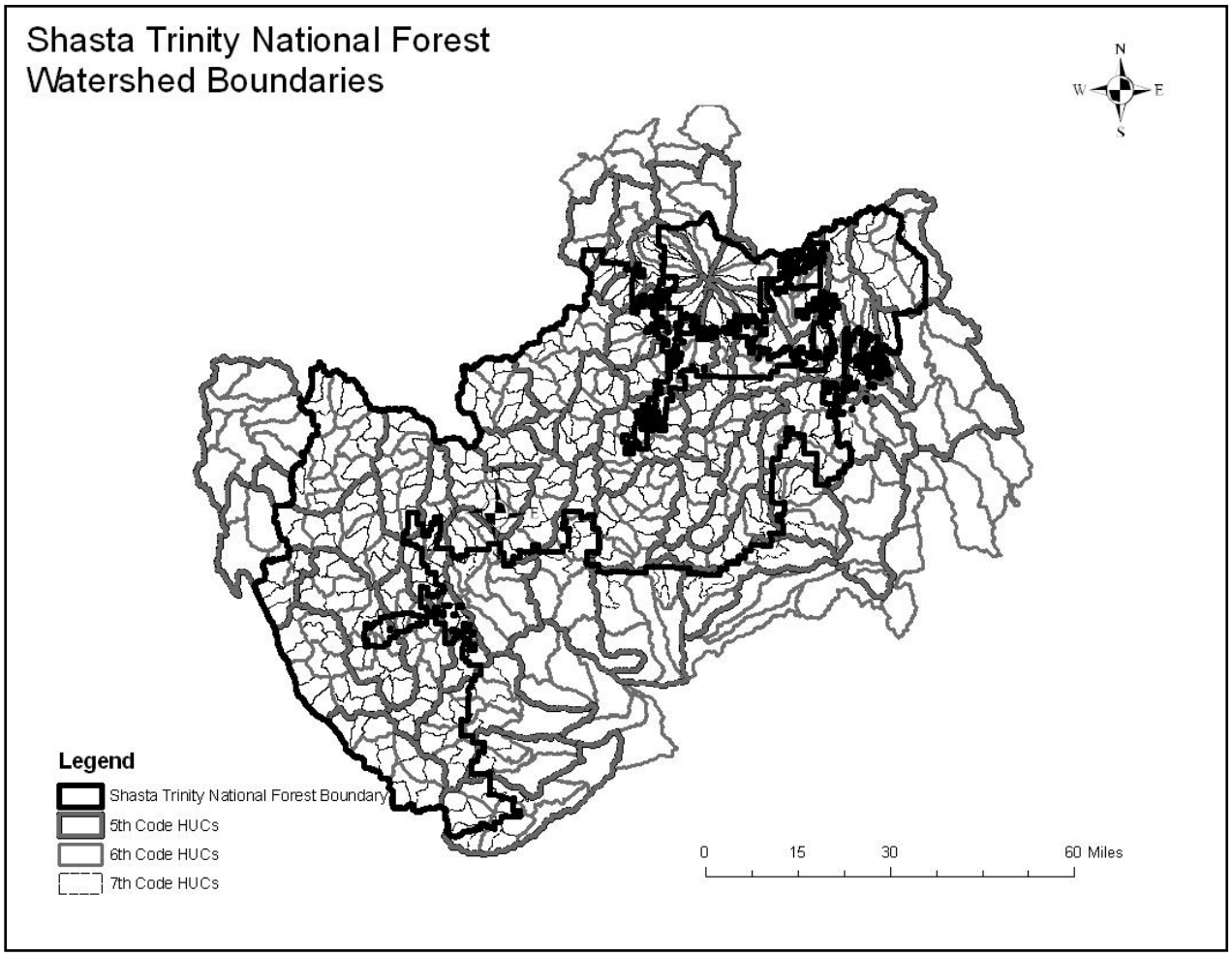


Figure 3.02-1. Shasta-Trinity National Forest watershed boundaries

The principal communities within these watersheds are Hayfork, Lewiston, Weaverville, Mount Shasta, McCloud, and the greater Redding area. The largest is the city of Redding with a population of approximately 107,800 residents.

The Forest Plan identifies four key watersheds important for fish populations and water quality: New River, Canyon Creek, North Fork of the Trinity River, and South Fork of the Trinity River. The areas delineating these watersheds are specifically defined and do not match existing HUC boundaries.

Streams and Water bodies

There are about 5,000 miles of perennial streams, 7,500 miles of intermittent streams, and 55,000 acres of lakes and reservoirs within and adjacent to the STNF boundary.

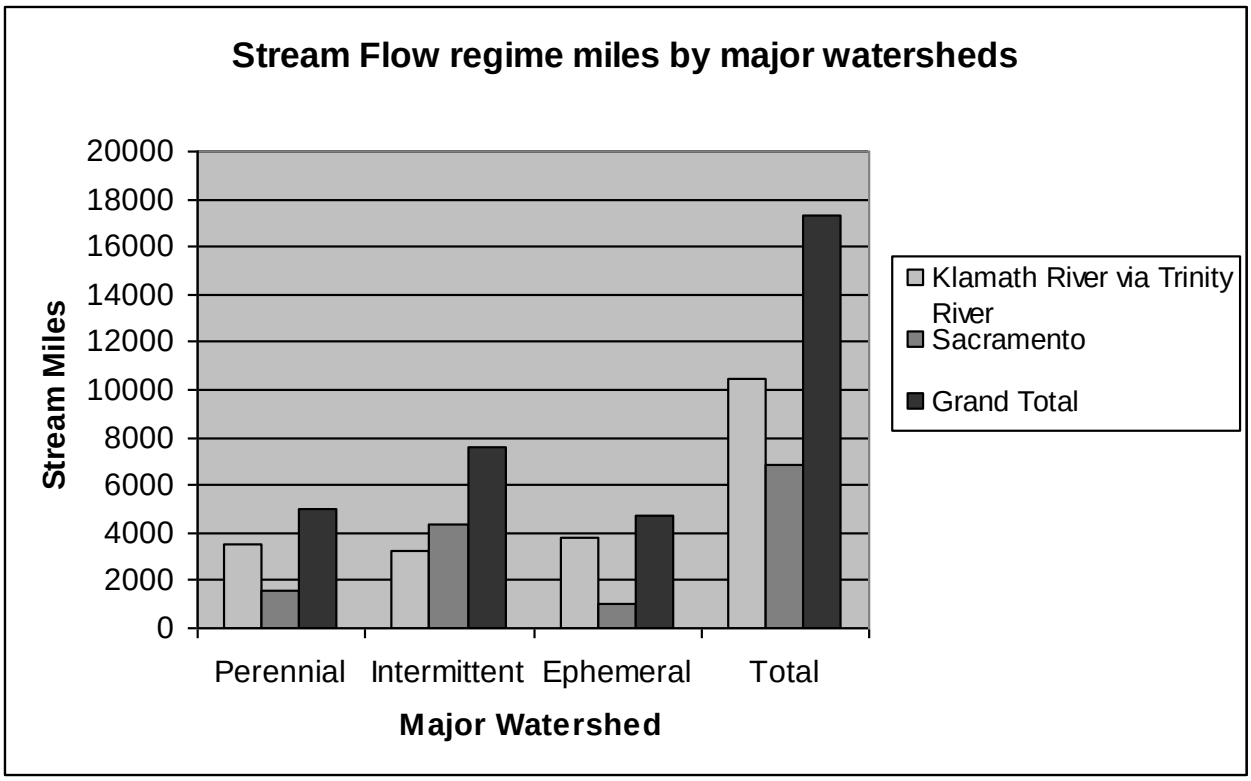


Figure 3.02-2. Stream flow regime by major watersheds

Table 3.02-1. Lakes by major river basin

River Basin	Lake Names	Acres
Klamath River via Trinity River	Trinity Lake	15,665
	(459 Smaller Lakes)	1,179
	Lewiston Lake	673
	Total	**17,517**
Sacramento River Headwaters	Shasta Lake	28,403
	Whiskeytown Lake	3,131
	(487 Smaller Lakes)	1,783
	Sacramento River	910
	Lake Britton	718
	Lake McCloud	496
	Keswick Res	462
	Siskiyou Lake	434
	Iron Canyon Reservoir	429
	Haynes Reservoir	233
	Total	**36,999**
Grand Total		**54,516**

Riparian Areas

The estimated extent of riparian reserve areas is approximately 274,308 acres. Past land management activities have been inconsistent in the application of riparian area resource management. Consequently, there is a wide diversity of riparian area conditions throughout the STNF.

The condition of the forests' riparian areas varies from sites that have never been disturbed, to areas which have already recovered or are in the process of recovering from disturbance. Other areas are in need of restoration efforts to help them recover more quickly. Road construction, recreational developments, large landslides, and mining activities have caused long-term and many irreversible effects. An estimated 5 percent of the total 274,308 acres of riparian areas on the forest are in a degraded condition and in need of rehabilitation.

Some of the greatest impacts to riparian areas stem from existing NFTS roads. Currently there are 203 miles of roads and trails within riparian reserves areas on the forest, and 6,999 stream crossings on the forest. Riparian reserve road densities tend to be higher in the South Fork Trinity River and Hayfork Creek Watersheds.

Water Quality

The water on the STNF is a valuable, widely used, renewable natural resource. Water produced from the forest's watersheds is used throughout the State for power generation, irrigation, domestic consumption, and many other beneficial uses. The varied users of the forests' water require a consistently high level of water quality. The water resource is also used for sustaining a variety of fish, wildlife, and other instream water uses. Several aquatic species, including Chinook and coho salmon, and steelhead trout utilize the South Fork Trinity River Watershed.

The quality of water that is produced as runoff from the STNF is measured against water quality objectives established by the Clean Water Act and the River Basin Plan objectives established by the State of California. Water quality is regulated by the Clean Water Act, under the direction of the EPA and the California State Water Resources Control Board. Local regulation is provided in the Trinity River Basin by the North Coast Regional Board and in the Sacramento River Basin by the Central Valley Regional Board. Water quality control plans for both regions contain water quality objectives (standards), beneficial uses, and a "Statement of Policy with Respect to Maintaining High Quality Waters in California." These plans regulate water quality of the waters of the STNF just as they regulate all other water of the respective river basins.

The State of California has found that most water bodies within the STNF meet State water quality standards. However, the State has identified the South Fork of the Trinity River, the East Fork of the Trinity River from its headwaters to Trinity Reservoir, Trinity Reservoir, and Shasta Lake as having pollution levels or impacts that exceed State standards–particularly due to elevated levels of sediment and

water temperature. The Trinity Reservoir and East Fork Trinity River are also listed for metals (mercury). Shasta Lake is also listed for metals–cadmium, copper, and zinc.

Trinity River Watershed was judged to exceed the existing water quality standards (WQS) necessary to protect the beneficial uses of the basin, particularly the cold water fishery. Accelerated erosion from roads, land use practices, past wildfires, and other causes adversely affects the ability of the stream system to support coldwater fish such as Chinook salmon and steelhead trout. The South Fork of the Trinity River has an established total maximum daily load (TMDL) for sedimentation and water temperature. The TMDL (EPA 1998) calls for a 30 percent reduction in sediment load for the South Fork of the Trinity River and Hayfork Creek.

The East Fork of the Trinity River from its headwaters to Trinity Reservoir, and Trinity Reservoir are both scheduled to have TMDLs completed by 2019. The source of the mercury is unknown, but is considered to be related to past mining practices. Shasta Lake is scheduled to have a TMDL completed by 2020. The source of the metals is considered to be from mining and other resource-extraction activities.

Water Yield

The STNF is within the Upper Sacramento and Trinity River Basins. Average annual flows from the Upper Sacramento (Sacramento River at Keswick gauge) and Trinity River (Trinity River at Lewiston gauge) are 10,260 cfs (cubic feet per second) and 588 cfs, respectively. The basins produce an average annual runoff of 6,972,000 acre-feet of water. Of this total, about 5,450,000 acre-feet of water flow from National Forest System lands.

Watershed Condition

Watershed condition on the Forest is described with watershed condition classes in the Forest Plan; forest-wide cumulative watershed affects analyses, and State- and EPA-sponsored water quality support investigations. These watersheds of concern (Table 3.02-2) reflect all of the above efforts. The aforementioned analyses have all utilized methods where watershed condition has been classified by evaluating the cumulative watershed impacts–past and present, forest use/management activities, and natural disturbances such as wildfire. The forest analyses are based on a method which calculates soil disturbance and compaction using an index of roading, timber harvest, and wildfire disturbance activities and describes them in terms of equivalent road acres (ERA). A watershed's sensitivity is evaluated and classified and a threshold of concern (TOC) value is assigned. This value is expressed in percent ERA, with lower sensitivity watersheds having a higher TOC than the highly sensitive watersheds. The Forest Plan describes three watershed condition classes in terms of the level of ERAs for individual watersheds with respect to their TOC.

Five subwatersheds were originally identified in the Forest Plan as having relatively high disturbance levels (Table 3.02-2) which cause them to be a class 3. These watersheds are the East Fork of the South Fork Trinity River, Rattlesnake Creek, Butter Creek, Plummer Creek, Hyampom and Upper Hayfork

Creek. Forest-wide equivalent roaded acres analysis (USDA 1990) was completed again in 2005, indicating that Big Creek-Hyampom, and Pelletreau Creek 7th code HUC subwatersheds were over their thresholds of concern–22.5 percent and 17.1 percent, respectively. Disturbance levels have recovered in the other watersheds previously listed.

Table 3.02-2. Shasta-Trinity watersheds of concern [a]

HUC 5 Name	HUC 6 Name	HUC7 Name	Reason for Concern
Lower South Fork Trinity 1801021205	Hyampom 180102120502		CWE Concern High Disturbance
		Big Creek-Hyampom 18010212050203	CWE Over TOC
		Pelletreau Creek 18010212050201	CWE Over TOC
Middle South Fork Trinity 1801021202	Sulphur Glade Creek-Waldorf Flat 180102120205	Hitchcock Creek-Oak Flat 18010212020502	CWE Over TOC
	Butter Creek 180102120204		CWE Concern High Disturbance
	Plummer Creek 180102120203		CWE Concern High Disturbance
	Rattlesnake Creek 180102120201		CWE Concern High Disturbance
Upper South Fork Trinity 1801021201	East Fork, South Fork Trinity River 180102120202		CWE Concern High Disturbance
Lower Hayfork 1801021204			303D/TMDL
Upper Hayfork 1801021203			303D/TMDL
E Fork of Trinity River 1801021103			303D/TMDL
Middle SF Trinity River 1801021202			Key
New River 1801021110			Key
North Fork Trinity River 1801021109			Key
Canyon Creek 1801021108			Key

a - Reasons listed are for cumulative watershed effects (CWE), current disturbance near or over established thresholds of concern (TOC), key watersheds, and Clean Water Act 303(d) listings with developed total maximum daily loads (TMDL).

Analysis for total maximum daily load has been completed on the South Fork of the Trinity River 4th code HUC (and particularly for the Lower and Upper Hayfork subwatersheds) which indicate that sediment from roading and other forest management activities is contributing to degraded water quality conditions.

Soils

The STNF has complex geology that strongly influences soil development on the forest. This geology leads to steep slope development that poses erosion issues for dedicated purposes such as road and trail

building. Additional issues involve fine textured soils on granitic, metamorphic and serpentine soils that erode easily, are prone to rutting, and can deliver offsite sediment or adversely affect adjacent productive land. Of particular significance are serpentine soils, also referred to as ultramafic soils, typically associated with serpentine geology. The dust from these serpentine soils can carry asbestos prone fibers, presenting a health hazard to road and trail users. For the field inventory, analysis concentrated on locations of unauthorized routes within serpentine in addition to fine textured and unstable soils related to slumping and general signs of erosion.

For context, the STNF has a diverse variety of soil types, related to the complex geology–over 105 soils series are mapped. The STNF landbase is 17 percent highly productive soils with representative series of Boomer, Hugo, Shasta, and Cohasset. On the lower production scale, roughly 40 percent of the forest has low productivity to unsuitable soils (from a timber production standpoint). Representative low productivity soil series are Dubakella, Deadwood, Goulding and Etsel. The bulk of the forest has moderate productivity with many diverse mapped soil series such as Marpa and Nuens. Most of these soils can be broken down into four broad categories based on their geologic parent materials: granitic, serpentine, metamorphic, and volcanic. The sandy skeletal soils of the volcanics tend to be less of an erosion concern due to their natural armoring or resistance to erosion. However, the granitic, serpentine, and metamorphic groups all have the potential for accelerated erosion or mass wasting.

About 195,000 acres on the STNF have a high to very high erosion hazard rating. This rating is largely a measure of soil cohesiveness; a function of soil texture, and slope steepness. These high and very high ratings are typically associated with the granitic, serpentine, and fine grained metamorphic parent rock areas.

Predominant granitic soils include Hotaw, Chawanankee, Chaix, and Oval. Granitic rocks are concentrated on the west side of the forest, almost due west of a north-south line through Trinity Reservoir. The granitics are most prominent in the wilderness areas, occupying the jagged peaks such as the Trinity Alps.

Other fine textured soils include the metamorphic soils such as Holland, Forbs, Hugo and Huntmount. Again these soils are prone to accelerated surface erosion. The metamorphic soils are generally found in the middle-eastern third and southwest third of the forest.

Serpentine soils are primarily found in the upper watershed of the East Fork Trinity River along the Weaverville Ranger District and Mount Shasta Ranger District boundary where asbestos mining was historically concentrated. Roads are found in areas with Ishi Pishi Family, Weitchpec Family and Dubakella Family soils. In the East Fork Trinity area, the serpentine complex rocks have short, steep pitches from strong slope dissection. Serpentine soils have low fertility due to a low calcium/magnesium ratio, and therefore do not recover readily once disturbed. These areas can be barren, with sparse vegetative cover and shallow soils (USFS 2004). Where soils have developed on serpentine parent material, serpentine soils can have a severe risk of compaction due to clayey texture and soft rock

structure, despite rocky soils. The fine texture can lead to rutting and offsite erosion from native road surfaces. No new routes are proposed within serpentine soils.

Unstable soils are mostly associated with inner gorge features along rivers and streams where erosion hazard is high. Large unstable soil areas are generally associated with low angle thrust faulting and/or extensive areas of ultramafic (serpentinite) intrusions. These areas are prominent in the South Fork Trinity River valley north of Hyampom, and within the Trinity Alps Wilderness; and in the headwaters of New River, Salmon River and East Fork Trinity River. User created roads and trails are not common in these areas, except for roughly 4 miles in the South Fork Trinity River Watershed north of Hyampom.

Environmental Consequences

Alternative 1 – No Action

Direct/Indirect Effects of the Prohibition of Cross-Country Motor Vehicle Travel

Table 3.02-3. Summary of alternative 1 prohibition of cross-country motor vehicle travel indicators

	Current Unauthorized or Proposed Route Miles	Miles of Unauthorized Routes on High or Very High EHR soils	Miles of Unauthorized Routes in Riparian Reserves	Number of Stream Crossings on Unauthorized Routes
Alt 1	1232	129.3	203	932

The primary hydrologic effect of forest roads is to alter hill slope drainage by intercepting precipitation either directly, as it falls on impervious surfaces, or indirectly as groundwater flow emerging at the road cut face. Depending on the engineered drainage of a road, intercepted water may be transported to streams much faster than would occur naturally, augmenting peak flows and altering their timing (Jones and Grant 1996; Wemple and Jones 2003). In addition, water flowing from running surfaces of roads will readily transport in suspension sediment less than 0.5 millimeters in diameter. This class of sediment is particularly injurious in fish-bearing streams where it clogs the interstitial pores in gravel beds, cutting off the circulation of water critical to eggs and emergent fry.

These concerns notwithstanding, numerous and extensive research has shown that even dense networks of roads, concomitant with other management such as harvested slopes in the western United States, do not affect peak flows in watersheds over about 3,500 acres, and even for much smaller watersheds, only for small peaks much less than 1-year frequency, and not of size to scour channels (Ziemer 1998; Beschta et al. 2000; Jones 2000). However, for roads where drainage runs directly as surface flow, either at crossings or rutted-relief drains, research has also shown that roads can add significant and possibly egregious amounts of fine sediment to a natural system (Bilby, 1989). There is a potential for isolated and infrequent spills of petroleum products from motor vehicles onto stream crossings on the current unauthorized routes. There is currently no data or information available to make a quantitative analysis of the current impact from petroleum product leakage onto stream crossings. However, it is our estimation that these spills would not be in volumes great enough to measure or cause changes in water quality within the stream.

With the no-action alternative there would be no prohibition on cross-country travel. The proliferation of cross-country travel is represented by 1,252 miles of unauthorized routes. This translates to roughly 1,300 acres of disturbed soil from compaction and erosion. Using the erosion hazard rating, roughly 10 percent of this area has high or very high risk for surface erosion from steep slopes and fine textures. This includes serpentine soils that have fine textures and lower productive potential because there is an excess of magnesium in relation to calcium or in other words, very low Ca/Mg ratios. Risk is highest in the western portion of the forest where granitic, isolated serpentine soils and steep slopes predominate. There are currently 129.3 miles of unauthorized routes located on soils classified as high or very high for erosion hazard. These unauthorized routes on high and very high EHR soils are particularly prone to detrimental soil disturbance and losses in long-term soil productivity. Further, there are 203 miles of unauthorized routes in riparian reserve areas, within which there are also 932 stream crossings: these stream crossings are not designed or managed and are often prone to water quality impacts from sediment delivery. If the current condition were to continue, there will be no improvement (decline) in run-off characteristics within small watersheds or reductions in road-related sedimentation. Further, impacts from existing unauthorized routes to soil productivity would continue. Therefore, there would be no expected change in either direct or indirect effects from either the current forest transportation system or from the existing unauthorized routes.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Table 3.02-4. Summary of alternative 1 addition of facilities indicators

	Miles of Unauthorized Routes in Riparian Reserves	Miles of Unauthorized Routes on High or Very High EHR Soils within Riparian Reserves	Number of Stream Crossings for Unauthorized Routes on High or Very High EHR Soils	Sum of Tons of Sediment Delivered at Stream Crossings for Unauthorized Routes in Watersheds of Concern	Sum of Acres of Negative Impact to Soil Productivity in Lake Bottoms
Alt 1	1232	129.3	203	412	0

There would be no routes added to the NFTS. Unrestricted motor vehicle travel on lake bottoms would continue. Lake bottom sediment deposits would continue to be displaced and disturbed with motor vehicle activities during periods where reservoirs are drawn down.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Table 3.02-5. Summary of alternative 1 effects of changes to existing NFTS indicators

	Miles of Unauthorized Routes on High or Very High EHR soils	Miles of Unauthorized Routes in Riparian Reserves
Alt 1	129.3	203

There would be no changes in vehicle class on any current routes in the NFTS.

Cumulative Effects

There would be no additional negative or positive cumulative effect over the current condition with the no-action alternative. The current trend of soil productivity loss and water quality impacts due to existing unauthorized routes would continue as is described previously.

Alternative 2 – Proposed Action

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Table 3.02-6. Summary of alternative 2 prohibition of cross-country motor vehicle travel indicators

	Proposed Addition of Currently Unauthorized Route Miles	Miles of Proposed Routes on High or Very High EHR Soils	Miles of Proposed Routes in Riparian Reserves	Number of Stream Crossings on Proposed Routes
Alt 2	44.2	4.75	2.8	36

Erosion-prone unauthorized routes, located mostly in the Trinity River Watersheds, are reduced 27 percent, with elimination of almost 95 percent of the routes with severe erosion risk. Alternative 2 does not differ substantially in this regard from the other action alternatives. The routes displayed in Table 3.02-7 exist on soils prone to accelerated erosion and rutting. Total unauthorized routes in hydrologically sensitive areas decrease from 203 miles to 2.8 miles, translating to a 98 percent reduction from current conditions. Miles of unauthorized routes within sensitive areas that are located on high and very high erosion hazard soils is reduced from 26.3 miles to 0.8 miles. Hydrologic recovery of unauthorized routes would occur within 30 years, with 11 percent of these having long-term effects from limiting soil conditions. Those routes with limiting soil conditions were considered to be routes on high and very high EHR areas and all areas on serpentine soils. These are categories of soils where natural revegetation and recovery would be slow or unlikely. However, on all other categories of soils, it is expected that these routes will become naturally reclaimed over time, and these watersheds should benefit from reduced road-related impacts such as road or trail drainage connectivity to stream channels and the resultant sediment delivery. Erosion prone unauthorized routes, located mostly in the Trinity River watersheds, are reduced 27 percent, with elimination of almost 95 percent of the routes with severe erosion risk. Alternative 2 does not differ from the other action alternatives in this regard. The routes displayed in Table 3.02-7 exist on soils prone to accelerated erosion and rutting. If necessary for resource protection, wet weather seasonal closures will be applied to these routes.

Implementation of the proposed action would have a substantial decrease on suspended sediment and runoff yield from route surfaces. Under alternative 2, cross-country travel would be reduced by 99 percent. Alternative 2 also decreases the number of stream crossings from the current 292 unauthorized crossings to 36 crossings. As noted above, the majority of the miles added within riparian reserve areas are associated with floodplain sand and gravel bottom locations for river boat access in the Trinity River Basin, lake bottom access locations around Trinity Lake, and stream crossing areas within and near the city of Mount Shasta. Again, as described in the direct and indirect effects discussion above, these route

additions do not pose a substantial risk to long-term soil productivity or water quality. In all but one instance, the local topography or soils limit the risk for negative impacts. There is a potential for isolated and infrequent spills of petroleum products from motor vehicles onto stream crossings on the routes to be added. It is not anticipated that these spills would be in volumes great enough to measure or cause changes in water quality within the stream. Any larger spills would be managed through the Forest Spill Prevention, Containment, and Countermeasures Plan (SPCC) as required through the Forest BMP 2-12.

Table 3.02-7. Alternative 2 routes located on high and very high erosion soils

Route Number	Route Type	Soil Name	EHR Rating	Miles
PM702	Trail	Dystric Xerorthents	H	0.04
SE476	Road	Marpa Family	H	0.14
SE477	Road	Marpa Family	H	0.03
SE508	Road	Rock Outcrop	H	0.12
SFMU7	Road	Chaix Family	H	0.01
TC1249	Trail	Typic Xerorthents	H	0.06
TC1829	Trail	Deadwood Family	H	0.14
TC1829	Trail	Hugo Family	H	0.14
U34N26DA	Road	Goulding Family	H	0.26
U34N26DAA	Road	Goulding Family	H	0.09
U1B005A	Road	Goulding Family	H	0.02
SE416	Road	Neuns Family	H	1.01
SE314	Road	Neuns Family	H	0.06
SE314	Road	Neuns Family	H	0.06
TRMU3	Road	Neuns Family	H	0.15
TRMU3	Road	Deadwood Family	H	0.15
TRMU2	Road	Etsel Family	H	0.04
UT29N30HA	Trail	Typic Xerorthents	H	0.31
Total				**2.83**

In the short-term, there would be expected significant benefits in reduction of fine sediment (mostly < 0.5 millimeters in diameter) transported off of running surfaces of travel routes in hydrologically sensitive areas. Research shows that fine sediments make up at least 80 percent and usually much more of total sediment delivered from road use (Bilby et al. 1989; Forsyth 2006). Sediment production from OHV trails is more variable and thus cessation of use would have more problematic results. Similarly, it has been demonstrated repeatedly that traffic volume is the primary agent of sediment production. Fines created during dry season, and usually the peak season of use, are washed away with the first storm events of each wet season (Luce and Black 1999). The termination of traffic on these routes will create near term reductions in fine sediment yields from approximately 114 miles of routes in hydrologically sensitive areas.

The decrease in erosion risk from prohibiting cross-country travel is shown in Figure 3.02-3. All system roads, system trails, and unauthorized routes are displayed in alternative 1 that have high runoff

potential (HFC C and D) and high erosion risk (MEHR high and very high). The action alternatives show new collective system routes with proposed road and trail additions. The risk is highlighted in two parts: (1) using risk for damage from compaction resulting in high runoff potential, and (2) identifying how much is in steep or fragile areas that have high and very high erosion potential. Figure 3.02-3 shows a modest reduction in runoff potential of 27 percent, particularly from compaction, for alternative 2. However, substantial reduction in high erosion risk would occur with alternative 2, almost a 95 percent reduction from the current situation.

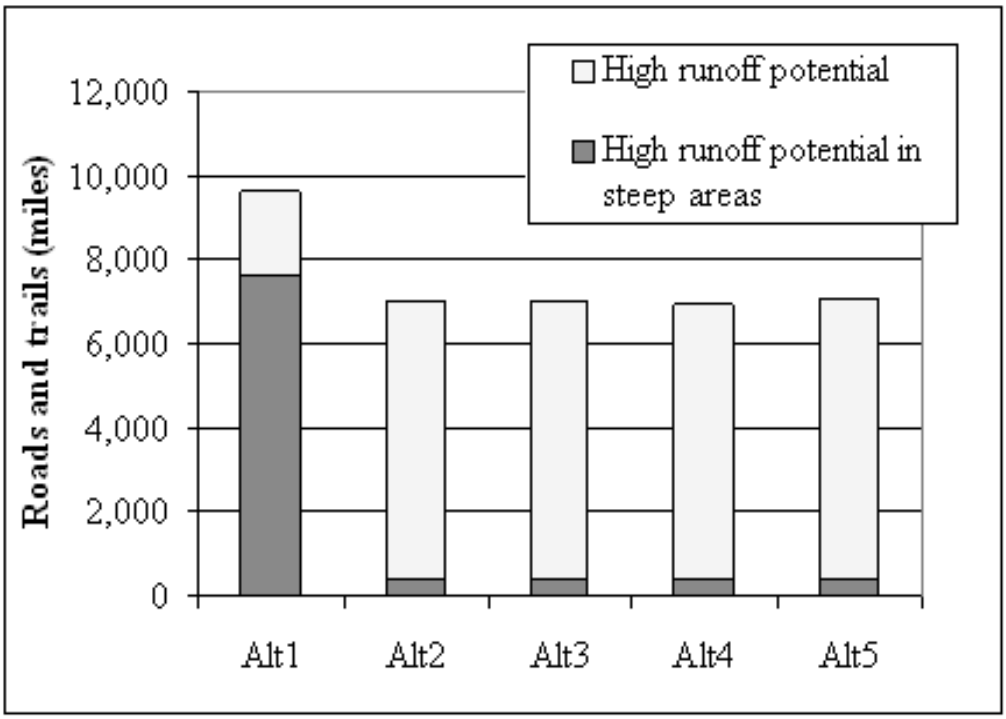


Figure 3.02-3. Comparison of current NFTS roads and trails on high runoff erosion potential soils, including unauthorized roads and trails (alternative 1) with proposed alternatives with existing NFTS roads and added routes (alternatives 2–5)

Within the context of the overall Forest, these high erosion routes represent 11 percent of the current unauthorized user roads and trails. Recovery would be longer than 30 years for the high erosion prone areas (11 percent), and within 30 years for the majority (89 percent). Prohibited routes will still intercept and concentrate surface flows for some time. Recovery may be delayed if unauthorized use continues. In the long-term, unauthorized routes will re-vegetate, increasing infiltration capacity of running surfaces, and mitigating road-directed runoff. In many cases sloughing cuts and fills will further disperse runoff from compacted running surfaces without directly leading to sources of sediment to channels. Vegetated and debris filled road ditches may lead to ponding on one-time running surfaces and failure of fill slopes, but will have reduced or eliminated capacity to capture and direct intercepted groundwater flow which augments peak runoff, as well as being the primary source of suspended sediment.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Table 3.02-8. Summary of alternative 2 addition of facilities indicators

	Miles of Proposed Routes in Riparian Reserves	Miles of Proposed Routes on High or Very High EHR Soils within Riparian Reserves	Number of Stream Crossings for Proposed Routes on High or Very High EHR Soils	Sum of Tons of Sediment Delivered at Stream Crossings for Proposed Routes in Watersheds of Concern	Sum of Acres of Negative Impact to Soil Productivity in Lake Bottoms
Alt 2	2.8	0.8	2	7.5	0

Alternative 2 adds 44.2 miles of unauthorized routes to the NFTS system and prohibits cross-country travel on 1,208 miles of unauthorized routes. Approximately 6.45 miles of road would be added within riparian reserves (Table 3.02-9). Of these routes within riparian reserves, approximately 0.8 miles are located on soils with high or very high erosion hazard ratings. Route U34N26DA in particular is located on relatively steep erosive slopes over a 0.26 mile section. This route is located within the Trinity Reservoir 5th HUC on loamy skeletal soils (Goulding Family) which are rated as high for erosion hazard.

The majority of the miles added within riparian reserves are associated with intermittent stream crossings and floodplains, sand and gravel bottom locations for access to the Trinity River, lake bottom access locations around Trinity Lake, and stream crossings near the city of Mount Shasta and on the lower slopes of Mount Shasta. The Trinity River access locations pose a low risk for impacts to soils or water quality as these proposed routes are on floodplain gravel materials which are relatively resistant to erosion and indirect impacts to water quality. The access from the existing road system to these routes is often steep and may require erosion control measures such as rolling dips or waterbars to control road drainage. The following roads (see Table 3.02-9) are located within hydrologic sensitive areas. Routes in hydrological sensitive areas and on erosive soils have the potential to cause accelerated erosion and become a source for sediment delivery to stream channels, thereby reducing water quality. Due to their proximity to streams, rivers, and lakes, wet weather seasonal closures will be applied to these routes if necessary for resource protection.

Table 3.02-9. Alternative 2 routes within hydrologically sensitive areas

Route Number	Route type	Miles
TC349	Road	0.04
U1S39B	Road	0.05
RM706	Road	0.03
PM304	Road	0.01
U1B005A	Road	0.09
TC1098	Road	0.01
TC1829	Trail	0.03
TC899	Road	0.06
TRMU6	Road	0.02

Route Number	Route type	Miles
TC1249	Trail	0.00
U34N26DA	Road	0.26
U34N26DAA	Road	0.09
U414C	Road	0.01
NRA1	Road	0.60
U36N35AA	Road	0.51
U35N85A	Road	0.19
JM244	Road	0.43
JM25	Road	0.19
JG30	Road	0.18
JG31	Road	0.18
JM72	Road	0.06
NRA2	Road	0.30
NRA3	Road	0.10
JM44	Trail	0.10
SE194	Road	0.04
SE476	Road	0.00
SE477	Road	0.00
SE314	Road	0.01
U40N35A	Road	0.02
U41N18AAD	Road	0.02
U40N91YA	Road	0.02
U42N18AA	Road	0.19
U42N18A	Road	2.51
U41N55D	Road	0.02
U41N55E	Road	0.02
U41N18AA	Road	0.02
U41N18A	Road	0.03
Total		**6.45**

Two areas are proposed for vehicle travel below the high-water mark. Those areas are located in the Shasta Lake Area and Trinity Lake Area. Both of these areas would require the following restrictions for vehicle travel:

- Existing seasonal restrictions for bald eagles
- Highway-legal vehicles only
- 15 mph speed limit for resource protection

The proposed addition of open areas within the lake bottom areas are a low risk to soil productivity and water quality. The land within the reservoir area is designated for water storage and is not part of the

productive land base. Further, these "areas" are located within the normal reservoir waterbody area, so movement or displacement of lake bottom sediments is not going to increase the current sediment delivery. Therefore, there will be no further degradation to water quality within the lake bottom due to vehicle access. Motor vehicle traffic on lakebeds will redistribute in-place sediments, but they will not be changing the productive capacity or adding more sediment than what is found onsite currently. There are no acres of impact to soil productivity or water quality. There is a potential for isolated and infrequent spills of petroleum products from motor vehicles onto reservoir bottom sediments in the proposed areas to be added. It is not anticipated that these spills would be in volumes great enough to measure or cause changes in water quality within the reservoir. Any larger spills would be managed through the Forest Spill Prevention, Containment, and Countermeasures Plan (SPCC) as required through the Forest BMP 2-12.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Table 3.02-10. Summary of alternative 2 effects of changes to existing NFTS indicators

	Miles of Proposed Routes on High or Very High EHR soils	Miles of Proposed Routes in Riparian Reserves
Alt 2	2.49	2.8

No changes to the existing NFTS routes are proposed.

Cumulative Effects

Past, ongoing and future effects are from continued use of roads and trails brought into the system. Cross-country travel would be prohibited. Of the forest's 7th code watersheds, 182 would have at least a 10 percent long-term decrease in road density. This is roughly 40 percent of the total 7th code watersheds. Many of the larger percentage decreases occur within watersheds which have TMDLs, are over their thresholds of concern (TOC), or are identified as key watersheds for fisheries and water quality concerns (Table 3.02-11).These route density decreases may result in detectable and favorable hydrologic responses (Grant et al. 2008). These watersheds could see reduced peaks or slowing and delaying of peak timing for small storm events, as well as decrease in fine sediment delivered to streams.

Table 3.02-11. Percent change in 7th code HUC watersheds from action alternatives [a]

7th Code Watershed	Current Road Density (miles/ square mile)	Current Road Density Present and Foreseeable Future Roads Decisions (miles/ square mile)		Percent Decrease from Alt 1				Factors
			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	
Upper Rattlesnake Creek 18010212020101	4.98	-0.10	4.9	-26	-26	-26	-23	TOC, TMDL, Key
Post Creek 18010212020102	3.16	-0.17	3	-25	-25	-25	-25	TOC, TMDL, Key
North Rattlesnake Creek 18010212020103	3.23	-0.04	3.2	-27	-27	-27	-27	TOC, TMDL, Key
Lower Rattlesnake Creek 18010212020104	3.29	-0.13	3.2	-20	-21	-21	-20	TOC, TMDL, Key
Cave Creek-Swift Creek 18010212020201	2.26	0.00	2.3	-35	-35	-35	-35	TOC, TMDL, Key
Little Bear Wallow Creek-Hidden Valley 18010212020202	1.91	0.00	1.9	-33	-41	-41	-33	TOC, TMDL, Key
Miller Springs 18010212020203	1.66	0.00	1.7	-11	-16	-16	-11	TOC, TMDL, Key
Upper Plummer Creek 18010212020301	3.74	0.00	3.7	-16	-17	-17	-16	TOC, TMDL, Key
Lower Plummer Creek 18010212020302	1.60	0.00	1.6	-45	-46	-46	-45	TOC, TMDL, Key
Upper Indian Valley Creek 18010212020401	3.67	0.00	3.7	-32	-32	-32	-29	TOC, TMDL, Key
Lower Indian Valley Creek 18010212020402	2.23	0.00	2.2	-7	-8	-8	-7	TOC, TMDL, Key
Butter Creek Meadows 18010212020403	2.13	0.00	2.1	-8	-8	-8	-8	TOC, TMDL, Key
Hitchcock Creek-Oak Flat 18010212020502	0.98	0.00	1	-13	-14	-14	-13	Over TOC, TMDL, Key
Hyampom Valley 18010212050202	1.62	0.00	1.6	-13	-15	-15	-13	TOC, TMDL
Big Creek-Hyampom 18010212050203	0.35	0.00	0.4	-4	-4	-4	-4	Over TOC, TMDL
Big Slide Creek-South Fork Trinity River 18010212050204	1.60	0.00	1.6	-19	-19	-19	-19	TOC, TMDL
Grapevine Creek-South Fork Trinity River 18010212050205	0.25	0.00	0.2	-8	-8	-8	-8	TOC, TMDL
Headwaters South Fork Trinity River 18010212010101	0.60	0.00	0.6	-11	-11	-11	-11	TMDL, Key
Shell Mountain Creek 18010212010102	1.84	0.00	1.8	-11	-12	-12	-11	TMDL, Key
Raspberry Gulch-South Fork Trinity River 18010212010103	1.99	0.00	2	-13	-17	-17	-13	TMDL, Key
Bierce Creek-South Fork Trinity River 18010212010301	2.37	0.00	2.4	-13	-15	-15	-13	TMDL, Key

7th Code Watershed	Current Road Density (miles/ square mile)	Current Road Density Present and Foreseeable Future Roads Decisions (miles/ square mile)		Percent Decrease from Alt 1				Factors
			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	
Rough Gulch-Happy Camp Creek 18010212010303	0.83	-0.06	0.8	-17	-17	-17	-17	TMDL, Key
Red Mountain Creek 18010212010302	2.67	-0.06	2.6	-17	-17	-17	-14	TMDL, Key
Prospect Creek 18010212010202	3.68	-0.06	3.6	-21	-22	-22	-21	TMDL, Key
Lower East Fork South Fork Trinity River 18010212010203	1.82	0.00	1.8	-22	-22	-22	-22	TMDL, Key
Upper East Fork South Fork Trinity River 18010212010201	1.59	0.00	1.6	-24	-24	-24	-18	TMDL, Key
Smoky Creek 18010212010401	1.77	-0.02	1.7	-25	-25	-25	-24	TMDL, Key
Cable Creek-Farley Creek 18010212010403	1.22	0.00	1.2	-39	-39	-39	-39	TMDL, Key
Lower Big Creek-Hayfork Creek 18010212030602	1.79	0.00	1.8	-17	-17	-17	-17	TMDL
Stringbean Creek-Goods Creek 18010212030103	4.34	-0.28	4.1	-18	-19	-19	-18	TMDL
Barker Creek 18010212030501	1.42	0.00	1.4	-20	-20	-20	-20	TMDL
Upper Carr Creek 18010212030401	1.22	0.00	1.2	-21	-21	-21	-21	TMDL
Bridge Gulch-Hayfork Creek 18010212030301	2.13	0.00	2.1	-24	-24	-24	-19	TMDL
Headwaters Hayfork Creek 18010212030101	5.55	-1.06	4.5	-26	-29	-29	-23	TMDL
Lower East Fork Hayfork Creek 18010212030202	0.83	0.00	0.8	-29	-29	-29	-14	TMDL
Lower Carr Creek 18010212030403	0.62	0.00	0.6	-32	-32	-32	-32	TMDL
Carrier Gulch-Hayfork Creek 18010212030302	2.65	0.00	2.6	-32	-32	-32	-31	TMDL
Duncan Creek 18010212030402	0.99	0.00	1	-33	-33	-33	-29	TMDL
Halls City Creek-Wilson Creek 18010212030104	4.74	-0.60	4.1	-33	-33	-33	-33	TMDL
Dubakella Creek 18010212030102	2.93	-0.48	2.4	-37	-38	-38	-33	TMDL
Duncan Gulch-Hayfork Creek 18010212030502	1.05	0.00	1	-45	-45	-45	-45	TMDL
Upper Corral Creek 18010212040401	2.78	0.00	2.8	-11	-11	-11	-11	TMDL
Hayfork Valley 18010212040302	1.14	0.00	1.1	-12	-12	-12	-12	TMDL
Lower Corral Creek 18010212040403	0.68	0.00	0.7	-13	-13	-13	-13	TMDL
Upper Tule Creek 18010212040201	2.51	0.00	2.5	-18	-18	-18	-18	TMDL

7th Code Watershed	Current Road Density (miles/ square mile)	Current Road Density Present and Foreseeable Future Roads Decisions (miles/ square mile)		Percent Decrease from Alt 1				Factors
			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	
Lower Tule Creek 18010212040202	2.57	0.00	2.6	-20	-20	-20	-20	TMDL
Little Creek-Hayfork Creek 18010212040303	1.64	0.00	1.6	-24	-24	-24	-24	TMDL
Lower Hayfork Creek Canyon 18010212040505	2.29	0.00	2.3	-30	-30	-30	-30	TMDL
Philpot Creek 18010212040103	3.00	0.00	3	-32	-32	-32	-30	TMDL
Olsen Creek 18010212040504	3.51	0.00	3.5	-32	-32	-32	-32	TMDL
Lower Salt Creek-Hayfork Creek 18010212040105	1.75	0.00	1.7	-33	-33	-33	-21	TMDL
Salt Gulch-Salt Creek 18010212040104	1.24	0.00	1.2	-34	-34	-34	-32	TMDL
Kingsbury Gulch-Kellogg Gulch 18010212040301	1.94	0.00	1.9	-35	-35	-35	-35	TMDL
Miners Creek 18010212040502	0.42	0.00	0.4	-38	-38	-38	-38	TMDL
Bear Creek 18010212040501	0.47	0.00	0.5	-41	-41	-41	-41	TMDL
Ditch Gulch-Salt Creek 18010212040102	5.58	-1.13	4.4	-44	-44	-44	-42	TMDL
Upper Salt Creek-Hayfork Creek 18010212040101	2.77	-0.29	2.5	-56	-56	-56	-56	TMDL
Horse Heaven Meadows 18010211030101	2.36	0.00	2.4	-16	-16	-16	-16	TMDL
Squirrel Gulch-Lower East Fork Trinity River 18010211030404	2.56	0.00	2.6	-17	-21	-21	-17	TMDL
Maxwell Creek-Trinity River 18010211080302	0.44	-0.01	0.4	-11	-26	-26	-11	TMDL
Soldier Creek-Trinity River 18010211080303	2.27	-0.12	2.2	-14	-16	-15	-12	Key
Conner Creek-Trinity River 18010211080306	1.66	-0.07	1.6	-24	-24	-24	-24	Key
Big East Fork 18010211080201	0.52	0.00	0.5	-24	-24	-24	-24	Key

a - Road density (miles/square mile) is listed in Alternative 1. Listed watersheds have concern from past disturbance levels near threshold of concern (TOC), listed TMDL, and/or listed as key watersheds.

Road density is used as a surrogate for watershed condition. Watersheds of concern are identified where past disturbance values are near or over thresholds of concern (TOC) using the ERA (equivalent roaded acre) methodology (USDA 1990). Fourteen watersheds are displayed in Table 3.02-11 above with past disturbance near their respective TOC values. Sixty of these subwatersheds drain into 303(d) listed streams: the Lower and Upper Hayfork drainages, and the larger South Fork Trinity River basin. Twenty eight of the listed watersheds in Table 3.02-2 are considered "key" for fisheries and water quality. The South Fork Trinity River HUC 4 Watershed would receive substantial road density reductions. Within this watershed, there are 14 subwatersheds listed with disturbance levels near or over thresholds of concern. These areas lie primarily within the Lower and Middle South Fork Trinity River subwatersheds: Upper Rattlesnake Creek (26 percent) and Upper Plummer Creek (17 percent). Recovery in these two watersheds may be limited due to the abundance of serpentine soils within these HUC 7 subwatersheds. Natural background surface erosion is higher on these sites and vegetation regrowth is limited. Hitchcock Creek-Oak Flat subwatersheds currently have disturbance levels which are over the TOC and will have modest reductions in road density of 13 percent.

Lower South Fork Trinity River drainages will decrease between 4 and 19 percent in road density (see Table 3.02-11). Hitchcock Creek-Oak Flat and Big Creek-Hyampom have impaired conditions over thresholds of concern and would show only modest decreases in road density due to already very low values despite the high disturbance levels. Decreases in Big Slide Creek (19 percent) will prove most beneficial since the unauthorized routes cross several areas of unstable ground.

With the exception to Plummer Creek in the South Fork Trinity, the greatest reductions in road density are in the 303(d) listed streams, the Lower and Upper Hayfork. Upper Salt Creek-Hayfork Creek would decrease road density up to 56 percent with the closure of 21 miles of unauthorized routes.

Canyon Creek, key fisheries watershed, has an impressive 64 percent reduction in road density for its tributary Dutch Creek. Though this tributary has low overall density, an unauthorized route where motor vehicle use would be prohibited, is along erosion-prone lower slopes and riparian, thereby having proportionally adverse effects.

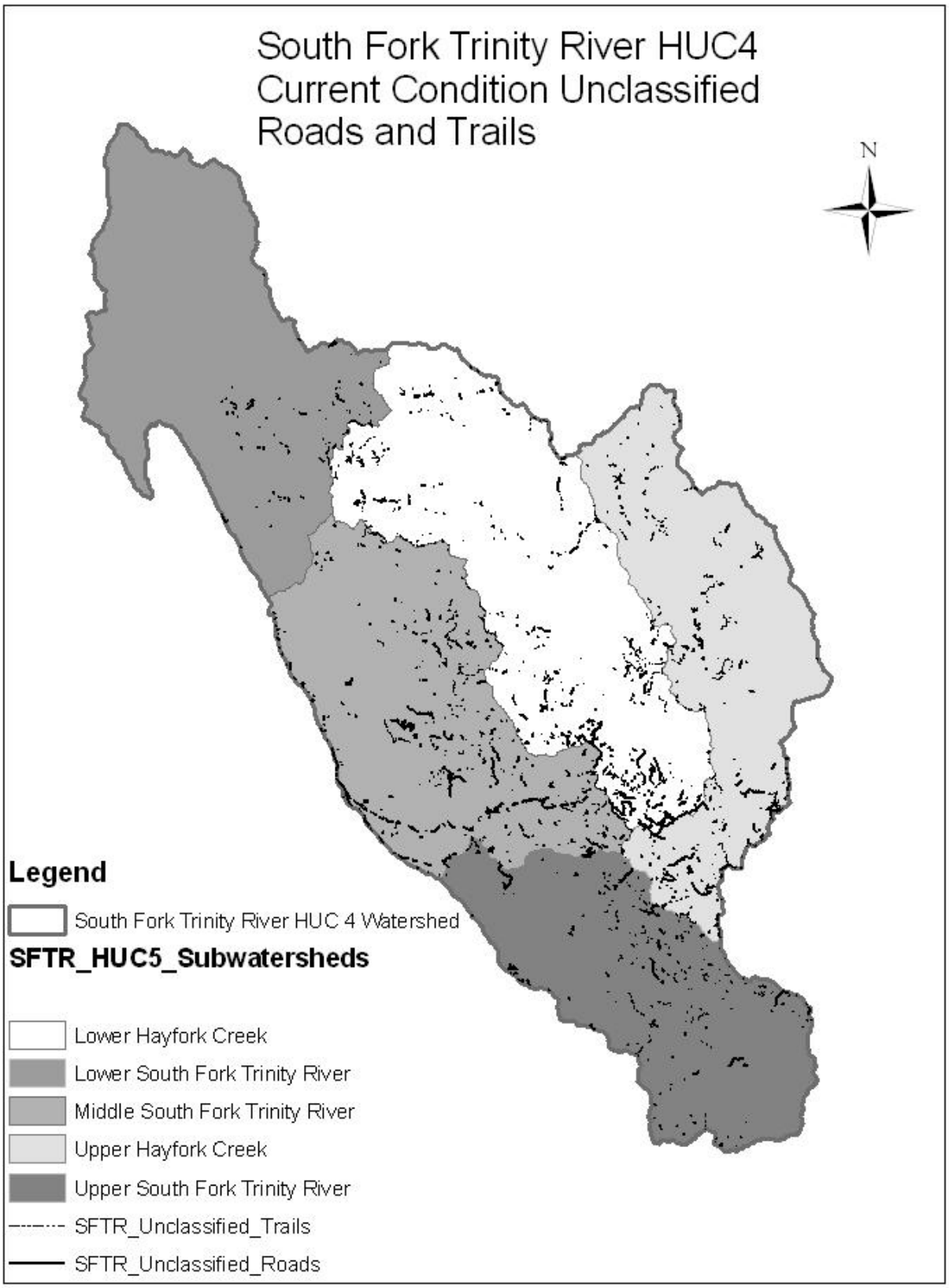


Figure 3.02-4. Current unauthorized routes within the South Fork Trinity River HUC 4 Watershed

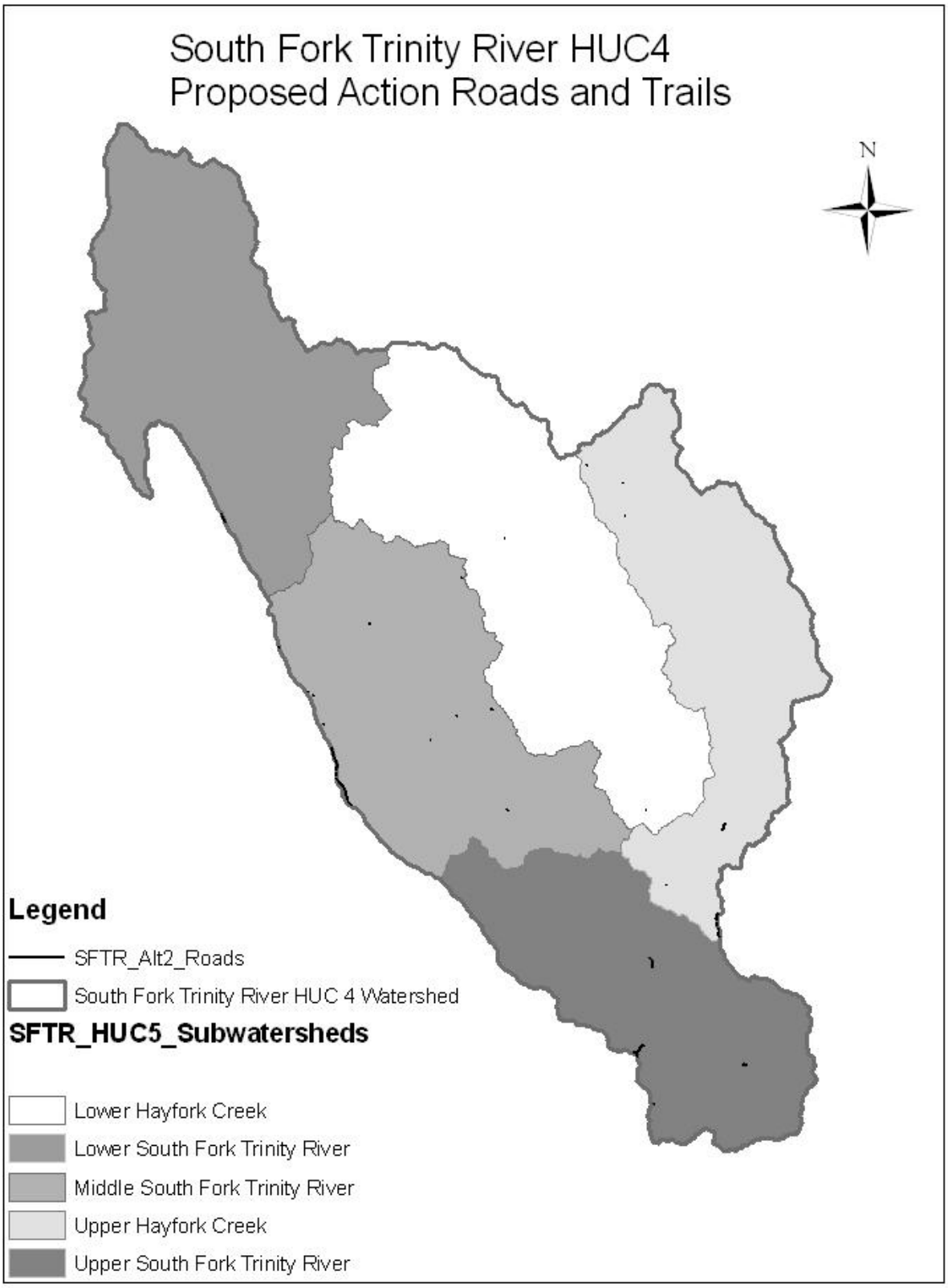


Figure 3.02-5. Proposed action routes to be added to the National Forest Transportation System

Alternative 3 – Cross-country Travel Prohibition Only - No Additions to the Existing NFTS

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Table 3.02-12. Summary of alternative 3 prohibition of cross-country motor vehicle travel indicators

	Proposed Addition of Currently Unauthorized Route Miles	Miles of Proposed Routes on High or Very High EHR Soils	Miles of Proposed Routes in Riparian Reserves	Number of Stream Crossings on Proposed Routes
Alt 3	0	0	0	0

Alternative 3 does not add any routes and thus results in the maximum unauthorized roads and trails where cross-country travel is prohibited. Motor vehicle travel would be prohibited on 1,252 miles of unauthorized routes. This results in discontinued use on 33 miles of routes within hydrologically sensitive areas, reducing stream crossing by 13 percent. Prohibiting use on these routes reduces the major effects of cross-country motor vehicle travel and route proliferation on water resources including increased peak flows and sediment loads due to compacted and non-vegetated route surfaces and detachment of sediment by vehicles.

Use of unauthorized routes in hydrologic sensitive areas decreases 100 percent from current condition, alternative 3 omits 0.26-mile section road (Route U34N26DA) proposed within steep sided riparian area (Trinity Reservoir 5th HUC). Stream crossings decrease forest-wide from 6,999 to 6,067 crossings (a 13 percent reduction), which is the lowest number of crossings across the action alternatives. There is a potential for isolated and infrequent spills of petroleum products from motor vehicles onto stream crossings on the routes to be added. It is not anticipated that these spills would be in volumes great enough to measure or cause changes in water quality within the stream. Any larger spills would be managed through the Forest Spill Prevention, Containment, and Countermeasures Plan (SPCC) as required through the Forest BMP 2-12. The reductions in the number of stream crossings in the South Fork Trinity River Watershed and Hayfork Creek Watersheds are particularly beneficial in terms of improving water quality in these 303(d) watersheds.

Erosion prone unauthorized routes reduced 27 percent, with elimination of almost 95 percent of the routes with severe erosion risk. Again, many of these routes on erosion-prone soils are located within the South Fork Trinity River and Hayfork Creek Watersheds. The reduction of these routes on erosion prone soils will be a long-term benefit for improving water quality within these watersheds. Hydrologic recovery of closed routes would occur within 30 years, with 11 percent of these having long-term effects from limiting soil conditions. Those routes with limiting soil conditions were considered to be routes on high and very high EHR areas and all areas on serpentine soils. These are categories of soils where natural revegetation and recovery would be slow or unlikely. However, on all other categories of soils, it is expected that these routes will become naturally reclaimed over time, and these watersheds should benefit from reduced road-related impacts such as road or trail drainage connectivity to stream channels and the resultant sediment delivery.

Prohibited routes will still intercept and concentrate surface flows for some time. In the long-term, some or all unauthorized routes and areas would probably re-vegetate and de-compact regaining some or most of their hydrologic and geomorphic functions, although use of these routes by non-motor vehicle traffic could delay or prevent recovery. Recovery potential in terms of current erosion-prone routes does not differ substantially from the other action alternatives (see Figure 3.02-2).

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Table 3.02-13. Summary of alternative 3 addition of facilities indicators

	Miles of Proposed Routes in Riparian Reserves	Miles of Proposed Routes on High or Very High EHR Soils within Riparian Reserves	Number of Stream Crossings for Proposed Routes on High or Very High EHR Soils	Sum of Tons of Sediment Delivered at Stream Crossings for Proposed Routes in Watersheds of Concern	Sum of Acres of Negative Impact to Soil Productivity in Lake Bottoms
Alt 3	0	0	0	0	0

In alternative 3, no unauthorized routes will be added to the NFTS. Alternative 3 would collectively leave 44 acres for natural recovery as compared to alternative 2, 8 acres as compared to alternative 4, and 83 acres as compared to alternative 5. There would be no routes added to areas where soils are rated as high or very high. Further, no routes would be added in hydrologically sensitive areas.

There are no areas proposed for motor vehicle travel below the high-water mark on any lakes or reservoirs. Motor vehicle travel below the high-water marks is prohibited (except to access permitted areas–an existing condition outside the scope of this analysis). No adverse effects are anticipated to water and soils within these reservoirs from this alternative.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Table 3.02-14. Summary of alternative 3 effects of changes to existing NFTS indicators

	Miles of Proposed Routes on High or Very High EHR soils	Miles of Proposed Routes in Riparian Reserves
Alt 3	0	0

There would be no vehicle class changes to any routes within the NFTS.

Cumulative Effects

Density of routes would be reduced in 182 7th field watersheds across the forest, similar to all other action alternatives (see Table 3.02-11). These watersheds could see reduced runoff peaks or slowing and delaying of peak timing for small storm events, as well as decrease in fine sediment delivered to streams. Overall differences are subtle between the action alternatives, since added roads are dispersed across the

forest for alternatives 2, 4, and 5. However, road density decreases over 1 percent compared to alternatives 2 and 5 for the following drainages:

- Little Bear Wallow Creek in the Middle South Fork Trinity River
- Dubakella Creek in the Upper Hayfork
- Squirrel Gulch-Lower East Fork Trinity River in the East Fork Trinity River
- Maxwell Creek-Trinity River in the Canyon Creek Watershed

As an example, the South Fork Trinity River HUC 4 watershed shows substantial reductions in total routes (see Figure 3.02-5) as compared to the current condition (see Figure 3.02-4). Watershed recovery follows the other action alternatives since recovery does not differ more than 10 percent. However, with no additional routes, alternative 3 has the most plausible beneficial effects on water and soils.

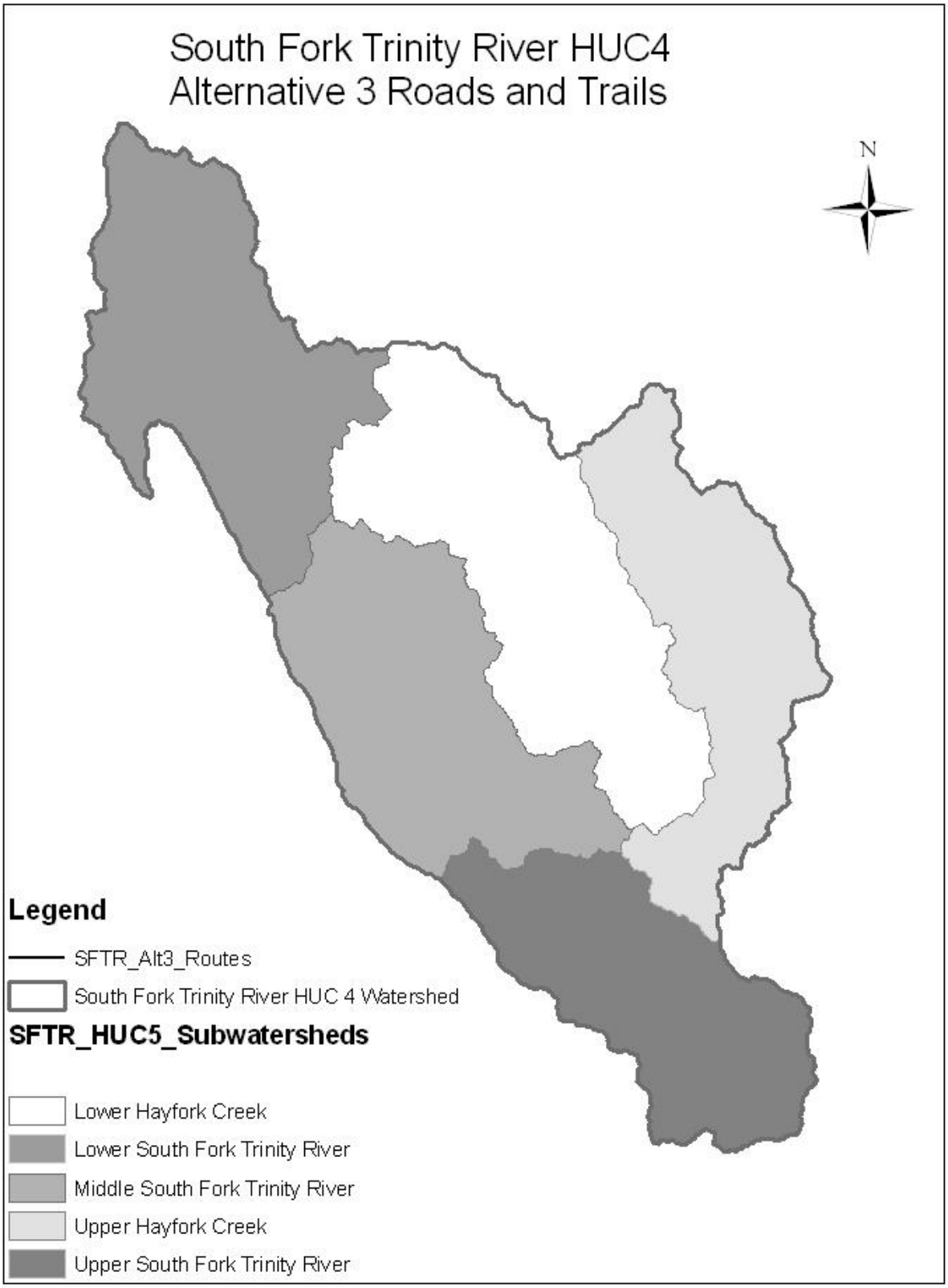


Figure 3.02-6. South Fork Trinity River HUC 4 Watershed alternative 3 routes to be added to the National Forest Transportation System

Alternative 4 – Minimize Impacts to Natural Resources and Roadless Areas

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Table 3.02-15. Summary of Alternative 3 Prohibition of Cross-Country Motor Vehicle Travel indicators

	Proposed Addition of Currently Unauthorized Route Miles	Miles of Proposed Routes on High or Very High EHR Soils	Miles of Proposed Routes in Riparian Reserves	Number of Stream Crossings on Proposed Routes
Alt 4	15.6	0	0	0

There would be a prohibition on cross-country travel on the forest, including the 1,244 miles of identified unauthorized routes. Short-term benefits are reductions of fine sediments from running surfaces with direct surface drainage into streams. All 33 miles of routes within erosion-prone riparian reserves would be closed. Total number of stream crossings would decrease 13 percent down to 6,067.

Unauthorized routes in hydrologic sensitive areas decreases 100 percent from current condition, alternative 4 does not add roads in riparian reserves. Stream crossings decrease from 6,999 to 6,067 crossings (a 13 percent reduction). There is a potential for isolated and infrequent spills of petroleum products from motor vehicles onto stream crossings on the routes to be added. It is not anticipated that these spills would be in volumes great enough to measure or cause changes in water quality within the stream. Any larger spills would be managed through the Forest Spill Prevention, Containment, and Countermeasures Plan (SPCC) as required through the Forest BMP 2-12. The reductions in the number of stream crossings in the South Fork Trinity River Watershed and Hayfork Creek Watersheds are particularly beneficial in terms of improving water quality in these 303(d) watersheds

Erosion prone unauthorized routes reduced 27 percent, with elimination of almost 95 percent of the routes with severe erosion risk. Again, many of these routes on erosion prone soils are located within the South Fork Trinity River and Hayfork Creek Watersheds. The reduction of these routes on erosion prone soils will be a long-term benefit for improving water quality within these watersheds. Hydrologic recovery of closed routes would occur within 30 years, with 11 percent of these having long-term effects from limiting soil conditions. Those routes with limiting soil conditions were considered to be routes on high and very high EHR areas and all areas on serpentine soils. These are categories of soils where natural revegetation and recovery would be slow or unlikely. However, on all other categories of soils, it is expected that these routes will become naturally reclaimed over time, and these watersheds should benefit from reduced road related impacts such as road or trail drainage connectivity to stream channels and the resultant sediment delivery.

In the long-term, some or all unauthorized routes and areas would probably re-vegetate and de-compact regaining some or most of their hydrologic and geomorphic functions, although use of these routes by non-motor vehicle traffic could delay or prevent recovery. Hydrologic recovery would be within 30 years for 89 percent of the current unauthorized routes; 11 percent would have delayed recovery from serpentine soils and/or steep slope conditions.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Table 3.02-16. Summary of Alternative 4 Addition of Facilities indicators

	Miles of Proposed Routes in Riparian Reserves	Miles of Proposed Routes on High or Very High EHR Soils within Riparian Reserves	Number of Stream Crossings for Proposed Routes on High or Very High EHR Soils	Sum of Tons of Sediment Delivered at Stream Crossings for Proposed Routes in Watersheds of Concern	Sum of Acres of Impact to Soil Productivity in Lake Bottoms
Alt 4	0	0	0	0	0

Alternative 4 would add 15.6 miles of currently unauthorized routes to the NFTS. Most of these routes are primarily trails (<50 inch width). None of these routes are within riparian reserves. Designating system travel on these routes would preclude natural recovery on up to 8 acres, primarily unauthorized roads. There would be no addition of routes to areas where soils are rated as high or very high. Further, no routes would be added to hydrologically sensitive areas. It is not expected that the addition of these routes will have a measurable or substantial effect on water quality. None of these routes are connected to stream channels and the likelihood of these routes impacting water quality is remote.

Three areas are proposed for open motor vehicle travel below the high-water mark on lakes and reservoirs. These areas are Shasta Lake Area, Trinity Lake Area, and Iron Canyon Reservoir Area. These areas would require the following restrictions for vehicle travel:

- Existing seasonal restrictions for bald eagles
- Highway-legal vehicles only
- 10 mph speed limit for resource protection

The land within the reservoir area is designated for water storage and is not part of the productive land base. Further, the open areas are located within the normal reservoir waterbody area, so movement or displacement of lake bottom sediments is not going to increase the current sediment delivery–therefore, there will be no further degradation to water quality within the lake bottom due to vehicle access. Motor vehicle traffic on lakebeds will redistributes in-place sediments, but they will not be changing the productive capacity or adding more sediment than what is found onsite currently. There are no acres of impact to soil productivity or water quality

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Table 3.02-17. Summary of Alternative 4 Effects of Changes to Existing NFTS indicators

	Miles of Proposed Routes on High or Very High EHR soils	Miles of Proposed Routes in Riparian Reserves
Alt 4	0	0

Vehicle class will be changed on 30.41 miles of existing routes. These changes do not substantially change effects to water quality. These routes exist regardless of vehicle class. The main impacts from existing routes to water quality are from the presence of the route. However, substantial changes in traffic volume could affect the production of fine sediment from running surfaces and may lead to added sediment delivery to routes within riparian areas.

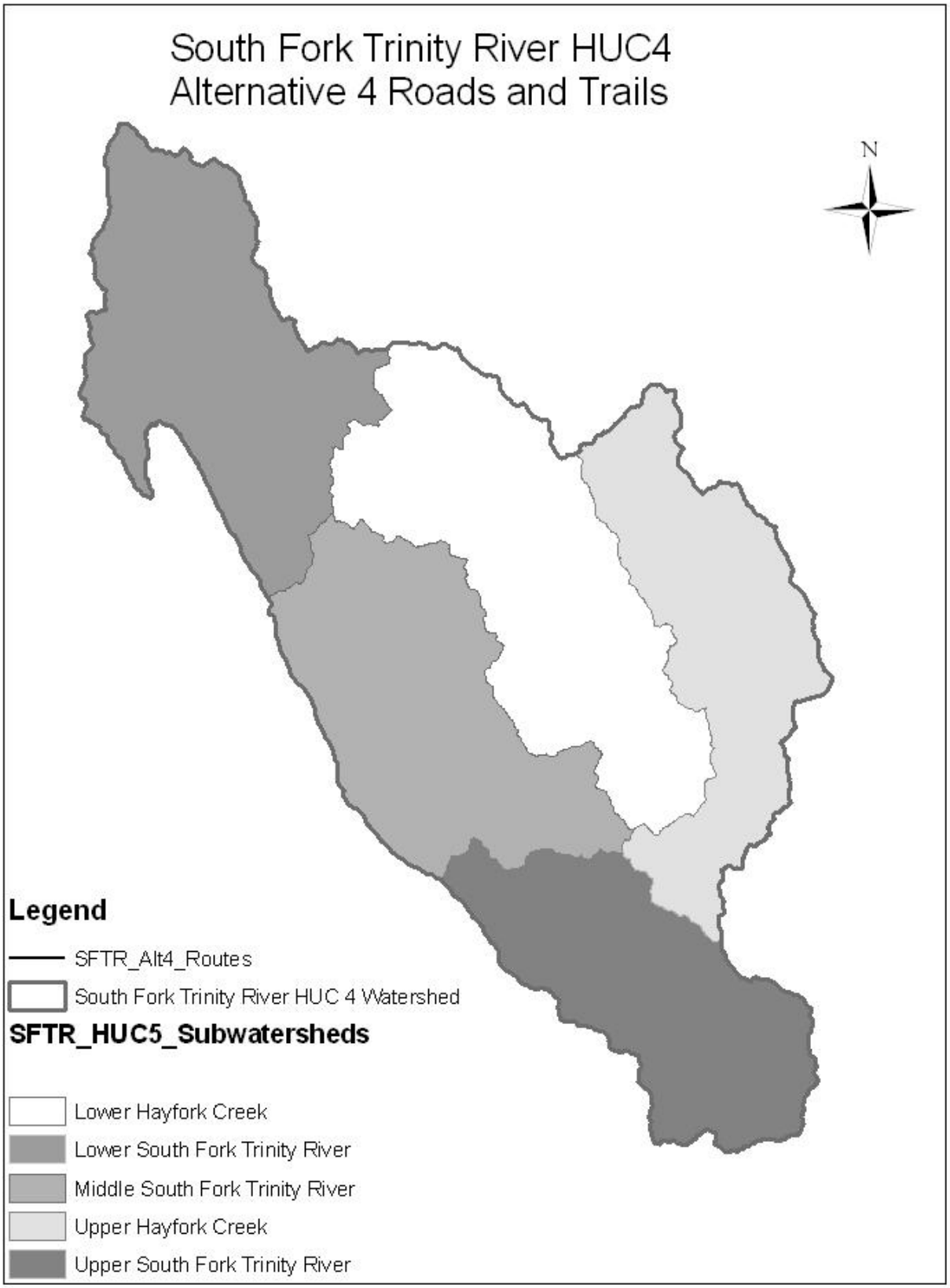


Figure 3.02-7. South Fork Trinity River HUC 4 Watershed alternative 4 routes to be added to the National Forest Transportation System

Cumulative Effects

Density of routes would be reduced in 182 7th field watersheds across the forest, similar to all other action alternatives (see Table 3.02-11). These watersheds could see reduced peaks or retardation of peak timing for small storm events, as well as decrease in fine sediment delivered to streams. Overall differences are subtle between the action alternatives since added roads are dispersed across the forest for alternatives 2, 4, and 5. However, road density decreases over 1 percent compared to alternatives 2 and 5 for the following drainages:

- Little Bear Wallow Creek in the Middle South Fork Trinity River
- Dubakella Creek in the Upper Hayfork
- Squirrel Gulch-Lower East Fork Trinity River in the East Fork Trinity River
- Maxwell Creek-Trinity River in the Canyon Creek Watershed

As an example, the South Fork Trinity River HUC 4 watershed shows substantial reductions in total routes (see Figure 3.02-7) as compared to the current condition (see Figure 3.02-4).Watershed recovery follows the other action alternatives since recovery does not differ more than 10 percent. However, with very few additional routes, alternative 4 has the second most plausible beneficial effects on water and soils of the action alternatives.

Alternative 5 – Improved Access and Motorized Recreation Opportunities

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Table 3.02-18. Summary of alternative 5 prohibition of cross-country motor vehicle travel indicators

	Proposed Addition of Currently Unauthorized Route Miles	Miles of Proposed Routes on High or Very High EHR Soils	Miles of Proposed Routes in Riparian Reserves	Number of Stream Crossings on Proposed Routes
Alt 5	106.1	6.37	11.6	61

Alternative 5 prohibits cross-country travel on the forest. Motor vehicle travel would be prohibited on 1,146 miles of identified unauthorized roads and trails across the forest. Short-term benefits are reductions of fine sediments from running surfaces with direct surface drainage into streams. There are 204 miles of unauthorized routes in this category forest-wide. Of these, 9.31 miles have high to very high erosion potential. Alternative 5 eliminates 32 miles of these steep riparian routes for a 99 percent reduction. Total number of crossings would decrease 12 percent, down to 6,128. Alternative 5 retains 61 more stream crossings than alternatives 3 and 4, and 25 more than alternative 2. There is a potential for isolated and infrequent spills of petroleum products from motor vehicles onto stream crossings on the routes to be added. It is not anticipated that these spills would be in volumes great enough to measure or cause changes in water quality within the stream. Any larger spills would be managed through the Forest Spill Prevention, Containment, and Countermeasures Plan (SPCC) as required through the Forest BMP 2-12.

Unauthorized routes in hydrologic sensitive areas decrease 99 percent from current condition. Road stream crossing decrease from 6,999 to 6,128 (12 percent reduction), which is the highest number of crossings of the action alternatives. The reductions in the number of stream crossings in the South Fork Trinity River Watershed and Hayfork Creek Watersheds are particularly beneficial in terms of improving water quality in these 303(d) watersheds.

Erosion-prone unauthorized routes reduced 27 percent, with elimination of almost 95 percent of the routes with severe erosion risk; alternative 5 is essentially the same in this regard as the other action alternatives. Hydrologic recovery of routes would occur within 30 years, with 11 percent of these having long-term effects from limiting soil conditions. Those routes with limiting soil conditions were considered to be routes on high and very high EHR areas and all areas on serpentine soils. These are categories of soils where natural revegetation and recovery would be slow or unlikely. However, on all other categories of soils, it is expected that these routes will become naturally reclaimed over time, and these watersheds should benefit from reduced road-related impacts such as road or trail drainage connectivity to stream channels and the resultant sediment delivery.

In the long-term, some or all unauthorized routes and areas would probably re-vegetate and ameliorate the compacted soil conditions regaining some or most of their hydrologic and geomorphic functions. Use of these routes by non-motor vehicle traffic could delay or prevent recovery, however. Hydrologic recovery would be within 30 years for 89 percent of the current unauthorized routes; 11 percent would have delayed recovery from serpentine soils and/or steep slope conditions.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Table 3.02-19. Summary of alternative 5 addition of facilities indicators

	Miles of Proposed Routes in Riparian Reserves	Miles of Proposed Routes on High or Very High EHR Soils within Riparian Reserves	Number of Stream Crossings for Proposed Routes on High or Very High EHR Soils	Sum of Tons of Sediment Delivered at Stream Crossings for Proposed Routes in Watersheds of Concern	Sum of Acres of Impact to Soil Productivity in Lake Bottoms
Alt 5	11.6	0.5	5	24	0

Alternative 5 adds 106 miles of routes which are currently unauthorized routes to the NFTS. Alternative 5 has approximately 11.59 miles of routes that would be adopted within riparian reserves. Of this, roughly 0.26 miles has high erosion risk from steep slopes (route U34N26DA). Designating system travel on all added routes would exclude natural recovery on up to 84 acres, primarily on unauthorized roads. Routes in hydrologically sensitive areas and on erosive soils have the potential to cause accelerated erosion and become a source for sediment delivery to stream channels, thereby reducing water quality. Due to their proximity to streams, rivers, and lakes, wet weather seasonal closures will be applied to these routes if necessary for resource protection.

Three areas are proposed for travel below the high-water mark on lakes and reservoirs. These areas are located on Shasta Lake Area, Trinity Lake Area, and Iron Canyon Reservoir Area. These areas would require the following restrictions for vehicle travel:

- Existing seasonal restrictions for bald eagles
- Allows all vehicle classes
- 10 mph speed limit for resource protection

The land within the reservoir area is designated for water storage and is not part of the productive land base. Further, these "areas" are located within the normal reservoir waterbody area, so movement or displacement of lake bottom sediments is not going to increase the current sediment delivery. Therefore, there will be no further degradation to water quality within the lake bottom due to vehicle access. OHV traffic on lakebeds will redistribute in-place sediments, but will not change the productive capacity or add more sediment than what is found onsite currently. There are no acres of impact to soil productivity or water quality. There is a potential for isolated and infrequent spills of petroleum products from motor vehicles onto reservoir bottom sediments in the proposed areas to be added. It is not anticipated that these spills would be in volumes great enough to measure or cause changes in water quality within the reservoir. Any larger spills would be managed through the Forest Spill Prevention, Containment, and Countermeasures Plan (SPCC) as required through the Forest BMP 2-12.

Table 3.02-20. Alternative 5 routes within hydrologically sensitive areas

Route #	Route Type	Miles
TC508	Trail	0.14
TC349	Road	0.04
RM706	Road	0.03
U29N33B	Trail	0.04
PM304	Road	0.01
U1S39B	Road	0.05
RM1206	Trail	0.02
U1B005A	Road	0.09
TC899	Road	0.06
TC1098	Road	0.01
TC1249	Trail	0.00
TC1829	Trail	0.03
SFMU9	Trail	0.01
IV021	Road	0.02
TC851	Trail	0.01
IV003	Road	0.00
IV004	Road	0.00
IV005	Road	0.00
IV006	Road	0.00

Route #	Route Type	Miles
IV007	Road	0.01
IV008	Road	0.01
IV010	Road	0.04
IV013	Road	0.00
TC857	Road	0.05
TRMU6	Road	0.02
U34N26DA	Road	0.26
U34N26DAA	Road	0.09
U414C	Road	0.01
NRA1	Road	0.60
U36N35AA	Road	0.51
SE194	Road	0.04
U35N85A	Road	0.19
JM244	Road	0.43
JM25	Road	0.19
JG30	Road	0.18
JG31	Road	0.18
JM72	Road	0.06
NRA2	Road	0.30
NRA3	Road	0.10
JM44	Trail	0.10
SE476	Road	0.00
SE477	Road	0.00
SE314	Road	0.01
U42N18AA	Road	0.19
U42N18A	Road	2.51
WE039	Trail	0.48
WE040	Trail	0.09
U42N84C	Trail	0.03
U42N84CA	Trail	0.02
WE540	Trail	0.20
WE542	Trail	0.09
WE545	Trail	0.10
U42N15J	Trail	0.65
U42N15M	Trail	0.42
U42N15NA	Trail	0.37
U42N15N	Trail	0.09
U42N15H	Trail	0.29
U42N15D	Trail	0.19
U42N15DA	Trail	0.22
U42N15K	Trail	0.53
U42N15KA	Trail	0.03

Route #	Route Type	Miles
U42N15MC	Trail	0.62
PC025	Trail	0.07
U41N55D	Road	0.02
U40N35A	Road	0.02
U41N18AA	Road	0.02
U41N18A	Road	0.03
U41N55E	Road	0.02
U41N18AAD	Road	0.02
U40N91YA	Road	0.02
MC115	Trail	0.03
MC092	Trail	0.01
EA284	Trail	0.22
MC098	Trail	0.02
MC091	Road	0.02
Total		**11.59**

Table 3.02-21. Alternative 5 routes located on high and very high erosion soils

Route #	Route Type	Soil Name	Miles
TC507	Trail	Hohmann Family	0.49
TC507	Trail	Hohmann Family	0.49
TC508	Trail	Hohmann Family	0.03
PM702	Trail	Dystric Xerorthents	0.04
SE476	Road	Marpa Family	0.14
SE477	Road	Marpa Family	0.03
SE508	Road	Rock Outcrop	0.12
SFMU7	Road	Chaix Family	0.01
TC1249	Trail	Typic Xerorthents	0.06
TC1829	Trail	Deadwood Family	0.14
TC1829	Trail	Hugo Family	0.14
RM1206	Trail	Holland Family, granitic	0.20
PC025	Trail	Sadie Family, deep	2.09
PC025	Trail	Asta Family	2.09
PC026	Trail	Asta Family	0.21
U29N33B	Trail	Beaughton Family	0.03
SE512	Trail	Neuns Family	0.52
U34N26DA	Road	Goulding Family	0.26
U34N26DAA	Road	Goulding Family	0.09
U1B005A	Road	Goulding Family	0.02
PM211	Trail	Beaughton Family	0.32

Route #	Route Type	Soil Name	Miles
SE416	Road	Neuns Family	1.01
SE314	Road	Neuns Family	0.06
SE314	Road	Neuns Family	0.06
TRMU3	Road	Neuns Family	0.15
TRMU3	Road	Deadwood Family	0.15
TRMU2	Road	Etsel Family	0.04
UT29N30HA	Trail	Typic Xerorthents	0.31
Total			**9.31**

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Table 3.02-22. Summary of Alt. 5 Effects of Changes to Existing NFTS indicators.

	Miles of Proposed Routes on High or Very High EHR soils	Miles of Proposed Routes in Riparian Reserves
Alt 5	6.37	11.6

Vehicle class will be changed on 30.41 miles of existing routes. These changes do not substantially change effects to water quality. These routes still exists regardless of vehicle class and the main impacts from existing routes to water quality are from the presence of the route. However, substantial changes in traffic volume could affect the production of fine sediment from running surfaces and may lead to added sediment delivery to routes within riparian areas.

Cumulative Effects

Density of routes would be reduced in 182 7th field watersheds across the forest, similar to all other action alternatives (see Table 3.02-11). These watersheds could see reduced peaks or retardation of peak timing for small storm events, as well as decrease in fine sediment delivered to streams. Overall differences are subtle between the action alternatives, since added roads are dispersed across the forest for alternatives 2, 3, and 5. Road densities are the highest of all action alternatives and closely resemble alternative 2. However, road density decreases over 1 percent compared to alternatives 2 and 5 for the following drainages:

- Little Bear Wallow Creek in the Middle South Fork Trinity River
- Dubakella Creek in the Upper Hayfork
- Squirrel Gulch-Lower East Fork Trinity River in the East Fork Trinity River
- Maxwell Creek-Trinity River in the Canyon Creek Watershed

As an example, the South Fork Trinity River HUC 4 watershed shows substantial reductions in total routes (see Figure 3.02-8) as compared to the current condition (see Figure 3.02-4). Watershed recovery follows the other action alternatives since the reduction in routes on high runoff areas and high runoff

areas on steep slopes does not differ more than 10 percent between the alternatives (see Figure 3.02-3). Alternative 5 would add the most routes of all the alternatives and is the least attractive of the action alternatives in terms of promoting soil productivity and water quality. Nevertheless, alternative 5 still reduces overall road density forest-wide substantially and would be a net benefit for soil productivity and water quality.

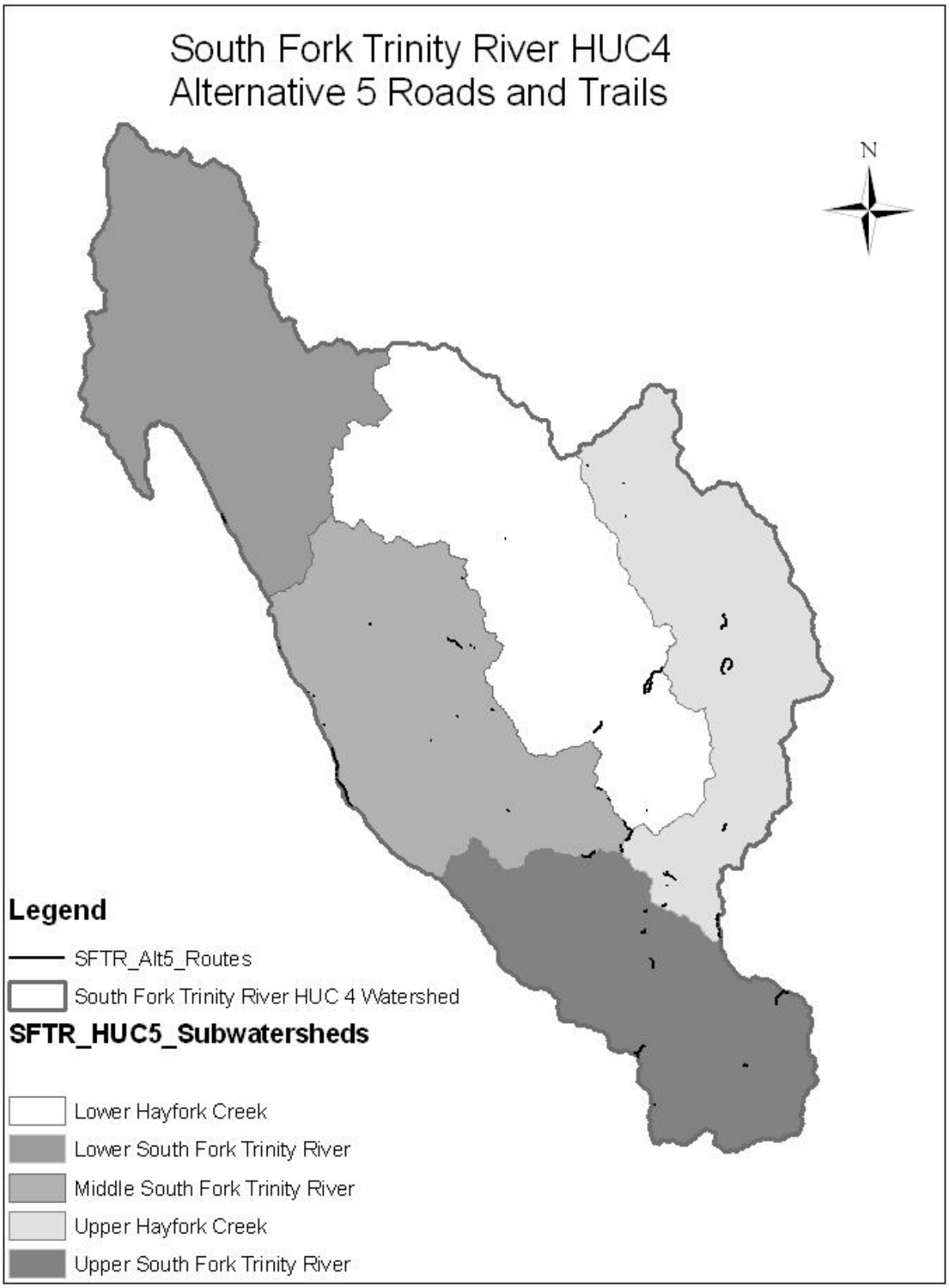


Figure 3.02-8. South Fork Trinity River HUC 4 Watershed alternative 5 routes to be added to the National Forest Transportation System

Summary of Effects Analysis across All Alternatives

Each of the action alternatives should significantly reduce the overall effects of routes across the forest due to the prohibition on cross-country travel. Alternative 3 is simply a prohibition on cross-country travel with no additions to the NFTS or vehicle class change on existing routes. It has the greatest positive effect for water resource by disallowing travel on at least 1,252 miles of unauthorized routes.

Table 3.02-23. Comparison of effects for watershed resources

	Rankings of Alternatives for Each Indicator				
Indicators – Watershed Resources	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**
Miles of unauthorized routes in hydrologically sensitive areas	5	3	1	2	4
Sum of the erosion potential in cubic yards or tons or route miles with existing erosional features on unauthorized routes and areas proposed for addition to the NFTS in hydrologically sensitive areas on the forest	5	3	1	2	4
Numbers of locations where routes divert or have potential to divert streamflow	5	3	1	2	4
Sum of route miles with documented erosional features	5	3	1	2	4
Change in road density	5	3	1	2	4
Average for Watershed Resources	**1**	**3.2**	5	**3.4**	**2.4**

Compliance with the Forest Plan and Other Direction

1. Clean Water Act

The Basin Plan for the South Fork and East Fork Trinity River contains water quality objectives, implementation plans for meeting those objectives, and other policies of the State Water Quality Control Board and the Federal Government, which are applicable to fuel treatment projects.

Water quality objectives are outlined in the California North Coast Regional Water Quality Control Board's (NCRWQCB) Water Quality Control Plan for the North Coast Region, as Adopted by the NCRWQB on December 9, 1993, Including Amendments Through 2004 (North Coast Region Water Quality Control Board 2001) (Basin Plan). The primary purpose for maintaining water quality is to assure that the beneficial uses of water are not adversely affected.

For management actions on National Forest System lands, the Forest Service Pacific Southwest Region (Region 5) entered into a 1981 management agency agreement with the NCWQCB and State of California requiring the Forest Service to institute a water quality management program to meet applicable water quality objectives and protect beneficial uses. Under the agreement, implementation of State-approved and EPA-certified BMPs is considered sufficient to protect water quality (see project file: ST_Watershed_BMP.doc).

Activities on the STNF are monitored regularly to confirm implementation and effectiveness of BMPs. Annual BMPEP monitoring reports are located in the project files and on the internet at http://fs.usda.gov/goto/stnf/planningdocs.

2. Aquatic Conservation Strategy (ACS)

The LRMP contains the components, objectives, and standards and guidelines for the ACS as recommended by the ROD. Of the nine ACS objectives on pages 4-6 and 4-7 of the LRMP, the following are applicable to the proposed travel management project:

Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.

The project would allow for the improvement of road impacts to the watershed, by prohibiting travel on 77 percent or more of identified unauthorized roads and trails forest-wide. Those roads and trails brought into the system would receive systematic maintenance.

Maintain and restore spatial and temporal connectivity between watersheds.

None of the alternatives change aquatic access between watersheds, because there is not a significant change in flow nor are barriers created. Prohibiting cross-country travel (off road use) may prevent some further impacts to spatial and temporal connectivity caused by unauthorized travel through wetted stream channels.

Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.

This project is consistent with riparian reserve guidelines, which prohibit and regulate activities in the riparian reserves that may prevent or retard attainment of the aquatic conservation strategy. Water quality is expected to improve from pre-project conditions, both forest-wide and on the basis of individual watersheds. Maintenance of water quality would be achieved through minimizing sediment delivery to stream courses through road improvement actions and prohibiting cross-country travel.

Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the regime include the timing, volume, rate and character of sediment input, storage, and transport.

With cross-country travel prohibition in general, and that specifically affecting up to 510 miles of unauthorized roads and trails, some improvement is expected forest-wide in the load of fine sediments reaching streams.

Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats, and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

In many 7th field watersheds reduction of route density may also result in detectable changes in peak flow timing and volume with concomitant reductions in sediment.

Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows.

Any changes in peak flow and timing would most probably be to small peaks associated with early season (fall) storm events that are not typically of sufficient volume and duration to affect floodplains.

Maintain and restore the species composition and structural diversity of plant communities in riparian areas.

Species composition of plant communities in riparian areas would be maintained, since construction of new roads is not proposed. Prohibition of cross-country travel may prevent further impacts to plant communities.

Maintain and restore habitat to support well-distributed populations of native plant and invertebrate riparian dependent species.

The action alternatives do not construct new roads, and therefore, populations of native plant and invertebrate riparian-dependent species will be protected in a state similar to the current condition.

3.03. Aquatic Resources

Introduction

Management of aquatic-dependent species and habitat, and maintenance of a diversity of animal communities, is an important part of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on National Forest System (NFS) lands must be planned and implemented so that they do not jeopardize the continued existence of threatened or endangered species or lead to a trend toward listing or loss of viability of Forest Service sensitive species. In addition, management activities should be designed to maintain or improve habitat for management indicator species to the degree consistent with multiple-use objectives established in each Forest Land and Resource Management Plan (LRMP). Management decisions related to motor vehicle travel can affect aquatic species by increasing human-caused mortality, causing changes in behavior due to disturbance, and habitat modification (Gaines et al. 2003, Trombulak and Frissel 2000, USDA Forest Service 2000). It is Forest Service policy to minimize damage to vegetation, avoid harassment to wildlife (including fish and aquatics species), and avoid significant disruption of habitat while providing for public motor vehicle use on NFS lands (FSM 2353.03(2)). Therefore, management decisions related to motor vehicle travel on NFS lands must consider effects to aquatic biota and their habitat.

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Direction relevant to the proposed action as it affects aquatic biota includes:

Endangered Species Act

The Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.) requires that any action authorized by a Federal agency not be likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the ESA, as amended, requires the responsible Federal agency to consult the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) concerning threatened and endangered species under their jurisdiction. It is Forest Service policy to analyze impacts to threatened and endangered species to comply with the Endangered Species Act. The analysis of impacts that could occur from implementation of an alternative has been documented in a biological assessment (BA) and is summarized in this chapter.

Forest Service Manual and Handbooks (FSM/H 2670)

Forest Service sensitive (FSS) species are species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability in national forests. It is Forest Service policy to analyze impacts to sensitive species to ensure

management activities do not create a significant trend toward federal listing or loss of viability. The impact analysis of sensitive species is documented in a biological evaluation (BE) and is summarized in this chapter.

STNF Land and Resource Management Plan (LRMP)

The 1995 LRMP identified the following management prescriptions for riparian reserves and key watersheds. These prescriptions will be considered during the analysis process.

Standards and Guidelines (Pages 4-24, 25)

16. Recreation

m. Continue to improve access to rivers, streams, and lakes for water-oriented recreation activities consistent with the Aquatic Conservation Strategy. Continue to provide access to hunting, fishing, and wildlife viewing areas.

o. Mitigate the physical impacts of increased, dispersed recreation use. Rehabilitation efforts should respond to resource damage to soils, water, and vegetation.

17. Riparian Areas

b. Maintain riparian area values, particularly when locating and constructing new roads and trails.

c. Identify and treat riparian areas that are in a degraded condition.

Management Prescriptions (Pages 4-59, 60)

IX. Riparian Management

A. Fish habitat will be maintained and enhanced along with those semi-primitive nonmotorized recreational opportunities associated with riparian areas.

B. Management Practices

Emphasized: Semi-Primitive Nonmotorized Recreation (Perennials)

Semi-Primitive Motorized Recreation (Intermittent/Ephemerals)

Permitted: Road Construction and Reconstruction

Roaded Natural Recreation and Rural Recreation

Effects Analysis Methodology

Assumptions Specific to Aquatic Biota Analysis

1) All vehicle types result in the same amount of disturbance effect on aquatic-dependent species.
2) Aquatic species spend all or significant portions of their life cycles either in or moving through riparian habitats.
3) Habitat is already impacted in the short-term. In the long-term, habitat will remain the same on unauthorized trails added to the NFTS, but will improve to at least some degree on unauthorized trails where cross-country travel is prohibited and passive restoration occurs (see soils report for further assumptions).
4) Human-caused disturbances near small streams can disrupt natural biological processes and have the potential to adversely affect biological characteristics and fragment habitats.
5) Sediment from roads can result in adverse effects to aquatic habitats if they enter the aquatic environment.
6) Unpaved roads located near or with crossings on small streams can result in adverse effects to aquatic habitat.
7) The overall effect of roads to aquatic habitats is related to the amount of sediment movement from road surfaces, and is highly variable within and among surface types. It is related to levels of maintenance, road drainage, and timing and type of use of the road.
8) The reduction or elimination of vehicle traffic on a road near a stream will result in less sediment delivered from the road to the stream.
9) The elimination of vehicle traffic on a road near a stream during periods of wet road conditions will result in less sediment being delivered from the road to the stream. Vehicle use on wet roads has the potential to cause ruts and damage to the roads with a resultant increase in erosion of sediment from the road during rainfall events and periods of snowmelt.
10) The density of roads and trails at the watershed scale will not be substantially changed as a result of any of the action alternatives for at least the next 20 years because all of the action alternatives involve the prohibition of cross-country travel and vehicle use by the public rather than the physical removal of roads. Routes not added to the NFTS under alternatives 2 through 5 would slowly revegetate and regain the conditions that exist on adjacent lands. The low levels of public nonmotorized use, permitted use, or administrative use would be insufficient to overcome the natural growth of vegetation and accumulation of organic material into the unauthorized routes.
11) Routes without hydrologic connectivity to streams will not influence sedimentation rates and will have no effect on that water quality parameter affecting aquatic species.
12) Routes in riparian areas can cause vegetative disturbances that result in decreased stream shading, increases in solar loading, and possible changes in stream temperatures.

13) Routes in riparian areas can cause vegetative disturbances that result in decreased contributions of leafy debris to streams and changes in nutrient cycling.
14) Routes or sections of routes outside of riparian reserves with no hydrologic connectivity to streams will not influence the aquatic environment, or have negative impacts on aquatic biota.

Data Sources

1) GIS layers of the following information: routes; habitats; and "designated" or important aquatic areas (e.g., riparian conservation areas, critical aquatic refuges).
2) Site-specific surveys/assessment of any localized sensitive aquatic habitats with routes proposed to be added to the NFTS (e.g., wet meadows, stream crossings, riparian corridors).

Aquatic Biota Indicators

1) Miles of routes/areas open for motor vehicle use within or adjacent to aquatic resources.
2) Number of routes/areas open for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources.
3) Density of routes open for motor vehicle use potentially affecting aquatic threatened, endangered, or sensitive species.
4) Miles of routes/areas open for motor vehicle use within riparian habitat, including meadows and stream banks.
5) Numbers of routes/areas open for motor vehicle use within habitats of TES aquatic biota – based on SONCC coho salmon designated critical habitat.
6) Miles of routes open for motor vehicle use within habitats of TES aquatic biota – based on SONCC coho salmon designated critical habitat.

Aquatic Biota Methodology by Action

1. Direct and indirect effects of the prohibition of cross-country motor vehicle travel.

2. Direct and indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: dependent on indicator.

Indicator(s): Refer to the five aquatic biota indicators just above.

Methodology: GIS analysis of added routes in relation to habitat and important/sensitive aquatic areas.

Rationale: Literature indicates that placement of routes in relation to habitat can affect aquatic species through mortality, disturbance, and habitat modification (Moyle and Randall 1996, Trombulek and Frissell 2000, USDA Forest Service 2000).

3. Direct and indirect effects of changes to the existing NFTS (vehicle class).

Same as for 2 above.

4. Cumulative Effects

Short-term timeframe: Not applicable; cumulative effects analysis will be done only for the long-term time frame.

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Indicator(s): Refer to the five aquatic biota indicators above.

Methodology: GIS analysis of past/current, added, and future routes in relation to habitat and important/sensitive aquatic areas and in context of other past, current and future management actions affecting aquatic habitat.

Rationale: Literature indicates that placement of routes in relation to habitat can affect aquatic species through mortality, disturbance, and habitat modification (Trombulek and Frissell 2000, USDA Forest Service 2000).

Affected Environment/Environmental Consequences

Affected Environment

There are more than 50,000 acres of lakes and reservoirs and 6,278 miles of rivers and streams within the 2.1 million-acre STNF. Of the rivers and streams, 1,900 miles are fishable. Two main river basins carve through the Forest; the Sacramento and Trinity River Basins. The upper Sacramento River flows into Shasta Lake, then south into the Central Valley of California. The Trinity River originates in the Trinity Mountains flowing down into Trinity Lake, on to Lewiston Lake, and then through Lewiston Dam towards the Klamath River. The Klamath River empties into the Pacific Ocean. Water is diverted out of the Trinity Basin into the Sacramento Basin via the Clear Creek Tunnel. In the Sacramento Basin, outstanding coldwater fisheries are found in the Sacramento, McCloud and Pit Rivers. Eight miles of the McCloud River (below McCloud Reservoir) are classified as a wild trout stream and offer a blue-ribbon fishing experience of national acclaim. The headwater areas of the Trinity River (the North and South Forks of the Trinity River and their tributaries, Squaw Creek; and Squaw Valley Creek) also support fisheries of regional interest. The fish in Shasta, Trinity, Lewiston, McCloud, and Iron Canyon Reservoirs, as well as in over 80 alpine lakes, are also of major recreational interest. The Sacramento and Trinity

River Basins once sustained several of the largest populations of important anadromous fish (salmon and steelhead) in California. However, factors such as dam construction, catastrophic floods, landslides, over-harvest of fish, and human activities on the landscape (including timber harvest, related road construction, and domestic livestock grazing) have contributed to reduced habitat quality and population levels.

Two types of habitat problems can impose long-term impacts to anadromous or inland coldwater fish stocks - those that are human-induced and those that are naturally inherent to a system (e.g., unstable soils or geological formations). Human-induced activities are further delineated by those that are under Forest Service administrative control and those that are outside the purview of Forest Service authority. Only those Forest Service, human-induced actions associated with the alternatives that have potential to impact either anadromous or inland coldwater fish habitat will be discussed here.

Instream habitat improvement and watershed rehabilitation projects, are helping bring about the recovery of salmon and steelhead populations in the Trinity River Basin. Forest Service involvement with plans to initiate recovery of anadromous fish in the Sacramento River Basin has been limited because of the comparatively small amount of STNF land involved (primarily Beegum Creek, a tributary to Cottonwood Creek).

Aquatic Invertebrates

Aquatic Invertebrate Sensitive Species

The STNF provides habitat for many species of aquatic biota. There are currently four aquatic invertebrates listed on the 2007 Region 5 sensitive species list and nine species of aquatic invertebrates listed as survey-and-manage species (Table 3.03-1). These species and their habitats on the STNF are described in detail in the STNF Motorized Travel Management EIS Aquatics Biota Biological Evaluation (BE) for aquatic invertebrates, which is hereby incorporated by reference into this document and can be found in the project record. The BE written for aquatic invertebrate species on the Region 5 sensitive species list provides the effects analysis and determination. The effects of the proposed activities under alternative 1 may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability of the populations or species. There would be no effect/impact to any species or habitat under alternatives 2, 3, 4, or 5. No aquatic invertebrate management indicator species (MIS) are designated for the STNF.

Table 3.03-1. US Forest Service, Pacific Southwest R5 sensitive and survey-and-manage species

ESA Threatened	Survey & Manage		R5 Sensitive	
	Scientific Name	**Common Name**	**Scientific Name**	**Common Name**
none	*Fluminicola n. sp. 14*	Potem pebblesnail	*Anodonta californiensis*	CA floater (freshwater mussel)
	Fluminicola n. sp. 15	flat-top pebblesnail	*Fluminicola seminalis*	Nugget Pebblesnail (snail)
	Fluminicola n. sp. 16	Shasta Springs pebblesnail	*Juga (Calibasis) occata*	Scalloped Juga (snail)
	Fluminicola n. sp. 17	disjunct pebblesnail	*Pisidium (Cyclocalyx) ultramontanum*	Montane peaclam
	Fluminicola n. sp. 18	globular pebblesnail		
	Fluminicola n. sp. 20	Lost Creek pebblesnail		
	Fluminicola seminalis	Sacramento (now "Nugget") pebblesnail		
	Juga (Oreobasis) n. sp. 3	cinnamon juga		
	Lyogyrus n. sp. 3	canary duskysnail		

Sources: Frest and Johannes 1999, and D. Ratcliff, personal communication 2008

The Potem pebblesnail and globular pebblesnail occur in the upper Sacramento River and the Pit River basins, California. These two species and the Shasta Springs pebblesnail are known to occur on Federal land; all three occur within the STNF. The nugget pebblesnail is also currently known on Federal lands with only two sites on the Forest. The flat-top and disjunct pebblesnails, and cinnamon juga are not known to occur within the STNF. The canary duskysnail is endemic to the Pit River of northern California but not known to be present on the Forest.

These species will not be included in detail in this analysis because there are no routes that affect their habitat; therefore, they are not affected by motor vehicle use on the STNF. A thorough discussion of these species and their habitat can be found in the Aquatic Biota BE.

Fisheries

The STNF provides habitat for many species of fish. There are currently three species of fish listed as threatened under the Endangered Species Act that either occurs on the Forest, or their critical habitat occurs on or could be affected by management actions taken by the Forest. Five species of fish are present on the 2007 Region 5 sensitive species list (Table 3.03-2). These species and their habitats are described in detail in the BA/BE which is hereby incorporated by reference.

The fish BA/BE and it's two supplements provide the effects analysis and determination for these species of fish. In summary, for ESA species it reports that all actions, when considered collectively and individually, would have either no effect or are not likely to adversely affect Southern Oregon Northern California Coastal (SONCC) coho salmon and their critical habitat (Figure 3.03-1). The only activity that was determined to "May Affect, Not Likely to Adversely Affect" SONCC coho salmon is the addition of routes TRMU2, TRMU3, and U414C to the NFTS. Thus it has been concluded that Motorized Vehicle Travel Management on the STNF associated with this action would have insignificantly negative effects

due to the addition of three routes regarding sediment and chemical contamination for SONCC coho salmon that may be in the vicinity of the area. The Letter of Concurrence in conjunction with this BA/BE was signed and sent by the National Marine Fisheries Service on February 10, 2010. It has also been concluded that Motorized Vehicle Travel Management on the STNF will have no effect on Central Valley steelhead and Central Valley spring-run Chinook salmon and their critical habitats. Regarding USFS Sensitive Species, the effects determination documents that Motorized Vehicle Travel Management on the STNF would not likely result in a trend towards listing or loss of viability and that this action would have net beneficial effects on watershed conditions that support these species.

Table 3.03-2. STNF threatened, sensitive, and management indicator species of fish

ESA Threatened		Survey & Manage	R5 Sensitive[a]		MIS	
Scientific Name	**Common Name**	**Scientific Name**	**Scientific Name**	**Common Name**	**Fish Assemblage**	**Common Name**
Oncorhynchus kisutch	S. OR/N. CA coho salmon (SONCC)	**none**	*Mylopharodon conocephalus*	Hardhead	Anadromous Commercial	Spring-Run Chinook (South Fork Trinity River only)
Oncorhynchus mykiss	Central Valley steelhead		*Oncorhynchus mykiss* pop 7	McCloud River redband trout	Anadromous Recreational Sport fish	Winter-Run Steelhead
Oncorhynchus tshawytscha	Central Valley spring-run Chinook salmon		*Oncorhynchus mykiss*	Steelhead - Klamath Mtn. Prov. ESU[b]	Anadromous Threatened, Endangered & Sensitive Sport fish	Spring-run (summer) Steelhead (South Fork Trinity River only)
			Oncorhynchus tshawytscha	Up Klam/Trinty Chinook ESU-spr run	Inland Coldwater Sport fish	Rainbow Trout
			Oncorhynchus tshawytscha	Upper Trinity Riv. Chinook ESU-fall run	Inland Warm water Sport fish	Largemouth Bass

a – Listed on the October 2007 Regional Forester's sensitive species list
b – ESU stands for evolutionarily significant unit: a term used to identify distinct population segments of a species

In addition, there are five management indicator species (MIS) of fish on the STNF. These species and their habitats are described in the Aquatic MIS report which is hereby incorporated by reference. The MIS report can be found within the project file and reports that activities associated with motorized vehicle travel management on the NFTS may impact individual fish or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the populations or species.

Threatened/Endangered/Sensitive Fish Species

The three federally designated threatened fish species on the STNF that will be discussed in this analysis are Southern Oregon/Northern California coho salmon (*Oncorhynchus kisutch*; SONCC), Central Valley steelhead (*O. mykiss*), and Central Valley spring-run Chinook salmon (*O. tshawytscha*). These species and their habitats on the STNF are described in detail in the BA/BE and its two supplements. The Region 5 sensitive fish species include the hardhead (*Mylopharodon conocephalus*), McCloud River redband trout

(*O. mykiss* pop 7), steelhead - Klamath Mountain Province evolutionarily significant unit (ESU) (*O. mykiss*), Upper Klamath/Trinity Chinook ESU-spring run (*O. tshawytscha*), and Upper Trinity River Chinook ESU-fall run (*O. tshawytscha*).

Anadromous Fish

The primary area of concern is the Trinity River Basin, particularly the South Fork Trinity River. Even though this basin is gradually recovering from the catastrophic impacts of the 1964 flood event, populations of fall and spring runs of Chinook salmon, like the summer steelhead, have not responded. Their numbers remain relatively low. This river system has instability issues because of its geological nature and is vulnerable to disturbances. Although both natural and human-caused disturbances have been and will continue to be potential sediment producers, forest management activities can be sensitive to watershed and fisheries needs in order to maintain populations of fall and spring runs of Chinook salmon in this drainage. Within Canyon Creek, New River, and the North Fork Trinity River, spring-run Chinook salmon adults, like summer steelhead, are vulnerable to poaching during the summer since they are visible in clear canyon pools. The California Department of Fish and Game (DFG) recognizes poaching as one of the most immediate threats to these fish. These latter tributaries to the main stem Trinity River have not been identified as major sediment producers accelerated by human-induced activities, although areas of natural instability do exist within their systems.

The Forest Service plays an important role in the enhancement of anadromous fish within the Trinity River Basin. Major investments have been made by the agency and the Trinity River Restoration Program (TRRP) to facilitate the improvement of adult returns of winter-run steelhead and increase the survival of rearing juveniles within the main stem and South Fork Trinity River Basin. This effort is expected to continue. Although the spring-run (summer) steelhead stocks within the New River and North Fork Trinity River Basin are stable, they are not stable in the South Fork Trinity River. Adult returns of spring-run Chinook are very low within these three basins as well as Canyon Creek and throughout the Klamath-Trinity River Basin. Cooperative efforts are ongoing with DFG and other concerned agencies as to the most appropriate methods that can be applied to protect and enhance these stocks. Concerted efforts have been undertaken by the TRRP agencies to implement a program to restore fish and wildlife resources within the Trinity River Basin to pre-Central Valley Project levels. The Forest Service continues to be a supportive and active member of this restoration effort.

Inland Coldwater Fisheries

After three consecutive years of drought conditions (2007-2009), major concerns have been expressed over the viability of the small tributary streams to support wild trout populations, especially redband trout. The greatest concerns for the redband trout streams are centered on cattle grazing/disturbance, high point source recreational use, and water drafting for dust abatement.

The California Department of Fish and Game and the U.S. Fish and Wildlife Service have recommended that special management protection be provided for all redband trout waters on the STNF. A redband trout conservation agreement was established in 1998 and signed by eight entities consisting of agencies and landowners. The agreement is currently in the process of being renewed. In an effort to improve the informational database on inland fish streams, habitat typing began in 1990. Surveys have been completed by the Forest Service and DFG over the last 2 to 3 decades across the Forest. These include surveys on Raccoon Creek, Squaw Creek, Squaw Valley Creek, and the Upper McCloud River. In addition, three redband trout streams (Moosehead Creek, Sheepheaven Creek, and Trout Creek) have been habitat typed. Further assessments of the alpine lake resources need to be made to identify ways of emphasizing the diversified recreational sport fishing opportunities offered by these waters. The Upper Trinity River, tributary to Trinity Lake, needs to be evaluated to determine watershed rehabilitation and fish habitat restoration needs, and to establish its candidacy as a State wild trout stream.

The Upper Sacramento River (above Shasta Lake) supported a unique wild trout fishery until the summer of 1991. The trout populations from a 45-mile stretch of this river were temporarily lost as a result of an accidental chemical (Metam Sodium) spill in July, 1991. Because of the spill, virtually all fish and other aquatic biota downstream to Shasta Lake were killed. After the spill, the DFG discontinued the stocking of catchable-size hatchery rainbow trout and began supporting the fishery as a wild trout stream. Populations of native trout and other aquatic biota from tributaries of the Upper Sacramento River have repopulated the affected 45-mile stretch.

Inland Warmwater Fisheries

Impacts from land management activities on warmwater fish habitat and associated recreational sport fishing is minimal within the Whiskeytown-Shasta-Trinity National Recreation Area (NRA). Opportunities to improve shoreline rearing habitat at Shasta and Trinity Lakes are being pursued jointly by the Forest Service and the DFG. Establishing sound partnerships will be important to accomplish future habitat improvement efforts, especially in the warmwater fisheries program.

Selection of Management Indicators

Management indicator fish species (MIS) have been grouped into specific assemblages or groups to simplify tracking the effects of Forest Service management activities on fish habitats. Three assemblages have been established. These are: (I) Fish Habitat - Anadromous Assemblage, (2) Fish Habitat - Inland Coldwater Assemblage, and (3) Fish Habitat - Inland Warmwater Assemblage. The species associated with these assemblages are listed above in Table 3.03-2. These fish are identified in the Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 1995a).

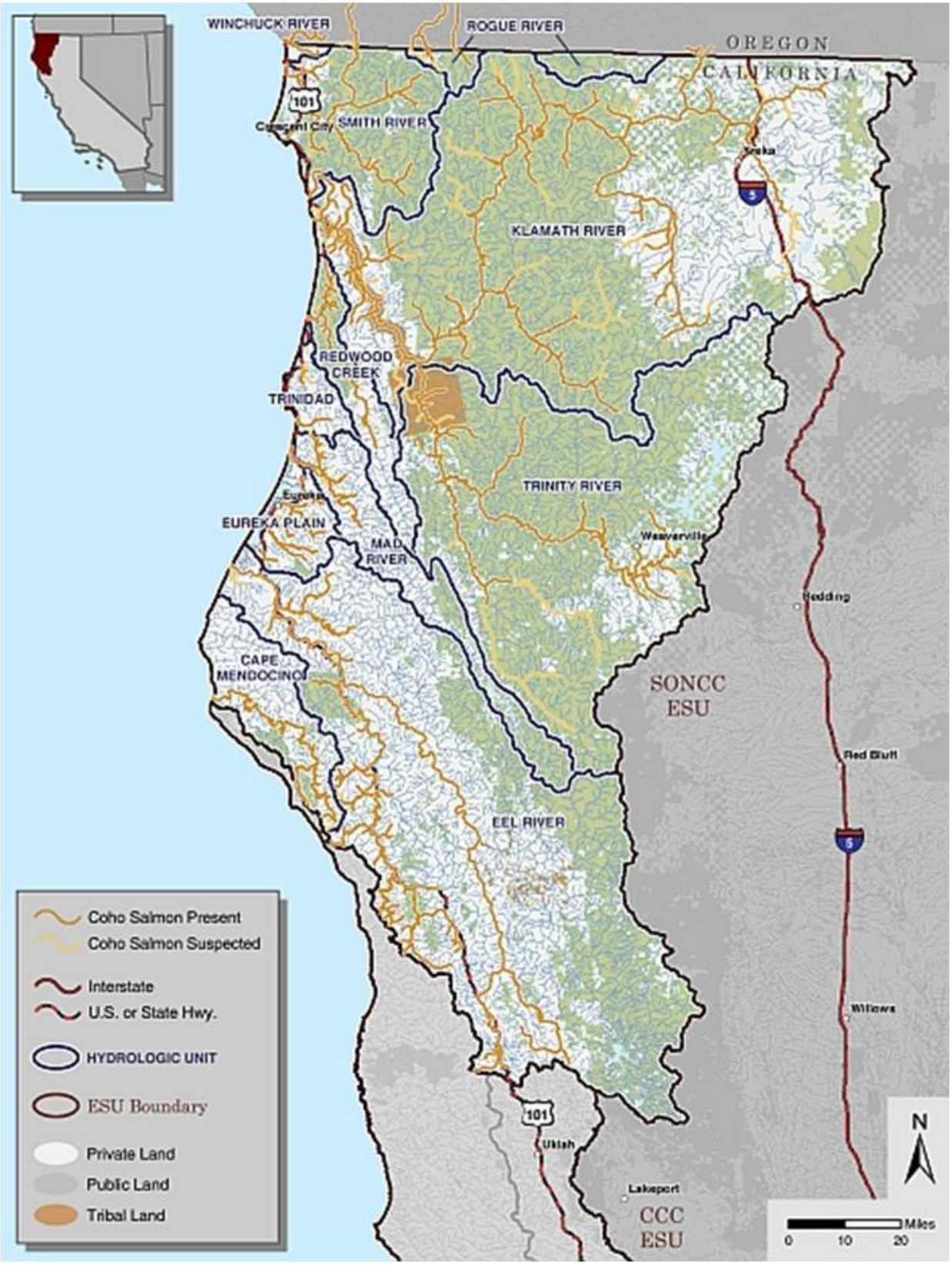


Figure 3.03-1. Present distribution of coho salmon in the Southern Oregon/Northern California coho evolutionarily significant unit (ESU)

The Forest Service manages aquatic habitats to maintain viable populations of native fish (rainbow trout, salmon, and steelhead), and introduced species such as bass and trout for recreation purposes. To ensure that viable populations are maintained, these management indicators are selected to act as "barometers" for aquatic communities. These indicators can then be used in determining the needs of a species and for predicting habitat capability responses to management activities. Simply put, these management indicators are used to guide and monitor Forest management activities in a manner that will maintain biological diversity in addition to producing enough fish to meet recreational and commercial needs. Management indicators are selected from species with similar habitat requirements. Management of these species will ensure that viable population levels of other species represented by the indicator species, including sensitive species (listed in Table 3.03-2), are also maintained. These species and their habitats on the STNF are described in detail in the BA/BE.

The Central Valley Project and the Trinity River Division

The Shasta (authorized in 1935 and completed in 1945) and Trinity (authorized in 1955 and completed in 1964) River Divisions of the Central Valley Project store and transfer water resources of the Trinity and northern Sacramento River basins to the Central Valley. Water from the Trinity River Basin is stored, regulated, and diverted through a system of dams, reservoirs, tunnels, and power plants. The system diverts the water into Whiskeytown Lake, the Sacramento River, and ultimately the Central Valley of California.

Historically, the Trinity River had an abundance of salmon and steelhead. Annual salmon runs in the Klamath Basin, including the Trinity River as its largest tributary, once reportedly totaled approximately 500,000 salmon. Construction and operation of the Trinity River Division (Figure 3.03-2) resulted in unintended, yet severely detrimental impacts to the Trinity River and its fish populations. The Trinity River Division of the Central Valley Project is composed of Trinity Dam (a large storage reservoir), Lewiston Dam (which controls the water released into the Trinity River), and Clear Creek Tunnel (which transports water from Lewiston Dam into Whiskeytown Lake in the Sacramento River Basin).

Construction of the Trinity and Lewiston Dams on the Trinity River also resulted in a 109-mile loss of all upstream anadromous fish spawning and rearing habitat. As subsequent studies have shown, the Trinity River Division also caused the rapid degradation of fish habitats below the dams by eliminating gravels from above the dams necessary for spawning habitat. The Trinity River Division also reduced and stabilized flows, allowing fine sediments contributed from tributaries to smother the existing gravels. The resulting channelization of the river further degraded available habitats. Within a decade, salmon and steelhead populations declined significantly. The U.S. Fish and Wildlife Service completed an EIS in 1980 that estimated fish population reductions of 60 to 80 percent since completion of the Trinity River Division.

In 1984 the Trinity River Basin Fish and Wildlife Management Act (PL 98-541) was signed, authorizing the Secretary of the Interior to develop and implement a management program to restore the

fish and wildlife populations in the Trinity River Basin to levels that existed prior to construction of the Trinity and Lewiston dams. This restoration is ongoing.

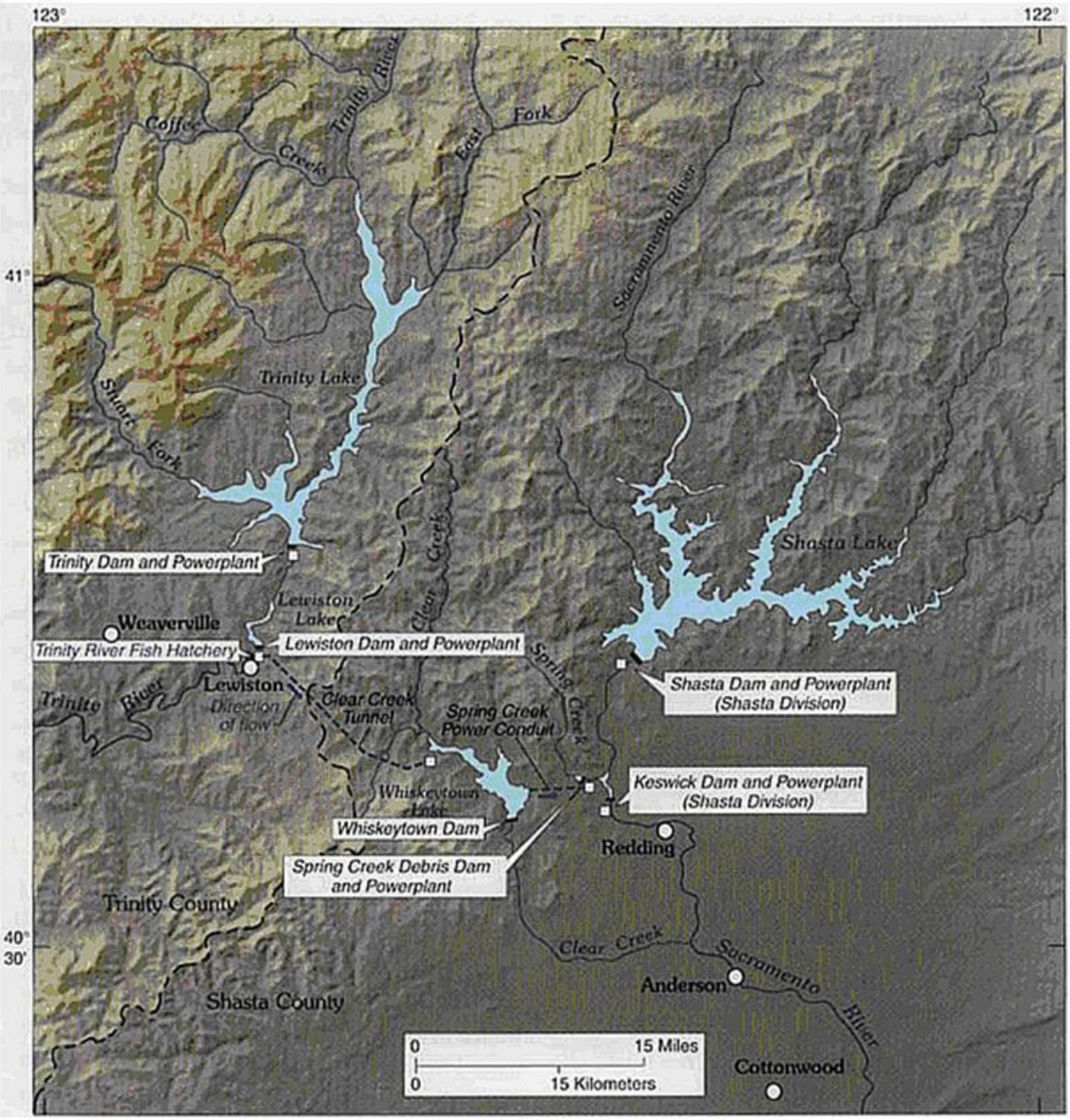


Figure 3.03-2. The Trinity River Division of the Central Valley Project is composed of Trinity Dam (a large storage reservoir), Lewiston Dam (which controls the water released into Trinity River) and Clear Creek Tunnel (which transports water from Lewiston Dam into Whiskeytown Lake in the Sacramento River Basin).

Motor Vehicle Use

Motor vehicle travel off designated NFTS routes and utilization of unauthorized routes has had some impacts to fish and aquatic species on the STNF. There are many factors influencing the aquatic

environment on the STNF. While such motor vehicle use has had an influence on the STNF, it has been very minor in comparison to other habitat influences. Proportionally, there is little use of riparian areas for motor vehicles across the landscape on the STNF. Of the 1,252 miles of unauthorized routes, 106 miles (8 percent) are within riparian reserves. Of that 8 percent, most are in riparian reserves of intermittent headwater streams where there have been few or no effects to fish. Where motor vehicles have been used in riparian areas and in direct contact with waterways, impacts have included increased erosion of stream banks, which can lead to increased sediment delivery to watercourses. Additionally, a change in riparian vegetation has occurred in these areas.

Increases in sediment and turbidity are widely known to negatively impact aquatic resources including invertebrates, fish (Sigler et al. 1984) and amphibians (Welsh and Lind 1996). The use of unauthorized routes in and near watercourses have altered hydrologic function and contributed to increased sedimentation in the aquatic environment threatening aquatic species habitat. Riparian areas are of vital importance to aquatic species and have been modified to a small degree across the STNF. Negative impacts to riparian vegetation have resulted in mild, local decreases in stream productivity and decreases in stream shading in some areas. Stream productivity has been mildly reduced as a result of riparian vegetation modification, reduction, or elimination. In these areas, leafy debris or other organic materials are no longer delivered to the stream channel at historic levels. This organic material is consumed by aquatic species including invertebrates, algae, and bacteria as a food source, thus providing a productive and robust aquatic environment supplying food sources for fish.

A decrease in stream shading because of modifications or reductions to riparian vegetation has occurred and resulted in increases in daily water temperatures through solar temperature loading in some areas. Aquatic species are reliant on natural temperature regimes, and when altered, temperature changes can result in the decreased vigor and production of aquatic populations. Stream temperature is very important to the aquatic communities' diversity and structure. Water temperature can mediate competitive interactions between fish species. Reeves et al. (1987) found that the interactions between fish were influenced by temperature. Alterations in environmental conditions like temperature may reduce habitat suitability for some species but increase it for others. As stated above, these impacts have been mild on the STNF and are likely immeasurable.

Fire

Wildfire has had minimal effects to the aquatic biota of the STNF despite some recently large and intense burns. In some areas where fire severity has been moderate to high, prescriptions for preventing substantial increases in sediment delivery have been created and implemented.

One such prescription was made in 2008 for a tributary to the Upper South Fork Trinity River. The primary area of urgent concern was an unnamed tributary watershed that lies between Rainbow and Trough ridges. This watershed is a tributary to Shell Mountain Creek, which flows into the South Fork Trinity River. Several areas of moderate- to high-severity burn were identified along the minor tributaries

and hill slopes that lie south of the tributary creek and north of Rainbow Ridge. Steep slopes were observed and historic hill slope instability was documented. The section showed a high potential to deliver sediment directly to the unnamed tributary creek, Shell Mountain Creek and eventually the South Fork Trinity River.

Straw mulching treatment areas were identified in the moderate and high-burn-severity areas north of Rainbow Ridge and south of the main unnamed tributary to Shell Mountain Creek (as described above). This treatment was developed by the soils specialist, and fisheries concerns were incorporated into the design. It was recommended that all areas of appropriate slope that burned at moderate and high severity be treated. Treating those areas addresses the majority of fine-sediment source material. Erosion along untreatable steeper slopes was expected to occur, but expected to have a much lower impact to fish and aquatic resources as those areas consisted of larger rock and limited fine sediments. In general, recent fires started early enough in the season that they burned fairly moderately and were beneficial to resources (D. Ratcliff, personal communication 2009).

Mining

Significant mining has occurred in the Trinity River basin historically. Gold was first discovered in 1848 at Reading Bar, near Douglas City. The news enticed a massive movement of miners and settlers into the region. Mining operations literally lined the banks of the Trinity River. The instream gravels were dredged and the river often diverted entirely out of the channel. Huge hydraulic mining operations washed immense quantities of soil from the hillsides into the river. These operations resulted in the first long-term impact to the riparian and aquatic habitats of the Trinity River. The effects of mining on aquatic resources have been dramatic. Some of the most dramatic effects are the direct disruption of the channel substrate that is vital for salmonid reproduction and the resulting increases in turbidity when mining activities are occurring. Though mining does not occur at rates historically seen on the Trinity River, there is still ongoing mining that has negative impacts to aquatic resources including the fish of the Trinity River.

Summary

Multiple natural and human-induced changes have occurred over the landscape on the STNF resulting in impacts to aquatic biota and creating the current condition of today. Effects from dam construction, flow management, catastrophic floods, natural landslides, fires, over-harvest of fish, and human activities on the landscape have contributed to reduced habitat quality and population levels.

Environmental Consequences

Alternative 1 – No-action

Under this alternative, no changes would be made to the current NFTS and no cross-country travel prohibition would be put into place. The Travel Management Rule would not be implemented, and no motor vehicle use map (MVUM) would be produced. Motor vehicle travel by the public would not be

limited to designated routes. Unauthorized routes would continue to have no status or authorization as NFTS facilities.

Direct and Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Cross-country motor vehicle travel frequently results in degradation of riparian vegetation, increased bank erosion, nutrient loading, sedimentation, and hydrocarbon pollution to streams.Thisin turn increases metabolic rate, respiration crushing, and oxygen demand of fish and amphibians (Jennings 1996). Motor vehicles traveling across stream banks degrade those banks, increase future erosion potential, and deliver sediment to streams, increasing turbidity. These changes result in decreases to water quality that can result in negative impacts to aquatic resources such as fish and aquatic invertebrates. Water quality can be degraded when OHV-created dust settles into aquatic systems (Ouren et al. 2007). Cedarholm et al. (1981) found that sediment in spawning gravel increased by 2.6 to 4.3 times in watersheds with more than 4.1 miles of road per square mile. Disturbance in aquatic systems is a particular problem for anadromous fish holding and spawning, reducing spawning success (Moyle et al. 1996). When the index of biotic integrity (IBI) was analyzed on 100 Sierra Nevada watersheds, IBI scores were negatively correlated with the percentages of area containing roads associated with streams (Moyle and Randall 1996).

In general, the continuation of off-road travel and the use of unauthorized routes could impact fisheries and aquatic resources in the form of increased erosion and, consequently, increased sediment delivery to watercourses. The creation of new unauthorized routes and the continued use of previously established unauthorized routes near watercourses and riparian areas are of increased concern because many of these routes are user-created and were never designed to effectively move water off of the route. This can lead to the potential for increased amounts of water being captured and diverted into streams. It can also be disruptive to the hydrologic processes that function to provide the high water quality that aquatic species are dependent upon. In addition to negative impacts to water quality, the effects of cross-country motor vehicle travel include opportunities for motorists to cause direct mortality through the crushing of individual aquatic species as they drive through streams and perennially wet areas.

Aquatic habitats could be further altered and degraded. In some areas, cross-country motor vehicle travel has negatively impacted aquatic populations as a result of focused use in areas that are unsuitable for these activities. For instance, there are unauthorized routes that cross Dry Lake. This vernal pool (seasonally dry) provides habitat for a crustacean that has a vulnerable life cycle stage during the dry season. The eggs of the crustacean lie in wait for the pool to fill and then they hatch when the conditions are right. Motor vehicles have driven on the dry lakebed crushing the eggs in the dry soil.

As there are continued disruptions in the aquatic and riparian environment and declines in water quality as unauthorized routes have proliferated, threatened, endangered, and sensitive species could be negatively affected. Focused use in areas that are unsuited for cross-country motor vehicle travel is also a concern. Unmanaged motor vehicle use has resulted in unplanned roads, trails, erosion, and watershed

degradation. Riparian areas are particularly vulnerable to motor vehicle use. Approximately 1,252 miles of unauthorized routes have been identified on the STNF. Approximately 8 percent of those miles are within riparian reserves. The use of these routes would continue, and new routes could be created. The actual extent to which aquatic biota would be affected as a result of implementing this alternative cannot be quantitatively assessed because of the unknown potential for essentially unlimited expansion of the unauthorized route system. Under this alternative, there would be 15 unauthorized routes (Table 3.03-5) in the riparian reserves of designated critical habitat for SONCC coho salmon. The continued unmanaged use of these routes poses risks to SONCC coho salmon critical habitat.

Riparian areas that are of vital importance to aquatic species are impacted through modifications to vegetation and hydrology that occur with the creation and use of unauthorized routes. Negative impacts to vegetation can result in decreased stream productivity and decreased stream shading. Stream productivity can be reduced when riparian vegetation is modified, reduced, or eliminated. Once riparian vegetation is impacted, it no longer provides leafy debris or other organic materials to the stream channel. This organic material is consumed by aquatic species including invertebrates, algae, and bacteria as a food source, thus providing a productive and robust aquatic environment supplying food sources for fish. A decrease in stream shading because of modifications or reductions to riparian vegetation contributes to increases in water temperatures through solar temperature loading. Aquatic species are reliant on natural temperature regimes, and when altered, temperature changes can result in the decreased vigor and production of aquatic populations. Stream temperature is very important to the aquatic communities' diversity and structure. Alterations in environmental conditions like temperature may reduce habitat suitability for some species but increase it for others. The continuation of vehicle travel off designated NFTS roads, and use of unauthorized routes, would leave currently disturbed areas unable to reestablish important vegetation and hydrologic function. Current ground disturbances would persist, impacting the fisheries and other aquatic resources on the STNF. In the long-term, this alternative is likely to result in aquatic and riparian habitat degradations and negative impacts to individual fish and other aquatic species individuals. The continued unrestricted creation and use of roads and cross-country travel would have an unquantifiable amount of risk to Forest fisheries and aquatic resources.

The existing cross-country motor vehicle use of lake bottoms below the high-water mark would continue. The effects of disruptions of the sediments because of motor vehicle use below the in these areas are not sufficient in magnitude to be transmitted into the aquatic environment, thus there would be no effect to aquatic species as a result of turbidity increases. There are impacts occurring on the lake bottom of Shasta Lake from motor vehicle use below the high-water mark, and under this alternative, these effects would continue. These impacts have an indirect effect on individuals and habitat of the fish and aquatic invertebrate community. Brush structures are placed on 260 to 300 acres of the lake bottom annually to provide habitat for fish. These structures are driven over by motor vehicles. In recent years, the structures have been placed in areas with lower vehicle use rates. Approximately 50 to 60 acres of lake bottom are treated annually through the planting of 5,000 willows. Additionally, the lake bottom is planted with grass seed to establish fine scale habitat for juvenile fish to seek cover once the grass is

inundated with water. The submerged grass beds also provide feed for invertebrates, which then are a food source for fish. The acreage of seeding has varied over the years, but as a result of increasing impacts from motor vehicles, it has been reduced to about 3 acres in 2008. The seeding is done primarily in the Jones Valley area and has covered as many as 500 acres per year in years past (personal communication J. Zustak 2009). It is estimated that approximately 5 to 10 percent of the areas seeded and planted were impacted in 2008. Shasta Lake is 28,403 acres in size. If 60 acres were planted with willows, 500 acres were planted with grass, and 300 acres were treated with brush structures that would total 860 acres. If 5-10 percent of those acres were impacted that would be 0.2 percent of the lakes acreage.

There is also impact occurring on Jones Valley Creek as a result of motor vehicle use. Occasionally vehicles get stuck in the mud while crossing Jones Valley Creek. Once stuck, the vehicles remain in place for a while (sometimes days) until they can be pulled out. There is a population of rainbow trout that migrate up Jones Valley Creek during the storm events of January. Vehicles have been stuck during that migration time, and have created a passage barrier. The crossing action causes increased sedimentation delivery and higher levels of turbidity in the creek. Additionally some of the vehicles that get stuck are older and have leaked petroleum-based products into the creek. These leaks are rapidly dispersed and diluted once they move in to the lake. Prior to sufficient dilution, they can directly impact individuals of the fish and aquatic community. There are no documented cases of fish kills, though the possibility is there. This population of fish is estimated to be 1/10 of 1 percent of the trout of Shasta Lake. These activities lead to effects to individuals of this population, and occur on an occasional basis.

Direct and Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Short-term timeframe: By not adding current unauthorized routes to the system, no maintenance would be conducted on them and they would continue to pose a risk for aquatic species. There would be no standards applied and no management of unauthorized routes. By not identifying season of use, any areas where there are increased risks for negative impacts during a particular season would continue to have those risks as a result of inappropriate seasonal use. For example, some areas with intermittent stream crossings may not be hydrologically sensitive during the dry summer months and crossing them with a motor vehicle may not have a negative impact on the habitat for aquatic biota at that time. Use of the same route during the wet season could cause increased compaction, sediment delivery to perennial streams, and possible direct mortality to individual aquatic species.

Identification of vehicle class would not have an effect on aquatic resources. Different classes of motor vehicles used in riparian areas and in streams have very similar impacts to aquatic species. Generally, the larger the vehicle the greater the impact but there are a suite of variables that can affect the impact any vehicle has in a particular location. Some variables include the rate of speed a vehicle is going, the size of its wheels, the number of passes it makes through an area and the current conditions of the area. For instance, it is possible for a large vehicle to have less effect than a small vehicle if it is moving at a slow rate through a stream on a dry day. A small motor vehicle could have a larger effect if it

is moving at a high rate of speed through the same stream on a wet day when the stream bank is muddy. Accordingly, the impacts of all motor vehicles are assumed to be the same for the purpose of this analysis. The identification of vehicle class, or lack of identification of vehicle class, would have no effect on aquatic biota as all vehicle classes have the same effects on aquatic biota (refer back to the assumptions specific to aquatic biota analysis on page 174).

Long-term timeframe: The current unauthorized routes would continue to be used in the absence of management practices, contributing to the degradation to aquatic habitat conditions. Effects to aquatics species as a result of the use of these roads would continue, and as time passes, these routes would proceed on a declining trajectory because of lack of management, maintenance, or restoration.

Direct and Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

There would be no changes to vehicle class under alternative 1; therefore, there would be no direct and indirect effects.

Endangered Species Act and Sensitive Species Findings

The aquatic analysis for Alternative 1 makes no findings for Sensitive Species and was not evaluated for compliance with the Endangered Species Act because it does not implement subpart B of the Travel Management Rule.

Cumulative Effects

Effects of dam construction, catastrophic floods, landslides, wildfires, over harvest of fish and other human activities on the landscape (including timber harvest, off-road travel, flow management, mining, and domestic livestock grazing) have contributed to reduced aquatic habitat quality and aquatic biota population levels currently present across the STNF. This results in the current condition as described in the affected environment section of this document.

Short-term timeframe: not applicable; cumulative effects analysis applies only to the long-term time frame.

Long-term timeframe: The cumulative effects of implementing this alternative with other present and reasonably foreseeable actions have been evaluated. Present and reasonably foreseeable actions are those actions that are identified in appendix B. Fish habitat improvement projects, vegetation management projects (timber harvest, fuel management and precommercial thinning), grazing allotments, mining, and road closures and decommissioning could have effects that would mitigate or add to the effects of this action.

Typically, with these types of projects, there are a suite of effects to fish and aquatic biota. The effects are dependent on the design criteria of the projects and can be minimal or extensive. Ground-disturbing

activities can displace sediments, which can be delivered to waterways and have an effect to aquatic biota. Mining and minerals projects have the potential to affect water quality with increases in turbidity. Grazing allotments can contribute to destabilization of banks and result in increases in turbidity as well. Indicator values including spatial boundary for all alternatives these impacts can be mitigated or prevented, dependent on project design criteria. See Table 3.03-3.

Table 3.03-3. Indicator values including spatial boundary for all alternatives

	Miles of user-created routes open for motor vehicle use within or adjacent to aquatics resources - Forest-wide	Routes open for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources - Forest-wide	Miles of roads per square mile density of routes open for motor vehicle use potentially affecting aquatic TES - 7th-field watershed	Miles of routes open for motor vehicle use within riparian habitat including meadows and stream banks - Forest-wide	Routes open for motor vehicle use within SONCC coho salmon designated critical habitat - Forest-wide	Miles of routes open for motor vehicle use within SONCC coho salmon designated critical habitat - Forest-wide
Alt 1	106.7	6	1.53	116.96	204	23.4
Alt 2	4.4	0	1.30	13.1	15	2.68
Alt 3	0.0	0	1.53	0	0	0
Alt 4	0.05	0	1.3	8.74	0	0
Alt 5	6.70	0	1.3	15.39	15	2.68

TES = threatened, endangered and sensitive species
SONCC = Southern Oregon/Northern California Coast coho salmon

Some of these actions, particularly timber management projects, have the potential to increase road density. Temporary roads are constructed to harvest timber resources. Temporary roads are to be used only during the period of harvest and would not be open to public motor vehicle use. Present and reasonably foreseeable road management actions include decommissioning and closing 186.1 miles of NFTS roads and unauthorized routes, adding 5.6 miles of unauthorized routes to the NFTS and constructing .46 miles of road. The primary effects of increases in road density are related to increased risk to water quality parameters such as turbidity and temperature. Road management projects that decommission or close roads would have positive long-term beneficial effects.

Under this alternative, there is no ban on cross-country travel, no additions to the NFTS, and no changes to the current NFTS. Depending on specific project designs, the cumulative effects of adding more roads to the system, increasing turbidity, or affecting water quality through reasonably foreseeable and present actions could increase negative impacts to aquatic resources and when considered in conjunction with this action, there would be cumulative effects. If project design criteria are created to avoid negative effects, there would not be any cumulative effects as a result of the implementation of this alternative.

Alternative 2 – Proposed Action

Under this alternative, cross-country travel would be prohibited and additions to the NFTS would occur.

Direct and Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

The threats to aquatic resources from cross-country motor vehicle travel, as described in the above section, would be eliminated with the prohibition of cross-country motor vehicle travel. Habitat quality and quantity is expected to slowly recover in the long-term through passive restoration once cross-country motor vehicle travel stops. Additionally, future route proliferation would also be stopped. The use of 102.33 miles of user-made routes in riparian reserves would stop, allowing the areas to begin recovering naturally. Important areas with threatened, endangered, or sensitive aquatic species would be further protected from disturbance by the prohibition of cross-country travel. Risks to water quality would be greatly decreased, as would risks of direct disturbance and other disruptions of the aquatic environment.

Direct and Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Short-term timeframe: Little change is expected to occur in the first year following the addition of routes to the NFTS. In this alternative, 4.41 miles of previously unmanaged routes in riparian reserves would be added to the NFTS. There are 15 routes occurring in riparian reserves adjacent to threatened SONCC coho salmon or designated critical habitat for SONCC coho salmon. Of those 15 routes, 3 have direct access to SONCC coho salmon-occupied habitat. These routes are located on the Trinity River (TRMU2, TRMU3, and U414C). The effects of the use of these routes include a minimal contribution of sediment to the Trinity River. The sediment that is delivered because of the use of these sites is expected to settle rapidly, and **may affect, but is not likely to adversely affect** aquatic resources including SONCC coho salmon or critical habitat.

Table 3.03-4. Routes within riparian reserves in alternative 2

Route	Comments
JM244	Riparian reserve of Trinity Lake
JM25	Riparian reserve of Trinity Lake
JM72	Riparian reserve of Trinity Lake
NRA1	Riparian reserve of Trinity Lake
NRA2	Riparian reserve of Trinity Lake
PM304	Route in riparian reserve of non-fish-bearing stream
SE194	Route in riparian reserve of fish-bearing stream
SE476	Route in riparian reserve of fish-bearing stream
SE477	Route in riparian reserve of fish-bearing stream
TC1004	Route in riparian reserve of fish-bearing stream
TC1238	Riparian reserve of SONCC coho designated critical habitat stream
TC1249	Riparian reserve of SONCC coho designated critical habitat stream – access to stream
TC1829	Riparian reserve of SONCC coho stream
TC349	Non-fish-bearing perennial stream with crossing
TC838	Riparian reserve of SONCC coho designated critical habitat stream
TC899	Route in riparian reserve of fish-bearing stream
TRMU2	Riparian reserve of SONCC coho stream - Trinity River access point direct access

Route	Comments
TRMU3	Riparian reserve of SONCC coho stream - Trinity River access point direct access
TRMU5	Riparian reserve of SONCC coho stream - Trinity River access point direct access
TRMU6	Riparian reserve of SONCC coho Stream Trinity River
U1S39B	Riparian reserve of SONCC coho designated critical habitat stream
U34N26DA	Lewiston Lake access
U34N26DAA	Lewiston Lake access
U35N05A	Backbone Creek, Sacramento Arm, Shasta Lake
U35N85A	Riparian reserve of Trinity Lake
U414A	Riparian reserve of SONCC coho stream
U414C	Riparian reserve of SONCC coho stream
U414CA	Riparian reserve of SONCC coho stream
U414D	Riparian reserve of SONCC coho stream
U414F	Riparian reserve of SONCC coho stream
U414FA	Riparian reserve of SONCC coho stream
U42N18A	Within riparian reserves of multiple non-fish bearing, non-perennial streams; approximately 7 stream crossings and a section that runs adjacent to a non-fish bearing stream
U42N18AA	Within riparian reserve of a non-fish bearing, non-perennial stream, one crossing

These access points on the Trinity River are hardened after many years of use, and the typical substrate at the point of entry is now medium- to large-sized cobble. Additionally, as a result of the managed flows of the Trinity River there is little connectivity to the floodplain. Without floodplain connection and seasonal inundation events, sediments from the disturbed riparian areas immediately adjacent to the river are not delivered into the river, reducing risk to the aquatic environment at the river access points. Flow management and channelization has allowed vegetation to establish in the floodplains where historically it could not due to the seasonal high-flow events. This vegetation creates a naturally-occurring mitigation for the minor losses of riparian vegetation associated with the use of motor vehicles in these sites. While there is the small potential for aquatic biota to be intermittently and temporarily affected as a result of the use of these three sites, the disturbance would not be measurable, and are not biologically relevant in the greater context of this dramatically disrupted aquatic reservoir ecosystem.

This alternative proposes to add two areas that would be open to motor vehicle use. These are the Shasta Lake Area and the Trinity Lake Area. There would be a 15 mile per hour speed limit, and only highway-legal vehicles would be allowed. As described in alternative 1, the use of motor vehicles on the lake bottom of Shasta Lake results in indirect effects to aquatic resources, specifically small warmwater fish and invertebrates who use the areas planted with grass and areas where brush structures have been placed. When the planted grass and brush structures are run over with vehicles, they no longer provide habitat for fish or invertebrates. There would be no effects to aquatic species on Trinity Lake as a result of lake bottom use. Mitigations for cultural resources are included in this alternative and include a variety of actions that could reduce impacts to aquatic resources on Shasta Lake in the Jones Valley area. These mitigations would occur as needed (a thorough description of mitigation actions can be found in appendix

L) and could include the closure of locations in the Jones Valley Area to protect cultural resources. If motor vehicle travel in these areas is eliminated, the impacts to aquatic species would cease.

Long-term timeframe: Over time, the added routes would be managed in accordance with best management practices to protect aquatic-dependent resources. The use and maintenance of those routes could lead to typical road- and trail-related water quality degradation from runoff, but under management conditions, these routes could be maintained to the identified standard level of maintenance. Adding these routes to the system would allow for the proper maintenance the routes, reduce risks to aquatic biota and habitats, and protect aquatic resources of the STNF.

Direct and Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

There would be no changes to vehicle class under alternative 2; therefore, there would be no direct and indirect effects.

Endangered Species Act and Sensitive Species Findings

For alternative 2, the BA/BE states a finding of **no impact** for all aquatic invertebrate species on the Regional Forester's sensitive species list. A finding of **may affect, not likely to adversely affect** is documented in the BA/BE for Southern Oregon/Northern California Coast coho salmon and its supplement (number 2). A finding of **no effect** is documented in the Supplemental BA/BE for Central Valley spring-run Chinook and Central Valley steelhead

Table 3.03-5. Unauthorized routes in riparian reserves of designated critical SONCC coho salmon habitat in alternatives 2, and 5

Route Number	HUC6	HUC7	HUC7 Name	Miles
TC1238	180102120306	18010212030601	Upper Big Creek-Hayfork Creek	.04
TC1249	180102120306	18010212030602	Lower Big Creek-Hayfork Creek	.06
TC1829	180102120403	18010212040304	Rusch Creek	0.14
TC838	180102120203	18010212020301	Upper Plummer Creek	.13
TRMU2	180102111104	18010211110402	Del Loma-Trinity River	0.45
TRMU3	180102111102	18010211110204	Prairie Creek-Trinity River	0.15
TRMU5	180102111102	18010211110204	Prairie Creek-Trinity River	0.15
TRMU6	180102111102	18010211110204	Prairie Creek-Trinity River	0.11
U1S39B	180102120201	18010212020104	Lower Rattlesnake Creek	0.23
U414A	180102110803	18010211080303	Soldier Creek-Trinity River	0.58
U414C	180102110803	18010211080302	Maxwell Creek-Trinity River	0.19
U414CA	180102110803	18010211080302	Maxwell Creek-Trinity River	0.12
U414D	180102110803	18010211080302	Maxwell Creek-Trinity River	0.15
U414F	180102110803	18010211080302	Maxwell Creek-Trinity River	0.15
U414FA	180102110803	18010211080302	Maxwell Creek-Trinity River	0.04
Total Miles				**2.68**

Cumulative Effects

Effects from dam construction, catastrophic floods, natural landslides and fires, over harvest of fish; and human activities on the landscape (including timber harvest, off-road travel, flow management, mining, and domestic livestock grazing) have contributed to reduced habitat quality and population levels currently present across the STNF resulting in the current condition as described in the affected environment section of this document.

Short-term timeframe: not applicable; cumulative effects analysis only applies to the long-term time frame.

Long-term timeframe: The cumulative effects of implementing alternative 2 with other present and reasonably foreseeable actions have been evaluated. Present and reasonably foreseeable actions are those actions that are identified on the STNF Schedule of Proposed Actions (SOPA). Fish habitat improvement projects, timber management projects (timber harvest, fuel management and precommercial thinning), grazing allotments, mining, and road closures and decommissioning could have effects that would mitigate or add to the effects of this action.

Typically, with these types of projects, there are a suite of effects to fish and aquatic biota. The effects are dependent on the design criteria of the projects and can be minimal or extensive. Ground-disturbing activities can displace sediments, which can be delivered to waterways and have an effect to aquatic biota. Mining and minerals projects have the potential to affect water quality with increases in turbidity. Grazing allotments can contribute to destabilization of banks and result in increases in turbidity as well. Most of these impacts can be mitigated or prevented, dependent on project design criteria.

Some of these actions, particularly timber management projects, have the potential to increase road density. Temporary roads are constructed to harvest timber resources. Temporary roads are to be used only during the period of harvest and would not be open to public motor vehicle use. Present and reasonably foreseeable road management actions include decommissioning and closing 186.1 miles of NFTS roads and unauthorized routes, adding 5.6 miles of unauthorized routes to the NFTS and constructing .46 miles of road. The primary effects of increases in road density are related to increased risk to water quality parameters such as turbidity and temperature. Road management projects that decommission or close roads would have positive long-term beneficial effects as they would reduce road density as would the prohibition of cross-country travel.

Cumulative effects of adding roads to the system, increasing turbidity, or affecting water quality through reasonably foreseeable and present actions could cause negative impacts to aquatic resources. When considered in conjunction with this action, there would be cumulative effects. The implementation of this alternative would prohibit the use of 102.33 miles of unauthorized routes in riparian reserves. The routes would not be removed from the landscape, but their use would no longer result in effects to aquatic biota. The cumulative effect of the implementation of this alternative when considered in conjunction

with present and reasonably foreseeable actions would be more positive than negative in nature. The discontinued use of these routes would offset the 0.46 miles of new road construction and potential water quality degradations associated with reasonably foreseeable projects. It would add to the positive effects of present and reasonably foreseeable road closures and road obliteration projects. Net positive effects are expected as compared to the existing condition described in Alternative 1.

Alternative 3 – Cross-Country Travel Prohibition Only – No Additions to the Existing NFTS

Under alternative 3, a cross-country travel prohibition would be put into place, no facilities would be added to the NFTS, and no changes would be made to the current NFTS. Unauthorized routes would continue to have no status or authorization as NFTS facilities. The prohibition of cross-country motor vehicle travel would occur if this alternative is selected.

Direct and Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Cross-country motor vehicle travel poses threats to aquatic biota as described in the direct and indirect effects section for alternative 1. Alternative 3 poses the lowest risk to aquatic biota by preventing any further degradation on the STNF as a result of cross-country travel. The use of 1,252 miles of unauthorized routes across the forest would end, and those routes would begin to recover. Of those 1,252 routes, 106 miles are in riparian reserves. There are 15 unauthorized routes within or having some portion within riparian reserves adjacent to designated critical habitat for SONCC coho salmon. This alternative would reduce both current and future threats for these species. The implementation of this alternative would have beneficial effects for these species in the long-term as these roads recovered, and it would have no negative effect to the species.

Direct and Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Short-term timeframe: Under alternative 3, no cross-country travel would be allowed and unauthorized routes would no longer be used reducing the short-term risk to aquatic species.

Long-term timeframe: Ending the use of unauthorized routes would alleviate the degradation to aquatic habitat conditions. Effects to aquatics species caused by the use of these routes would decrease, and in the long-term, these routes would begin to recover because of naturally occurring restoration.

Direct and Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

There would be no changes to vehicle class under alternative 3; therefore, there would be no direct and indirect effects.

Endangered Species Act and Sensitive Species Findings

For alternative 3, the BA/BE states a finding of **no impact** for all aquatic invertebrate species on the Regional Forester's sensitive species list. A finding of **no effect** is documented in the BA/BE (and supplements) for Central Valley spring-run Chinook, Central Valley steelhead, and Southern Oregon/Northern California Coast coho salmon.

Cumulative Effects

Effects from dam construction, catastrophic floods, natural landslides, and fires, over harvest of fish; and human activities on the landscape (including timber harvest, off-road travel, flow management, mining, and domestic livestock grazing) have contributed to reduced habitat quality and population levels across the STNF resulting in the current condition as described in the affected environment section of this document.

Short-term timeframe: not applicable; cumulative effects analysis only applies to the long-term time frame.

Long-term timeframe: The cumulative effects of implementing this alternative with other present and reasonably foreseeable actions have been evaluated. Present and reasonably foreseeable actions are those actions that are identified in appendix B. Fish habitat improvement projects, vegetation management projects (timber harvest, fuel management and precommercial thinning), grazing allotments, mining, and road closures and decommissioning could have effects that would mitigate or add to the effects of this action.

Typically, with these types of projects, there are a suite of effects to fish and aquatic biota. The effects are dependent on the design criteria of the projects and can be minimal or extensive. Ground-disturbing activities can displace sediments, which can be delivered to waterways and have an effect to aquatic biota. Mining and minerals projects have the potential to affect water quality with increases in turbidity. Grazing allotments can contribute to destabilization of banks and result in increases in turbidity as well. Most of these impacts can be mitigated or prevented, dependent on project design criteria.

Some of these actions, particularly timber management, have the potential to increase road density. Temporary roads are constructed to harvest timber resources. Temporary roads are to be used only during the period of harvest and would not be open to public motor vehicle use. Present and reasonably foreseeable road management actions include decommissioning and closing 186.1 miles of NFTS roads and unauthorized routes, adding 5.6 miles of unauthorized routes to the NFTS and constructing .46 miles of road. The primary effects of increases in road density are related to increased risk to water quality parameters such as turbidity and temperature. Road management projects that decommission or close roads would have positive long-term beneficial effects as they would reduce road density as would the prohibition of cross-country travel.

Under alternative 3, cross-country travel would be prohibited, and no additions or changes would be made to the existing NFTS. Depending on specific project designs, cumulative effects of adding roads to the system with reasonably foreseeable and present actions could increase turbidity or affect water quality causing negative impacts to aquatic resources. The implementation of this alternative would essentially stop the use of 1,250 miles of unauthorized routes. The routes would not be removed from the landscape, but their use would no longer affect aquatic biota. The cumulative effect of the implementation of this alternative when considered in conjunction with present and reasonably foreseeable actions would be more positive than negative in nature. The discontinued use of 1,250 miles of road would offset the 0.46 miles of new road construction and potential water quality degradations associated with reasonably foreseeable projects. The implementation of alternative 3 would add to the positive effects of present and reasonably foreseeable road closures and road obliteration projects. Net positive effects are expected as compared to the existing condition described in Alternative 1.

Alternative 4 – Minimize Impacts to Natural Resources and Roadless Areas

Under this alternative cross-country travel would be prohibited, additions to the NFTS would occur, and changes to the existing NFTS would occur.

Direct and Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

The direct and indirect effects of prohibiting cross-country travel have been discussed above. There is little difference under this alternative. Motor vehicle travel on more than 106 miles of unauthorized routes in riparian reserves would be eliminated under this alternative. There would be no more use of the river access points along the Trinity River, fully removing any potential threats to the aquatic biota including SONCC coho salmon in that river.

Direct and Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

This alternative proposes to add three areas that would be open to motor vehicle use. These are the Shasta Lake Area, the Trinity Lake Area, and Iron Canyon Reservoir Area. There would be a 10 mile per hour speed limit, and only highway-legal vehicles would be allowed. As described in alternative 1, the use of motor vehicles on the lake bottom of Shasta Lake results in indirect effects to aquatic resources. Small warmwater fish and invertebrates that use the areas planted with grass, and areas where brush structures have been placed may be affected. There would be no effects to aquatic species in the Trinity Lake Area or the Iron Canyon Reservoir Area as a result of lake bottom use. Mitigations for cultural resources are included in this alternative and include a variety of actions that could reduce impacts to aquatic resources in the Jones Valley area. If motor vehicle travel in these areas is eliminated, the impacts to aquatics species in those specific locations would cease.

Long-term timeframe: Over time, this alternative would allow for a very high level of recovery in the riparian reserves currently impacted by cross-country motor vehicle use and the use of unauthorized routes.

Direct and Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Under this alternative, motorized mixed-use would be allowed on particular existing NFTS maintenance level 3 roads. Implementation of this alternative for this action would have no effects to aquatic biota because the designation of motorized mixed-use has no impacts to aquatic species. A change to allow all vehicle types will not increase the disturbance effect on aquatic-dependent species.

Endangered Species Act and Sensitive Species Findings

For alternative 4, the BE/BA states a finding of **no impact** for all aquatic invertebrate species on the Regional Foresters sensitive species list. A finding of **no effect** is documented in the BE/BA (and supplements) for Central Valley spring-run Chinook, Central Valley steelhead, and Southern Oregon/Northern California coho salmon.

Cumulative Effects

Effects from dam construction, catastrophic floods, natural landslides, and fires, over harvest of fish, and human activities on the landscape (including timber harvest, off-road travel, flow management, mining, and domestic livestock grazing) have contributed to reduced habitat quality and population levels across the STNF resulting in the current condition as described in the affected environment section of this document.

Short-term timeframe: not applicable; cumulative effects analysis applies only to the long-term time frame.

Long-term timeframe: The cumulative effects of implementing this alternative with other present and reasonably foreseeable actions have been evaluated. Present and reasonably foreseeable actions are those actions that are identified in appendix B. Fish habitat improvement projects, vegetation management projects (timber harvest, fuel management and precommercial thinning), grazing allotments, mining, and road closures and decommissioning could have effects that would mitigate or add to the effects of this action.

Typically, with these types of projects, there are a suite of effects to fish and aquatic biota. The effects are dependent on the design criteria of the projects and can be minimal or extensive. Ground-disturbing activities can displace sediments, which can be delivered to waterways and have an effect to aquatic biota. Mining and minerals projects have the potential to affect water quality with increases in turbidity. Grazing allotments can contribute to destabilization of banks and result in increases in turbidity as well. Most of these impacts can be mitigated or prevented, dependent on project design criteria.

Some of these actions, particularly timber management projects, have the potential to increase road density. Temporary roads are constructed to harvest timber resources. Temporary roads are to be used only during the period of harvest and would not be open to public motor vehicle use. Present and reasonably foreseeable road management actions include decommissioning and closing 186.1 miles of NFTS roads and unauthorized routes, adding 5.6 miles of unauthorized routes to the NFTS and constructing .46 miles of road. The primary effects of increases in road density are related to increased risk to water quality parameters such as turbidity and temperature. Road management projects that decommission or close roads would have positive long-term beneficial effects as they would reduce road density as would the prohibition of cross-country travel.

Under alternative 4, cross-country travel would be prohibited, and additions and other changes would be made to the existing NFTS. Depending on specific project designs, cumulative effects of adding roads to the system with reasonably foreseeable and present actions could increase turbidity or affect water quality causing negative impacts to aquatic resources. The implementation of this alternative would remove from use 106.69 miles of unauthorized routes in riparian reserves. The routes would not be removed from the landscape, but their use would no longer result in effects to aquatic biota. The cumulative effect of the implementation of this alternative when considered in conjunction with present and reasonably foreseeable actions would be more positive than negative in nature. The discontinued use of these routes would offset the .46 miles of new road construction and potential water quality degradations associated with reasonably foreseeable projects. It would add to the positive effects of present and reasonably foreseeable road closures and road obliteration projects. Net positive effects are expected as compared to the existing condition described in Alternative 1.

Alternative 5 – Improved Access and Motorized Recreation Opportunities

Under this alternative cross-country travel would be prohibited, and additions and other changes to the existing NFTS would occur.

Direct and Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

The threats to aquatic resources from cross-country motor vehicle travel as described in alternative 1 would be eliminated with the prohibition of cross-country motor vehicle travel. Habitat quality and quantity is expected to slowly recover in the long-term through passive restoration once cross-country motor vehicle travel stops. Additionally, future route proliferation would also be stopped. The use of 100.04 miles of unauthorized routes in riparian reserves would discontinue allowing the areas to begin recovering naturally. Important areas with threatened, endangered, or sensitive aquatic species would be further protected from disturbance by prohibiting cross-country travel. Risks of water quality degradation would be greatly decreased, as would risks of direct disturbance, and disruptions of the aquatic environment.

Direct and Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Short-term timeframe: Little change is expected to occur in the first year following the addition of routes to the NFTS. This alternative is very similar to alternative 2 in its effects to aquatic resources but, within riparian reserves, it has an additional 2.29 miles of added routes, including the areas within one vehicle length. In this alternative, 6.70 miles of unauthorized routes in riparian reserves would be added to the NFTS for future management. There are 15 instances of routes occurring in riparian reserves adjacent to SONCC coho salmon or designated critical habitat for SONCC coho salmon. Of those 15 routes, three have direct access to SONCC coho occupied habitat. These routes are located on the Trinity River (TRMU2, TRMU3, and U414C).

Table 3.03-6. Routes within riparian reserves, alternative 5

Route Number	Comments
IV001	Route in riparian reserve of fish-bearing stream
IV005	
IV006	
IV007	
IV008	
IV009	
IV010	
IV011	
IV012	
IV013	
IV014	
IV015	
IV016	
IV018	
IV021	
JM244	Riparian reserve
JM25	Riparian reserve of Trinity Lake
JM72	Riparian reserve
MC090	Non-fish-bearing, non-perennial stream
MC091	Non-fish-bearing, non-perennial stream with crossing
MC092	Non-fish-bearing, non-perennial stream
NRA1	Riparian reserve
NRA2	Riparian reserve
PC025	Perennial stream non-fish-bearing - multiple crossings
PM304	Route in riparian reserve of non-fish-bearing stream
RM1206	Route in riparian reserve of fish bearing stream
SE194	
SE476	
SE477	
TC1004	
TC1238	Riparian reserve of SONCC coho critical habitat
TC1249	Riparian reserve of SONCC coho critical habitat
TC1489	Perennial stream non-fish-bearing - routes enters riparian zone
TC1829	Riparian reserve of SONCC coho stream
TC349	Perennial stream non-fish-bearing - route crosses stream
TC838	Riparian reserve of SONCC coho critical habitat
TC899	Route in riparian reserve of fish bearing stream
TRMU2	Riparian reserve of SONCC coho stream - Trinity River access point direct access
TRMU3	
TRMU5	
TRMU6	Riparian reserve of SONCC coho stream Trinity River
U1B005A	Perennial stream non-fish-bearing - multiple crossings
U1S39B	Riparian reserve of SONCC coho habitat
U34N26DA	Lewiston Lake access
U34N26DAA	Lewiston Lake access
U35N05A	Backbone Creek, Sacramento Arm, Shasta Lake
U35N85A	Trinity Lake access
U36N35AB	Parent route in Riparian Reserve of Trinity Reservoir
U414A	Riparian reserve of SONCC coho stream
U414C	
U414CA	
U414D	
U414F	
U414FA	
U42N18A	Within riparian reserves of multiple non-fish bearing, non-perennial streams; approximately 7 stream crossings and a section that runs adjacent to a non-fish bearing stream
U42N18AA	Within riparian reserve of a non-fish bearing, non-perennial stream, one crossing

The effects of the use of these routes are described for this action above in alternative 2.

This alternative proposes to add Trinity Lake Area, Shasta Lake Area and Iron Canyon Reservoir as open areas allowing all vehicle classes with a speed limit of 10 mph. The effects of implementing this alternative would be the same as those described in alternative 4.

Long-term timeframe: Over time, added routes would be managed in accordance with best management practices to protect aquatic-dependent resources. The use and maintenance of those routes could lead to typical road- and trail-related water quality degradation from runoff, but under management conditions, these routes could be maintained to the identified standard level of maintenance. By adding these routes to the system, they would be a lower risk to the aquatic biota of the STNF because maintenance over the course of time would improve conditions on the added routes and protect aquatic resources of the STNF.

Direct and Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Under this alternative, motorized mixed-use would be allowed on particular maintenance level 3 roads. Implementation of this alternative for this action would have no effect to aquatic biota because the designation of motorized mixed-use has no impacts to aquatic species. A change to allow all vehicle types will not increase the disturbance effect on aquatic-dependent species.

Endangered Species Act and Sensitive Species Findings

The BE/BA states a finding of **no impact** for all aquatic invertebrate species on the Regional Foresters sensitive species list. A finding of **no effect** is documented in the Supplemental BE/BA for Central Valley spring-run Chinook and Central Valley steelhead, and a finding of **may affect, not likely to adversely affect** is documented in the BE/BA (and supplement) for Southern Oregon/Northern California coho salmon for alternative 5.

Cumulative Effects

Effects from dam construction, catastrophic floods, natural landslides, and fires, over harvest of fish, and human activities on the landscape (including timber harvest, off-road travel, flow management, mining, and domestic livestock grazing) have contributed to reduced habitat quality and population levels across the STNF resulting in the current condition as described in the affected environment section of this document.

Short-term timeframe: not applicable; cumulative effects analysis only applies to the long-term time frame.

Long-term timeframe: The cumulative effects of implementing alternative 5 are very similar to the cumulative effects of implementing alternative 4 (see the above discussion).

Under alternative 5, cross-country travel would be prohibited, and additions and other changes would be made to the current NFTS. Depending on specific project designs, cumulative effects of adding roads to the system with reasonably foreseeable and present actions could increase turbidity or affect water quality causing negative impacts to aquatic resources. The implementation of this alternative would remove 100.04 miles of unauthorized routes in riparian reserves from use. The routes would not be removed from the landscape, but their use would no longer result in effects to aquatic biota. The cumulative effect of the implementation of this alternative when considered in conjunction with present and reasonably foreseeable actions would be more positive than negative in nature. The discontinued use of these routes would offset the 0.46 miles of new road construction and potential water quality degradations associated with reasonably foreseeable projects. It would add to the positive effects of present and reasonably foreseeable road closures and road obliteration projects. Net positive effects are expected as compared to the existing condition described in Alternative 1.

Summary of Effects Analysis across All Alternatives

Table 3.03-7. Aquatic biota indicators for all alternatives

Indicator - Aquatic Biota	Alternatives				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles of unauthorized routes open for motor vehicle use within or adjacent to aquatics resources	106.74	4.41	0	0.05	6.7
Number of routes open for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources	6	0	0	0	0
Density of routes open for motor vehicle use potentially affecting aquatic TES	1.534	1.301	1.534	1.297	1.313
Miles of routes open for motor vehicle use within riparian habitat including meadows, and stream banks	116.96	13.1	0	8.74	15.39
Number of routes open for motor vehicle use within habitats of TES aquatic biota – based on SONCC coho salmon critical habitat	204	15	0	0	15
Miles of routes open for motor vehicle use within habitats of known TES aquatic biota – based on SONCC coho salmon critical habitat	23.4	2.68	0	0	2.68

In the following table, rankings are scored on a scale of 1 to 5 from greatest (1), to least (5) impact.

Table 3.03-8. Comparison of effects to aquatic biota

Indicators – Aquatic Biota	Rankings of Alternatives for Each Indicator				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles of unauthorized routes open for motor vehicle use within or adjacent to aquatics resources – Forest-wide.	1	3	5	4	2
Number of routes open for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources – Forest-wide	1	3	5	4	2
Density of routes open for motor vehicle use potentially affecting aquatic TES - 7th field watershed	1	3	5	4	2
Miles of routes open for motor vehicle use within riparian habitat including meadows, and stream banks - Forest-wide	1	3	5	4	2
Number of routes open for motor vehicle use within habitats of TES aquatic biota – based on SONCC coho salmon critical habitat	1	3	5	4	2
Miles of routes open for motor vehicle use within habitats of known TES aquatic biota – based on SONCC coho salmon critical habitat	1	3	5	4	2
Average for aquatic biota	**1**	**3**	**5**	**4**	**2**

Compliance with the Forest Plan and Other Direction

Endangered Species Act (ESA). All alternatives comply with the ESA. None of the alternatives, if implemented, would be likely to jeopardize the continued existence of a threatened or endangered species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical.

Forest Service Manual and Handbooks (FSM/H 2670). All alternatives comply with the Forest Service Manual and Handbooks. Impacts to FSS species have been analyzed to ensure management activities do not create a significant trend toward federal listing or loss of viability. This assessment is documented in the BE.

STNF Land and Resource Management Plan (LRMP). All alternatives comply with the STNF LRMP. The management prescriptions for riparian reserves and key watersheds were considered during the analysis process.

3.04. Herpetological Resources

Introduction

The management of herpetofauna (reptiles and amphibians) and habitat, and the maintenance of a diversity of animal communities are important parts of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on National Forest System (NFS) lands are planned and implemented so that they do not jeopardize the continued existence of threatened or endangered species, or lead to a trend toward listing or loss of viability of Forest Service Sensitive species. Management decisions related to motor vehicle travel can affect herpetological species by increasing human-caused mortality, change behavior due to disturbance, and modify habitat (Gaines et al. 2003, Trombulak and Frissel 2000). It is Forest Service policy to minimize damage to vegetation, avoid harassment to wildlife, and avoid significant disruption of wildlife habitat while providing for motor vehicle use on NFS lands (FSM 2353.03(2)).

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Direction relevant to the proposed action as it affects herpetofauna includes:

Forest Service Manual and Handbooks (FSM/H 2670)

Forest Service sensitive species are species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability in national forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a significant trend toward federal listing or loss of viability. The impact analysis of sensitive species is documented in a biological evaluation (BE) and is summarized in this chapter.

STNF Land and Resource Management Plan (LRMP)

The record of decision for the 1995 Shasta-Trinity National Forest LRMP identified the following standards and guidelines applicable to motorized travel management and wildlife which would be considered during the analysis process.

Within Threatened, Endangered and Sensitive (TES) species habitat:

- Survey and evaluate habitat for TES species at the project level in coordination with the USFWS.

The STNF LRMP Standard and Guideline (page 4-41) states that for Shasta salamander, all known and future localities must be delineated and protected, and a buffer of at least the height of one site-potential tree or 100 feet horizontal distance, whichever is greater, should surround the limestone outcrop.

Supplemental Management Direction for Trinity Unit (pg 4-115) and Nosoni Unit (pg. 4-132) states, "Maintain or improve habitat for wildlife including self-sustaining populations of Shasta salamanders."

Effects Analysis Methodology

Assumptions Specific to Herpetofauna Analysis

1) All vehicle types or classes result in the same amount of disturbance effect to wildlife. There was no analysis done for any proposed changes to vehicle class or motorized mixed-use. Vehicle class restrictions on added roads and trails (including the proposals for level 2 roads which would allow all vehicle classes) and the proposed motorized mixed-use on the existing level 3 NFTS roads are not expected to have any detectable impact on wildlife. Closed system roads retained for limited administrative use (ML1 roads) and non-motorized trails are assumed to have no measurable adverse effect to herpetofauna, unless local data or knowledge indicates otherwise.
2) The spatial boundaries of the analysis are across the entire forest and account for the exclusion of wilderness, private lands, other state or federal non-NFS lands, and large perennial water bodies.
3) Winter activities using snowmobiles or other over-snow vehicles are outside the scope of this project analysis as are the effects of motorized boating traffic.
4) Existing non-motorized uses on the forest are assumed to continue.
5) Location of a route is equal to disturbance effects from that route (i.e., assume all routes provide the same level of disturbance), unless local data or knowledge indicate otherwise.
6) Habitat is already impacted in the short-term. In the long-term, habitat will still be impacted on added routes, but would become less impacted due to passive restoration in areas where cross-country travel is prohibited and unauthorized routes are not added to the NFTS.
7) LRMP standard and guide C-16 allows for removal of hazard trees along right of ways, therefore it is permissible to remove hazard trees along added routes.

Data Sources

- Compiled list of species to be considered from:
    - Region 5 Sensitive Species list amended 15 October 2007
    - California Department of Fish and Game list of California Species of Special Concern (March 2009)
- Completed site-specific surveys/assessment of wildlife habitats with routes proposed to be added to the NFTS. Compiled habitat, distribution, and disturbance concern information for species, including disturbance buffer zones, LRMP standards and guidelines, GIS habitat definitions, elevation limits, soil/rock types, need for permanent water, late-successional reserve (LSR) assessment recommendations, etc.

- GIS shapefiles and coverages for herpetofauna data, LRMP prescriptions and land allocations, habitat/vegetation layers, and California Wildlife Habitat Relationship (WHR) model, transportation layer, user-created routes, streams, air photos, topographical maps, and orthophotos. Note – the STNF GIS shapefiles and coverages for the herpetofauna data were very generalized in their habitat extent. No specific microsite data exists within the STNF GIS system. The species data is based upon this generalized information. A conservative approach was taken for species analysis and overestimates amount of suitable habitat.

Herpetofauna Methodology by Action

Studies have documented that motorized travel can affect terrestrial species by increasing human-caused mortality, change behavior due to disturbance, or modify habitat (Gaines et al. 2003; Trombulak and Frissel 2000; USFS 2000). For each alternative, herpetological resources are analyzed for direct and indirect short-term impacts (1 year) and cumulative long-term impacts (20 years). The following indicator measures related to motorized routes have been used to analyze the impacts of the project actions located in or near special interest herpetofauna occurrences or habitats.

Miles of all routes (authorized and unauthorized) and affected acreage within occupied or suitable habitat on the STNF were chosen to provide a relative measure of the direct and indirect effects to herpetofauna. Although biological thresholds for these indicators have been suggested for other amphibian species (Gibbs and Shriver 2005), none have been established for the herpetofauna analyzed in this document. The indicators chosen provide general measures by which the effects of the project alternatives may be compared.

1. Direct and indirect effects of the prohibition of cross-country motor vehicle travel.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: dependent on indicator**.**

Measurement Indicators

Indicator 1- Miles of all NFTS routes within occupied or suitable habitat.

Indicator 2 – Miles of routes added to the NFTS within occupied or suitable habitat.

Indicator 3 - Number of acres impacted from routes added to the NFTS within occupied or suitable habitat

Indicator 4 - Added acres open to motor vehicle use below the high water mark within occupied or suitable habitat

Indicator 5 - Number of stream crossings (perennial and intermittent) on routes added to the NFTS within occupied or suitable habitat

Indicator 6 - Percent of occupied or suitable habitat impacted by added routes

Methodology: GIS analysis of added routes in relation to habitat and important/sensitive areas.

Rationale: Literature indicates that placement of routes in relation to habitat can affect aquatic species through mortality, disturbance, and habitat modification (Moyle and Randall 1996, Trombulak and Frissel 2000, USDA Forest Service 2000).

2. Direct and indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

Same as #1 above.

3. Direct and indirect effects of changes to the existing NFTS (vehicle class).

Same as #1 above.

4. Cumulative Effects

Short-term timeframe: Not applicable; cumulative effects analysis will be done only for the long-term time frame.

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Measurement Indicators: Same as #1 above.

Methodology: GIS analysis of past/current, added, and future routes in relation to habitat and important/sensitive areas and in context of other past, current and future management actions affecting herpetofauna habitat.

Rationale: Literature indicates that placement of routes in relation to habitat can affect aquatic species through mortality, disturbance, and habitat modification (Trombulak and Frissel 2000, USDA Forest Service 2000).

Affected Environment/Environmental Consequences

Affected Environment

The species considered in this document are from the latest Regional Forester's Sensitive species list dated October 2007.

Reptiles and Amphibians

- Cascade frog (*Rana cascadae*)
- Foothill yellow-legged frog (*Rana boylii*)
- Western pond turtle (*Clemmys marmorata*)
- Shasta salamander (*Hydromantes Shastae*)
- Southern torrent salamander (*Rhyacotriton variegatus*)

The California red-legged frog is a federally threatened species and is discussed in the Wildlife Biological Assessment for this project.

The herpetofauna group of sensitive species is comprised of Cascade frog, foothill yellow-legged frog, western pond turtle, Shasta salamander, and southern torrent salamander. These species are associated with open wetlands, moist meadows and streams within mature forests that contain characteristics of late-successional stages. These characteristics include large trees, elevated amounts of decadence in the form of snags, down logs, tree decay and deformity.

The unauthorized routes do not constitute a change to habitats but are an existing condition whose vegetation-change impact has already occurred.

Cascade Frog

Cascade frogs historically occupied moderate and high elevation (about 1,300–8,000 feet) lentic habitats throughout the Cascade Range, from the very northern edge of California's Sierra Nevada to within 16 miles of the British Columbia border (Nussbaum et al., 1983; Fellers and Drost, 1993; Jennings and Hayes, 1994). Cascade frogs remain present in portions of the Trinity Alps and Marble Mountains, but a decline in the population has been documented throughout most of its southern range (Jennings 1996).

Adults use a variety of habitats but are mostly associated with open wetland habitats. Cascade frog adults commonly occupy moist meadows and can be found in relatively small permanent and temporary ponds. Adults are also found along streams in summer, especially at lower elevations where lentic habitats are less common (Fellers et al. 2007). Adults generally stay close to water, particularly along sunny shores, under dry summer conditions, but can be found traversing uplands during high humidity (Fellers and Drost 1993). Cascade frogs over-winter by entering torpor to survive the harsh cold conditions present in their habitat range.

Measurement Indicator 1: All NFTS routes within occupied or suitable habitat for the Cascade frog: 497.1 miles.

Foothill Yellow-legged Frog

The foothill yellow-legged frog was historically found throughout much of California and southwestern Oregon, but currently occupies a small portion of its historical range (Amphibiaweb 2009, Jennings and Hayes 1994). Foothill yellow-legged frogs have been extirpated from at least two thirds of their historic localities over their entire Sierran range (Jennings 1996, Lind 2005). Lind (2005) estimated foothill yellow-legged frog populations (prior to 1980) have disappeared from approximately 51 percent of their historic range. The foothill yellow-legged frog is a highly aquatic amphibian that prefers streams with a rocky substrate. Foothill yellow-legged frogs breed at locations with substrates and channel shapes that provide suitable velocities and depths over a relatively broad range of discharge volumes (Kupferberg 1996). Locally, breeding occurs in late May or early June when water levels become stable enough to reduce the risk of stranding or scour. These frogs prefer partial shade, shallow riffles, and cobble sized or greater substrate (Hayes and Jennings 1988). Kupferberg (1996) reported adult frogs may disperse into small tributary streams with persistent water following breeding. During all seasons, these frogs are rarely encountered far from permanent water, though foothill yellow-legged frogs have been observed in abandoned rodent burrows and under logs as far as 100 meters from a stream (Zeiner et al. 1988). Tadpoles typically use shallow water habitats where warmer water and food resources (diatoms, algae) are plentiful. Adults are likely to use exposed streambeds and riparian areas to forage for a variety of terrestrially- and aquatically-derived insects.

Measurement Indicator 1: All NFTS routes within occupied or suitable habitat for the foothill yellow-legged frog: 4,117.1 miles.

Western Pond Turtle

Western pond turtles are habitat generalists, occurring in a wide variety of permanent and intermittent aquatic habitats as well as terrestrial habitats. They may occur up to 6,000 feet in elevation. Individual western pond turtles (usually males) may have large home ranges and may wander within a given watercourse for several kilometers on a regular basis (Holland 1994, Reese and Welsh 1997). Terrestrial habitats are needed for nesting, overwintering, and for seasonal uses. Western pond turtle nests have been found as far as 435 yards from the stream (Reese and Welsh 1997) in open sunny areas on hillslopes, generally with a south to southwest facing aspect. Nest sites typically occur in open areas dominated by grasses or herbaceous annuals on dry, well-drained soils with high clay/silt content and low (less than 15 degree) slope (Holland 1994). There is some indication that most nesting excursions occur at night (Rathbun et al. 1992). Western pond turtles also move into upland slopes while overwintering or during periods when aquatic habitats become unsuitable (dry). The timing of overwintering movements is poorly understood, but generally occur from the fall (October) to early spring (April).

Measurement Indicator 1: All NFTS routes within occupied or suitable habitat for the Western Pond turtle: 2,722.9 miles.

Shasta Salamander

The Shasta salamander is unique to the STNF and is found in the vicinity of Shasta Lake and in the Centipede drainage southeast of McCloud, California. The largest populations appear to be associated with limestone outcrops where Shasta salamanders are active in wet caves and crevices and under surface debris such as down wood and rocks in forested areas adjacent to the outcrops (Herman 2003). During the long dry season (May-October), these salamanders retreat to cool, moist underground refugia (Herman 2003). Shasta salamanders are found under cover objects when the temperature is between 3 and 12° C with the highest likelihood for detection below 8° C (Lewendal 1995, Herman 2003). Shasta salamanders require moist conditions. They have been found in cool, moist or wet forested ravines or valleys below 975m in elevation. They may be found away from an outcropping during the rainy season, but they retreat to their subsurface habitat when moisture is not present. The home range is thought to not exceed 100m from their subterranean habitat (Nauman and Olson 2004).

Recent studies have found Shasta salamanders in forested areas distant from obvious limestone outcrops (Linstrand 2000, Nauman and Olson 2004). Some of these areas have rocky, non-limestone substrates (Nauman and Olson 2004) while others have little to no rocky substrate (Lindstrand 2000).

Measurement Indicator 1: All NFTS routes within occupied or suitable habitat for the Shasta salamander: 272.8 miles.

Southern Torrent Salamander

The southern torrent salamander ranges from southern Oregon to northern California in forested headwater streams, seeps or springs (Tait and Diller 2006). Cold water temperatures (8-13°C) with gravel and coarse substrate are preferred (Welsh and Lind 1996). Larvae often occur under stones in shaded streams. Adults also inhabit these streams or stream-sides in saturated moss-covered talus, or under rocks in splash zone. Typically the salamander occurs in older forest sites with large conifers, abundant moss, and >80 percent canopy closure; required microclimate and microhabitat conditions generally exist only in older forests (Welsh 1990, Welsh and Lind 1996). Young, managed forests may be occupied as long as the required microhabitats are present (Diller and Wallace 1996).

In first-order tributaries to the Mad River, Humboldt County, CA oviposition has been estimated to occur in August – September, with eggs hatching early spring (Taint and Diller 2006). Fecundity appears to be associated with size (Karraker 1999). Eggs are cryptically oviposited in interstitial spaces; generally cobble or larger size substrate (Welsh and Lind 1996). Metamorphosis from egg to sub-adult southern torrent salamander can occur in three to three and a half years (Tait and Diller 2006).

Southern torrent salamanders are opportunistic feeders. Larvae feed on aquatic invertebrates such as snails, arachnids, crustaceans and insects. Adults eat aquatic/semi-aquatic invertebrates, including beetles, stoneflies, snails, etc. (Nussbaum et al 1983).

Measurement Indicator 1: Miles of all NFTS routes within occupied or suitable habitat for the Southern Torrent salamander: 563.4 miles.

Environmental Consequences Common to Amphibians and Reptile Species

The use of a variety of motorized wheeled vehicles has become an increasingly popular form of recreation on National Forest lands. As it has become more popular, vast improvements in technology have also been incorporated into the sport resulting in more powerful vehicles that are capable of cross-country travel in more areas. Large increases in the number of users and improved vehicles have resulted in the proliferation of routes throughout many National Forests, including the STNF. Route proliferation and the use of motorized wheeled vehicles have a broad range of direct and indirect effects on terrestrial and aquatic wildlife. The direct and indirect effects of motorized use on wildlife can be placed in three general categories: 1) human-caused mortality, 2) changes in behavior, and 3) habitat modification (Gaines et al. 2003).

Human-caused Mortality

Death or injury from a vehicle hitting or running over an animal is well documented and affects the vast majority of terrestrial species, though to varying degrees (Trombulak and Frissell 2000). Glista et al. (2007) found that amphibian mortality accounts for the majority of vertebrate road-kills (92 percent, N=10,515) and turtles account for the majority of reptile road kills (37.5 percent, N=141). In general, road mortality increases with traffic volume and has shown to negatively affect amphibian density (Fahrig et al. 1995, Gibbs and Shriver 2005). Semi-aquatic herpetofauna may be especially vulnerable to road mortality because their life histories often involve migration between wetland and upland habitats and most are inconspicuous slow-moving species (Trombulak and Frissel 2000). Seasonal dispersal and reproductive requirements can increase mortality from road traffic as herpetofauna move from habitat types in greater numbers (Glista et al. 2007, Fahrig et al. 1995). High road densities and the associated road mortality have also shown to skew sex ratios in semi aquatic turtles that seek upland nesting sites (Gibbs and Steen 2005).

Stream crossings are areas of particular concern for collisions. Although some stream crossings have culverts or bridges, fords or low-water crossings are very typical along trails. Locations of fords vary widely, but often occur along a relatively low gradient stretch of stream. When a ford is created in these areas, it often creates a small pool where different life history stages (fingerling fish or tadpoles) of some species may congregate. Increased densities of these species may result in higher rates of collisions. Although some species may be more prone to crushing at crossings, numerous herpetofaunal species migrate from aquatic to terrestrial environments to complete their life histories.

Changes in Behavior (displacement or avoidance, impacts on breeding behavior, and physiological impacts)

Documented changes in behavior for herpetofauna species caused by human disturbance are limited. However, it can be assumed that herpetofauna exhibit similar responses to other wildlife species. Walther (1969) in Frid and Dill (2002) assumed that wildlife exhibit a predator avoidance response when they become non-lethally disturbed by humans. When a motorized vehicle or human triggers a predator avoidance response in an individual, it may directly or indirectly affect that individual's fitness. Direct effects of disturbance to an individual's fitness are commonly measured through increases in stress hormone levels. Significant increases in stress hormone levels have been found to reduce reproductive success of individuals of some species. The indirect effects of disturbance are commonly displayed through changes in an individual's time and energy budget. As a vehicle or human approaches an individual, the most obvious and common disturbance response is for that individual to avoid the threat and seek cover. After an individual exhibits the disturbance response, a period of time will elapse until that individual resumes pre-disturbance behavior. Since this change in an individual's time budget may result in less time feeding or resting (fitness-enhancing activities), the disturbance may result in changes to the individual's energy budget and potentially impact their fitness. If an individual is repeatedly disturbed in an area, they may eventually avoid the area; essentially being displaced from the habitat. Studies have documented shifts in an animal's home range area, shifts in foraging patterns, and disturbance of nesting or breeding behaviors resulting from motorized road or trail use and associated increased human recreation activity facilitated by motorized access (Reijnen and Foppen 1994, Johnson et al. 2000, Rost and Bailey 1979). Recreation activities (hiking, camping, fishing, shooting, etc.) that are associated with the access provided by motorized routes, result in indirect disturbance and displacement effects that often exceed the direct influence of the roads and trails. Many species avoid areas in proximity to roads or trails, or exhibit flight behavior within a certain distance of route use, though studies documenting the magnitude and duration of behavioral responses are limited. Road usage by vehicles has a significant role in determining animal's road avoidance behavior.

Habitat Modification

Motorized travel management may result in numerous different impacts to species habitat quality and quantity. Since many of these species are amphibians, they are acutely prone to changes in aquatic and adjacent terrestrial habitats. Alterations to terrestrial habitat may include, but are not limited to: direct reductions in cover (vegetative and underground), introductions of non-native plant species, and impacts to meadow hydrology. Alterations to aquatic habitat may include, but are not limited to: reductions in shade, increased water temperatures, increased sedimentation, altered hydrology and geomorphology.

The surfaces of unpaved roads can route fine sediments to streams, lakes, and wetlands, increasing turbidity of the water (Reid and Dunne 1984). Various studies have demonstrated that sediment delivery to stream channels in a forested environment is correlated to road surface type, physical characteristics of the adjacent areas (e.g., litter depth, coarse wood), soils (erodibility), the steepness of slope below the

road, and vehicle usage (Clinton and Vose 2003). The knowledge of the impact of increased sediment load on amphibians is limited (Gillespie 2002). However, the negative impacts of increased sediments on aquatic species, including fish, macroinvertebrates, and periphyton, are well known (Power 1990, Newcombe and MacDonald 1991). High concentrations of suspended sediment may directly kill aquatic organisms and impair aquatic productivity (Newcombe and Jensen 1996). Egg survival may be impacted by roads and trails through increases in fine sediments. Increased sedimentation may also reduce availability of important food resources for tadpoles such as algae (Power 1990). Fine sediment deposits also tend to fill pools and smooth gravel beds, degrading habitats (Forman and Alexander 1998).

At least five different general classes of chemicals are transferred into the environment from maintenance and use of roads: heavy metals, salt, organic molecules, ozone, and nutrients (Trombulak and Frissel 2000). The changes to water chemistry by road runoff may affect living organisms in several ways. For example, chemicals found in road de-icers may kill (Doughtery and Smith 2006) or displace frog life stages, or they may be accumulated in plants as toxins which, in turn, can depress larval amphibian growth. Roads can also influence both peak flows (floods) and debris flows (rapid movements of soil, sediment, and large wood stream channels) two processes which have major influences on riparian vegetation (Jones et al. 2000) as well as aquatic and riparian patch dynamics critical to stream ecosystems (Pringle et al. 1988). Numerous frog species breed in streams which can be adversely affected by fluctuations in the frequency or magnitude of peak flows, thereby, adversely affecting recruitment.

Since surveys of all aquatic habitats have not been conducted systematically for this project, occupied and suitable herpetofauna habitat was conservatively estimated. For this analysis, occupied and suitable habitat has been defined and mapped as all high, moderate and low quality reproductive, foraging and cover habitat and includes perennial and intermittent streams within the Shasta-Trinity National Forest.

Environmental Consequences by Alternative

Measurement Indicator 1 remains the same for each species in all alternatives, and is included in the species descriptions in the Affected Environment section above. The values are repeated here for easy reference:

Miles of all NFTS routes within occupied or suitable habitat on the Shasta-Trinity National Forest:

- **Cascade frog** (*Rana cascadae*): 497.1 miles
- **Foothill yellow-legged frog** (*Rana boylii*): 4,117.1 miles
- **Western pond turtle** (*Clemmys marmorata*): 2,722.9 miles
- **Shasta salamander** (*Hydromantes Shastae*): 272.8 miles
- **Southern torrent salamander** (*Rhyacotriton variegatus*): 563.4 miles

Alternative 1 – No-action

Direct/Indirect Effects of the prohibition of cross –country motor vehicle travel

There would be no prohibition of cross-country travel under this alternative, and motor vehicle use on unauthorized routes would continue. An impact, both in the short term and the long term would be disturbance and habitat fragmentation that would cause individuals to move or alter behavior. The potential for disturbance to focal species within this group can be evaluated using the information in Table 3.04-1.

Table 3.04-1. Alternative 1: Miles of routes and acres affected within occupied or suitable habitat on the Shasta-Trinity National Forest

Species	Total acres of habitat	Miles of unauthorized routes within habitat	Miles of NFTS routes within habitat	Combined miles of NFTS routes and unauthorized routes within habitat	Acres of habitat affected by NFTS and unauthorized routes
Cascade Frog	**248,265**	52.8	497.1	549.7	1,044.4
Foothill Yellow-legged Frog	**2,010,329**	736.4	4,117.1	4,853.6	9,221.8
Western Pond Turtle	**1,113,607**	498.2	2,722.9	3,221.1	6,120.0
Shasta Salamander	**141,359**	25.7	272.8	298.5	567.1
Southern Torrent Salamander	**304,815**	92.1	563.4	655.5	1,245.4

Cross-country travel could impact amphibian populations through reduction of connectivity. Connectivity is important for juvenile dispersal. The preponderance of evidence suggests that the short-term impact of habitat loss and fragmentation increases with species dispersal ability. However, species with limited dispersal abilities are likely to be equally imperiled by habitat loss and fragmentation over longer time periods (Cushman 2006).

The apparent vulnerability of amphibians (Houlahan et al., 2000; Kiesecker et al., 2001; Baillie et al., 2004) may be due to many factors, including: (1) relatively low vagilities (the capacity or tendency of an organism or a species to move about or disperse in a given environment), which amplifies the effects of habitat fragmentation (deMaynadier and Hunter, 2000; Bowne and Bowers, 2004), (2) high vulnerability to death when moving across roads and through inhospitable terrain, which depresses population growth rates (Carr and Fahrig, 2001; Carr et al., 2002), and (3) often narrow habitat tolerances, which exacerbates the effects of habitat loss, degradation, and edge effects (Semlitsch, 2000; Houlahan and Findlay, 2003).

Amphibians generally have lower rates of movement per generation than invertebrates, mammals or reptiles (Bowne and Bowers, 2004). Species with limited dispersal abilities are likely to be imperiled by habitat loss and fragmentation over longer time periods. Amphibian populations experience relatively frequent extinction and turnover (Alford and Richards, 1999; Trenham et al., 2003), thus population

connectivity is ultimately important even for populations of species that are not directly impacted by habitat loss or elevated mortality risks in dispersing.

Direct/Indirect Effects of adding facilities to the NFTS

Table 3.04-2. Measurement indicators 2-6 for alternative 1

Indicators:	2	3	4	5	6
Species	**Miles of unauthorized routes within habitat (existing condition)**	**Number of acres impacted from unauthorized routes[a]**	**Habitat acres open to motor vehicle use below the high water mark**	**Number of stream crossings on unauthorized routes**	**Percent of occupied or suitable habitat Impacted by unauthorized routes[b]**
Cascade Frog	52.8	100.3	0	103	9.6
Foothill Yellow-legged Frog	736.4	1399.1	0	881	15.1
Western Pond Turtle	498.2	946.5	0	781	15.4
Shasta Salamander	25.7	48.8	0	15	8.6
Southern Torrent Salamander	92.1	174.9	0	89	14.0

a - Calculated using: Miles x 1.9 (based on 16 ft roadbed).
b - The percent increase in route miles within occupied or suitable herpetofauna habitat. Calculated as: (miles of added unauthorized routes within occupied or suitable habitat divided by the miles of all NFTS routes within occupied or suitable habitat).

Unauthorized and NFTS routes affect approximately 9.6 percent of Cascade frog habitat, 15.1 percent of foothill yellow-legged frog habitat, 15.4 percent of western pond turtle habitat, 8.6 percent of Shasta salamander habitat and approximately 14 percent of southern torrent salamander habitat through alteration and disturbance.

The general effects of motorized travel on herpetofauna are described in the section titled Environmental Consequences: Effects Common to Amphibians and Reptile Species. The degradation of herpetofauna habitat will continue under alternative 1 and will likely have direct and indirect negative effects to individuals. Although there are no additions to the NFTS, the amount of user created routes from proliferation and continued expansion of unauthorized routes may result in increasing amounts of disturbance to amphibians, reptiles and their habitat.

The major direct impact to these herpetofauna populations on the STNF would be mortality due to motorized vehicles traveling through occupied habitats such as riparian, meadow wetland, stream and lake areas where the amphibians or reptiles are foraging or dispersing. Habitat alteration would also be a direct impact to the population on the STNF. Indirectly, the disturbance from unauthorized routes can negatively affect populations from an increase in sedimentation, displacement of prey populations, exposure to hydrocarbons and the modification of vegetation.

Direct/Indirect Effects of changes to the NFTS

Under this alternative there would be no changes to the existing NFTS. Present season of use and vehicle class on NFTS routes would continue.

Cumulative Effects

Present and reasonably foreseeable actions are those actions identified on the STNF Schedule of Proposed Actions (see appendix B). Projects include ongoing and future timber harvest, vegetation restoration, fuels management, grazing allotments, road management including closures, and decommissioning, recreation use, fire salvage, and mining reclamation which could have effects that would mitigate, or add to the effects of this action. In addition, unplanned events such as wildfires and tree mortality related to periodic droughts will continue to affect habitat. Generally, this group of species is affected negatively by actions that reduce canopy closure. Long-term trends have generally been negative for this species group, as seen by the identification of Forest Service "Sensitive" species such as the herpetofauna listed. Road maintenance and hazard tree removal on the existing NFTS will continue to potentially affect the habitat. Many of the actions listed in appendix B could have the potential to increase road density temporarily (i.e. forest product projects with timber harvest, fuels management projects, pre-commercial thinning projects, grazing allotments, and mining). The primary effects of increases in road density are related to increased disturbance and habitat fragmentation.

The actions in appendix B total 5.60 miles of unauthorized routes proposed for addition to the NFTS, or 2 percent of the NFTS amount proposed to be closed, abandoned, or decommissioned. This proportion of the total proposed actions forestwide is not expected to have significant impacts. Furthermore, the unauthorized routes do not constitute a change to habitat, but rather are an existing condition whose vegetation change impact has already occurred and whose conditions would continue into the future. Overall, vehicle-related impacts from this alternative appear to aggregate with other impacts occurring on the landscape. The scope and intensity of foreseeable actions is much smaller an impact than that of the already existing unauthorized routes.

Alternative 2 - Proposed Action

Direct/Indirect Effects of the Prohibition of Cross –Country Motorized Vehicle Travel

Under this alternative motor vehicle cross-country travel would be prohibited on approximately 1,599,062 acres, including discontinued use on approximately 1,208 miles of unauthorized routes. This alternative would prevent disturbance and habitat alteration to the species from motorized cross-country travel. In the long-term, species habitat would be expected to passively recover from soil and vegetation impacts caused by unmanaged motorized travel, including unauthorized routes that will no longer receive motorized traffic. Additionally, future route proliferation would also be stopped. The potential impacts discussed under alternative 1 from cross-country travel would not occur allowing the areas to begin recovering naturally. Species would not be affected by disturbance, habitat fragmentation or indirect

impacts to prey or food resources from cross-country vehicle travel. Under this alternative, compared to alternative 1 there would be less potential for mortality, habitat alteration, breeding disturbance, and less stress and behavior change from cross-country travel.

Table 3.04-3 displays the combined route mileage of the existing system roads and the proposed additions within habitats used by the species, and the total acres of habitat affected. This alternative would add a total of 44.2 miles of routes to the NFTS. This would affect species through disturbance, and habitat modification.

Table 3.04-3. Alternative 2: Miles of routes and acres affected within occupied or suitable habitat on the Shasta-Trinity National Forest

Species	Total acres of habitat	Miles of routes added	Combined miles of NFTS and added routes within habitat	Acres of habitat affected by combined routes
Cascade Frog	**248,265**	2.0	498.8	947.7
Foothill Yellow-legged Frog	**2,010,329**	24.1	4141.3	7868.4
Western Pond Turtle	**1,113,607**	17.0	2740.0	5206
Shasta Salamander	**141,359**	1.1	274.0	520.6
Southern Torrent Salamander	**304,815**	0.8	564.3	1072.1

This alternative would reduce the potential for disturbance by reducing route mileage within Cascade frog habitat by approximately 51 miles, foothill yellow-legged frog habitat by 712 miles, western pond turtle habitat by 481 miles, Shasta salamander habitat by 25 miles, and southern torrent salamander habitat by 91 miles over the existing condition described in alternative 1.

Prohibiting cross-country travel would limit the proliferation of user created routes within these species habitats. This would reduce the risk of direct and indirect effects from motorized travel over the short and long-term.

Direct/Indirect Effects of adding facilities to the NFTS

Table 3.04-4. Measurement indicators 2-6 for alternative 2

Indicators:	2	3	4	5	6
Species	**Miles of routes added to the NFTS within habitat**	**Number of habitat acres impacted from added routes[a]**	**Added acres open to motor vehicle use below the high water mark**	**Number of stream crossings on routes added to the NFTS**	**Percent of occupied or suitable habitat impacted by added routes[b]**
Cascade Frog	2.0	3.8	0	2	0.4
Foothill Yellow-legged Frog	24.1	45.8	0	26	0.5
Western Pond Turtle	17.1	32.5	0	8	0.6
Shasta Salamander	1.1	2.1	0	1	0.4
Southern Torrent Salamander	0.8	1.6	0	21	0.1

a - Calculated using: Miles x 1.9 (based on 16ft roadbed).
b - The percent increase in route miles within occupied or suitable herpetofauna habitat. Calculated as: (miles of added unauthorized routes within occupied or suitable habitat divided by the miles of all NFTS routes within occupied or suitable habitat).

Under this alternative, 44.2 miles of routes would be added to the NFTS. The type of impacts to these species depends on the type of route, amount and type of use, and season of use (Gaines 2003). Added and NFTS routes affect approximately 0.4 percent of Cascade frog and Shasta salamander habitat, 0.5 percent of foothill yellow-legged frog habitat, 0.6 percent of western pond turtle habitat, and 0.1 percent of southern torrent salamander habitat through alteration and disturbance.

Cascade frog - There is potential risk of direct effects to Cascade frogs although it is low for the following reasons: 1) one study in the Trinity Alps found that, of the few Cascade frogs that dispersed overland outside of riparian areas, it was during the spring when the ground was still moist and generally at the time of snowmelt recession (McFarland 2009); there is little likelihood of overlap between frog dispersal timing and motor vehicle use timing on the routes in these subwatersheds, because spring conditions would likely prohibit access due to snow and 2) adults generally stay close to water and there are only 2 stream crossings.

A total of 2 miles of routes would be added within Cascade frog suitable habitat. There is potential for indirect effects occurring to the habitat from the addition of the routes and continued motorized travel on the routes. The risk for adverse effects, however, is considered low. This is because the routes are widely distributed across the area of suitable habitat, and the area of influence at the site level is relatively small.

Foothill yellow-legged frog - There is potential risk of direct effects to foothill yellow-legged frog although it is low for the following reasons: this species is not likely to be susceptible to direct mortality from motor vehicles because this species rarely moves more than 5 meters (16.4 feet) from stream channels (Bourque 2005). Also, according to Zweifel (1955), “these frogs are so closely restricted to

streams that it is unusual to find one at a greater distance from the water than it could cover in one or two leaps." Zweifel (ibid) also notes that this species does not leave streams in the rainy season and is not found on roads at night during rains, even though the species may be present in nearby streams.

A total of 24.1 miles of routes would be added within foothill yellow-legged frog suitable habitat. There is potential for indirect effects occurring to the habitat from the addition of the routes and continued motorized travel on the routes. The risk for adverse effects, however, is considered low. This is because the routes are widely distributed across the area of suitable habitat, and the area of influence at the site level is relatively small. One primary potential effect of routes near streams, in general, is the associated increase in sedimentation.

Western pond turtle - There is potential risk of direct effects to western pond turtles although it is low for the following reasons: individual western pond turtles have large home ranges and may wander within a given watercourse for several kilometers on a regular basis. Gibbs and Shriver (2002) modeling study found that no populations of small-bodied pond turtles were threatened by road mortality. Although it has been observed by Reese and Welsh (1997) that the upland area used by turtles exceeded the size of traditionally protected riparian buffer zones. Reese and Welsh observed frequent and prolonged use of terrestrial habitat for both nesting and overwintering activities; turtles travelled into upland area as far as 500 m from the Trinity River. Males utilized terrestrial habitat over ten months of the year, and females were on land every month as a result of their additional terrestrial behavior while gravid. Hatchlings overwintered in the nest. Current knowledge is lacking in the ability to accurately predict specifically which portions of the terrestrial environment are critical for western pond turtles. They utilize a variety of upland habitat as well as the network of creek, ponds and ephemeral bodies of water associated with riverine systems.

A total of 17.1 miles of routes would be added within western pond turtle suitable habitat, there is potential for indirect effects occurring to the habitat from the addition of the routes and continued motorized travel on the routes. The risk for adverse effects, however, is considered low. This is because the routes are widely distributed across the area of suitable habitat, and the area of influence at the site level is relatively small.

Southern torrent salamander - There is potential risk of direct effects to southern torrent salamanders although it is low for the following reasons: the required microclimate and microhabitat conditions generally exist only in older forests and these areas are protected by a riparian buffer.

A total of 0.85 miles of routes would be added within southern torrent salamander suitable habitat. There is potential for indirect effects occurring to the habitat from the addition of the routes and continued motorized travel on the routes. The risk for adverse effects, however, is considered low. This is because the routes are widely distributed across the area of suitable habitat, and the area of influence at the site level is relatively small. One potential effect of routes near streams, in general, is the associated increase in sedimentation.

Shasta salamander - There is potential risk of direct effects to Shasta salamander although it is low for the following reasons: the Shasta salamander is unique to the STNF and inhabits limestone and rock outcroppings with caves or deep talus. The home range of this species is thought to not exceed 100m from their subterranean habitat. To delineate this habitat, a 300 foot buffer was established around known limestone outcrops. With the establishment of this buffer zone this species is not likely to be susceptible to direct mortality from motor vehicles. Table 3.04-5 shows the routes in Alt 2 that are within this buffer. These short segments are a small portion of the available habitat and are not likely to significantly affect these species, reducing the probability that an individual of any of these species would expose itself during the higher use periods. Most of the species under consideration are least mobile during the dry periods preferred by OHV riders. These amphibians are susceptible to desiccation and avoid exposure during the day. No potential indirect effects are anticipated.

Table 3.04-5. Added routes under alternative 2 that are within a 300 foot buffer of limestone formations on the STNF

Route #	Road or Trail	Miles	Comments
TC1238	Road	0.04	4 islands grouped
U31N02Q	Trail	0.28	2 islands grouped
U35N05A	Road	1.74	4 islands grouped
U414F**	Road	0.18	Huge formation
U414A**	Road	0.59	Huge formation

** Note that these two routes are also included in the Modified Alternative 2 final selection. Both are short spurs in large open areas alongside the Trinity River with no apparent limestone outcrops within the 300-foot buffer and well outside the known range of the species associated with these formations – the Shasta salamander. In regards to effects on this species, these routes may be safely discounted.

Most of the effects to herpetofauna species are from the existing approved transportation system. Unauthorized routes constitute 1,252 miles (965 miles of roads and 287 miles of trails) while the existing transportation system extends across approximately 6,760 miles (5,329 miles of roads open to the public and 1,431 miles of trails), and only 44.2 miles of routes will be added to the existing transportation system under this alternative.

Parking and dispersed camping within one vehicle length of a designated route will be allowed. The disturbance effect would be minimal and short term given the parking and/or camping is temporary and would not be over 30 feet from the edge of a travel route.

Under this alternative motorized use of lake bottoms (areas below high water mark) would be allowed on Shasta Lake and Trinity Lake. Table 3.04-6 shows the estimated acres of lake bottom that each species would potentially use below high water mark.

Some other restrictions on the lake bottom use are a 15 mph speed limit restriction for resource protection and highway-legal vehicles only. Expected effects will be similar to the intrusive character of motor vehicle routes.

Table 3.04-6. Acres of lake bottom use by individual species

Species	Acres of lake bottom – areas below high water mark
Cascade Frog	0
Foothill Yellow-legged Frog	0
Western Pond Turtle	0
Shasta Salamander	0
Southern Torrent Salamander	0

None of the species under consideration have suitable habitat within the lake bottom areas. These areas are routinely inundated from lake flooding, barren when exposed and for the most part unshaded and exposed. The Cascade frog generally occurs at higher altitudes, the foothill yellow-legged frog prefers partial shade, shallow riffles in streams and cobble-sized or greater substrates (Hayes and Jennings 1988). Kupferberg (1996) reported adult frogs may disperse into small tributary streams with persistent water following breeding, however, streams feeding through the lake bottom areas to Shasta and Trinity lakes are generally too exposed to provide suitable habitat. During all seasons, these frogs are rarely encountered far from permanent water. Off-highway vehicle use only occurs when the lake bottom is exposed. Foothill yellow-legged frogs are unlikely to use the area during this time due to the dry nature and lack of cover in the open lake bottom areas. Western pond turtles prefer smaller bodies of water that retain exposed woody debris as haul out sites. Although Shasta salamander could potentially disperse to limestone outcroppings in the lake bottoms during moist weather, these areas are devoid of vegetation and the productive base to develop food sources for the salamander. Southern torrent salamander is limited to a restricted area on the western portion of the Forest and all of the lake bottoms being considered here are well out of the range of these species.

This alternative would result in the addition of two stream crossings within occupied or suitable Cascade frog habitat, 26 stream crossings in foothill yellow-legged frog habitat, 8 stream crossings in western pond turtle habitat, 1 stream crossing in Shasta salamander habitat and 21 stream crossings in southern torrent salamander habitat. These stream crossings would likely result in direct and indirect effects to some individuals at various life history stages. However, possible impacts from unauthorized routes to all habitats are greatly reduced compared to alternative 1.

Direct/Indirect Effects of changes to the existing NFTS

This alternative proposes no changes to the NFTS and therefore would have no direct or indirect effects.

Cumulative Effects

Present and reasonably foreseeable actions are those actions identified on the STNF Schedule of Proposed Actions (see appendix B). Projects include ongoing and future timber harvest, vegetation restoration, fuels management, grazing allotments, road management including closures, and decommissioning, recreation use, fire salvage, and mining reclamation which could have effects that would mitigate, or add to the effects of this action. In addition, unplanned events such as wildfires and tree mortality related to periodic

droughts will continue to affect habitat. Generally, this group of species is affected negatively by actions that reduce microclimate moisture such as significantly reducing or removing canopy closure in occupied habitat. Road maintenance and hazard tree removal will continue on the existing NFTS as well as the routes that are added to the system under this proposal and will continue to potentially affect the microsite habitat. Many of the above actions also have the potential to temporarily increase road density (i.e. forest product projects with timber harvest, fuels management projects, pre-commercial thinning projects, grazing allotments, and mining). The primary effects of increases in road density are related to increase disturbance and habitat fragmentation.

This alternative would add approximately 44.2 miles of routes to the NFTS, and would prohibit cross-country travel and discontinue use of unauthorized routes. The 44.2 miles of routes added to the NFTS would be maintained over time, adding to the cumulative effects. However, the physical habitat impact would be small. The 2 miles of routes added to the NFTS in Cascade frog habitat in this alternative is equivalent to 3.8 acres of impacts; for foothill yellow-legged frog this equates to approximately 143 acres of impacts. These route additions are offset in the long run by the prohibition on cross-country travel and the passive restoration that is expected to occur on the routes not added to the NFTS. In this alternative the impacts from the route system are substantially reduced compared to the impacts of alternative 1, and augmented additionally by the cessation of impacts from cross-country travel. Overall, impacts from this alternative appear to be a reduction in cumulative effects to habitat compared to the existing condition described in Alternative 1. The addition of 44.2 miles to the NFTS will be offset by the passive restoration of 1,208 miles of unauthorized routes, and eliminating the potential habitat degradation from cross-country travel. This alternative is expected to provide a measurable reduction in cumulative effects from disturbance by substantially reducing the area of habitat influence.

In addition to the existing seasonal closures which affect 220 NFTS routes and two reservoirs, mitigation of additional seasonal closures for LSR species under this alternative are also proposed. These seasonal closures will also benefit herpetofauna species. See appendix D for a full list of routes.

The actions in appendix B total 5.60 miles of unauthorized routes proposed for addition to the NFTS, or 2 percent of the NFTS amount proposed to be closed, abandoned, or decommissioned. This proportion of the total proposed actions forestwide is not expected to have significant impacts. Furthermore, the added routes do not constitute a change to habitat, but rather are an existing condition whose vegetation change impact has already occurred and whose conditions would continue into the future. Overall, vehicle-related impacts from this alternative appear to aggregate with other impacts occurring on the landscape. The scope and intensity of foreseeable actions is much smaller an impact than that of the existing unauthorized routes.

Alternative 3 - Cross-County Travel Prohibition– No Additions to the Existing NFTS

Direct/Indirect Effects of the Prohibition on Cross –Country Motorized Vehicle Travel

This alternative would prevent disturbance to the species within this group by prohibiting cross-country travel on approximately 1,599,471 acres, including discontinued use of approximately 1,252 miles of unauthorized routes. In the long-term (20 years), focal species habitat would be expected to passively recover from soil and vegetation impacts caused by unmanaged motorized travel. The potential impacts discussed under alternative 1 from cross-country travel would not occur. The focal species would not be affected by disturbance, or indirect impacts to prey or food resources.

This alternative would not add any routes or open areas to the NFTS. The effects of routes would still occur on the 5,416 miles of NFTS roads and motorized trails open for use; however, this is a reduction of 1,252 miles compared to alternative 1. This would result in a beneficial effect of 2,254 acres of road prism area being passively restored. Table 3.04-7 displays the amount of route mileage within habitats used by the focal species.

Table 3.04-7. Alternative 3: Miles of routes and acres affected within occupied or suitable habitat on the Shasta-Trinity National Forest

Species	Total acres of habitat	Miles of added routes within habitat	Combined miles of NFTS and added routes within habitat	Acres of habitat affected by combined routes
Cascade Frog	**248,265**	0	496.8	943.9
Foothill Yellow-legged Frog	**2,010,329**	0	4,117.1	7,822.4
Western Pond Turtle	**1,113,607**	0	2,722.9	5,173.5
Shasta Salamander	**141,359**	0	272.8	518.3
Southern Torrent Salamander	**304,815**	0	563.4	1,070.4

Compared to alternative 1 this alternative would reduce the route mileage within Cascade frog habitat by approximately 52.8 miles, within foothill yellow-legged frog habitat by 736.4, within western pond turtle habitat by 498.2 miles, within Shasta salamander habitat by 25.7 miles, and within southern torrent salamander habitat by 92.1 miles.

Under this alternative no motorized use of lake bottoms (areas below high water mark) would be allowed on Shasta Lake or Trinity Lake.

Under this alternative no additional stream crossings would occur within these species habitat.

Direct and Indirect Effects of adding facilities to the NFTS

No additions to the NFTS are proposed under this alternative so there would be no direct or indirect effects.

Direct and Indirect Effects of changes to the NFTS

This alternative proposes no changes to NFTS so there would be no direct or indirect effects.

Cumulative Effects

This alternative would prohibit cross-country motorized travel on approximately 1,599,471 acres including the discontinued use of approximately 1,252 miles of unauthorized routes. The impacts to species in this group from cross-country travel and from unauthorized routes would cease, and may partially counter some of the effects from vegetation management occurring elsewhere. The unauthorized route impacts would begin to decrease at the 20-year long-term point as the routes begin to develop vegetation and downed woody debris and passively restore to more suitable habitat for these species. All of these acres would have many decades of growth and recovery before they fully became suitable for the species in this group. However, the low rate and intensity of impacts from cross-country travel do not appear to be sufficient to counter other impacts that are occurring from vegetation management and stochastic events such as insect outbreaks and stand-replacing fires. Overall, when aggregated with other impacts to this group, impacts from this alternative appear to be insufficient to alter the larger trends occurring on the landscape.

The SOPA actions in appendix B total 5.60 miles of unauthorized routes proposed for addition to the NFTS, or 2 percent of the NFTS amount proposed to be closed, abandoned, or decommissioned. This proportion of the total proposed actions forestwide is not expected to have significant impacts.

Alternative 4 - Minimize Impacts to Natural Resources and Roadless Areas

Direct/Indirect Effects of the Prohibition of Cross – Country Motorized Vehicle Travel

Under this alternative cross-country travel would be prohibited on approximately 1,599,277 acres including discontinued use on approximately 1,236 miles of unauthorized routes. This alternative would prevent disturbance and habitat alteration to the species from cross-country travel. In the long-term, species habitat would be expected to passively recover from soil and vegetation impacts caused by unmanaged motorized travel, including unauthorized routes that no longer receive motorized traffic. Additionally, future route proliferation would also be stopped. The potential impacts discussed under alternative 1 from cross-country travel would not occur. Species would not be affected by disturbance, habitat fragmentation or indirect impacts to prey or food resources from cross-country vehicle travel. Under this alternative, compared to alternative 1 there would be less potential for breeding disturbance, less stress and behavior change from cross-country travel.

Under this alternative, the addition of 15.56 miles of routes to the NFTS would occur. Within Cascade frog habitat, 0.47 miles would be added, 0.93 miles in foothill yellow-legged frog habitat and 1.7 miles in western pond turtle habitat, but none in Shasta or Southern Torrent salamander habitat. Table 3.04-8 displays the route mileage within habitats used by the focal species.

Table 3.04-8. Alternative 4: Miles of routes and acres affected within occupied or suitable habitat on the Shasta-Trinity National Forest

Species	Total acres of habitat	Miles of routes added	Combined miles of NFTS and added routes within habitat	Acres of habitat affected by combined routes
Cascade Frog	**248,265**	0.47	497.3	944.8
Foothill Yellow-legged Frog	**2,010,329**	0.93	4118.1	7824.3
Western Pond Turtle	**1,113,607**	1.7	2724.6	5176.7
Shasta Salamander	**141,359**	0	272.8	518.3
Southern Torrent Salamander	**304,815**	0	563.4	1070.4

Compared to alternative 1 this alternative would reduce the route mileage within Cascade frog habitat by approximately 52.3 miles; within foothill yellow-legged frog habitat by 735.4; within western pond turtle habitat by 496.5 miles; within Shasta salamander habitat by 25.7 miles; and within southern torrent salamander habitat by 92.1 miles over the existing condition.

Direct and Indirect Effects of adding facilities to the NFTS

Table 3.04-9. Measurement indicators 2-6 for alternative 4

Indicators:	2	3	4	5	6
Species	**Miles of routes added to the NFTS within habitat**	**Number of habitat acres impacted from added routes[a]**	**Added acres open to motor vehicle use below the high water mark**	**Number of stream crossings on routes added to the NFTS**	**Percent of occupied or suitable habitat impacted by added routes[b]**
Cascade Frog	0.47	0.8	0	0	0.09
Foothill yellow-legged frog	0.93	1.7	0	1	0.02
Western Pond Turtle	1.7	3.2	0	0	0.06
Shasta Salamander	0	0	0	0	0
Southern Torrent Salamander	0	0	0	0	0

a -Calculated using: Miles x 1.9 (based on 16ft roadbed).
b - The percent increase in route miles within occupied or suitable herpetofauna habitat. Calculated as: (miles of added unauthorized routes within occupied or suitable habitat divided by the miles of all NFTS routes within occupied or suitable habitat).

Added and NFTS routes affect approximately 0.09 percent of modeled Cascade frog habitat, approximately 0.02 percent of foothill yellow-legged frog habitat and approximately 0.06 percent of western pond turtle habitat through alteration and disturbance. The potential impact to Cascade frog, foothill yellow-legged frog, and western pond turtle species is minimal given the percent of habitat affected.

Cascade frog - There is potential risk of direct effects to Cascade frogs although it is low for the following reasons: 1) one study in the Trinity Alps found that, of the few Cascade frogs that dispersed overland outside of riparian areas, it was during the spring when the ground was still moist and generally at the time of snowmelt recession (McFarland 2009); there is little likelihood of overlap between frog

dispersal timing and motor vehicle use timing on the routes in these subwatersheds, because spring conditions would likely prohibit access due to snow and 2) adults generally stay close to water.

A total of 0.47 miles of routes would be added within Cascade frog suitable habitat. There is potential for indirect effects occurring to the habitat from the addition of the routes and continued motorized travel on the routes. The risk for adverse effects, however, is considered low. This is because the routes are widely distributed across the area of suitable habitat, and the area of influence at the site level is relatively small.

Foothill yellow-legged frog - There is potential risk of direct effects to foothill yellow-legged frogs although it is low for the following reasons: this species is not likely to be susceptible to direct mortality from motor vehicles because this species rarely moves more than 5 meters (16.4 feet) from stream channels (Bourque 2005). Also, according to Zweifel (1955), "these frogs are so closely restricted to streams that it is unusual to find one at a greater distance from the water than it could cover in one or two leaps." Zweifel (ibid) also notes that this species does not leave streams in the rainy season and is not found on roads at night during rains, even though the species may be present in nearby streams.

A total of 0.93 miles of routes would be added within foothill yellow-legged frog suitable habitat. There is potential for indirect effects occurring to the habitat from the addition of the routes and continued motorized travel on the routes. The risk for adverse effects, however, is considered low. This is because the routes are widely distributed across the area of suitable habitat, and the area of influence at the site level is relatively small. One potential effect of routes near streams, in general, is the associated increase in sedimentation.

Western pond turtle - There is potential risk of direct effects to western pond turtles although it is low for the following reasons: individual western pond turtles have large home ranges and may wander within a given watercourse for several kilometers on a regular basis. Gibbs and Shriver (2002) modeling study found that no populations of small-bodied pond turtles were threatened by road mortality. Although it has been observed by Reese and Welsh (1997) that the upland area used by turtles exceeded the size of traditionally protected riparian buffer zones. Reese and Welsh observed frequent and prolonged use of terrestrial habitat for both nesting and overwintering activities; turtles travelled into upland area as far as 500 m from the Trinity River. Males utilized terrestrial habitat over ten months of the year, and females were on land every month as a result of their additional terrestrial behavior whiles gravid. Hatchlings overwintered in the nest. Current knowledge is lacking in the ability to accurately predict specifically which portions of the terrestrial environment are critical for western pond turtles. They utilize a variety of upland habitats as well as the network of creek, ponds and ephemeral bodies of water associated with riverine systems.

A total of 1.7 miles of routes would be added within western pond turtle suitable habitat, there is potential for indirect effects occurring to the habitat from the addition of the routes and continued motorized travel on the routes. The risk for adverse effects, however, is considered low. This is because

the routes are widely distributed across the area of suitable habitat, and the area of influence at the site level is relatively small.

Unauthorized routes constitute 1,252 miles (965 miles of roads and 287 miles of trails) while the transportation system extends across approximately 6,760 miles (5,329 miles of roads open to the public and 1,431 miles of trails), and only 15.56 miles of routes would be added to the existing NFTS routes under this Alternative.

Parking and dispersed camping within one vehicle length of a designated route would be allowed. The disturbance effect would be minimal and short term given the parking and/or camping is temporary and would not be over 30 feet from the edge of a travel route.

This alternative would result in the addition of one stream crossing within occupied or suitable foothill yellow-legged frog habitat. This stream crossing may result in direct and indirect effects to some individuals at various life history stages. However, possible impacts from routes to all habitats are greatly reduced compared to alternative 1.

Under this alternative motorized use of lake bottoms (areas below high water mark) would be allowed on Shasta Lake, Trinity Lake and Iron Canyon Reservoir. Table 3.04-10 shows the estimated acres of lake bottom that each species would potentially use below high water mark.

Table 3.04-10. Acres of lake bottom use by individual species

Species	Acres of lake bottom – areas below high water mark
Cascade Frog	0
Foothill Yellow-legged Frog	0
Western Pond Turtle	0
Shasta Salamander	0
Southern Torrent Salamander	0

None of the species under consideration have suitable habitat within the lake bottom areas. These areas are routinely inundated from lake flooding, barren when exposed and for the most part unshaded and exposed. The Cascade frog generally occurs at higher altitudes, the foothill yellow-legged frog prefers partial shade, shallow riffles in streams and cobble-sized or greater substrates (Hayes and Jennings 1988). Kupferberg (1996) reported adult frogs may disperse into small tributary streams with persistent water following breeding, however, streams feeding through the lake bottom areas to Shasta and Trinity lakes are generally too exposed to provide suitable habitat. . During all seasons, these frogs are rarely encountered far from permanent water. Off-highway vehicle use only occurs when the lake bottom is exposed. Foothill yellow-legged frogs are unlikely to use the area during this time due to the dry nature and lack of cover in the open lake bottom areas. Western pond turtles prefer smaller bodies of water that retain exposed woody debris as haul out sites. Although Shasta salamander could potentially disperse to limestone outcroppings in the lake bottoms during moist weather, these areas are devoid of vegetation and

the productive base to develop food sources for the salamander. Southern torrent salamander is limited to a restricted area on the western portion of the Forest and all of the lake bottoms being considered here are well out of the range of these species.

Some other restrictions on the lake bottom use are a 10 mph speed limit restriction for resource protection and highway-legal vehicles only. Expected effects will be similar to the intrusive character of motor vehicle routes.

Direct/Indirect Effects of Changes to the Existing NFTS

Motorized mixed use is proposed in this alternative. Changes to class of use are not expected to have any detectable impact on wildlife. The source of disturbance, whether an auto, truck, or OHV, is assumed to be the same for this analysis. Changing the mix of use is not expected to have any impacts on wildlife.

Cumulative Effects

This alternative would discontinue cross-country travel which includes all but the added 15.56 miles of existing routes. The added routes in Cascade frog habitat for this alternative, when converted to equivalent-acres of habitat is 0.8 acres. For foothill yellow-legged frog, the added routes equate to about 1.7 acres, and for the western pond turtle the area equates to 3.2 acres. The effects would be similar to alternative 2 but with fewer miles added thereby increasing the beneficial effects of passive habitat restoration of unauthorized routes and less disturbance. Overall, impacts from this alternative appear to be minor even when aggregated with other impacts occurring on the landscape as described in the cumulative effects sections for alternative 2.

In addition to the existing seasonal closures which affect 220 NFTS routes and two reservoirs, mitigation of additional seasonal closures for LSR species under this alternative are also proposed. These seasonal closures will also benefit herpetofauna species. See appendix D in the FEIS for a full list of routes.

The actions in appendix B total 5.60 miles of unauthorized routes proposed for addition to the NFTS, or 2 percent of the NFTS amount proposed to be closed, abandoned, or decommissioned. This proportion of the total proposed actions forestwide is not expected to have significant impacts. Furthermore, the added routes do not constitute a change to habitat, but rather are an existing condition whose vegetation change impact has already occurred and whose conditions would continue into the future. Overall, vehicle-related impacts from this alternative appear to aggregate with other impacts occurring on the landscape. The scope and intensity of foreseeable actions is much smaller an impact than that of the existing unauthorized routes.

Alternative 5 - Improved Access and Motorized Recreation Opportunities

Direct/Indirect Effects of the Prohibition of Cross –Country Motorized Vehicle Travel

Under this alternative cross-country travel would be prohibited on approximately 1,598,619 acres including discontinued use on approximately 1,146 miles of unauthorized routes. This alternative would prevent disturbance and habitat alteration to the species within this group from cross-country travel. In the long-term, species habitat would be expected to passively recover from soil and vegetation impacts caused by unmanaged motorized travel, including unauthorized routes that would no longer receive motorized traffic. Additionally, future route proliferation would also be stopped. The potential impacts discussed under alternative 1 from cross-country travel would not occur. Under this alternative, compared to alternative 1 there would be less potential for breeding disturbance, less stress and less behavior change from cross-country travel.

This alternative would add 106.12 miles of routes to the NFTS. The miles of routes added to the system in this alternative are displayed in Table 3.04-11.

Table 3.04-11. Alternative 5: Miles of routes and acres affected within occupied or suitable habitat on the Shasta-Trinity National Forest

Species	Total acres of habitat	Miles of routes added	Combined miles of NFTS and added routes within habitat	Acres of habitat affected by combined routes
Cascade Frog	**248,265**	2.46	499.3	948.6
Foothill Yellow-legged Frog	**2,010,329**	44.75	4161.9	7907.6
Western Pond Turtle	**1,113,607**	32.56	2755.5	5235.4
Shasta Salamander	**141,359**	1.13	274.0	520.6
Southern Torrent Salamander	**304,815**	0.95	564.4	1072.3

Compared to alternative 1 this alternative would reduce the route mileage within Cascade frog habitat by approximately 50.4 miles, within foothill yellow-legged frog habitat by 691.7 miles, within western pond turtle habitat by 465.7 miles, within Shasta salamander habitat by 24.6 miles, and within southern torrent salamander habitat by 91.2 miles over the existing conditions.

Direct and Indirect Effects of adding facilities to the NFTS

Added and NFTS routes affect approximately 0.4 percent of Cascade frog habitat, 1.0 percent of foothill yellow-legged frog habitat, 1.1 percent of western pond turtle habitat, 0.4 percent of Shasta salamander habitat, and 0.1 percent of southern torrent salamander habitat through alteration and disturbance.

Table 3.04-12. Measurement indicators 2-6 for alternative 5

Indicators:	2	3	4	5	6
Species	**Miles of routes added to the NFTS within habitat**	**Number of habitat acres impacted from added routes[a]**	**Added acres open to motor vehicle use below the high water mark**	**Number of stream crossings on routes added to the NFTS**	**Percent of occupied or suitable habitat impacted by added routes[b]**
Cascade Frog	2.46	4.6	0	2	0.4
Foothill Yellow-legged Frog	44.75	85	0	52	1.0
Western Pond Turtle	32.56	61.8	0	16	1.1
Shasta Salamander	1.13	2.1	0	1	0.4
Southern Torrent Salamander	0.95	1.8	0	36	0.1

a - Calculated using: Miles x 1.9 (based on 16 ft roadbed).
b - The percent increase in route miles within occupied or suitable herpetofauna habitat. Calculated as: (miles of added unauthorized routes within occupied or suitable habitat divided by the miles of all NFTS routes within occupied or suitable habitat).

Cascade frog - There is potential risk of direct effects to Cascade frogs although it is low for the following reasons: 1) one study in the Trinity Alps found that, of the few Cascade frogs that dispersed overland outside of riparian areas, it was during the spring when the ground was still moist and generally at the time of snowmelt recession (McFarland 2009); there is little likelihood of overlap between frog dispersal timing and motor vehicle use timing on the routes in these subwatersheds, because spring conditions would likely prohibit access due to snow and 2) adults generally stay close to water and there are only 2 stream crossings.

A total of 2.46 miles of routes would be added within Cascade frog suitable habitat. There is potential for indirect effects to occur to the habitat from the addition of the routes and continued motorized travel on the routes. The risk for adverse effects, however, is considered low. This is because the routes are widely distributed across the area of suitable habitat, and the area of influence at the site level is relatively small.

Foothill yellow-legged frog - There is potential risk of direct effects to foothill yellow-legged frogs although it is low for the following reasons: this species is not likely to be susceptible to direct mortality from motor vehicles because this species rarely moves more than 5 meters (16.4 feet) from stream channels (Bourque 2005). Also, according to Zweifel (1955), “these frogs are so closely restricted to streams that it is unusual to find one at a greater distance from the water than it could cover in one or two leaps.” Zweifel (ibid) also notes that this species does not leave streams in the rainy season and is not found on roads at night during rains, even though the species may be present in nearby streams.

A total of 44.75 miles of routes would be added within foothill yellow-legged frog suitable habitat. There is potential for indirect effects to occur to the habitat from the addition of the routes and continued motorized travel on the routes. The risk for adverse effects, however, is considered low. This is because

the routes are widely distributed across the area of suitable habitat, and the area of influence at the site level is relatively small. One potential effect of routes near streams, in general, is the associated increase in sedimentation.

Western pond turtle - There is potential risk of direct effects to western pond turtles although it is low for the following reasons: individual western pond turtles have large home ranges and may wander within a given watercourse for several kilometers on a regular basis. Gibbs and Shriver (2002) modeling study found that no populations of small-bodied pond turtles were threatened by road mortality. Although it has been observed by Reese and Welsh (1997) that the upland area used by turtles exceeded the size of traditionally protected riparian buffer zones. Reese and Welsh observed frequent and prolonged use of terrestrial habitat for both nesting and overwintering activities; turtles travelled into upland area as far as 500 m from the Trinity River. Males utilized terrestrial habitat over ten months of the year, and females were on land every month as a result of their additional terrestrial behavior while gravid. Hatchlings overwintered in the nest. Current knowledge is lacking in the ability to accurately predict specifically which portions of the terrestrial environment are critical for western pond turtles. They utilize a variety of upland habitat as well as the network of creek, ponds and ephemeral bodies of water associated with riverine systems.

A total of 32.56 miles of routes would be added within western pond turtle suitable habitat. There is potential for indirect effects to occur to the habitat from the addition of the routes and continued motorized travel on the routes. The risk for adverse effects, however, is considered low. This is because the routes are widely distributed across the area of suitable habitat, and the area of influence at the site level is relatively small.

Southern torrent salamander - There is potential risk of direct effects to southern torrent salamanders although it is low for the following reasons: the required microclimate and microhabitat conditions generally exist only in older forests and these areas are protected by a riparian buffer.

A total of 0.95 miles of routes would be added within southern torrent salamander suitable habitat. There is potential for indirect effects to occur to the habitat from the addition of the routes and continued motorized travel on the routes. The risk for adverse effects, however, is considered low. This is because the routes are widely distributed across the area of suitable habitat, and the area of influence at the site level is relatively small. One primary potential effect of routes near streams, in general, is the associated increase in sedimentation.

Shasta salamander - There is potential risk of direct effects to Shasta salamanders although it is low for the following reasons: the Shasta salamander is unique to the STNF and inhabits limestone and rock outcroppings with caves or deep talus. The home range of this species is thought to not exceed 100m from their subterranean habitat. To delineate this habitat a 300 foot buffer was established around known limestone outcrops. With the establishment of this buffer zone this species is not likely to be susceptible to direct mortality from motor vehicles. Table 3.04-13 shows the added routes in Alt 5 that are within this buffer. Table 3.04-13 shows the 5 very short segments and the two longer segments of unauthorized

routes proposed under Alternative 5 for inclusion in the NFTS that pass within the 300-foot buffer. These short segments are a small portion of the available habitat and are not likely to significantly affect these species, reducing the probability that an individual of any of these species would expose itself during the higher use periods. Most of the species under consideration are least mobile during the dry periods preferred by OHV riders. These amphibians are susceptible to desiccation and avoid exposure during the day. No potential indirect effects are anticipated.

Table 3.04-13. Routes added under alternative 5 that are within a 300 foot buffer of limestone formations on the STNF

Route #	Road or Trail	Miles	Comments
TC1238	Road	0.04	4 islands grouped
U31N02Q	Trail	0.28	2 islands grouped
U35N05A	Road	1.74	4 islands grouped
U414F**	Road	0.18	Huge formation
U414A**	Road	0.59	Huge formation
U29N33B***	Trail	0.90	Isolated
TC1427	Trail	1.04	Isolated

** Note that these two routes are also included in the Modified Alternative 2 final selection. Both are short spurs in large open areas alongside the Trinity River with no apparent limestone outcrops within the 300-foot buffer and well outside the known range of the species associated with these formations – the Shasta salamander. In regards to effects on this species, these routes may be safely discounted. Figures 1 and 2 at the end of this document show these routes.

*** This route lies at the southern portion of the South Fork Mountain Management Unit and well outside of the known or expected range of the Shasta salamander. There are no apparent limestone outcroppings within 300 feet of this route. In regards to effects on this species, these routes may be safely discounted.

Unauthorized routes constitute 1,252 miles (965 miles of roads and 287 miles of trails) while the transportation system extends across approximately 6,760 miles (5,329 miles of roads open to the public and 1,431 miles of trails), and only 106.11 miles of routes would be added to the transportation system under this alternative.

Parking and dispersed camping within one vehicle length of a designated route would be allowed. The disturbance effect would be minimal and short term given the parking and/or camping is temporary and would not be over 30 feet from the edge of a travel route.

Under this alternative motorized use of lake bottoms (areas below high water mark) would be allowed on Shasta Lake, Trinity Lake and Iron Canyon Reservoir. Table 3.04-14 shows the estimated acres of lake bottom that each species would potentially use below high water mark.

Table 3.04-14. Acres of lake bottom use by individual species

Species	Acres of lake bottom – areas below high water mark
Cascade Frog	0
Foothill Yellow-legged Frog	0
Western Pond Turtle	0
Shasta Salamander	0
Southern Torrent Salamander	0

None of the species under consideration have suitable habitat within the lake bottom areas. These areas are routinely inundated from lake flooding, barren when exposed and for the most part unshaded and exposed. The Cascade frog generally occurs at higher altitudes, the foothill yellow-legged frog prefers partial shade, shallow riffles in streams and cobble-sized or greater substrates (Hayes and Jennings 1988). Kupferberg (1996) reported adult frogs may disperse into small tributary streams with persistent water following breeding, however, streams feeding through the lake bottom areas to Shasta and Trinity lakes are generally too exposed to provide suitable habitat. . During all seasons, these frogs are rarely encountered far from permanent water. Off-highway vehicle use only occurs when the lake bottom is exposed. Foothill yellow-legged frogs are unlikely to use the area during this time due to the dry nature and lack of cover in the open lake bottom areas. Western pond turtles prefer smaller bodies of water that retain exposed woody debris as haul out sites. Although Shasta salamander could potentially disperse to limestone outcroppings in the lake bottoms during moist weather, these areas are devoid of vegetation and the productive base to develop food sources for the salamander. Southern torrent salamander is limited to a restricted area on the western portion of the Forest and all of the lake bottoms being considered here are well out of the range of these species.

Some other restrictions on the lake bottom use are a 10 mph speed limit restriction for resource protection and all vehicle classes. Expected effects will be similar to the intrusive character of motor vehicle routes.

This alternative would result in the addition of two stream crossings within occupied or suitable Cascade frog habitat, 52 stream crossings in foothill yellow-legged frog habitat, 16 stream crossings in western pond turtle habitat, 1 stream crossing in Shasta salamander habitat and 36 stream crossings in southern torrent salamander habitat. These stream crossings would likely result in direct and indirect effects to some individuals at various life history stages. However, possible impacts from added routes to all habitats are greatly reduced compared to alternative 1.

Direct/Indirect Effects of changes to the Existing NFTS

Motorized mixed use is proposed in this alternative. Changes to class of use are not expected to have any detectable impact on wildlife. The source of disturbance, whether an auto, truck, or OHV, is assumed to be the same for this analysis. Changing the mix of use is not expected to have any impacts on wildlife.

Cumulative Effects

Present and reasonably foreseeable actions are those actions identified on the STNF Schedule of Proposed Actions (see appendix B). Projects include ongoing and future timber harvest, vegetation restoration, fuels management, grazing allotments, road management including closures, and decommissioning, recreation use, fire salvage, and mining reclamation which could have effects that would mitigate, or add to the effects of this action. In addition, unplanned events such as wildfires and tree mortality related to periodic droughts will continue to affect habitat. Generally, this group of species is affected negatively by actions that reduce canopy closure. Road maintenance and hazard tree removal will continue on the existing

NFTS as well as the routes that are added to the system under this proposal and will continue to potentially affect the microsite habitat of these species. Many of the above actions also have the potential to increase road density temporarily (i.e. forest product projects with timber harvest, fuels management projects, pre-commercial thinning projects, grazing allotments, and mining) The primary effects of increases in road density are related to increase disturbance and habitat fragmentation.

This alternative would add approximately 106.11 miles of routes to the NFTS, and would discontinue cross-country travel which includes discontinued use of unauthorized routes. Impacts to species in this group from the additional 106.11 miles of routes, would aggregate with effects from vegetation management occurring elsewhere. The added routes equate to 4.6 acres in Cascade frog habitat, 85 acres in foothill yellow-legged frog habitat, 61.8 acres in western pond turtle habitat, 2.1 acres in Shasta salamander habitat, and 1.8 acres in southern torrent salamander habitat. The effect of these route additions are offset by the prohibition on motorized cross country travel on nearly 1.6 million acres and over 1100 miles of unauthorized routes that are not added to the NFTS in this alternative. Portions of unauthorized routes that are not added to the NFTS will, over time, passively restore into habitat for these species. In this alternative the impacts from the route system are somewhat reduced compared to the impacts of alternative 1, and countered additionally by the cessation of impacts from cross-country travel. Overall, impacts from this alternative appear to be minor, even when aggregated with other impacts occurring on the landscape as a result of the projects listed in appendix B.

In addition to the existing seasonal closures which affect 220 NFTS routes and two reservoirs, mitigation of additional seasonal closures for LSR species under this alternative are also proposed. These seasonal closures will also benefit herpetofauna species. See appendix D for a full list of routes.

The actions in appendix B total 5.60 miles of unauthorized routes proposed for addition to the NFTS, or 2 percent of the NFTS amount proposed to be closed, abandoned, or decommissioned. This proportion of the total proposed actions forestwide is not expected to have significant impacts. Furthermore, the unauthorized routes do not constitute a change to habitat, but rather are an existing condition whose vegetation change impact has already occurred and whose conditions would continue into the future. Overall, vehicle-related impacts from this alternative appear to aggregate with other impacts occurring on the landscape. The scope and intensity of foreseeable actions is much smaller an impact than that of the existing unauthorized routes.

Determinations

Cascade Frog

The Shasta-Trinity National Forest Travel Management Project alternative 1 may affect individual Cascade frogs as cross-country travel could contribute to disturbance, mortality, habitat fragmentation or direct effects that may cause impacts to breeding and reproductive activities. Alternatives 2, 4, and 5 would prohibit cross-country motorized vehicle travel but would add mileage (2, 0.47, and 2.46 miles,

respectively) within Cascade frog habitat to the NFTS. Because alternatives 2, 4, and 5 add mileage to the NFTS there may be some disturbance effects to individual frogs, but the extent of disturbance is expected to be minimal due to the relatively small amount of miles added. The percent of suitable habitat affected is negligible at ≤0.4%. Alternative 3 would have no increase in effect as motorized cross-country vehicle travel would be prohibited and no additional routes would be added to the NFTS within Cascade frog habitat.

The determination for the Cascade frog is that alternatives 1, 2, 4, and 5 **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population**. Alternative 3 would have **no effect** to Cascade frog or their habitat. Alternatives 2, 3, 4 and 5 show a beneficial effect compared to the existing condition in alternative 1, due to the assumptions that the impact already exists. Passive restoration of non-system routes will recover and improve habitat for those routes which are not added to the system.

Foothill Yellow-legged Frog

The Shasta-Trinity National Forest Travel Management Project alternative 1 may affect individual foothill yellow-legged frogs as cross-country travel could contribute to disturbance, mortality, habitat fragmentation or direct effects that may cause impacts to breeding and reproductive activities. Alternatives 2, 4, and 5 would prohibit cross-country motorized vehicle travel but would add mileage (24.1, 0.93, and 44.75 miles, respectively) within habitat to the NFTS. Because alternatives 2, 4, and 5 add mileage to the NFTS there may be some disturbance effects to individual frogs. The percent of suitable habitat affected is negligible at ≤1.0%. Alternative 3 would have no increase in effect as motorized cross-country vehicle travel would be prohibited and no routes would be added to the NFTS within foothill yellow-legged frog habitat.

The determination for the foothill yellow-legged frog is that alternatives 1, 2, 4, and 5 **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population**. Alternative 3 would have **no effect** to foothill yellow-legged frog or their habitat. Alternatives 2, 3, 4 and 5 show a beneficial effect compared to the existing condition in alternative 1, due to the assumption that the impacts already exists. Passive restoration of non-system routes will recover and improve habitat for those routes which are not added to the system.

Western Pond Turtle

The Shasta-Trinity National Forest Travel Management Project alternative 1 may affect individual western pond turtles as cross-country travel could contribute to disturbance, mortality, habitat fragmentation or direct effects that may cause impacts to breeding and reproductive activities. Alternatives 2, 4, and 5 would prohibit cross-country motorized vehicle travel but would add mileage (17, 1.7, and 32.56 miles, respectively) within habitat to the NFTS. Because alternatives 2, 4, and 5 add mileage to the NFTS there may be some disturbance effects to individual turtles. The percent of suitable

habitat affected is negligible at ≤1.1%. Alternative 3 would have no increase in effect as motorized cross-country vehicle travel would be prohibited and no additional routes would be added to the NFTS within western pond turtle habitat.

The determination for the western pond turtle is that alternatives 1, 2, 4, and 5 **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population**. Alternative 3 would have **no effect** to western pond turtle or their habitat. Alternatives 2, 3, 4 and 5 show a beneficial effect compared to the existing condition in alternative 1, due to the assumption that the impacts already exists. Passive restoration of non-system routes will recover and improve habitat for those routes which are not added to the system.

Shasta Salamander

The Shasta-Trinity National Forest Travel Management Project alternative 1 may affect individual Shasta salamander as cross-country travel could contribute disturbance, mortality, habitat fragmentation or direct effects that may cause impacts to breeding and reproductive activities. Alternatives 2, 4, and 5 would prohibit cross-country motorized vehicle travel but would add mileage (1.13, 0, and 1.13 miles, respectively) within habitat to the NFTS. Because alternatives 2, 4, and 5 add mileage to the NFTS there may be some disturbance effects to individual salamanders but the extent of disturbance is expected to be minimal due to the relatively small amount of miles added. The percent of suitable habitat affected is negligible at 0.4%. Alternative 3 would have no increase in effect as motorized cross-country vehicle travel would be prohibited and no routes would be added to the NFTS within Shasta salamander habitat.

The determination for the Shasta salamander is that alternatives 1, 2, 4, and 5 **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population**. Alternative 3 would have **no effect** to Shasta salamander or their habitat. Alternatives 2, 3, 4 and 5 show a beneficial effect compared to the existing condition in alternative 1, due to the assumptions that the impact already exists. Passive restoration of non-system routes will recover and improve habitat for those routes which are not added to the system.

Southern Torrent Salamander

The Shasta-Trinity National Forest Travel Management Project alternative 1 may affect individual southern torrent salamander as cross-country travel could contribute to disturbance, mortality, habitat fragmentation or direct effects that may cause impacts to breeding and reproductive activities. Alternatives 2, 4, and 5 would prohibit cross-country motorized vehicle travel but would add mileage (0.85, 0, and 0.95 miles, respectively) within habitat to the NFTS. Because alternatives 2, 4, and 5 add mileage to the NFTS there may be some disturbance effects to individual salamanders but the extent of disturbance is expected to be minimal due to the relatively small amount of miles added. The percent of suitable habitat affected is negligible at 0.1%. Alternative 3 would have no increase in effect as motorized

cross-country vehicle travel would be prohibited and no routes would be added to the NFTS within southern torrent salamander habitat.

The determination for the southern torrent salamander is that alternatives 1, 2, 4, and 5 **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population**. Alternative 3 would have **no effect** to southern torrent salamander or their habitat. Alternatives 2, 3, 4 and 5 show a beneficial effect compared to the existing condition in alternative 1, due to the assumption that the impacts already exists. Passive restoration of non-system routes will recover and improve habitat for those routes which are not added to the system.

Summary of Effects Analysis across All Alternatives

Table 3.04-15. Indicator values by alternative

Indicator	Alternatives				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
1 – Miles of all NFTS routes within occupied or suitable habitat for Cascade frog	497.1				
1 – Miles of all NFTS routes within occupied or suitable habitat for Foothill Yellow-legged frog	4,117.1				
1 – Miles of all NFTS routes within occupied or suitable habitat for Western pond turtle	2,722.9				
1 – Miles of all NFTS routes within occupied or suitable habitat for Shasta salamander	272.8				
1 – Miles of all NFTS routes within occupied or suitable habitat for Southern Torrent salamander	563.4				
2 – Miles of added routes added within occupied or suitable habitat for Cascade frog	52.8 (existing condition)	2	0	0.47	2.46
2 – Miles of added routes added within occupied or suitable habitat for Foothill Yellow-legged frog	736.4 (existing condition)	24.1	0	0.93	44.75
2 – Miles of added routes added within occupied or suitable habitat for Western pond turtle	498.2 (existing condition)	17.0	0	1.7	32.56
2 – Miles of added routes added within occupied or suitable habitat for Shasta salamander	25.7 (existing condition)	1.13	0	0	1.13
2 – Miles of added routes added within occupied or suitable habitat for Southern Torrent salamander	92.1 (existing condition)	0.85	0	0	0.95
3 – Number of acres impacted from added routes added within occupied or suitable habitat – Cascade frog	100.3	3.8	0	.8	4.6
3 – Number of acres impacted from added routes added within occupied or suitable habitat – foothill yellow-legged frog	1399.1	45.7	0	1.7	85
3 – Number of acres impacted from added routes added within occupied or suitable habitat – western pond turtle	946.5	32.3	0	3.2	61.8
3 – Number of acres impacted from added routes added within occupied or suitable habitat – Shasta salamander	48.8	2.1	0	0	2.1
3 – Number of acres impacted from added routes added within occupied or suitable habitat – southern torrent salamander	174.9	1.6	0	0	1.8
4 – Acres open to motor vehicle use below the high water mark within occupied or suitable habitat – Cascade frog	0	0	0	0	0

Indicator	Alternatives				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
4 – Acres open to motor vehicle use below the high water mark within occupied or suitable habitat – foothill yellow-legged frog	0	0	0	0	0
4 – Acres open to motor vehicle use below the high water mark within occupied or suitable habitat – western pond turtle	0	0	0	0	0
4 – Acres open to motor vehicle use below the high water mark within occupied or suitable habitat – Shasta salamander	0	0	0	0	0
4 – Acres open to motor vehicle use below the high water mark within occupied or suitable habitat – southern torrent salamander	0	0	0	0	0
5 – Number of stream crossings (perennial and intermittent) on added routes within occupied or suitable habitat - Cascade frog	103	2	0	0	2
5 – Number of stream crossings (perennial and intermittent) on added routes within occupied or suitable habitat - foothill yellow-legged frog	881	26	0	1	52
5 – Number of stream crossings (perennial and intermittent) on added routes within occupied or suitable habitat - western pond turtle	781	8	0	0	16
5 – Number of stream crossings (perennial and intermittent) on added routes within occupied or suitable habitat - Shasta salamander	15	1	0	0	1
5 – Number of stream crossings (perennial and intermittent) on added routes within occupied or suitable habitat - southern torrent salamander	89	21	0	0	36
6 – Percent of occupied or suitable habitat impacted by added routes - Cascade frog	9.6	0.4	0	0.09	0.4
6 – Percent of occupied or suitable habitat impacted by added routes - foothill yellow-legged frog	15.1	0.5	0	0.02	1.0
6 – Percent of occupied or suitable habitat impacted by added routes - western pond turtle	15.4	0.6	0	0.06	1.1
6 – Percent of occupied or suitable habitat impacted by added routes - Shasta salamander	8.6	0.4	0	0	0.4
6 – Percent of occupied or suitable habitat impacted by added routes - southern torrent salamander	14.0	0.1	0	0	0.1

Table 3.04-16. Comparison of effects to herpetofauna indicators and rankings of alternatives for each indicator

Indicators – Herpetofauna	Rankings of Alternatives for Each Indicator				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
1– Miles of all NFTS routes within occupied or suitable habitat	1	3	5	4	2
2 – Miles of added routes within occupied or suitable habitat	1	3	5	4	2
3 – Number of acres impacted from added routes within occupied or suitable habitat	1	3	5	4	2
4 – Acres open to motor vehicle use below the high water mark within occupied or suitable habitat	1	3	5	4	2
5 – Number of stream crossings (perennial and intermittent) on added routes within occupied or suitable habitat	1	3	5	4	2
6 – Percent of occupied or suitable habitat impacted by added routes	1	3	5	4	2
Average for Herpetofauna	**1**	**3**	**5**	**4**	**2**

Compliance with the Forest Plan and Other Direction

Forest Service Manual and Handbooks (FSM/H 2670)

All alternatives comply with the Forest Service Manual and Handbooks. Impacts to Forest Service sensitive species have been analyzed to ensure management activities do not create a significant trend toward Federal listing or loss of viability. This assessment is documented in the BE.

STNF Land and Resource Management Plan

All alternatives comply with the STNF LRMP. The management prescriptions for herpetofauna habitats were considered during the analysis process. The record of decision for the 1995 Shasta-Trinity National Forest LRMP identified the following standards and guidelines applicable to motorized travel management and wildlife which would be considered during the analysis process.

Within Threatened, Endangered and Sensitive (TES) species habitat:

Survey and evaluate habitat for TES species at the project level in coordination with the USFWS.

For the STNF Travel Management Project, each proposed route addition was evaluated for their potential to impact threatened, endangered and sensitive species habitat in coordination with the USFWS. Appropriate mitigation measures were developed in the form of annual limited operating periods for the routes that occur within a ½ mile of any known threatened, endangered, or sensitive sites. As a general guideline, nonsilviculture activities located inside LSRs that are neutral or beneficial to the creation and maintenance of late-successional habitat are allowed.

For this project, each proposed route addition was evaluated for the potential to occur within late-successional reserve habitat. Those routes that did fall within the late-successional reserve were further analyzed to determine if they were beneficial to the LSR. It was determined that the routes that did occur within the LSR were beneficial due to the assumptions that the impacts already exist, there will be fewer miles of routes in LSRs as a result of the action, and that with passive restoration of unauthorized routes will recover and improve late-successional habitat for those routes which are not added to the system.

The STNF LRMP Standard and Guideline (page 4-41) states that Shasta Salamander - All known and future localities must be delineated and protected, and a buffer of a least the height of one site-potential tree or 100 feet horizontal distance, whichever is greater, should surround the limestone outcrop.

Supplemental Management Direction for Trinity Unit (pg 4-115) and Nosoni Unit (pg. 4-132) - “Maintain or improve habitat for wildlife including self-sustaining populations of Shasta salamanders”

For this plan, each proposed route addition was evaluated for their potential to meet the criteria outlined in chapter 2. Alternatives 2, 3, 4, and 5 would comply if implemented because motor vehicle use would be confined to designated routes.

3.05. Wildlife

Introduction

The management of terrestrial wildlife and habitat, and the maintenance of a diversity of animal communities are important parts of the Forest Service mission (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on National Forest System (NFS) lands are planned and implemented so that they do not jeopardize the continued existence of federally listed threatened or endangered species or lead to a trend toward the listing or loss of viability of Forest Service sensitive species. In addition, changing forest conditions as a result of natural processes and management activities are examined through the monitoring of the habitat components of management indicator assemblages to the degree consistent with multiple-use objectives established in each forest LRMP. Management decisions related to motor vehicle travel can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Gaines et al. 2003; Trombulak and Frissel 2000; USDA Forest Service 2000). It is Forest Service policy to minimize damage to vegetation, avoid harassment to wildlife, and avoid significant disruption of wildlife behaviors and adverse modifications of habitat while providing for motor vehicle use on NFS lands (FSM 2353.03(2)). Therefore, management decisions related to motor vehicle travel on NFS lands must consider effects to wildlife and their habitat.

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Direction relevant to the proposed action as it affects terrestrial wildlife includes the following.

Endangered Species Act (ESA)

The Endangered Species Act of 1973 (16 USC 1531 et seq.) requires that any action authorized by a Federal agency is not likely to jeopardize the continued existence of a threatened or endangered (TE) species, or result in the destruction or adverse modification of its designated critical habitat. Section 7 of the ESA, as amended, requires the responsible Federal agency to consult the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) concerning TE species under their jurisdiction. It is Forest Service policy to analyze impacts to TE species to ensure management activities are not likely to jeopardize the continued existence of a TE species, or result in the destruction or adverse modification of its designated critical habitat. This assessment is documented in a biological assessment (BA) and is summarized or referenced in this chapter.

In an effort to streamline consultation on route designation for the National Forests of Region 5, the U.S. Fish and Wildlife Service and the U.S. Forest Service developed regional programmatic project design criteria (PDC) for the designation of roads, trails and areas for recreational wheeled motorized

vehicle use.[4] The U.S. Fish and Wildlife Service has agreed that, by using all of the following Project Design Criteria for each of the Threatened and Endangered species and Critical Habitat, route designations will meet either a "No Effect" or a "Not Likely to Adversely Affect" determination and that they would concur with this determination on a programmatic basis. Forest consultation can tier to this programmatic consultation with no further consultation if no routes affect Critical Habitat and all other Project Design Criteria are followed.[5]

Forest Service Manual and Handbooks (FSM/H 2670)

Forest Service sensitive (FSS) species are species identified by the regional forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on national forests. It is Forest Service policy to analyze impacts to FSS species to ensure management activities do not create a significant trend toward Federal listing or loss of viability. This assessment is documented in a biological evaluation (BE) and is summarized or referenced in this chapter.

The Shasta-Trinity National Forest Land and Resource Management Plan (LRMP)

The record of decision (ROD) for the 1995 Shasta-Trinity National Forest LRMP identified the following standards and guidelines applicable to motorized travel management and terrestrial wildlife which will be considered during the analysis process.

Within threatened, endangered and sensitive (TES) species habitat:

- Survey and evaluate habitat for TES species at the project level in coordination with the USFWS. Place in late successional reserves (LSRs) or riparian reserves, and/or require limited operating periods or other restrictions as appropriate.
- Manage and protect potential bald eagle and peregrine falcon sites for future occupancy.
- Require limited operating periods adjacent to active goshawk nesting sites until the young have fledged.

Within late-successional reserves:

- Road construction in LSRs generally is not recommended unless potential benefits exceed the costs of habitat impairment. If new roads are necessary to implement a practice that is otherwise in accordance with these guidelines, they will be kept to a minimum, be routed through non-late-successional habitat where possible, and be designed to minimize adverse impacts.

[4] July 2, 2007 Memorandum from the Regional Forester on Route Designation and T&E Species Criteria and the December 27, 2006 letter from Alexandra Pitts, the U.S. Fish and Wildlife Service Deputy Manager for the California/Nevada Operations Office regarding Route Designation Project Design Criteria.
[5] From the Final OHV Design Criteria document, October, 2006, page 1.

- OHV use may occur only on designated trails. This use will be located and scheduled to avoid conflicts with wildlife objectives.
- Limited Operating Periods (LOPs): Appendix G of the Shasta-Trinity National Forest LRMP lists an annual limited operating period for disturbance activities within 0.5 mile around bald eagle and northern goshawk nests. The LOPs are:
    - Appendix G-1, Bald eagle; January 1 to August 15
    - Appendix G-5, Northern goshawk; February 1 to August 15
    - Species-specific standards and guidelines are identified below under species effects analysis.

Changes between the DEIS and FEIS for season of use restrictions for northern spotted owls

In the Draft EIS, season of use restrictions had been proposed for routes and lake bottoms adjacent to suitable northern spotted owl nesting habitat in order to reduce the disturbance potential of vehicle traffic for this species. Further analysis showed season of use restrictions are not necessary for northern spotted owls and are not included in the action alternatives for the following reasons:[6]

- Additions and changes to the NFTS are consistent with regional programmatic project design criteria (PDC) developed in partnership with the US Fish and Wildlife Service for the designation of roads, trails and areas for recreational wheeled motorized vehicle use. No season of use restrictions are required for projects consistent with these recommendations. Project Design Criteria for each of the Threatened and Endangered species and Critical Habitat, route designations will meet either a “No Effect” or a “Not Likely to Adversely Affect” determination without season of use restrictions.
- Lake bottoms of Shasta Lake, Trinity Lakes and Iron Canyon reservoirs are not, and cannot become “habitat” for northern spotted owls. The lake bottoms are outside of designated critical habitat and use will not affect principal component elements of habitat.
- Noise from use of lake bottoms is intermittent and cannot be separated from background noise associated with adjacent roads, highways and watercraft use. Chronic noise such as the development of an OHV staging area may adversely affect northern spotted owls and likely require season of use restrictions and consultation with the US Fish and Wildlife Service. No such proposal is included in any of the action alternatives.
- Vehicle use on the lake bottoms where proposed in the action alternatives has speed limits. OHV use is proposed to access to the lake edge for water-based recreation, not to make OHV play areas out of the lake bottoms. In alternative 2, use is restricted to highway legal vehicles with a 15 mph hour

[6] See the Environmental Consequences section of this chapter for further discussion of season of use.

speed limit. In alternatives 4 and 5, vehicles are restricted to 10 mph. Vehicle noise at these speeds is substantially reduced from that experienced at higher speeds.

- Lake bottoms become more accessible as water is drawn down. Most lake bottom exposure occurs late in the season when northern spotted owls are less affected by disturbance. Owls are most sensitive to disturbance when lake levels are high and relatively inaccessible to OHV use.
- OHV use on designated routes is intermittent and cannot be separated from background noise on existing NFTS routes. There would be no discernible benefit from requiring a season of use restriction on routes added to the NFTS.

Effects Analysis Methodology

Assumptions Specific to Wildlife Analysis

1) All vehicle types or classes result in the same amount of disturbance effect to wildlife. Vehicle class restrictions on added roads and trails (including the proposals for ML 2 roads which would allow all vehicle classes) and the proposed motorized mixed-use on the existing ML 3 NFTS roads are not expected to have any detectable impact on wildlife. The disturbance, whether from an auto, truck, or ATV, is assumed to provide the same magnitude of impact for this analysis. There was no analysis done for any proposed changes to vehicle class or motorized mixed-use.

2) The road-effect zone (habitat influence zone) of any given unauthorized route, open ML 2 road, or motorized NFTS trail is equal distance on either side from center. Actual road-effect zones which vary on either side based upon slope, vegetation density, habitat suitability, prevailing winds, traffic volume, and numerous other mechanisms (Trombulak and Frissell 2000; Forman et al. 2003; Gaines, et al. 2003) cannot be readily factored for this analysis, so a fixed distance is used instead.

3) The spatial boundary of the analysis is the administrative boundary of the Forest and excludes wilderness, private lands, other state or federal lands, and large perennial water bodies.

4) Winter activities using snowmobiles or other over-snow vehicles and water-borne activities such as boats or other motorized watercraft are outside the scope of this project analysis. The effects of cross-country use by snowmobiles and the effects of boat traffic were not analyzed.

5) Existing non-motorized uses on the forest are assumed to continue.

6) Vehicle collisions with terrestrial wildlife are very unlikely on local ML 2 roads, motorized NFTS trails, or unauthorized routes. The vehicle rate of speed on a ML 2 road is typically less than 25 mph, and a ML 2 road is intended for high-clearance vehicles on native road surface. This assumption is supported by literature review and conclusions presented in Forman et al. (2003).

7) Location of a route is equal to disturbance effects from that route (i.e., assume all routes provide the same level of disturbance), unless local data or knowledge indicate otherwise.

8) Habitat is already impacted in the short-term. In the long-term, habitat will still be impacted on added routes, but would become less impacted due to passive restoration in areas where cross-country travel is prohibited and routes are not added to the NFTS.

9) There will be fewer miles of routes in LSRs as a result of the action alternatives.

10) LRMP standard and guide C-16 allows for removal of hazard trees along rights-of-way; therefore, it is permissible to remove hazard trees along added routes. Hazard trees that are felled in LSRs would not be removed.

11) Unauthorized routes will recover passively and improve late-successional habitat for those routes which are not added to the system.

Data Sources

- Compiled list of species to be considered from:
    - USFWS online threatened and endangered list: document number 591453821-154139,
    - Region 5 sensitive species list amended 15 October 2007,
    - Survey-and-manage list of species for pre-disturbance surveys from 2003,
    - California Department of Fish and Game list of California Species of Special Concern (2009)
    - The Western Bat Working Group list of high or moderate priority species (Updated 2005)
    - Region 5 programmatic agreement with the USFWS for threatened and endangered species: "USDA Forest Service, 2006" "Route Designation: Project Design Criteria for "No Effect" or "May Affect Not Likely to Adversely Affect" determination for TE Species – October 2006 version 1.
- Completed site-specific surveys/assessment of wildlife habitats with routes proposed to be added to the NFTS. Compiled habitat, distribution, and disturbance concern information for species, including limited operating periods and disturbance buffer zones, LRMP standards and guidelines, GIS habitat definitions, elevation limits, soil/rock types, need for permanent water, LSR assessment recommendations, etc.
- GIS shapefiles and coverages for wildlife sighting data, two NRIS FAUNA geodatabases [May 2008 and October 2007], LRMP prescriptions and land allocations, habitat/vegetation layers, and

California Wildlife Habitat Relationship (WHR) model, transportation layer, unauthorized routes, streams, air photos, topographical maps, and orthophotos.

- Note that between the Draft EIS and the Final, we have refined some of our habitat definitions for our focal species in order to make comparisons between the species more useful. The shift of definition will change some of the overall habitat numbers from the Draft to the Final.

Terrestrial Wildlife Indicators[7]

Studies have documented that motorized travel can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Trombulak and Frissell 2000; Gaines, Singelton et al. 2003)(USFS 2000)(Fahrig and Rytwinski 2009). For each alternative, wildlife resources are analyzed for direct and indirect short-term impacts (1 year) and cumulative long-term impacts (20 years). The following indicator measures related to motorized routes located in or near special interest wildlife occurrences or habitats were used to assess the impacts of the alternatives.

Indicator 1 - Acres Open to Motor Vehicle Use and Miles of Routes within Terrestrial Wildlife Habitat[8]

Miles and acres open to motorized use have the potential to affect wildlife in a number of ways. Effects to wildlife may range from behavioral changes, increased stress, or changes in reproductive success. The number of miles and acres open to motorized use is used to measure relative disturbance potential to terrestrial wildlife species on the STNF. Route designation tables and suitable habitat project maps are located in the project file.

[7] Note that these "terrestrial wildlife indicators" are selected specifically for the analysis of motorized vehicle use on the Forest. They should not be confused with 'management indicator assemblages" which are specified in the Land and Resource Management Plan as aids to the general analysis of diversity on the Forest. Although both groups are used as indicators, their analytical uses are different.

[8] Note that lake bottom areas are excluded from this indicator and are considered separately throughout the document. Lake bottoms are areas that are periodically flooded and remain barren during the period they are exposed for OHV use. Although they are not **within** any of the species habitats, we do consider these areas as proximate to habitat and they are considered in the context of the buffer areas.

Indicator 2 - Density of Roads, Motorized Trails and Open Routes for Habitat Effectiveness[9]

Road and/or motorized trail and route density[10] has often been used as a surrogate to estimate habitat value or the direct and indirect effects of motorized travel on terrestrial wildlife. Road and/or trail and route density thresholds for wildlife have not been established on the STNF, and thresholds for wildlife in the literature can vary by season and by geographic location. Therefore, road/trail density "thresholds" will not be used to determine effects of the project alternatives, but rather the density of roads, trails, and open unauthorized routes, on a forest-wide basis is used for a relative comparison of the alternatives

Indicator 3 - Miles of Motorized Routes to Measure Potential Disturbance

Use of motorized routes has the potential to affect wildlife in a number of ways. Effects to wildlife may range from behavioral changes, increased stress, or changes in reproductive success. The number of miles of motorized routes is used to measure relative disturbance potential to terrestrial wildlife species on the STNF. For Direct and Indirect effects analysis, only the routes added to the NFTS in each alternative will be looked at. For cumulative effects, the added routes will be considered with the entire NFTS network.

Indicator 4 - Number of Known Threatened, Endangered or Sensitive (TES) Sites within ½ Mile of Added Routes for Threatened, Endangered and Sensitive Species

Number of sensitive sites within ½ mile of added routes for threatened, endangered, and sensitive species would affect these species through behavioral changes, increased stress, or changes in reproductive success. The number of sites (e.g., suitable habitat, nest sites, winter roost areas) is used to measure relative disturbance potential to threatened, endangered and sensitive species on the STNF. *Note*: This analysis was conducted using a ½-mile buffer from habitat and important/sensitive terrestrial wildlife areas rather than ¼ mile. This more conservative approach is a standard Forest practice for analysis.

Indicator 5 - Zone of Influence [Amount of a Species (or Species Group's) Key Habitat that is influenced by Motorized Routes]

Motorized routes have a zone of influence within which habitat effectiveness or suitability is assumed to be reduced and wildlife population densities lower (Trombulak and Frissell 2000; Forman et al. 2003; Gaines et al. 2003). The effects to wildlife extend beyond the immediate road prism itself, into what can

[9] Road density can be measured in many ways. Because of the variability of the measure, it is best to use it as a relative index rather than an absolute measure. In this document we have measured this index using miles of road (either existing unauthorized, proposed additions, or all roads depending on the data item) per square mile of habitat. In this we measure ONLY those roads that occur in that species habitat and compare them to only those square miles of habitat. In this case, we have only used that habitat found on the Forest Service owned lands that are legally accessible to off-road vehicles at the current time. That has excluded wilderness, private lands included in the FS boundaries, lake surfaces and other areas with current OHV restrictions. Although the density of all roads on all lands within a predefined boundary may be more responsive to animal behavior and perception, by using the FS ownership layer, it focuses this index on those lands where we have jurisdictional authority to manage the density. In addition, for comparison purposes, we have made an attempt to ensure that each species habitat selection was roughly comparable in value to the other species by selecting high value habitat types rather than mixing the comparable values.

[10] Measured in miles of road or trail per square mile of land throughout the document.

be referred to as a zone of influence adjacent to motorized roads and trails. The degree of effect of the various factors associated with roads and trails can be evaluated more effectively when the amount of a given species habitat that occurs within this zone of influence of motorized routes is considered. Wildlife species behaviors and habitats are modified within various distances from motorized routes. The distances of the zone of influence for individual species that are used in the analysis of effects are based upon the best available science in the literature. Because there are limited data and studies for many species, assumptions and generalizations were made for some species where no data were available. The zone of influence is a relative index of habitat effectiveness that is used to compare alternatives.

The habitat influence zone is calculated by buffering the available routes forest-wide that occur in a species' habitat routes by 60 meters on both sides[11]; except for bald eagle which has a habitat influence zone of 300 meters, the minimum distance recommended (Anthony and Issac, 1989; Fraser et al. 1985; McGarigal 1988). At 400 meters width, habitat influence zones from separate roads, given average density of roads within bald eagle habitat, would overlap. The amount of suitable habitat within the habitat influence zone is divided by the total amount of suitable habitat forest-wide to determine the proportion of habitat that could be influenced by available routes. Following rankings developed by Gaines et al. (2003), the level of influence is as follows:

- Less than 30 percent suitable habitat within habitat influence buffer is a low level of human influence.
- Thirty to 50 percent within the habitat influence buffer is a moderate level of human influence.
- More than 50 percent within the habitat influence buffer is a high level of human influence.

Terrestrial Wildlife Methodology by Action

1. Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

- **Short-term Timeframe**: 1 year.
- **Long-term Timeframe**: 20 years.
- **Spatial boundary**: Forest

Indicator(s):

- **Indicator 1**: Acres open to motor vehicle use and miles of unauthorized routes within terrestrial wildlife habitat.

  Methodology: GIS analysis of existing unauthorized routes in relation to habitat.

[11] For direct and indirect effects analysis, the effect of just the added routes will be considered. For cumulative effects, the effects of the added routes for each alternative plus the effect of the NFTS network will be considered.

Rationale: Studies have documented that motor vehicle travel can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Gaines et al. 2003; Trombulak and Frissel 2000; USDA Forest Service 2000).

2. Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

- **Short-term Timeframe**: 1 year.
- **Long-term Timeframe**: 20 years.
- **Spatial Boundary**: Forest

Indicator(s):

- **Indicator 2**: Density of added motor vehicle routes.[12]
- **Indicator 3**: Miles of added motor vehicle routes.
- **Indicator 4**: Number of sensitive sites for TES species within ½ mile of an added route or area.
- **Indicator 5**: The proportion of a species (or species group's) habitat that is affected by added motor vehicle routes.

Methodology: GIS analysis of added routes in relation to habitat and important/sensitive terrestrial wildlife areas.

Rationale: Literature indicates that placement of routes in relation to habitat can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Gaines et al. 2003; Trombulak and Frissel 2000; USDA Forest Service 2000).

3. Direct/Indirect Effects of Changes to the Existing NFTS

The only proposed changes to the existing NFTS is to vehicle class or motorized mixed use. Only Alternatives 4 and 5 propose any change to the existing NFTS. The proposed alternative does not include changes to existing NFTS routes.

The changes proposed in alternatives 4 and 5 are assumed not to have direct or indirect effects on wildlife. Assumption 1 at the beginning of this document states that:

[12] Note that indicators 2, 3, 4 and 5 only consider proposed route additions in the direct and indirect effects of each alternative. Under cumulative effects, the current road system, foreseeable future additions to the system and the proposed additions will be considered. Note that "density" of roads is inherently cumulative and density for direct and indirect effects will evaluate the direct effect on road density of the proposed additions.

> "All vehicle types or classes result in the same amount of disturbance effect to wildlife. Vehicle class restrictions on added roads and trails (including the proposals for ML 2 roads which would allow all vehicle classes) and the proposed motorized mixed-use on the existing ML 3 NFTS roads are not expected to have any detectable impact on wildlife. The disturbance, whether from an auto, truck, or ATV, is assumed to provide the same magnitude of impact for this analysis."

This assumption is necessary based on several elements; 1) the disturbance, whether from an auto, truck, or ATV, is highly variable and more controlled by conditions, driving techniques and other variables. The variation between vehicles of the same class is as great or greater than the variation between classes (Delaney and Grubb 2001; USDI 2007; Pater, Grubb et al. 2009), 2) not only is the noise profile between classes highly variable, but also use patterns themselves are variable – one days mix of vehicles and noise will be entirely different on another day.

Because of the variability in vehicle profiles, use and driving technique and mix of use, we must assume that the variability of impact is due more to the presence or absence of motorized vehicles than any particular pattern of use in any particular area. Therefore, there are no indicators identified for this action.

4. Cumulative Effects

- **Short-term Timeframe**: Not applicable; cumulative effects analysis will be done only for the long-term time frame.
- **Long-term Timeframe**: 20 years.
- **Spatial Boundary**: Forest

Indicator(s):

- **Indicator 2**: Density of motor vehicle routes, of the current NFTS network plus the added routes.
- **Indicator 3**: Miles of motor vehicle routes including the added routes and the NFTS network.
- **Indicator 4**: Number of sensitive sites for TES species within ½ mile of a route including both NFTS routes and added routes.[13] Areas are considered separately.
- **Indicator 5**: The proportion of a species (or species group's) habitat that is affected by motor vehicle routes, including both added routes and the current NFTS routes.

[13] Note that cumulative effects for this indicator includes all routes and areas – NFTS plus the proposed additions).

Methodology: GIS analysis of past/current, added, and reasonably foreseeable future routes in relation to habitat and important/sensitive terrestrial areas and in the context of other past/current and future management actions affecting terrestrial habitat.

Rationale: Literature indicates that placement of routes in relation to habitat can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Gaines et al. 2003; Trombulak and Frissel 2000; USDA Forest Service 2000).

Affected Environment/Environmental Consequences

This section describes both the affected environment and environmental consequences of the alternatives. Direct, indirect and cumulative effects of each alternative are analyzed on NFS lands within the boundary of the STNF. The analysis area includes routes and areas proposed for addition to the NFTS and existing NFTS motorized roads and trails, collectively referred to as routes. [14]

Affected Environment

The STNF provides habitat for over 370 species of birds, mammals, amphibians, and reptiles (U.S. Forest Service 1995). There are currently three vertebrate wildlife species, 9 fish species, three invertebrate species and two plants that are listed as threatened or endangered under the Endangered Species Act (Table 3.05-1). The fish species will be treated separately and only one federally threatened species is potentially affected by the proposed project.[15] Under the programmatic agreement with the U.S. Fish and Wildlife Service, no further analysis for threatened and endangered species is necessary if the proposed project complies fully with the project design criteria specified under that agreement.[16]

Twenty-nine (29) species are listed as Forest Service sensitive (Table 3.05-1), including three (3) birds, six (6) mammals, four (4) amphibians, one (1) reptile, six (6) terrestrial invertebrates, four (4) aquatic invertebrates and five (5) fish. The amphibians and reptiles are covered in Chapter 3.04. The sensitive (TES) birds, mammals, and invertebrates and their habitats on the STNF are described in detail in the Shasta-Trinity National Forest Motorized Travel Management EIS Biological Evaluations[17],[18] which can be found in the project record and are summarized in Table 3.05-1. In addition, there are nine

[14] Note that routes and areas are generally treated separately. Routes are fixed, narrow linear features that pass through habitats and would with some exceptions, regrow to some habitat if they were no longer used. Areas are the lake "bottoms" (actually the lake **edges** when used) that are edge features to the lake itself and although bordered on their upper side by varieties of habitat, are variable in their size and width and due to yearly flooding, cannot revegetatere-vegetate to suitable habitat.
[15] Neither the marbled murrelet nor the red-legged frog are found on the Forest. We are out of the known range of the Valley Elderberry Longhorn Beetle. The vernal pool fairy shrimp and the Shasta crayfish are both aquatic and will not be affected by the proposed project. The northern spotted owl is potentially affected by the project and will be analyzed in the following document.
[16] July 2, 2007 Memorandum from the Regional Forester on Route Designation and T&E Species Criteria and the December 27, 2006 letter from Alexandra Pitts, the U.S. Fish and Wildlife Service Deputy Manager for the California/Nevada Operations Office regarding Route Designation Project Design Criteria.
[17] Wildlife Biological Evaluation for the Travel Management EIS, Janet Moser, June 1, 2009
[18] Herpetofauna Biological Evaluation for the Travel Management EIS, Janet Moser, September 16, 2009.

wildlife management indicator assemblages (see Table 3.05-3) on the STNF. The amphibians, reptiles, fish and aquatic invertebrates are dealt with in separate sections of this EIS.

Over the past year, the STNF experienced a major fire season. During this habitat analysis, fire acres were subtracted to obtain a more realistic estimate of available acres.

Unauthorized, off-road routes constitute 1,252 miles of road and trails on 1,632,316 acres of Forest land open to motor vehicle use. The existing transportation system (NFTS) extends across approximately 8,392 miles, including 6,961 miles of roads with 1,629.6 closed to public motor vehicle use and 1,431 miles of trails with 87 miles of motorized trails.

Table 3.05-1. Threatened and sensitive terrestrial bird, mammal, and terrestrial invertebrate species of the Shasta-Trinity National Forest (amphibians, reptiles, fish are analyzed separately)

Common Name	Scientific Name	Number of Forest Territories, Nest/Denning Sites, or Observations	Number of Forest Territories, Nest or Den Sites Within ½ Mile of Unauthorized Routes[a]	Potential for Effect
Threatened Species				
Birds				
Northern Spotted Owl	*Strix occidentalis caurina*	1,098 territories (more than 3000 recorded observations)	9	See Late-Successional Forest (LSF) section
Marbled murrelet	*Brachyramphus marmoratus*	0 Not known to occur on the Forest	0	Outside of the known range of the species
Invertebrates				
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	0	0	No suitable habitat exists and we are outside of the known range of this species. This species, will not be discussed further
Vernal Pool Fairy Shrimp	*Branchinecta lynchi*	1	0	Aquatic species that will not be affected by the proposed project.
Shasta crayfish	*Pacifastacus fortis*	NA	0	Aquatic species that will not be affected by the proposed project
Forest Service Sensitive Species				
Birds				
Bald eagle	*Haliaeetus leucocephalus*	46 nest sites	1	See Riparian section
Northern goshawk	*Accipter gentiles*	38 territories	4	See LSF section
Willow flycatcher	*Empidonax traillii*	14 observations	0	No effect on suitable habitat, will not be discussed further

Common Name	Scientific Name	Number of Forest Territories, Nest/Denning Sites, or Observations	Number of Forest Territories, Nest or Den Sites Within ½ Mile of Unauthorized Routes[a]	Potential for Effect
Forest Service Sensitive Species				
Mammals				
Pallid bat	*Antrozous pallidus*	1 observation	0	No effect on suitable habitat, will not be discussed further
Townsend's big-eared bat	*Corynorhinus townsendii*	0	0	No effect on suitable habitat, will not be discussed further
California wolverine	*Gulo gulo luteus*	19 historical observations	0	No effect on suitable habitat, will not be discussed further
American Marten	*Martes americana*	168 observations, 1 den	0	See LSF section
Western red bat	*Lasiurus blossevillii*	0	0	No effect on suitable habitat, will not be discussed further
Pacific fisher	*Martes pennanti pacifica*	284 observations, 1 den	0	See LSF section
Terrestrial mollusk				
Shasta sideband snail	*Monadenia troglodytes troglodytes*	2	0	No effect on suitable habitat, will not be discussed further
Wintu sideband snail	*Monadenia troglodytes wintu*	1	0	No effect on suitable habitat, will not be discussed further
Shasta chaparral snail	*Trilobopsis roperi*	2	0	No effect on suitable habitat, will not be discussed further
Tehama chaparral snail	*Trilobopsis tehamana*	0	0	No effect on suitable habitat, will not be discussed further
Big Bar/Pressley hesperian snail	*Vespericola pressleyi*	1 historical observation	1 historical observation	No suitable habitat in direct impact areas of project, will not be discussed further
Shasta hesperian snail	*Vespericola Shasta*	4	0	No effect on suitable habitat, will not be discussed further

a - The aquatic species are addressed in the aquatic biota section.

Lake Bottom Use

Shasta-Trinity National Forest has three reservoirs that, when the water is sufficiently low, provide open areas that the public has historically used for motorized vehicle recreation. These areas are used for small boat launching, motor vehicle riding, dispersed camping, and day use for fishing, swimming, and picnicking. On Shasta Lake during the high use period (May 1 to October 31), the number of vehicles per day ranges from approximately 10 on the west side of Shasta Dam to more than 100 at Jones Valley. On Trinity Lake during the high use period (June 1 to October 31), the number of vehicles per day range from approximately 10 at Rattlesnake to more than 50 at East Fork and Stuarts Fork. On Iron Canyon Reservoir during the high use period (June 1 to October 31), the number of vehicles per day ranges from approximately 25 at Deadlun Campground to more than 50 at Hawkins Flat boat ramp.

Although not all lake bottom or exposed areas are accessible by motorized vehicles, Shasta Lake has approximately 402 miles of perimeter, Trinity Lake has about 149 miles (167 if some inaccessible areas are counted) and Iron Canyon reservoir has about 11 miles of exposed lake bottom. Depending on the draw down, the acreage exposed can vary considerably. These reservoirs have **normal annual draw downs** of 60-75 feet, with draw downs of over 100 on Shasta routinely managed. The marinas on Shasta Lake move, depending on topography, anywhere from ¼ mile to 5 miles chasing the water as the lake recedes. These are **normal** operating procedures. The water draw downs are managed by USDI Bureau of Reclamation.

A fifty foot horizontal exposure on Shasta Lake exposes more than 2,500 acres whereas a 150 foot horizontal exposure can expose more than 7,000 acres. These areas however are barren and un-vegetated and yearly flooding prevents any re-growth of vegetation. Shasta Lake itself encompasses about 28,403 acres, Trinity Lake extends over about 15,644 acres and Iron Canyon Reservoir covers about 429 acres for a total of 44,476 acres.

Table 3.05-2. Lake Bottom Areas

	Shasta Lake	Trinity Lake	Iron Canyon Reservoir	Totals
Total Lake Acres	**28,403**	**15,644**	**429**	**44,476**
Total Lake Perimeter (miles of potential OHV area)	**402**	**149**	**11**	**562**
Estimated range of exposed acres depending on drawdown and other factors (50 foot horizontal to a 150 foot horizontal exposure)	2,500 – 7,000	900 - 2600	70 - 200	**~3500 to 10,000**

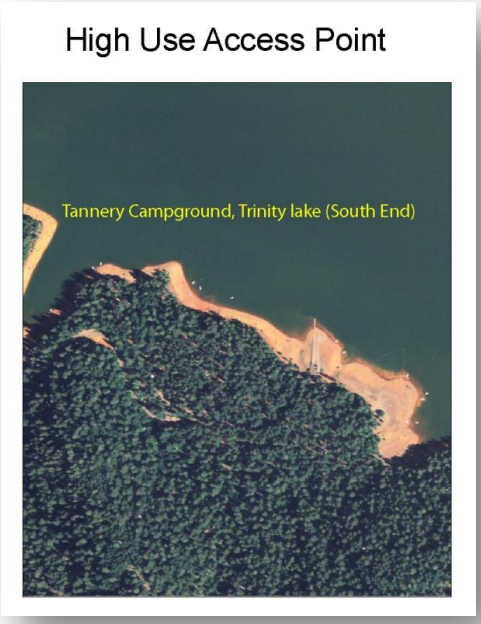


Figure 3.05-1. Example of a moderately high use lake bottom area - Tannery Campground, Trinity Lake

For purposes of this analysis, we will assume that lake bottom use on all three lakes and reservoirs has the potential to affect as much as 10,000 acres of barren ground.

Lake bottom access is highly variable and depends on factors such as access points (campgrounds, road ways, boat launching ramps, etc.), lake bottom slope, topography and surface material, and the presence of barriers such as streams, rock walls and other obstructions. A review of Trinity Lake indicated at least 24 access points unevenly distributed across the lake.

Tannery Campground at the south end of Trinity Lake (Figure 3.05-1) shows a typical moderately high use lake bottom situation. The campground attracts recreationists who have easy access from several points to the exposed lake bottom. From there, they are able to move along the lake bottoms for several miles until obstacles prevent further

passage. Although Tannery is a moderately high use area, some of the marinas have higher use as access points.

More distant areas, such as Manzanita Butte (Figure 3.05-2) in the north end of Trinity Lake, illustrate typical moderate and low use areas. Use in these areas is intermittent, highly dependent on water levels, off-road route conditions and the time recreationists can invest in getting to their preferred site. These areas see less use, less consistent use and more variability in their use patterns.

Most of the lake bottom areas consist of low, limited or no access points such as the ones illustrated in Figure 3.05-3. These areas are not served with access roads to the lake bottoms areas, are too steep for comfortable off-road use, are bounded by private land and restricted access or limited in other ways.

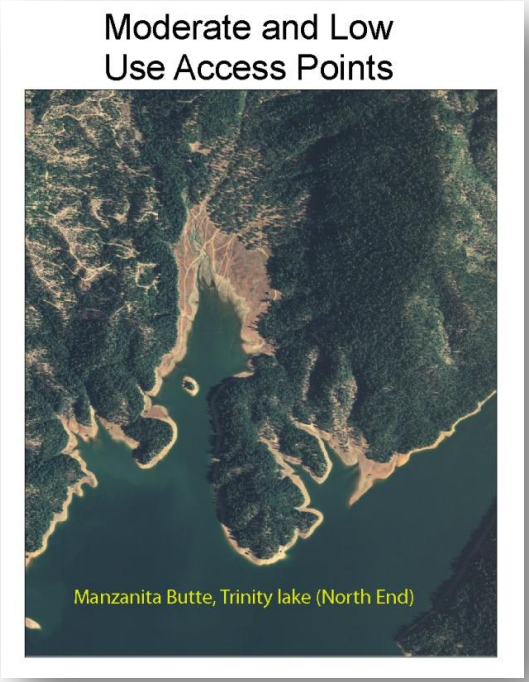


Figure 3.05-2. Example of moderate to low use areas, Manzanita Butte, Trinity Lake.

Lake bottom use frequently parallels water craft use and motor vehicles can sometimes be used for gaining access to on-land camping sites for recreationists focusing on watercraft use.

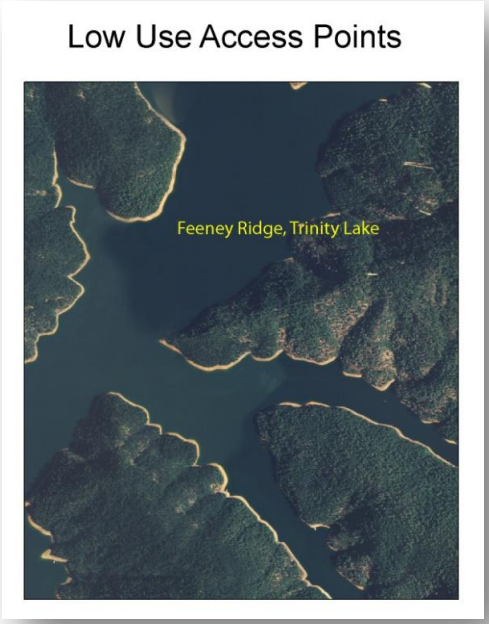


Figure 3.05-3. Example of low use lake bottom area. Feeney Ridge area, Trinity Lake.

Although the lake bottoms themselves are not considered suitable habitat for terrestrial species, they border suitable habitat in the upland areas. A 60-meter buffer (influence area) around Shasta-Lake consists of slightly over 9,000 acres. On Trinity Lake it encompasses about 3,300 acres and on Iron Canyon Reservoir it covers about 428 acres.

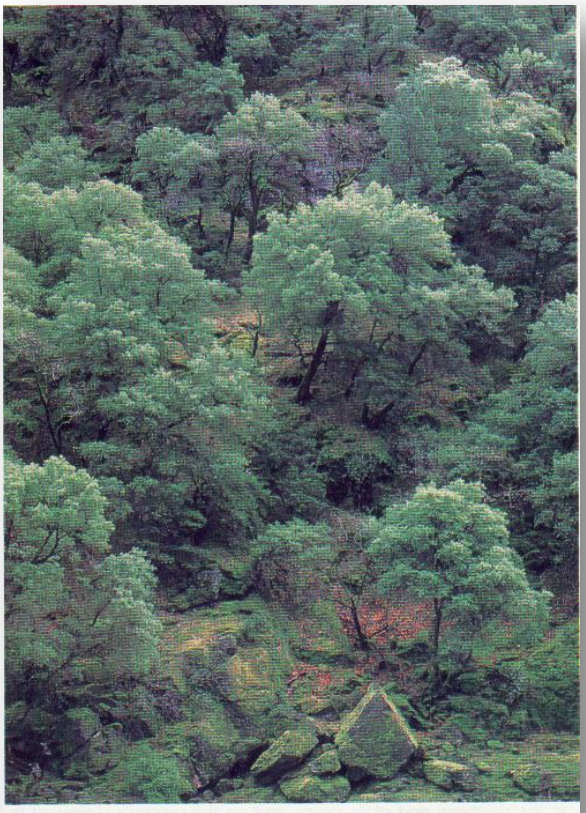
The 60-meter zone of influence on Shasta Lake is 27% Montane Hardwood (MHC) types including abundant Knobcone pine, grey pine, and a number of oak species. Understory vegetation is mostly scattered woody shrubs (manzanita, mountain-mahogany, poison oak) and a few forbs. Another 23% of the zone of influence consists of Sierran Mixed Conifer (SMC) dominated mostly by ponderosa pine and California black oak. The remainder is in ponderosa pine (PPN) at about 13%, Montane Hardwood Conifer (MHC) at about 12% and about 12% in

mixed chaparral (MCH). The remaining vegetated lands are in 13 different WHR vegetation types.

On Trinity Lake, the 60-meter zone of influence is comprised of about 46% Douglas-fir type (DFR) with another 27% composed of Sierran Mixed Conifer (SMC). The remaining types are in 11 different WHR vegetation types.

Iron Canyon Reservoir is bordered by about 85% Sierran Mixed Conifer (SMC) with the remainder in three different WHR types.

For purposes of this analysis, lake bottoms will be considered separately from route effects in direct and indirect effects but will be considered together in cumulative effects. Under cumulative effects, areas of overlap will be considered under the route analysis and then subtracted from the lake bottom analysis to arrive at an integrated analysis that does not double count acres.



MHW
Montane Hardwood habitat, Trinity County, California (photo by Philip McDonald)

Figure 3.05-4. Typical Montane Hardwood habitat found near lake bottom areas.

Existing Seasonal Closures

There are 220 NFTS routes and two reservoirs (Shasta Lake and Trinity Lake) with existing seasonal closures. Wildlife closures are primarily for goshawks and eagles as required by the forest plan. These closures vary in time throughout the year and are placed on the routes and reservoirs for different resource objectives. See appendix B for a full list of routes, season of use, and reasons for the closures. These closures benefit noise-sensitive species such as goshawks and eagles by decreasing disturbance for the short-term which would decrease wildlife energy expenditures, increase time on nests, and increase prey availability.

Wildlife Management Indicator Assemblages (WMIA)

The Shasta-Trinity National Forest Land and Resource Management Plan (1995) identifies nine wildlife assemblages selected as management indicators. Table 3.05-3 displays the nine wildlife assemblages and their habitat components. Project level analysis of wildlife management indicators considers how project proposals will affect assemblage habitat components and how that effect will change the quantity and distribution of those assemblage habitat types on the Forest. Management Indicator Assemblage analysis is part of an effectiveness monitoring program as developed in the LRMP (LRMP, p 5-16) to determine, over time, changes in the quantity and distribution of these habitat assemblages. As a monitoring

program, management indicator analysis documents actual Forest-wide changes every one to five years and is not a pre-project implementation effects analysis typical to NEPA or the ESA. However, at the project level, we provide decision-makers with information relative to how the proposed project is likely to change the quantity and distribution of the management assemblages in the project area and how these anticipated changes may affect the trend at the Forest scale.

This section discloses the results of the project level MIA analysis and, in the NEPA context, also documents the effects of the proposed alternatives on the habitat components of selected assemblages. A detailed analysis is contained in the Project MIA Report,[19] which is hereby incorporated by reference.

Note that none of the project alternatives will affect assemblage habitat components to such a degree that the proposed actions would categorically shift existing habitat assemblages from one type to another or a land category such as barren. As proposed, none of the alternatives will directly change the quantity or distribution of existing management indicator assemblage habitat or their components.

Indirectly, both the no action alternative and all additions to the NFTS will prevent the recovery of currently barren ground (roads and trail beds) to any of the vegetated habitat assemblages. The Klamath province is typically highly fragmented by variations in soil productivity, water availability, disturbance events such as wildfire, and other ecological and edaphic factors. To some degree, roads and trails are within the scale range of many of these natural gaps and do not significantly shift the patterns of fragmentation found naturally within the area. Un-vegetated gaps between existing blocks of assemblage habitat types are common on the Forest and the gaps formed by roads and trails are similar to the scale of these natural gaps. Roads and trails, however, are long, linear features easily distinguishable from more natural fragmentation in the area and more similar to stream courses without water than they are to disturbance gaps. These effects are insignificant at the Forest scale and will not significantly affect the quantity, distribution or trend of any of the habitat assemblages.

Habitat trends and impacts are reviewed by decision-makers in light of known population trends of vertebrate and invertebrate species found on the Forest. Analyzing project-level effects to management indicator assemblages involves the following steps:

- Identify which management indicator assemblages have habitat that would be either directly or indirectly affected by the project alternatives; these assemblages form a subset that are potentially affected by the project.
- Disclose the LRMP forest-level or bioregional-level monitoring requirements for this subset of forest management indicator assemblages.

[19] Management Indicator Assemblages Report for the 2009 Motorized Vehicle Management Project, S. Kelly Wolcott, May 5, 2009

- Analyze project-level effects on management indicator assemblage habitat components for this subset.
- Discuss the forest-scale habitat trends for this subset.
- Relate project-level impacts on management indicator assemblage habitat to habitat at the forest scale.

Project-level effects on management indicator assemblage habitats are analyzed and disclosed in a separate Project-Level Management Indicator Assemblage Habitat Report (USDA Forest Service, 2010) and reported as part of this environmental analysis under NEPA; this involves:

- Document compliance with LRMP requirements for management indicator monitoring.
- Reporting the direct and indirect effects to management indicator assemblage habitats as documented in the project-level report.
- Determine the significance of the impacts of the proposed project alternatives on management indicator assemblage habitat, and if significant (or if useful in the discussion of overall impacts) discuss how direct, indirect, and cumulative effects will change the quantity and/or quality of assemblage habitat on the forest.

WMIA: Selection of Project-Level Management Indicator Assemblages

Management indicator assemblages and their habitat components for the STNF are identified in the Forest Plan[20] and discussed further in the Forest Level Management Indicator Assemblage Habitat Report. A review was conducted below to determine: (1) which management indicator assemblage habitat types are not in or adjacent to the project area and would not be affected by the project; (2) which management indicator assemblage habitat types are in or adjacent to project area, but would not be either directly or indirectly affected by the project; (3) which management indicator assemblage habitats would be either directly or indirectly affected by the project; and (4) whether or not there are potential effects on the habitat components. An example of a species associated with each management indicator assemblage is provided to give some level of species specific context to the assemblage habitat type.

For purposes of analysis, routes and trails themselves are considered ‘barren’ and are not included in any of the actual assemblage habitat types. The analysis will focus on assemblage habitat types found adjacent to roads and trails.

Although no assemblage habitat types will actually be affected by the proposed project, several example species were selected to provide a context for the project within those assemblage types that typically generate a strong interest in the public or are of interest to decision-makers relative to

[20] Forest Plan, pages 3-24 to 3-26

stewardship issues on the Forest. Example species were selected for late-seral, open and early seral, multi-habitat, snags and downed logs, and chaparral type assemblage habitats. Riparian, aquatic, hardwood, cliffs, talus, caves and rock outcrops are protected across the Forest by LRMP level guidelines and best management practices and are less of a concern relative to the proposed project. Although aquatic areas and impacts are a concern relative to OHV traffic on the Forest, the aquatic system is analyzed in greater detail within the fisheries analysis section.

Table 3.05-3. Project level category of management indicator assemblages for the Shasta-Trinity National Forest Motorized Travel Management Project

Assemblage	Category for Project Analysis[a]	Comments	Example Species
Late-seral	2	This assemblage type occurs adjacent to roads and trails proposed for inclusion within the NFTS. The late-seral structure and characteristics of these stands would not be affected by route inclusion. The average age and general structure of the stand would remain as late seral habitat after project implementation.	Red-breasted nuthatch
Openings and Early-seral	2	This assemblage type occurs adjacent to roads and trails proposed for inclusion within the NFTS in the form of young plantations and stands. Use of these roads or trails will not modify the quantity or distribution of these open and early seral stands and will not affect the open and early seral characteristics of these areas.	Spotted towhee
Multihabitat	2	"Multihabitat" includes the other assemblage habitat types and would be affected by shifts from one assemblage habitat type to another. Multihabitat is only affected if a project shifts the quantity and distribution of the other habitat types relative to each other. This proposal affects currently used areas that are barren and not considered one of the habitat types. This project will not significantly change the quantity and distribution of these habitat types.	Mourning dove
Snags and Downed Logs	2	Snags and downed logs occur adjacent to trails and roads considered for inclusion in the NFTS. Although no snags or downed logs would be directly removed by this project, inclusion of routes and trails into the NFTS would indirectly lead to the falling of hazard snags along additional NFTS routes. Only those snags sufficiently decayed to present a falling hazard would be taken down and then they would be left along the roadside. Although this action accelerates the natural process of snag falling, it maintains large, downed woody debris. Relative to the natural variability found in snag and woody debris cycles, it would not significantly affect the relative amount or relationship between snags and woody debris.	Red-breasted nuthatch
Riparian	2	Vegetated riparian areas are found adjacent to roads and trails considered for inclusion in the NFTS.[21] These areas are protected from direct motor vehicle impacts through LRMP level protections and best management practices. Inclusion of new routes into the NFTS will not change the quantity or distribution of riparian areas on the Forest.	None assigned

[21] Note that roads and trails may be close enough to streams or lakes to be considered "riparian-influenced" themselves despite being barren of vegetation. For purposes of this analysis we are considering only those vegetated areas that have riparian characteristics or are strongly riparian influenced. Lake bottom areas are adjacent to lakes, and riparian influenced, but they are barren (not vegetated) and will not be considered riparian for purposes of this analysis.

Assemblage	Category for Project Analysis[a]	Comments	Example Species
Aquatic	2	Aquatic areas are found adjacent to routes proposed for inclusion in the NFTS and lake bottom areas are aquatic when flooded (although not used by OHV during those times). The project does not propose any actions that would affect aquatic areas within the project boundaries.	None assigned see aquatics section
Hardwoods	2	Hardwoods occur as a habitat component adjacent to routes proposed for inclusion in the NFTS. hardwoods will not be removed as a consequence of this project and will not be affected by project implementation.	None assigned
Chaparral	2	Chaparral occurs adjacent to routes proposed for inclusion in the NFTS. Project implementation will not affect existing chaparral and will not change the quantity or distribution of chaparral vegetation on the Forest.	Green-tailed towhee
Cliffs, Caves, Talus and Rock Outcrops	2	This assemblage habitat type occurs adjacent to routes proposed for inclusion within the NFTS. Caves will have a 250-foot protection buffer. This will protect any bats occupying the interior from disturbance during project implementation. It will also serve to protect the microclimate within the cave by preserving the forest structure (and air flow) directly outside the cave. Cliffs are inappropriate for riding. Talus is generally inappropriate for trail development. Rock outcrops are avoided in route siting. Project implementation will not change the quantity or distribution of cliffs, talus, caves, or rock outcrops on the Forest.	None assigned

a - Category 1: Management indicator assemblage whose habitat is not in or adjacent to the project area and would not be affected by the project.
Category 2: Management indicator assemblage whose habitat is in or adjacent to project area, but would not be directly affected by the project.
Category 3: Management indicator assemblage whose habitat would be either directly or indirectly affected by the project.

Note that no sites that are not currently impacted by off-road vehicle traffic are being considered for inclusion within the NFTS. All areas being considered are currently barren and have assemblage type habitat adjacent to the proposed routes. Continued use of those routes will not directly impact or change the quantity or distribution of these habitat assemblage types on the Forest. However, continued use of these areas will indirectly prevent the re-growth of assemblage type habitat on the routes themselves.

Management indicator assemblages for the Shasta-Trinity National Forest are identified in the LRMP. No management indicator assemblages will be analyzed here because no assemblages will be impacted by project activities (as indicated in Table 3.05-3).

WMIA: Relationship of Forest-Level Impacts to Forest-Scale Habitat and Population Trends for the Species

No alternatives will result in a significant shift of habitat assemblage types. All snags will be retained; though we categorically exclude younger forest types from the snag and down log assemblage habitat in order to favor the consideration of larger snags as inherently more valuable for most wildlife species as the smaller ones.

The actions proposed under any action alternative would not affect the current habitat trend on the Shasta-Trinity National Forest.

WMIA: Management Indicator Assemblage Summary

None of the management indicator assemblages whose habitats are in or adjacent to the project areas would be either directly or indirectly affected by the project. None of the proposed alternatives will modify management indicator assemblage habitat components sufficiently to shift from one category of management indicator to another. They will retain the essential characteristics that define that management indicator habitat type.

In summary, the proposed project will not change the existing distribution or quantity of management indicator assemblage habitat or their components. All stands will retain the characteristics and components of the existing management indicator assemblage habitat.

Wildlife Groups[22]

This section describes both the affected environment and environmental consequences of the alternatives as arranged by species groups: late-successional forest-associated species, wide-ranging carnivores, ungulates, riparian-associated species, and cavity-dependent species. Selected species represented within each group are listed in Table 3.05-4 and include some threatened, endangered, proposed, and sensitive (TEPS) species (Table 3.05-1). Each species group analysis is designed to provide enough information to infer impacts.

Literature describing the effects of motorized roads and trails upon wildlife have often grouped or categorized species in various ways to describe effects (Knight and Gutzwiller 1995; Gaines et al. 2003; Wisdom et al. 2000). Gaines et al. (2003) categorized species into the following groups based upon a combination of their biology and interactions with road- and motorized trail-associated factors:

1) old forest associated (or late-successional forest associated) species;

2) wide-ranging carnivores;

3) ungulates;

4) riparian-associated species; and

5) cavity dependent species.

[22] Note that the "Wildlife Groups" analysis is separate and different than the Management Indicator Assemblage (MIA) analysis. Although both approaches have similarities, they respond to different legal requirements. The MIA analysis is specifically responsive to guidelines in the Forest Plan for large-scale and long-term effectiveness monitoring (pages 5-16 of the LRMP) whereas the Wildlife Groups analysis is a framework developed in Gaines et al 2003 and adapted in this report to specifically address road and trail effects on wildlife. The Late-Seral assemblage category under the MIA analysis does not necessarily correspond with the Late-Successional Wildlife Groups category.

The distribution and abundance of these species provide insights regarding the integrity of the ecological system to which they belong. The species selected represent a range of environments found within the assessment area. These environments serve an umbrella function, and play key roles in maintaining community structure or processes.

Focal species were selected based on the following criteria:

1) their habitat associations represented the range of habitats associated with the wildlife group,

2) their road- and recreation trail-associated factors were representative of the range of the group,

3) their populations or habitats could be monitored,

4) they are species of interest or concern such as threatened or endangered, forest service sensitive, State game species, or species dependent on unique habitat features such as snags;[23] and

5) they were relatively well studied relative to the effects of road and trails on their habitat use.

The following species were selected as focal species for the purpose of this analysis. These species include one Federal threatened species, one Federal candidate species, four Forest Service sensitive species, three State of California game species (mule deer, elk, and black bear), and two species of interest. All of these species may have habitat that may be affected by motorized road or trail use. These species are associated with each of the wildlife groups as shown in Table 3.05-4[24].

Table 3.05-4. Wildlife groups and associated focal species

Wildlife group	Focal species
Late-successional forest associated species	Northern spotted owl, northern goshawk, American marten, Pacific fisher
Wide-ranging carnivores	Black bear
Ungulates	Mule deer, elk
Riparian-associated species	Bald eagle
Cavity-dependent species[25]	Hairy woodpecker, pileated woodpecker,

Cumulative Effects Boundary

The cumulative effects analysis includes reasonably foreseeable actions in Appendix B and all motorized routes that occur within the boundary of the STNF on NFS lands. The cumulative effects geographic and temporal boundary (20 years) pertains to all species groups.

[23] Note that this list is not all-inclusive. It does not include many sources of conservation documentation that may be of interest such as the Audubon Blue List, or Heritage classifications.
[24] These species are analyzed here within the context of focal species within each wildlife group. They are separately treated in the appropriate wildlife analysis report, including the Biological assessment and the Biological Evaluations,
[25] Although no snags will be directly removed by project implementation, if routes are added to the system, hazard snags next to the road or trail may be removed in the future if they pose a hazard to visitors.

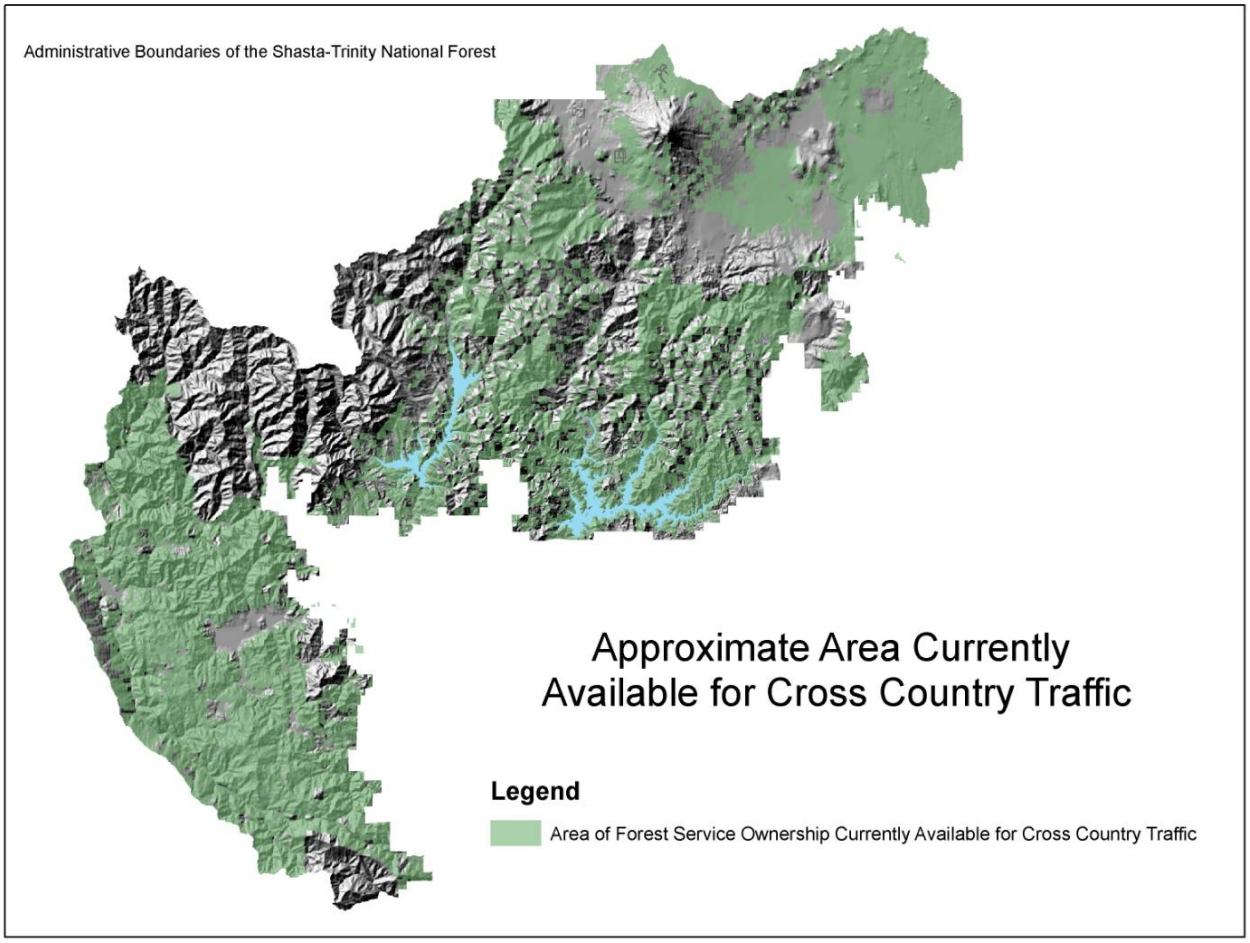


Figure 3.05-5. Shasta-Trinity National Forest administrative boundary. Approximate area currently open to cross-country traffic.

Late-successional Forest Focal Species: Affected Environment

The late-successional forest focal group is comprised of northern spotted owl, northern goshawk, American marten, and Pacific fisher. These species are associated with mature to old forests that contain late-successional characteristics. These characteristics include large trees, relatively high canopy closure, elevated amounts of decadence in the form of snags, down logs, tree decay and deformity.

Gaines et al. (2003) conducted a literature review of 71 late-successional, forest-associated wildlife species, and identified negative effects on these species that can result from route-associated factors. These impacts include direct loss of habitat, diminished quality of habitat attributes or fragmentation, and road avoidance or displacement resulting from direct harassment or noise disturbance. Various studies have shown that this species group is vulnerable to disturbance, changes in habitat, or displacement by habitat generalists.

Late-successional forests are a primary management focus of the Forest under the Northwest Forest Plan. Although definitions for late-successional forests vary with forest type, area, and the functional

reasons for its identification, late-successional forests were defined under the Northwest Forest Plan as "those forest seral stages that include mature and old-growth age classes."[26]

Under the Land and Resource Management Plan of the Shasta-Trinity NF, late-successional forests were defined (LRMP p. 4-15) as those forests with a mean dbh of at least 21 inches and canopy closure of at least 10%. This includes both open and closed canopy late-successional forests as well as true "old-growth."

Four major structural attributes of old-growth Douglas-fir and mixed conifer forests are: live old-growth trees, standing dead trees (snags), fallen trees or logs on the forest floor, and logs in streams. Additional important elements typically include multiple canopy layers, smaller understory trees, canopy gaps, and patchy understory. Structural characteristics of late-successional and old-growth forests vary with vegetation type, disturbance regime, and developmental stage. In some forest types subject to frequent, low-intensity fire, such as ponderosa pine, the late-successional and old-growth stages are typically characterized by relatively open understories and relatively few large fallen trees (in comparison to more moist Douglas-fir/western hemlock types).

Under the LRMP definition, there are about 1,058,229 acres of late-successional forest within the administrative boundaries of the Shasta-Trinity NF and about 842,043 acres within the actual ownership of the Forest. These acres are distributed amongst 19 forest types. Of those, Douglas-fir, mixed conifer-pine and Douglas-fir-pine comprise about 26% of the total acreage within the administrative boundaries and about 67% of the total current late-successional habitat. These three forest types are also about 26% of the total acreage within the actual ownership of the Forest and about 65% of the total late-successional forest found on the actual ownership.

About 515,322 acres of designated late-successional reserve (LSR) exist within the ownership of the Shasta-Trinity NF. About 275,498 acres (53% of the LSRs, about 33% of the total late-successional forest within the ownership of the Shasta-Trinity and about 26% of the total late-successional forest within the administrative boundaries of the Forest) are in some form of late-successional forest. An additional 1260 acres lie in smaller managed late-successional reserves (MLSR) as well. Both Wilderness areas (501,797 acres) and riparian reserves (652,164 acres) also restrict or prohibit the harvesting of late-successional vegetation. The five Shasta-Trinity NF Wilderness Areas prohibit cross country motorized vehicle travel and have no current roads.

Between these four allocations about 1,670,542 acres or about 78% of the Forest ownership is in some allocation that prohibits or restricts the harvest of late-successional forests.

[26] Page. B-1 of the USDA Forest Service and USDI Bureau of Land Management, Eds. (1994). *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* and *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Related Species within the Range of the Northern Spotted Owl*, USDA Forest Service and USDI Bureau of Land Management.

Late-Successional Reserves were designated within the range of the northern spotted owl in the Northwest Forest Plan (NWFP) and incorporated into the Forest LRMP in 1995. There are 36 LSRs on the Forest and about six MLSRs. These areas are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems which serve as habitat for late-successional and old-growth related species including the northern spotted owl. These reserves are designed to maintain functional interacting late-successional and old-growth forest ecosystem.

Portions of Chapter IV of FEMAT (FEMAT 1993: IV-27-31) and appendix B2 of the environmental impact statement (USDA Forest Service and USFWS, 1994) provide a detailed discussion of older forest elements relevant to the Northwest Forest Plan.

The routes proposed for addition to the NFTS do not constitute a change to habitats, but are an existing condition whose vegetation-change impact has already occurred.

Lake bottom use potentially includes (depending on lake levels, time of year and existing Limited Operating Periods, and barriers to travel such as streams and steep banks) as many as 402 miles on Shasta Lake, 148 miles on Trinity Lake and about 11 miles on Iron Canyon Reservoir for a total of 561 miles of potential route potential. None of these areas are vegetated and because of regular flooding, do not have the potential to develop suitable habitat for any of the late-successional species. However, each of the lakes has a component of late-successional forest[27] above the lake bottom areas. Shasta Lake has 13,338 acres (31% of the total buffer area) of late-successional forest (LRMP definition) within one-quarter mile and 2,563 acres (28% of the total buffer) within a 60 meter zone of influence. Trinity Lake has 10,354 acres (30% of the total buffer) of late-successional forest within a quarter mile of the lake, and 1,680 acres (50% of the total buffer) within 60-meters. Iron Canyon Reservoir has 1,099 acres (74% of the total) within a quarter mile and 189 acres (44% of the total buffer) within a 60-meter buffer.

Table 3.05-5. Late-Successional Forest in Quarter Mile and 60 Meter Buffers around the Lakes and the percentage of LSF in the total buffer

Late-Successional Forest (LSF) in Quarter Mile and 60 Meter Buffers around the Lakes	Shasta Lake		Trinity Lake		Iron Canyon Reservoir		Total
	Acres	% of Buffer	Acres	% of Buffer	Acres	% of Buffer	
LSF in 60 meter buffer	2,563.4	28.31%	1,680.2	49.70%	188.8	44.05%	**4,432.4**
LSF in ¼ mile buffer	13,337.7	30.54%	10,353.9	29.84%	1,099.3	73.70%	**24,790.8**

Northern Spotted Owl

The northern spotted owl (NSO) is a forest-dwelling owl strongly associated with late-successional forests that have complex multi-layered structure, large-diameter trees, and high canopy cover (Bias and Gutiérrez 1992; Gutiérrez et al. 1995). Nest stands often have a well-developed hardwood understory (e.g., canyon live oak [*Quercus chrysolepsis*]) and a conifer overstory. Spotted owl habitats are consistently characterized by greater structural complexity compared to available forest habitat. The NSO

[27] Note that the late-successional definition used here is from the LRMP, page 4-15

is listed as "Threatened" by the USFWS. The NSO is managed in accordance with the direction found within the Northwest Forest Plan (NWFP). For the NSO, critical habitat [28] area designation was established by USFWS in 1992 and recently updated in 2008[29]. Recently (April, 2009) the FWS requested a federal judge to allow them to withdraw the 2008 designations. Due to the uncertainty of future designations, we will calculate Critical Habitat based on both designations until the issue is fully resolved by the FWS. Critical habitat on the STNF equals approximately 611,353 acres (both designations). LSR land allocations, within the established critical habitat area, define potential suitable habitat on the STNF. LSRs on the STNF equal approximately 612,137 acres. Critical habitat units and LSRs provide relatively large blocks of suitable habitat that are well distributed across the range of the owl to provide the functions considered important to maintaining stable, self-sustaining, and interconnected populations. The overlap between LSR and critical habitat units equals approximately 480,257 acres. Approximately 193,641 acres of suitable nesting habitat exists within the designated LSR/CH units on the STNF; the rest of the suitable nesting habitat (186,189 acres) is on matrix lands of the forest. The total amount of suitable nesting habitat on the STNF is about 379,830 acres. There are 1,098 known territories within the forest boundary[30]. Observations and surveys have documented that the northern spotted owl is well-distributed across the western side of the Forest and more patchily distributed on the Eastern or 'dry' side of the Forest.

Northern spotted owls respond variably to disturbance (Anderson 1990; Franklin, Ward jr. et al. 1990; Franklin, Anderson et al. 1996; Delaney, Grubb et al. 1997; Franklin 1997; Franklin 1997; Folliard 2000; Brawn, Robinson et al. 2001; Delaney and Grubb 2001; Tempel and Guitierrez 2003; Courtney, Blakesley et al. 2004; Damiani 2007). In 2007, Damiani et al. concluded with reservations that "the presence of noise disturbance in a territory during the breeding season did not immediately affect reproductive output of owl pairs in that territory. The relative level of noise also did not influence reproductive output in the short term." They qualified that statement by saying that "[D]isturbance frequency did not influence reproductive output in low to medium quality habitats. However, increased years of disturbance had a negative effect on residual number of fledglings in high quality habitats. This effect was only detected in the longest window of time that we examined (11 years)." Disturbance effects

[28] Principal Component Elements, or PCEs, of owls are extensively described in the Federal Register listing of Critical Habitat completed in both 1992 and 2008. In 2008 these PCEs are described as those forest types that support the northern spotted owl across its geographic range and its, nesting, roosting foraging habitat, and dispersal habitat (P. **47347 Federal Register** /Vol. 73, No. 157 /Wednesday, August 13, 2008 /Rules and Regulations). In 1992, PCEs were simply defined as "…forested lands that are used or potentially used by the northern spotted owl for nesting, roosting, foraging, or dispersing." (Page 1838, Federal Register / Vol. 57, No. 10 / Wednesday, January 15, 1992).

[29] Note: In 1992 the Fish and Wildlife Service determined critical habitat for the owl. In 2008, the Service revised the original designations. In 2009, the FWS requested the courts to allow them to withdraw the 2008 designation. In order to ensure we have adequately analyzed all critical habitat designations, we have included both of these critical habitat designations here for analysis.

[30] Observation and nesting are recorded and will usually give, over the years, multiple sightings around areas that may or may not be the same individual or pair. We use these repeated sighting to develop the know territories data. However, using validated predictive modeling developed jointly by the USFWS and the USFS, we have about 1252 500-acre core areas with moderate to high probability of supporting NSO on the Forest covering over 600,000 acres.

were most noticeable when disturbance patterns were consistent over longer periods of time. The authors believed that some of the effect may be due more to habitat degradation that accompanies activity associated with chronic noise exposure than the noise itself.

Hearing sensitivity studies report that owls hear best in the middle frequency range and that owl hearing is greatly reduced in the lower and upper portions of the frequency spectrum (Delaney, Grubb et al. 1997; Delaney and Grubb 2001). Delaney et al. (1999) reported that Mexican spotted owls did not flush when the lEQ level for chain saws was ~ 59 dBO (46 dBA) and chainsaws were> 105 m distant. Other studies have shown owls flushing at about 50 db, or the approximate equivalent of light auto traffic at about 100 feet. When Delaney compared noise levels and frequency spectra for motorcycles and chainsaws they found they were comparable at similar distances, though there was some variation according to motorcycle type, number of motorcycles per event and trail slope. Chainsaws registered higher noise levels and more noise energy distributed in the middle frequency range than most of the individual motorcycles tested on moderately inclined and horizontal trails. This does not appear to be the case for motorcycle noise along steeply inclined trails. All of the action alternatives include speed limits on vehicles on lake bottoms which significantly reduce noise levels from motor vehicles.

Although roads and trails do fragment forest habitat, the gaps they present are usually under 50 feet and do not deter owls. Based on frequent calling surveys by Forest Biologists, northern spotted owls hesitate to cross openings larger than 200 feet but cross smaller opening readily.

Within the 60 meter zone of influence, northern spotted owls have virtually no suitable nesting and roosting habitat around Shasta Lake (32 acres located mostly far up the Pitt arm beyond the typical lake bottom recreation areas) and about 421 acres of suitable foraging. There are no lands capable of becoming suitable that are not currently in suitable habitat. On Trinity Lake, about 655 acres of suitable nesting and roosting habitat and about 222 acres of suitable foraging habitat are within the 60 meter buffer. There are about 270 acres of lands capable of becoming suitable that are not yet suitable. On Iron Canyon Reservoir, about 69 acres are currently suitable nesting and roosting, about 64 acres are suitable foraging habitat within the 60 meter buffer. About 3 acres are considered capable of becoming suitable that are not currently suitable.

Northern Goshawk

The Northern Goshawk, frequently referred to as simply the Goshawk, is a large forest raptor, occupying boreal and temperate forests throughout the Holarctic. In North America, it breeds from Alaska to Newfoundland and south. This partial migrant winters throughout its breeding range including occasionally the Great Plains and southeastern states; some individuals undergo short movements to lower elevations during winter, apparently in search of food. Irruptive movements of northern birds to the south occurs at approximately 10-year intervals that coincide with population lows of snowshoe hare (*Lepus americanus*) and grouse (Squires and Reynolds 1997; Polite and Pratt August 2005).

Largest of the three North American accipiters, the Goshawk is a powerful hunter capable of killing a variety of prey, including tree squirrels, hares, grouse, corvids, woodpeckers and large passerines such as American Robins (*Turdus migratorius*). When breeding, the female generally defends the nest while the smaller male provisions the family with food. Foraging males rapidly traverse large home ranges when searching for prey. Goshawks are well adapted for hunting in forests but also hunt open habitats. They are short duration sit-and-wait predators, perching briefly while searching for prey before changing perches. Their short, powerful wings allow rapid acceleration and their long tails quick maneuverability in trees. As an aggressive North American hunting hawk, Goshawks eagerly crash through brush when capturing prey or readily strike intruders approaching their nests.

Although Goshawks nest in a variety of habitat types–from willow stands along Arctic rivers to massive old-growth forests of the Pacific Northwest–they seem to prefer mature forests with large trees on moderate slopes with open understories. They nest in either coniferous, deciduous, or mixed-pine forests, depending on availability. Nest trees are usually one of the largest trees in the nest area; most territories contain several alternative nest trees.

On the Shasta-Trinity NF, goshawks hunt in wooded areas, using snags and dead-topped trees for observation and prey-plucking perches. This raptor feeds mostly on birds, from robin to grouse in size, but will also take small mammals, of squirrel and rabbit size. It will rarely eat carrion and insects. Its prey is usually caught in the air, on the ground, or in vegetation, using a fast, searching flight, or rapid dash from a perch.

Generally the goshawk uses mature and old-growth stands of conifer and deciduous habitats for both nesting and cover. It usually nests on north slopes, relatively near water, in the densest parts of the stand, but close to openings. In eastern Oregon, nests were usually was located in the fork of a large, horizontal limb close to the trunk, at the bottom of live canopy 6-24 m (19-82 ft) above the ground. These individuals used large, live trees with mean dbh of 27.4 cm (11 in). Goshawks will repeatedly use old nests, and will maintain alternative nesting sites.

The species is generally found in dense, mature conifer and deciduous forest, interspersed with meadows, other openings, and riparian areas. (Woodbridge and Hargis 2006; Salafsky, Reynolds et al. 2007)

Observations and surveys have documented that the northern goshawk is well-distributed across the northeastern section of the forest where aggregations of large trees with moderate to dense canopy cover provide suitable nesting and foraging conditions. The total amount of suitable habitat[31] within the administrative boundaries of STNF is 1,319,587 acres with about 984,483 acres found on actual Forest Service ownership. There are 38 known territories within the forest boundary.

[31] Note that suitable habitat may be defined in many ways. We have used the California Wildlife Habitat Relationships (CWHR) program to model out high quality reproductive habitat for the goshawk.

Collection, habitat loss, fragmentation, disturbance at a specific site, and edge effects were described by Gaines et al. (2003) as being road- and trail-associated factors that potentially affect the northern goshawk. Human disturbance has the potential to cause goshawks to abandon nesting during the nesting and post-fledging period (February 15 through September 15). Roads and trails provide easy flight access. These sites can potentially be areas of conflict as these roads are opened up in the spring. Grubb et al. (1998) reported that vehicle traffic from roads did not elicit any discernable behavioral response from goshawks at distances exceeding 400 meters (0.25 miles) from nests. [32]

A network of roads and motorized trails can fragment goshawk habitat by reducing canopy closure (Beier and Drennan 1997; Daw and DeStefano 2001) and by reducing forest interior patch size. Generally, as road width increases, so does fragmentation. Native surfaced roads and trails probably do not pose as much a risk to habitat fragmentation as do surfaced roads which, due to their higher use, typically are wider and have more regular maintenance and hazard tree management.

American Marten

Marten prefer coniferous forest habitat with large diameter trees and snags, large down logs, moderate-to-high canopy closure, and an interspersion of riparian areas and meadows. Important habitat attributes are: vegetative diversity, with predominately mature forest; snags; dispersal cover; and large woody debris (Allen 1987). Marten are managed by the provisions in the forest plan that provide for retaining canopy cover and the provision of decadence in the form of large down logs and snags. The total amount of suitable habitat on STNF is 456,372 acres. Marten appear to be well distributed across the forest according to the observation records. There is only one documented den site on the forest. It is likely, due to the number of observations, that most den sites are unknown.

At a landscape scale, patches of preferred habitat and the distribution of openings with respect to habitat patches may be critical to the distribution and abundance of martens (USDA 1994). While marten use small openings, and particularly meadows for foraging, these openings must occupy a small percent of the landscape. Martens have not been found in landscapes with greater than 25 percent of the area in openings (Hargis and Bissonette 1999; Potvin et al. 2000). Gaines et al. (2003) reported that marten may be affected by the following road and motorized trail-associated factors: direct mortality from vehicles, displacement or avoidance, habitat loss or fragmentation, snag reduction, down log reduction, edge effects, movement barrier or filter, and route for competitors.

Martens are known to be sensitive to changes in overhead cover, such as roads or trails (Hargis and McCullough 1984: Buskirk and Powell, 1994). Roads and trails can fragment habitat, thus affecting the

[32] Although goshawk territories may vary, a 1500-acre (600 ha) area is the best approximation of a territory size in our area for purposes of optimizing survey accuracy. A 1500-acre circle has a radius of a little more than ½ mile – the primary zone designated in the Forest Plan for a limited operating period for this species (Woodbridge, B. and C. D. Hargis (2006). Northern Goshawk Inventory and Monitoring Technical Guide. F. S. U.S. Department of Agriculture, Washington Office, Ecosystem Management Coordination Staff. Washington, DC, U.S. Forest Service. Gen. Tech. Rep WO-71: 80 p.)

ability of marten to use otherwise suitable habitat on either side of the route. Roads may decrease prey and food availability for marten (Allen 1987) due to prey population reductions from road kills and/or behavioral avoidance of roads. In a study conducted on the Lake Tahoe Basin Management Unit and Sierra National Forest, however, Zielinski (2007) found that marten occupancy or probability of detection did not change in relation to the presence or absence of motorized routes and OHV use when the routes (plus a 50 meter buffer) did not exceed about 20 percent of a 50 square kilometer area, and traffic did not exceed one vehicle every 2 hours. The study did not, however, measure behavioral changes or changes in use patterns and the study authors caution that application of their results to other locations would apply only if OHV use at the other locations is no greater than reported in their study.

High levels of coarse woody debris (snags, downed logs, root masses, large branches) are an essential component of marten habitat, especially during the winter months when marten require subnivian (beneath the snow) structures for cover and hunting opportunities. In addition, large logs with cavities provide rest and den sites for marten and fisher. Activities that remove large logs are therefore likely to degrade marten habitat (USDA 1994). Hazard tree removal along roads will reduce numbers of snags (future down logs) within a zone of influence of about 60 meters alongside roads. In addition, motorized routes provide access for fuelwood collection, which also contributes to decreased levels of snag and down wood within roadside corridors. However, snag removal within 60 meters of roads may be less consequential considering that displacement and avoidance factors may reduce marten habitat use adjacent to motorized routes.

Pacific Fisher

The Pacific fisher is associated with late successional and old growth conifer forests throughout their range. This species is among the most habitat-specific animals in North America, and changes in quality, quantity and distribution of available habitat can affect fisher distribution in California (Buskirk and Powell 1994). In the Sierra Nevada, fisher habitat occurs in mid-elevation forests (Grinnell, J.S. Dixon et al. 1937; Zielinski, R.L. Truex et al. 1997) largely on National Forest System lands, below the elevations of national parks and wilderness areas. The subspecies (*Martes pennanti pacifica*) occurs in California in the northern Coast Ranges and Klamath Province at elevations of 82 to 3,280 feet, and generally occurs sympatrically with the marten in the southern Sierra Nevada at elevations of 5,000 to 8,500 feet in mixed conifer forests (Zielinski, Kucera et al. 1995). Generally the fisher occurs at somewhat lower elevations than the marten.

Fishers use large areas of primarily coniferous forests with fairly dense canopies and large trees, snags, and down logs. A vegetated understory and large woody debris appear important for their prey species. It is assumed that fishers will use patches of quality habitat that are interconnected by other forest types, whereas they will not likely use patches of habitat that are separated by large open areas lacking canopy cover (Buskirk and Powell 1994). Buck et al. (Buck and et.al. 1994) described 1970s research in

managed Douglas-fir and white fir forests in northwestern California. They detected a selection pattern favoring residual stands of mature forest in areas heavily harvested for timber.

Riparian corridors (Heinemeyer and Jones 1994) and forested saddles between major drainages (Buck, Mullis et al. 1983) may provide important dispersal habitat or landscape linkages for the species. Riparian areas are important to fishers because they provide important concentrations of rest site elements, such as broken top trees, snags, and coarse woody debris (Seglund 1995.).

Habitat suitable for resting and denning sites is thought to be most limiting to the population; therefore, these habitats should be given more weight than foraging habitats when planning or assessing habitat management (Zielinski, Truex et al. 2004) (Powell and Zielinski 1994). Fishers generally use at least one rest site per day, and rarely reuse rest site structures (Kilpatrick and Rego 1994; Seglund 1995.; Zielinski and Duncan 2004; Zielinski, Treux et al. 2004; Zielinski, Truex et al. 2004)

The following California Wildlife Habitat Relationships (CWHR) types are important to fishers: generally structure classes 4M, 4D, 5M, 5D and 6 (stands with trees 11" diameter at breast height or greater and greater than 40% cover) in ponderosa pine, montane hardwood-conifer, mixed conifer, montane riparian, aspen, red fir, Jeffrey pine, lodgepole pine, subalpine conifer, and eastside pine (California Department of Fish and Game, 2005)

High quality fisher habitat has many elements in common between the two existing populations in California. Zielinski et al. (Zielinski and Duncan 2004; Zielinski, Truex et al. 2004) argue that retaining and recruiting trees, snags and logs of at least 39 in. dbh, encouraging dense canopies, structural diversity, and retaining and recruiting large hardwoods are important for producing high quality fisher habitat and resting/denning sites.

Assessing the effect of forest fragmentation on fishers in northwestern California, Rosenberg and Raphael (Rosenberg 1986) found fishers to be negatively associated with clearcuts and forested stands significantly edged by clearcuts. They also found fishers to more likely be detected in larger stands (>124 ac) than small stands, especially stands with high connectivity.

On the Weaverville Ranger District of the Shasta-Trinity National Forest, Seglund (Seglund 1995.) found that fisher rest sites occurred in large woody structures averaging 39 in dbh in patches with higher tree basal area, greater hardwood and shrub cover, and larger trees than sites sampled at random. Dark (Dark 1997) found higher detection frequencies at track plates in areas with greater canopy cover and more Douglas fir than random sites. Klug (Klug 1997) detected more fisher in Douglas fir than redwood forest types, and in areas with more logs and hardwoods.

Yeager (Yeager 2005) analyzed fisher rest sites in two areas of the Klamath Province: Shasta-Trinity National Forest and the Hoopa Indian Reservation. Fishers there used the largest diameter hardwood or conifer structures available (34 in – 49 in dbh) in stands where canopy closures exceeded 50 percent. Rest sites were frequently in drainage bottoms (Ibid).

In the coastal area, mid- and late-seral Douglas-fir and true fir forest types comprised an average of 70% of the home ranges of 7 female and 2 male fishers, with no difference according to gender (Zielinski and Duncan 2004; Zielinski, Truex et al. 2004). Coastal area home ranges were composed of 15-34 percent mid-seral Douglas-fir, 9-28 percent mid-seral true fir and 0.4-28 percent late seral Douglas-fir.

Carroll et al. (Carroll, Zielinski et al. 1999) developed and tested a series of fisher habitat models for northwestern California based upon fisher detections using standardized survey methodologies. The best 1999 model was not intended for use at the within-home range scale of habitat selection; rather, it used landscape-level variables to predict where fishers might locate their home ranges (Carroll 2005). The best predictors of fisher distribution were of large scale (landscape- to regional-scale from 3.9-19.3 mi^2) and used tree canopy closure, tree size class, and percent conifer. The analysis determined that large hardwood diameter was highly significant, leading to the suggestion that both denning cavities and mast production for prey species were provided by this component of the habitat, especially for habitats inland from the coast (Ibid).

Carroll (Carroll 2005) reanalyzed a 1999 model performance by including data from private timberlands in the redwood zone. He found a relatively good fit between the 199 model and the 2005 revision that included redwood data. Carroll (Carroll 2005) determined that the link between fisher distribution and high canopy closure appeared to be a biologically-relevant limiting factor at multiple scales across forest types and ecoregions.

Roads can impact fishers in the following ways: (1) vehicles can kill animals and potentially increase mortality rates; (2) roads can fragment habitat and affect the ability of animals to use otherwise suitable habitat on opposing sides of the road; (3) roads, and the presence of vehicles and humans, can cause wildlife to modify their behavior in the vicinity of roads; (4) roads allow human access to wildlife habitat and can increase the direct impacts of human activities; and 5) roads can serve as a vector for invasive species and the introduction of disease into native animal populations. Predicted habitat for wide-ranging carnivores in the Rocky Mountains was associated with low road densities (Mace et al. 1999, Carroll et al. 1999). There may be a threshold value for road density, above which the habitat cannot sustain certain wildlife species. Studies have not yet specifically addressed the effects of roads on fisher populations. Roads may affect fisher population distribution; areas with more roads may have increased fisher mortality due to road kill (Heinemeyer and Jones 1994).

Recreational activities can affect wildlife species; however, this relationship is poorly understood (Knight and Gutzwiller 1995). Recreational activities can alter wildlife behavior, cause wildlife displacement from preferred habitat, and decrease reproductive success and individual vigor. Peak recreation levels often coincide with the most critical phases of the species' life cycle, such as during breeding and reproduction. Flight from human presence and interruption of behavior increase energetic costs experienced by an individual. Because of physiological constraints, these costs are greater for smaller animals.). Recreational activities can alter wildlife behavior, cause wildlife displacement from

preferred habitat, and decrease reproductive success and individual vigor. Peak recreation levels often coincide with the most critical phases of the species' life cycle, such as during breeding and reproduction. Because of physiological constraints, these costs are greater for smaller animals.

The total amount of fisher habitat[33] within the administrative boundaries of the STNF is 1,243,503 acres with about 982,904 acres on actual Forest Service ownership. Fisher appear to be well distributed across the forest according our observation records. Similar to marten, there is only one documented den site on the forest.

Wide-ranging Focal Species: Affected Environment

Large- and mid-sized carnivores are unique in their response to human-induced habitat changes due to their large spatial habitat needs and their sensitivity to landscape patterns, including road edge effects and road density (Buskirk and Zielinski 2003). One species, black bear (*Ursus americana*), was included in the wide-ranging carnivore habitat assessment group.

The following is a summary of some of the potential trail- and road-associated effects to wide ranging-carnivores (Gaines et al. 2003):

- Mortality from hunting as facilitated by road and trail access
- Increased potential for illegal poaching of animals as facilitated by trails and roads
- Mortality or injury resulting from a motorized vehicle collisions with animals
- Displacement of individual animals from a specific location that is being used for reproduction and rearing of young
- Change in behavior and/or increased mortality of animals due to increased contact with humans, as facilitated by road and trail access including recreational sites, such as campgrounds
- Interference with dispersal or other movements as posed by a road or trail itself or by human activities on or near roads, trails, or networks
- Loss and resulting fragmentation of habitat due to the establishment of roads, trails, or networks, and associated human activities
- Reduction in density of snags and down logs due to their removal near roads
- Increase in heart rate or stress hormones when human use occurs along a road or trail or network of roads or trails

[33] Defined as high quality reproduction habitat by the CWHR.

Black Bear

Black bear inhabits dense, mature stands and feed in a variety of habitats including brushy stands of forest, valley foothill riparian, and wet meadows. Habitat requirements include large trees and various cavities and hollows in trees, snags, stumps, logs, uprooted trees, talus slopes, or earth dens. Within the administrative boundaries of the Forest, there are about 255,684 acres of black bear habitat in moderate to sparse cover forested areas with average dbh larger than 11" in eastside pine, Jeffrey pine, lodgepole pine, Montane hardwood, Montane riparian, ponderosa pine, red fir, and white fir types. These are high value bear habitats in this area. Bears however are wide-ranging and may be found across the forest. If all habitat within the administrative boundaries of the Forest are considered, over 2,338,240 acres or about 85% of the area within the administrative boundary would be considered low to high quality black bear habitat.

Black bears have been known to be affected by road- and trail-associated factors including collisions, hunting, poaching, negative human interactions, and displacement or avoidance (Gaines et al. 2003). In some cases, infrequently used routes are used by black bears as travel routes to access berries growing along road edges. Collisions on the lower speed, unpaved routes being evaluated for this project are not likely to occur.

Increased road density likely has an indirect impact on bears by increasing bear and human interaction, such as providing increased access to hunters. Bear harvest varies by habitat and accessibility to bear habitat. Bears are most vulnerable to harvest where road densities are high and escape cover is limited. The amount of human access for bear hunting and poaching opportunities is directly related to the proportion of roads and trails. As routes increase on the STNF, access for bear hunting and poaching increase. However, statewide bear monitoring indicates bear population trends are either stable or increasing. California Department of Fish and Game (2004) reports that legal and illegal bear harvest together "will not have significant negative effects on the State's bear resource." Therefore, it is possible to assume that human access for bear hunting and poaching does not have a negative impact on the bear population numbers on the STNF.

As human access increases, the potential for negative human interactions with bears also increases. Bear mortalities may result from repeated negative bear-human interactions, but the number of bear killed as a result of these negative encounters is not expected to affect the overall bear population on the STNF.

Little research has been conducted on the impacts on black bears from recreation in relation to the use roads and trails. Therefore, impacts to black bears from motor vehicle activities associated with roads and trails are not well understood. In Montana, Kasworm and Manley (1990) found that black bears avoided habitat within 274 meters of roads. Bears were more likely to be displaced by roads than by trails. In the habitat influence zone the potential for habitat alteration, as well as behavioral change, is high because of human activity, such as fuel wood gathering. For an analysis with habitat influence zone width over 127

meters, areas from separate routes would overlap, given average density of routes in black bear habitat on the forest.

Prescription VI. Wildlife Habitat Management

Under the wildlife habitat management prescription within the STNF LRMP, the primary purpose is to maintain and enhance big game, small game, upland game bird and non-game habitat thereby providing adequate hunting and viewing opportunities. Bears are hunted on the Forest through the use of hounds, while deer hunting and by archery. In 2008 122 bears were legally taken in Shasta County, 169 in Trinity County and 199 in Siskiyou County. The size and weight of bears makes OHV access important to hunters.

Ungulates: Affected Environment

Ungulates (hoofed mammals), including mule or black-tailed deer and elk, generate large amounts of public interest both for their value as game animals and for their frequent sighting on the Forest. Their ecological importance as large herbivores, their value as prey species for large carnivores and their specific habitat needs and response to recreation trails support their use as a focal species.

Mule Deer and Elk

Mule deer and elk use a mix of all successional stages, but the most critical habitat types are early successional forests, hardwoods, and shrublands. Most deer and elk on the STNF migrate seasonally between higher elevation summer range and low elevation winter range. Although mule deer are found throughout the Forest, elk have a more restricted range and only occur on the northern 40% of the Forest. However, elk have the potential to occur much widely on the forest and for the purposes of this document; we will evaluate their potential throughout the Forest rather than restrict their analysis to within the current range.

Many studies have been conducted on the interaction of road and trail-associated activities and mule deer and elk, and have shown that road and trail-associated factors have the potential to impact individuals and populations directly and indirectly, including mortality from vehicle-collisions, modification of behavior (avoidance or flight), mortality from hunting and poaching, habitat fragmentation, edge effects of roads and trails, and others. This section will highlight some examples of the way in which roads and trails can affect individuals and populations.

In general, ungulates will move away from, or flush, from an approaching person and will usually allow a person in or on a vehicle to get closer than a person on foot (Freddy et al. 1986; Wisdom et al. 2004). Wisdom et al. (2004) found that mule deer showed little measurable flight response to experimental OHV treatments, but cautioned that deer may well be responding with fine-scale changes in habitat use (i.e., avoidance), rather than substantial increases in movement rates and flight responses. Several studies have found that mule deer avoid areas in proximity to roads. Ungulates avoid primary

roads more than secondary or tertiary roads, and also avoid roads more in open habitats as opposed to areas with vegetative or topographic cover (deVos et al. 2003).

Main roads were found to reduce deer use up to 0.5 miles (800 meters), whereas secondary and primitive roads reduced deer densities from between 200 to 400 meters in these studies. Additional variables such as the amount and frequency of traffic, and the spatial distribution of roads in relation to deer use, influence the degree of negative effects that roads have on deer use in forested habitats (Perry and Overly 1977; Johnson et al. 2000; deVos et al. 2003). Where disturbance causes deer to avoid areas within preferred habitats, animals may be forced into less preferred or lower quality habitats. Such shifts, particularly if repeated, can result in adverse impacts to the energy balance of individual deer and ultimately can decrease population productivity, especially on winter ranges (deVos et al. 2003). For this analysis the habitat influence zone is 60 meters to either side of an added route. This zone is likely to have habitat alteration by human activity. The route density within elk and mule deer habitat on the forest do not allow greater habitat influence zone width because the zones from separate routes would on average overlap.

Greater human access can increase opportunities for hunting as well as poaching of ungulates. During the hunting season, deer and elk may become more wary of humans, and disturbance is greater when being hunted. Hunted ungulate populations tend to have stronger reactions to people on foot than motor vehicles. This may be due to the fact they can detect a vehicle from greater distances rather than being surprised by quieter humans on foot. Roads and trails can facilitate deer and elk harvest success. Major access routes radiating from urban centers into deer and elk range provide increased opportunities for hunters. Since hunting levels for deer and elk are controlled through hunting zone quotas and tag limits established by the CDFG, an increase in hunting opportunity or hunter success is unlikely to impact deer or elk populations (deVos 2003). Hunting limits also take into account estimates of the amount of illegal kill and road kill occurring. Levels of illegal harvest are not presently described as a significant source of mortality for deer or elk herds on the STNF.

Vehicle collisions with deer can contribute considerably to direct mortality. Deer are probably the most frequently-killed large mammal along North America's roads. Deer and vehicle collisions probably differ by the type of road or trail, so care must be given when considering deer-vehicle collisions. The majority of deer-vehicle collisions occur in the early morning or late afternoon and evening hours, around dawn and sunset, when the deer are most active and when visibility is poor. More deer-vehicle collisions occur during the spring and fall when deer are migrating. In the fall, hunting may cause deer to be more wary and increase movement of deer. In the spring, vegetation tends to green-up along roadsides and attract deer to roads. There are little to no data on deer road kills along forest roads; however, roads maintained at a higher standard for passenger vehicle (ML 3, 4, and 5), where vehicle speeds are greatest, have the most potential to contribute to deer-vehicle collisions. Deer-vehicle collisions on roads and trails which are maintained for high clearance vehicles (ML 2 roads) are probably not appreciable in number

due to the lower speeds and the amount of use received by these roads. Collisions on lower speed unpaved routes are not likely to occur.

Summary of trail and road associated impacts to mule deer and elk:

- Mortality from hunting as facilitated by motorized road and trail access
- Potential for increased illegal take of animals as facilitated by trails and roads
- Mortality or injury resulting from a motor vehicles colliding with an animal
- Loss and resulting fragmentation of habitat due to the establishment of roads, trails, or networks, and associated human activities
- Interference with dispersal or other movements as posed by a road or trail itself or by human activities on or near roads, trails, or networks
- Spatial shifts in populations or individuals animals away from human activities on or near roads, trails, or networks
- Displacement of individual animals from a specific location being used for reproduction and rearing of young
- Increase in heart rate or stress hormones when near a road or trail or network of roads or trails

This species group is not associated with any one type of habitat, but is associated with a wide variety of rangeland and brush-field habitats. This species group is associated with vegetation types that contain characteristics of early successional stages. These characteristics include no or smaller trees and shrubs for a given growing site, relatively low canopy closure, and limited amounts of decadence in the form of decay or deformity. Sites have more forbs and young shrubs than older or more forested vegetation types. The high mobility of the species in this group means a much wider array of habitats may actually contain these species at any given time as they travel across or through less important or less desirable habitats. The habitats modeled here thus represent key habitats required for healthy herds. Habitat for the mule or black-tailed deer covers about 359,000 acres within the administrative boundaries of the Forest – about 13% of the entire area. Within actual ownership of the Forest, prime mule deer habitat covers about 255,000 acres and also covers about 13% of the total Forest ownership. Elk habitat covers about 164,000 acres over the administrative boundary of the Forest (about 6%) and 114,000 acres over the Forest ownership (a little over 5%). Although these species will use a range of other habitats, this section refers to the modeled habitats as “key” habitats.

Prescription VI. Wildlife Habitat Management

Under the wildlife habitat management prescription within the STNF LRMP, the primary purpose is to maintain and enhance big game, small game, upland game bird and non-game habitat thereby providing

adequate hunting and viewing opportunities. Roaded natural recreation opportunities will be maintained within this prescription. Table 3.05-6 shows the routes proposed for addition to the NFTS and mileage by alternatives that fall within this prescription on the forest. This prescription is listed for informational purposes only as it will have no effect on alternatives.

Table 3.05-6. Routes Proposed for Addition to the NFTS and mileage within Prescription VI

Route ID	Mileage	Alt 2	Alt 4	Alt 5
EA495	0.26		X	X
EA512	0.49		X	X
EA514B	0.27		X	X
EA516	0.16		X	X
EA530	0.17		X	X
EA531	0.40		X	X
RM1036	1.64	X		X
RM1226	0.10	X		X
RM793	0.37			X
SE314	0.07	X		X
SE512	0.52			X
TC1427	1.04			X
TC1451	0.13			X
TC1451A	0.17			X
TC1462A	1.69			X
TC1489	1.42			X
TC1491	0.25			X
TC508	0.01			X
U1B005A	0.09	X		X
U35N05A	1.74	X		X
U42N26C	0.34		X	X
Total	**11.34**	**3.64**	**2.09**	**11.34**

Riparian Associated Focal Species: Affected Environment

The riparian group includes terrestrial and aquatic species that spend a part or their entire life cycle within or adjacent to riparian habitats. This section will provide general information on road and trail-associated impacts to bald eagle. Species not included in detail here will be addressed in the BE report and are hereby incorporated by reference.

This species group is associated with habitats along rivers, streams, and wetlands. Species that represent this group include the Forest Service sensitive species bald eagle. Currently riparian habitats are managed according to the standards contained within the STNF LRMP as amended by the Northwest Forest Plan.

Bald Eagle

Bald eagles are dependent on riparian and river systems to provide foraging locations for fish and waterfowl (Zeiner 1990). They primarily use large trees for nest locations close to the shore of lakes or streams. Jenkins (1992) found that bald eagles on the middle Pit River used trees that averaged 44.2 inches in diameter and averaged 1,391 feet from the water's edge. To evaluate effects to bald eagles, the riparian habitat conservation areas and the pond and lake GIS layers were buffered by 300 meters to

provide an estimate of the area on the forest available to potentially support bald eagles. The amount of area that actually could provide nesting is unknown because the small inclusions of large trees required for nest sites are not mapped.

On July 9, 2007, USFWS in a Final Rule announced that the bald eagle would be removed (delisted) from the Federal list of endangered and threatened wildlife in the lower 48 states. The bald eagle continues to be protected by the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. Upon delisting, the bald eagle was placed on the Regional Forester's list of Sensitive Species.

Bald eagles nest near or adjacent to large bodies of water. Within the STNF, 46 bald eagle breeding territories have been identified in recent years. The analysis area was a ½ mile buffer around all major water bodies within the STNF. The total amount of suitable reproductive habitat within the administrative boundaries of the STNF is 375,656 acres.

The road and motorized trail-associated factors that have been identified for the bald eagle include poaching, disturbance at specific site (nests and roost sites), and avoidance and displacement (Skagen et al. 1991; Stalmaster and Newman 1978). Several studies reported that eagles avoid or are adversely affected by human disturbance during the breeding period, which may result in nest abandonment and reproductive failure (Buehler et al. 1991; Grubb and King 1991; Grubb et al. 1992; Chandler et al. 1995; Grubb 1995).

The response of bald eagles to human activities is variable. Individual bald eagles show different thresholds of tolerance for disturbance. The distance at which a disturbance causes bald eagles to modify their behavior also is affected by the sight distance of the motor vehicle use. For example, forested habitat can reduce the noise generated by motorized activity. In addition, if the noise-generating activity is hidden from the nest site, disturbance thresholds may be reduced. Some studies report that bald eagles seem to be more sensitive to humans afoot than to vehicular traffic (Grubb and King 1991; Hamann 1999). Anthony et al. (1989) found that the mean productivity of bald eagle nests was negatively correlated with their proximity to main logging roads, and the most recently used nests were located in areas farther from all types of roads and recreational facilities when compared to older nests in the same territory. However, other studies indicate bald eagles can tolerate a certain amount of human disturbance (Harmata and Oakleaf 1992 [*in* Gaines et al. 2003]). Disturbance is most critical during nest building, courtship, egg laying, and incubation (Dietrich 1990). In general, recommended buffer distances to reduce potential disturbance to bald eagles during the breeding season have ranged from 300 to 800 meters (Anthony and Isaacs 1989; Fraser et al. 1985; McGarigal 1988). Grubb et al. (1992) found that eagles are disturbed by most activities that occur within 1,500 feet; and they take flight when activities occur within 600 feet. Grubb and King (1991) assessed pedestrian traffic and vehicle traffic on bald eagle nesting activities and recommended buffers of 550 meters for pedestrians and 450 meters for vehicles. For the purposes of this analysis a habitat influence zone of 300 meters was used to either side of routes added to NFTS.

Currently, the Shasta-Trinity National Forest enforces a yearly closure around known bald eagle nests. This closure varies year to year and is established according to eagle nesting sites selected for that year. These closures would continue under any alternative unless deemed unnecessary for the maintenance of a strong bald eagle breeding population on Shasta and Trinity lakes.

Cavity-Dependent Focal Species: Affected Environment

This species group is associated with cavities in trees. Species include woodpeckers such as the hairy woodpecker and pileated woodpecker. The Shasta-Trinity National Forest LRMP, as amended by the Northwest Forest Plan, provides for a variety of snag densities. The Shasta-Trinity NF LRMP specifies that snags are to be retained at levels sufficient to support species of cavity-nesting birds at 40 percent of potential population levels based on published guidelines and models or an average of 1.5 snags per acre greater than 15 inches in diameter and 20 feet in height (LRMP p. 4-62)(USDA 1995). It is common that forest managers will use high levels of snag retention in many project will retain a minimum of 4 per acre or will retain all soft snags that are not a hazard to forest workers.

This guideline is generally evaluated on a 40 acre minimum and requires a minimum of 60 snags of appropriate size or greater on 40 acres. DECAid, a summary of the current knowledge and best available data on dead wood in Pacific Northwest ecosystems (Mellen, Marcot et al. 2002) recommends that snags and dead wood be evaluated on a larger scale yet, 20 square miles or about 12,800 acres.

Evaluating snag patterns and occurrences at larger scales makes sense relative to the observed patterns of species use. “Natural” conditions on the landscape are highly variable. There is little data on the spatial distribution of dead wood within stands or on the larger landscape. Wildlife behavior shows that species frequently prefer clumps of snags and down wood rather than more widely dispersed individual snags. However, it’s unclear if this is because clumping is preferred or whether they are more generally available. In general, wildlife research offers no guidance on the spatial distribution that would be preferred, i.e. number, size or distribution of clumps.

In lieu of actual data, managers generally try to take advantage of naturally occurring clumps in the forest areas treated. Areas between clumps will also have snags retained. To mimic historic or “natural” conditions, a mix of clumps and more widely distributed snags should occur within and among stands. In fire-prone areas of Klamath and Sierra mixed conifer forests, higher amounts of dead wood should be left on the lower 3rd of slopes and north and east aspects are areas that are less likely to burn with high severity and where the highest levels of dead wood were likely to occur historically (Skinner 2002)

The data available suggests that for larger forest types typified in the Southwest Oregon and Northern California, that the majority of the plot-sized areas in unharvested landscape support moderate snag densities (> 0 to 12 snags/acre $\geq$ 10.0 in); > 0 to 8 snags/acre $\geq$ 19.7 in). Areas of higher snag densities (over 18 snags/acre $\geq$ 19.7 in dbh) do occur on a portion of the unharvested landscape. It is optimal to

balance high density areas of dead wood with moderate and low-density areas across the larger landscape (Bull, Parks et al. 1997).

Hairy Woodpecker

The hairy woodpecker, found across the Forest in almost all woodland and forest types, uses snags and dead parts of trees to create cavities (USFS 1991b, page 3–110) and to forage for insects. Zeiner et al. (1990) report that hairy woodpecker nest tree diameter ranges from 13 to 30 inches. Jackson et al. (2002) report cavity entrances are about 5 centimeters (2 inches) in diameter. This would indicate use of trees much smaller than the 13 inch minimum reported by Zeiner may not be physically possible due to structural weakness created in trees smaller than 10 to 13 inches in diameter.

These woodpeckers will use both live and dead trees for both foraging and nesting cavities. In a study in northern California, 46.6% of foraging observations were in live trees, 53.4% in dead trees; 32% on live substrate and 68% on dead substrate (n = 89) (Morrison, K. A. With et al. 1987) According to the Breeding Bird Survey (Sauer, Hines et al. 2008), the hairy woodpecker's population is increasing survey wide at a credible rate of 1.3% over the years between 1966 and 2007.

Using the California Wildlife Habitat Relationships models, the Forest has about 416,000 acres of high quality reproduction habitat within the administrative boundaries of the Forest and about 298,000 in actual ownership.

Pileated Woodpecker

Pileated woodpeckers use late-successional forest or younger forest with large remnant trees (Bull and Jackson 1995). Roost locations are in trees with existing hollow interiors created by decay. Nest trees in the Pacific Northwest are typically snags with large diameters (mean diameters of 38, 33, and 27 inches reported in Bull and Jackson [1995]). Pileated woodpeckers are reported to be "tolerant" of human activity near the nest, and to exhibit variable behavior near roosts where some individuals may be tolerant and other individuals may change roosts (Bull and Jackson 1995). The vegetation modeling predicts an estimated 828,000 acres of high quality reproduction habitat occur within the administrative boundaries of the Forest and about 677,000 acres occur on FS ownership. This species occurs widely on the Forest, particularly in mixed conifer, white fir, and red fir vegetation types on the STNF.

Environmental Consequences

Alternative 1 - No Action

Under alternative 1, the no-action alternative, cross-country travel would continue except as otherwise prohibited. This alternative would allow cross-country travel on national forest system lands outside of designated wilderness. Also, no additions would be made to the NFTS and current motorized use of all existing unauthorized routes and unrestricted use below the high-water marks on the reservoirs would

continue. Unauthorized routes and open areas would not be added to the NFTS and would have no status or authorization as NFTS facilities. No changes would be made to the NFTS.

Alternative 1: Direct/Indirect Effects of the Prohibition of Cross–country Motor Vehicle Travel

Under alternative 1, the no-action alternative, cross-country travel would continue except as otherwise prohibited. This alternative would allow cross-country travel on 1,586,325 acres of national forest system lands outside of designated wilderness. Also, no additions would be made to the NFTS and current motorized use of all existing unauthorized routes (5,219 routes totaling 1,252 miles) and unrestricted use below the high-water marks on the reservoirs would continue. Unauthorized routes and open areas would not be added to the NFTS and would have no status or authorization as NFTS facilities. No changes would be made to the NFTS. Existing seasonal restrictions on 220 routes and bald eagle closures below the high-water marks on Shasta and Trinity Lakes would continue unchanged. Disturbance from cross-country travel could cause individuals to move or alter behavior. The potential for disturbance to focal species can be evaluated using indicator 1 (Table 3.05-7).

Table 3.05-7. Alternative 1: Prohibition of cross country travel measurement indicator 1 for focal species of the late-successional group for direct/indirect effects. These effects take into account that this alternative will continue to allow cross country travel and use of unauthorized routes. Indicator 5 used to evaluate added areas in lake bottoms has been included here as well

Indicator			1	5
Species Group	**Species**	**Total acres of habitat within administrative boundaries of the Forest**	**Total Acres of Habitat available to cross-country travel (no wilderness)[34]**	**Acres of Habitat within 60 meter Zone of Influence (300 meter for Eagle) of Lake Bottom Areas (Shasta and Trinity Lakes and Iron Canyon Reservoir) Added as Open Areas**
Late-Successional Forest (LSF)	**Northern goshawk**	1,319.587	898,474	5,392
	Northern spotted owl	954,575	598,985	1,438
	Pacific fisher	1,243,503	782,525	5,316
	American marten	456,372	321,863	1,779
Wide-ranging	**Black bear**	255,684	149,547	468
Ungulate	**Mule Deer**	359,784	219,732	1,471
	Elk	163,697	101,885	1,167
Riparian	**Bald Eagle**	375,656	218,134	9,187
Cavity-dependent	**Hairy Woodpecker**	416,852	239,578	828
	Pileated woodpecker	828,629	517,993	3,088

In addition, with the continuation of cross-country travel, it is assumed that the existing unauthorized routes would continue to receive motorized use. The amount of unauthorized routes that will receive continued use under continued cross-country travel is displayed in Table 3.05-8 and discussed below.

[34] We will refer to this area as the Cross-Country travel access area.

Table 3.05-8. Alternative 1: Direct/Indirect effects for measurement indicators 3, 4 and 5: Late-successional focal species*

Indicators		3	3	4	5
Species Group	**Species**	**Miles of Unauthorized Routes within Habitat on NF available for motor vehicle use under cross-country travel**	**Acres of habitat for the unauthorized routes within suitable, identified habitat*** **	**# of known TES Sites (nesting or denning) Within a ½ Mile of Existing unauthorized Routes**	**Proportion of species habitat ** affected by all unauthorized routes**
Late-Successional Forest (LSF)	**Northern goshawk (nesting sites)**	461	24,858	5	2.77% Low
	Northern spotted owl (nesting sites)	348	18,434	9	3.08% Low
	Pacific Fisher	363	20,047	0	2.56% Low
	American Marten	151	8,329	0	2.59% Low
Wide-ranging	**Black bear**	155	7,674	N/A	5.13% Low
Ungulate	**Mule Deer**	292	14,422	N/A	6.56% Low
	Elk	186	8,378	N/A	8.22% Low
Riparian	**Bald Eagle**	125	40,237	1	18.45% Low
Cavity-dependent	**Hairy Woodpecker**	272	13,786	N/A	5.75% Low
	Pileated Woodpecker	242	13,020	N/A	2.51% Low

* These effects take into account that this alternative will continue to allow cross country travel and use of unauthorized routes.
** This is calculated on the available habitat in those areas of the Forest available for cross-country travel
*** Bald Eagle uses a 300-meter Zone of Influence – all others use a 60 meter Zone to calculate habitat affected

Late-Successional Forest Focal Group

Under this alternative, cross-country travel would potentially continue on 898,000 acres of northern goshawk habitat, 599,000 acres of northern spotted owl habitat, 783,000 acres of Pacific fisher habitat and 322,000 acres of American marten habitat.

Northern goshawks actively defend nest sites during portions of the breeding season. Cross-country travel could lead to disturbance that disrupts pair-bonding, could cause the exposure of eggs or young to inclement weather, and could increase adult energy expenditures.

Spotted owls could be disturbed during the nesting season by cross-country travel. Disturbance could lead to reduced time on the nest, thereby threatening eggs or young with exposure. Disturbance from off-road travel would typically occur in daylight when owls are in the resting portion of the diurnal cycle. Off-road disturbance impacts are limited by the heavily timbered areas where spotted owls usually nest. In general, these impacts are possible, but not likely. The continued proliferation of unauthorized routes is

however likely to adversely affect habitat for northern spotted owls over time because of the incremental increases in noise and disturbance in nesting and roosting habitats. .

Marten and fisher could be affected by loss of dens, increased disturbance of individuals, and by indirect impacts to prey. Vehicles that cross large downed log structures have the slight potential to collapse den sites, resulting in the potential loss of adults or young. Vehicles can also increase disturbance, resulting in additional energy expenditures which may negatively impact some individuals. Routes developed through repeated use (off-road travel) can contribute to habitat fragmentation for fisher because the species generally avoids entering open areas that have no overstory or shrub cover. Although there are reliable, documented exceptions to this[35] where fisher have been radio tracked foraging in very open areas between denser copses of trees, we make the more conservative assumption of sensitivity. Roads, and the associated presence of vehicles and humans, can also cause animals to modify their behavior. Previous studies have reported a negative correlation between detections of fisher and roads (Dark 1997; Golightly et al. 2006). Indirect effects would include the effects on prey populations that may also avoid or be killed by vehicles. In addition, with the continuation of cross-country travel, it is assumed that the existing unauthorized routes would continue to receive motorized use. Mileage of those unauthorized routes within focal species habitats displayed in Table 3.05-8 and discussed below.

Existing unauthorized routes impact five different Late Successional Reserves, nineteen spotted owl critical habitat units, and nine spotted owl core areas. Five documented goshawk sites are located within ½ mile of existing unauthorized routes (Table 3.05-8). In addition to these documented sites, 461 miles of unauthorized routes occur in suitable northern goshawk habitat, 348 miles of unauthorized routes occur in northern spotted owl habitat, 363 miles of unauthorized routes occur in suitable fisher habitat and 151 miles of unauthorized routes occur in suitable marten habitat. Table 3.05-8 shows that a modest number of known TES sites are within ½ mile of an existing route. Under alternative 1, disturbance effects would continue with the use of these routes.

Under this alternative, lake bottom use would continue on the three reservoirs, including 562 miles of perimeter and an estimated 10,000 acres[36] of potential use. Direct effects to late-successional species, including the goshawk, the spotted owl, the marten and the fisher, are expected to be low. Most late successional species prefer significant cover and the high levels of exposure from lack of vegetation on the lake bottom areas would keep them out of the area. Late-successional species may be affected indirectly through disturbance. Current noise levels would continue on the lake.

[35] Self, Steve, Personal Communication regarding the radio tracking of fishers in the Shasta-Trinity area; Self, Steve and Richard Callas. Report on file with Sierra Pacific Industries, Anderson, CA, 2006.; Self, Steven and S. J. Kerns. *Pacific Fisher Use of a Managed Forest Landscape in Northern California*. 1995.
[36] Note that actual acres open to lake bottom use is highly variable and depends on a large number of factors including lake drawdown, access points, slope, obstacles, etc. The 10,000 acres is only a very rough estimate of available areas based on aerial photographs and experience with the area.

The goshawk, the northern spotted owl and the marten are not known to occur in the immediate vicinity of Shasta Lake. There have been several records of pacific fisher occurring on the peripheries of the lake in unexpected and unusual habitat. Fishers are a wide-ranging and somewhat opportunistic species and may occasionally vary out of preferred habitat area. It is uncommon to see fisher in this area and we would not expect activity around Shasta Lake to significantly affect the populations of this species.

Both Trinity Lake and Iron Canyon Reservoir are surrounded by significant amounts of late-successional habitat suitable for goshawk, northern spotted owl, fisher and marten. Although we have no records of goshawk on the immediate vicinity of either of these lakes, they could occur in upland area – although we would not expect them to be common. Northern spotted owls do occur in the vicinity of both of these lakes.

Wide-Ranging Focal Species

Under this alternative, cross-country travel would continue on potentially as much as 150,000 acres of black bear habitat, including 155 miles of unauthorized routes within habitat (out of a total of 1,252 miles of unauthorized routes).

Cross-country travel could impact black bear food sources, such as berries and invertebrates, by changing soil conditions and trampling of plants, down logs, or insect nests. These impacts are expected to be infrequent because of the low quantity of cross-country travel on the forest. Black bear could be affected by loss of dens, increased disturbance of individuals, and by indirect impacts to prey. Vehicles have the rare potential to collapse den sites, resulting in the potential loss of adults or young. Vehicles can also increase disturbance, resulting in additional energy expenditures. Prey populations may be impacted by increased disturbance resulting in lowered energy reserves available for the production of young. If cross-country travel occurs to the extent that soil compaction was to occur, food resources for prey species could be diminished. Reduced production of young and reduced production of food would reduce the size of prey populations available for black bear.

In addition, with the continuation of cross-country travel, it is assumed that the existing unauthorized routes would continue to receive motorized use. The amount of unauthorized routes that will receive continued use under continued cross-country travel is displayed in Table 3.05-8 and discussed below. Although it appears that some black bears habituate to human presence, bears appear to be generally wary and thus are considered susceptible to disturbance. This may be because human contact is infrequent and possibly due to hunting pressure. Disturbance to black bear activities could occur along routes causing increased energy expenditures, lowered fat reserves, and ultimately lower reproduction. However, the amount of disturbance is likely limited because of the low volume of traffic that occurs on the unauthorized routes.

Under this alternative, lake bottom use would continue on the three reservoirs, including 562 miles of perimeter and an estimated 10,000 acres[37] of potential use. Direct effects to wide-ranging focal species, including the black bear, are expected to be low. Most wide-ranging species prefer a mixture of cover and the high levels of exposure seen at the lake bottom areas would, for the most part, keep them out of the area. Wide-ranging species may be affected indirectly through disturbance. Current noise levels would continue on the lake.

Ungulate Focal Species

Under this alternative, cross-country travel on 220,000 acres of mule deer habitat and 102,000 acres of elk habitat could potentially continue. Cross-country travel has the potential to trample or masticate browse plants and to impact soil conditions, leading to other changes in vegetation that may reduce food resources and hiding cover for juveniles or adults. If cross-country travel occurs to the extent that soil compaction occurs, food resources could be diminished resulting in lowered energy reserves available for production of young. Both deer and elk could be highly disturbed by cross-country travel. Disturbance could lead to increased energy expenditure and less time for nutritional intake, possibly leading to reduced productivity.

Direct mortality may occur from collisions with vehicles; however, collisions with vehicles operating off-road are rare or non-existent within the forest. It is possible that such collisions could occur under this alternative; however, given existing use and mobility of the species in this group, such occurrences would remain rare and would be inconsequential to species population dynamics. At the long-term analysis point (20 years in the future), assuming an increase of cross-country motor vehicle use, direct mortality events would occur more frequently, probably increasing at a rate similar to the rate of increase of off-highway use.

In addition, with the continuation of cross-country travel, it is assumed that the existing unauthorized routes would continue to receive motorized use, including 292 miles of unauthorized routes in mule deer habitat and 186 miles of unauthorized routes within elk habitat (Table 3.05-8). Additional routes are expected to be created in the future if cross-country travel continues. This alternative would impact the ungulate group from disturbance associated with vehicles using routes. In studies reported by Gaines et al. (2003), elk moved an average distance of 800 meters and deer moved 400 meters when displaced by human activity (Gaines et al. 2003). As noted above the habitat influence zone width for this analysis is 60 meters because of forest habitat route density.

Riparian Focal Species

Under this alternative, cross-country travel would continue on 218,000 acres of focal species (bald eagle) habitat. Although it appears that some bald eagles will habituate to human presence, eagles appear to be

[37] Note that actual acres open to lake bottom use is highly variable and depends on a large number of factors including lake drawdown, access points, slope, obstacles, etc. The 10,000 acres is only a very rough estimate of available areas based on aerial photographs and experience with the area.

generally wary and thus are considered susceptible to disturbance. This may be because human contact is infrequent. Disturbance to eagle activities could occur along routes causing increased energy expenditures, lowered fat reserves, and ultimately lower reproduction. However, the amount of disturbance is likely limited because of the low volume of traffic that occurs on the unauthorized routes.

Cross-country travel could impact eagles because they appear to be more sensitive to foot travel than vehicle travel (Gaines et al. 2003). Access by vehicles under incubating birds or winter roosting birds is presumed to be detrimental. Vehicle use under nest and roost trees probably results in lowered reproductive success. Vehicles can also increase disturbance, resulting in additional energy expenditures.

Although occasional direct mortality to adults may occur from collisions with vehicles on highways, it is not known to occur off road. If off-road vehicle collisions with the focal species in this group do occur, such occurrence appears to be an exceedingly rare event and has not been reported within the forest. At the long-term analysis point (20 years in the future), assuming an increase of off-highway use, direct mortality of adults would still be unlikely.

In addition, with the continuation of cross-country travel, it is assumed that the existing unauthorized routes would continue to receive motorized use, including 125 miles of unauthorized routes in bald eagle habitat (Table 3.05-8). Additional unauthorized routes are expected to be created in the future if cross-country travel continues.

Lake bottom recreational activity would continue under Alternative 1. Potentially as many as 10,000 acres would see continued intermittent low to high use patterns.

Cavity-Dependent Focal Species

Under this alternative, cross-country travel would continue on 240,000 acres of hairy woodpecker habitat and 518,000 acres of pileated woodpecker habitat.

One potential impact, both in the short and long-term, would be the increased loss of recently dead trees to woodcutting and hazard reduction. Indirectly, more route mileage added to the NFTS would equal more area that would be easily accessible for woodcutting. Woodcutting typically happens in proximity to a roadway resulting in fewer snags near the road. Snag removal is not allowed except if the tree is deemed a safety hazard. Occasionally woodcutters do cut down trees that are not legal; so this has to be taken in consideration when discussing a road corridor. Decreased habitat would cause birds to move to more suitable areas.

Disturbance to woodpecker activities could occur along routes causing increased energy expenditures, lowered fat reserves, and ultimately lower reproduction. Disturbance could occur during feeding activities. Vehicles in proximity may cause birds to flush from feeding locations. Disturbance may also impact food deliveries to cavities, pair-bonding, and cavity construction. Breeding-related impacts may be somewhat limited, as early breeding activities may begin when snow impedes or prevents most cross-

country travel. However, the amount of disturbance is likely limited because of the low volume of traffic that occurs on the unauthorized routes.

Cross-country travel includes the use of unauthorized routes. Although occasional direct mortality may occur from off-road collisions with vehicles, this appears to be an exceedingly rare event and has not been reported to occur within the forest. It is possible that such an event could occur under this alternative; however, given existing use and mobility of the species, such occurrences would remain rare and inconsequential to species population dynamics. At the long-term analysis point (20 years in the future), assuming an increase of off-highway use, direct mortality events would occur more frequently, probably increasing at a rate similar to the rate of increase of off-highway use.

Pileated woodpeckers often forage near or on the ground (Bull and Jackson 1995) and thus may be particularly susceptible to having feeding disturbed.

In addition, with the continuation of cross-country travel, it is assumed that the existing unauthorized routes would continue to receive motorized use. Cross-country travel, which includes motor vehicle use on 1,252 miles of unauthorized routes, would continue. This alternative contains approximately 272 and 242 miles, respectively, of existing unauthorized routes within modeled hairy and pileated woodpecker habitat (Table 3.05-8).

Alternative 1: Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

No facilities are added in Alternative 1. Therefore, there are no direct or indirect effects.

Alternative 1: Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class Changes)

Under alternative 1, there would be no changes to vehicle class controls on any existing roads or trails of the NFTS. Present season of use and vehicle class on NFTS routes would continue.

Alternative 1: Cumulative Effects

Cumulative effects must take into account present and reasonably foreseeable actions (identified in Appendix B). Present and reasonably foreseeable projects include ongoing and future timber harvest, vegetation restoration, fuels management, grazing allotments, road management including closures and decommissioning, recreation use, fire salvage, and mining reclamation which could have effects that would mitigate or add to the effects of this action. In addition, unplanned events such as wildfires and tree mortality related to periodic droughts will continue to affect habitat. Road maintenance and hazard tree removal that will continue on the existing NFTS will continue to potentially affect the 60 meter habitat influence zone, but under this alternative, no routes would be added to the NFTS so no additional maintenance impacts would occur. Many of the actions listed in appendix B could have the potential to increase road density temporarily (i.e., forest product projects with timber harvest, fuels management

projects, pre-commercial thinning projects, grazing allotments, and mining). The primary effects of increases in road density are related to increased disturbance and habitat fragmentation.

The present and reasonably foreseeable actions in appendix B include 5.60 miles of routes proposed for addition to the NFTS, 0.46 miles of new construction and 186 miles of NFTS roads proposed to be closed, abandoned, or decommissioned. This would result in a net decrease of 180 miles of routes. This proportion of the total proposed actions forest-wide is not expected to have significant impacts. Furthermore, the unauthorized routes do not constitute a change to habitat, but rather are an existing condition where vegetation change impact has already occurred and where conditions would continue into the future under this alternative. With continued cross-country travel, the existing NFTS is expected to continue to receive motorized use along with the existing unauthorized routes, and routes proliferation is expected to continue.

All routes are associated with a disturbance zone of influence. The indicators for cumulative effects concerning the NFTS and unauthorized route miles, route density and disturbance zone of influence within habitat for each focal species is identified in Table 3.05-9.

Table 3.05-9. Alternative 1: Cumulative effects measurement indicators 2, 3, 4 and 5

Indicators	2	3	4	5		5	
Species	**Density of Routes Within Habitat[1]**	**Combined Miles of NFTS[38] and Unauthorized Routes within Habitat on NF[39]**	**Number of sensitive sites within ½ mile of *Existing** NFTS and unauthorized routes for TES Species**	**Acres of Habitat Affected by Combined Routes[40] (Habitat Influence Zone) (Square Miles)**		**Percent of Habitat Affected By Route (Habitat Influence Zone)***	
Northern goshawk	2.6	3,668	85[41]	174,282	271	19.40%	Low
Northern spotted owl	3.2	3,001	3018 (nesting and observations) 1,098 known territories	137,005	214	22.87%	Low
Pacific fisher	2.5	3,090	224 (dens and observations)	152,303	237	19.46%	Low
American marten	2.6	1,302	137 (dens and observations)	64,357	100	20.00%	Low
Black bear	3.9	900	N/A	40,285	63	26.94%	Low
Mule Deer	4.4	1,513	N/A	68,387	106	31.12%	Moderate
Elk	5.0	791	N/A	34,999	54	34.35%	Moderate

[38] This also includes 'other' roads such as State or county roads, and private roads within the area.
[39] Combined miles of NFTS (System Roads), other (private, County, State, etc.) and unauthorized routes that are within the area accessible to cross-country traffic.
[40] In Alternative 1, "combined routes" refers to all NFTS routes, all State, County and private routes, all identified unauthorized routes and all acres of habitat inside the lake bottom Zone of Influence within the area of cross-country accessibility.
[41] Note that although there are 38 known territories on the Forest, there are more observed sites. This includes all observed sites.

Indicators	2	3	4	5		5	
Species	**Density of Routes Within Habitat[1]**	**Combined Miles of NFTS[38] and Unauthorized Routes within Habitat on NF[39]**	**Number of sensitive sites within ½ mile of *Existing** NFTS and unauthorized routes for TES Species**	**Acres of Habitat Affected by Combined Routes[40] (Habitat Influence Zone) (Square Miles)**		**Percent of Habitat Affected By Route (Habitat Influence Zone)***	
Bald eagle	3.3	1,134	48	193,391	239	88.66%	High
Hairy Woodpecker	4.5	1,702	N/A	73,408	264	30.64%	Moderate
Pileated Woodpecker	2.5	2,043	N/A	97,706	152	18.86%	Low

*Note that there are no added routes in this alternative; therefore this indicator shows existing routes.

Cumulative Effects Indicator 2

Route density was calculated forest-wide[42] to give an approximate coarse measure of habitat effects for focal species (see Table 3.05-9). The type of impacts depends on the type of route, amount and type of use, and season of use (Gaines 2003). Ouren and Watts (2005) concluded that proximity of secondary routes to arterial roads, highways, and population centers has a large influence on the intensity of use on these routes; the utility of road density analysis at the low-use end of the spectrum diminishes.

Route density thresholds for these species are not well understood. Route densities therefore are presented to compare relative effects between the alternatives rather than absolute thresholds. Under this alternative, which does not prohibit cross-country travel, including travel on existing unauthorized routes, route density is currently 2.6 miles/square mile for goshawk, 3.2 for spotted owl miles/square mile, 2.5 miles/square mile for the fisher, 2.6 miles/square mile for the marten, 3.9 miles/square miles for bear, 4.4 miles/square mile for the mule deer, 5.0 miles/square mile for elk, 3.3 miles/square mile for bald eagle, 4.5 miles/square mile for hairy woodpecker, and 2.5 miles/square mile for pileated woodpecker.

Cumulative Effects Indicator 3

Unauthorized routes constitute 1,252 miles while the transportation system extends across approximately 6,760 miles (5,329 miles of roads open to the public and 1,431 miles of trails). Unauthorized routes currently form about 16% of all the routes found on the Forest, official and unauthorized. Looking at it another way, unauthorized routes represent an 18.5% increase in roads and trails from the current, authorized and maintained system of Forest Service Roads.

[42] Route density was calculated by taking the miles of routes within a species habitat and dividing by the acres of habitat for the species within the boundary of the cross-country traffic accessible area. This does not include wilderness. Note that the relative percent of habitat affected would be substantially lower if it were calculated on the entire Forest land base. We calculate it on the available land for cross-country travel to make the analysis more sensitive to differences and to ensure the densities are calculated on the actual acreage available for cross-country travel.

The current NFTS includes about 2,290 miles of routes within late-successional forest[43] and there are about 630 miles of unauthorized routes within late-successional forest within the Forest, about 22% of the total routes on the Forest, official and unauthorized. The unauthorized routes represent about a 28% increase in routes in relation to the official, authorized routes. There are about 312,110 acres of late-successional forest within the administrative boundaries of the Late-successional Reserves[44] (about 51% of the LSRs). Within the National Forest System lands, there is a slightly higher proportion of late-successional forest (54%).

Within the Late-Successional Reserves, there are about 293 miles of unauthorized routes and about 4,007 miles of official NFTS routes.

Current and foreseeable actions by the Forest Service would reduce the total miles of roads and trails open to vehicle traffic by a relatively insignificant amount at the Forest scale. However, continued unauthorized development of recreational roads and trails by the public could add additional miles of trails.

Although one cannot measure accessible ***areas*** by miles, the total acreage officially accessible (not prohibited) for OHV use is about 499,000 acres. Not all of this area is truly passable with off-road vehicles. Steep cliff areas, areas with too dense vegetation, and areas isolated by both of these conditions exist on the Forest. Small features such as an embankment, a short cliff, an area of chaparral or other obstacle may close off significant areas from access.

Cumulative Effects Indicator 4

There are 85 known northern goshawk nest sites within a half mile of existing roads and trails and all unauthorized routes. There are also 3,018 NSO observations and nesting sites on the Forest (1,098 known territories), 224 marten sites and observations, 137 fisher sites and observations, and 48 bald eagles sites.

The road and trail system on the Shasta-Trinity National Forest, including both NFTS routes and other official routes, when given half mile buffers, covers about 84% of the non-wilderness lands within the administrative boundaries of the Forest. Half-mile buffers on all official roads covers about 1,881,654 acres of the Forest. Half-mile buffers on the unauthorized routes covers about 960,157 acres, about 90% of which is already within the half-mile buffers of existing, authorized routes. The 105,835 acres (96,266 acres of which are not in the wilderness) of half-mile buffer which are not within the buffer of the existing road system would be an additional impact not already considered in the existing system.

[43] Data from shapefile: Road_in_LSF_LRMP_FSonly.shp. Late-successional forest defined as in the LRMP for the Shasta-Trinity NF on page 4-15 as conifer forests with average dbh great than or equal to 21 inches and having at least 10% canopy cover. The late-successional definition is larger and more inclusive of different forest structures than the definitions of goshawk and NSO habitat.
[44] Calculated within the administrative boundary of the Forest.

Nine of the northern goshawk sites, or about 11% of the known sites, are within a half-mile of an unauthorized route that are not also within a half mile of an existing, official route. Five northern spotted owl sites, or about 0.17% of the total sites, are within a half mile of an unauthorized route that are not also within a half mile of an existing, official route.

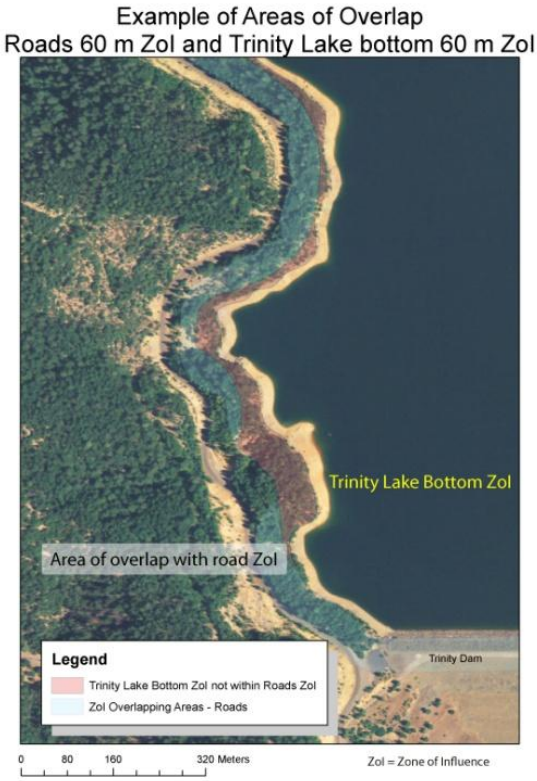


Figure 3.05-6. Example of areas of overlap in 60-m Zone of Influence - Trinity Lake.

Cumulative Effects Indicator 5

Table 3.05-9 indicates that according to the ranking system developed by Gaines et al. (2003), existing NFTS and unauthorized routes impact between 18% and 89% of the available habitat of the focal species within the analysis area. Goshawk, the northern spotted owl, the fisher, the marten, the black bear, and the pileated woodpecker all rank low below 30%. The mule deer, the elk and the hairy woodpecker are all marginally above 30% (moderate human influence) and the existing road system and the unauthorized roads jointly influence 89% of the available bald eagle habitat (high human influence). This would indicate a low level of impact from edge effects, snag and downed log reduction, and habitat loss and fragmentation resulting from route-associated factors (Gaines et al. 2003) for 6 of the 9 species. The habitat influence zone for elk includes 34.35% of the species habitat on the forest. The bald eagle is ranked so high relative to the other species because we use a 300-meter zone of influence for this species, and its habitat is more narrowly defined than most of the other species. Most of the effects revealed by this cumulative habitat influence analysis are from the existing approved transportation system, with only 15.6% of these effects being attributed to the unauthorized routes and the rest to the existing transportation system routes.

Lake Bottom Cumulative effects:

As was stated previously, the lake bottom areas are qualitatively different than the routes and are considered cumulative to the routes proposed. Under direct and indirect effects of lake bottom use, the entire lake bottom Zone of Influence is considered, habitat separated out from the zone and considered in its entirety. However, for cumulative effects analysis, the areas of overlap between the lake bottom zone of influence and existing system roads are subtracted from the lake bottoms in order to isolate those areas that are not considered under other portions of the analysis and in order to avoid double counting those acres that overlap.

As seen in Figure 3.05-6, the full 60-meter Zone of Influence of the lake bottom area overlaps with a 60-meter ZoI of the neighboring road. Where the road is part of the NFTS or official, the area of overlap has been subtracted from the Trinity Lake ZoI to highlight the areas not yet analyzed and to avoid overlapping acres. Direct and indirect effects analysis will consider the entire Zone of Influence, cumulative effects analysis will just consider the non-overlapping areas that are cumulative in effect to the existing road network.

Alternative 1, the no action alternative, would not prohibit lake bottom use on any of the three large reservoirs and the current use patterns are likely to continue.

Table 3.05-10. Lake bottom miles, estimated acres, Total acres potentially affected in Shasta and Trinity Lake and Iron Canyon Reservoir bottom Zones of Influence (ZoI) for Alternatives 1, 2, 4, and 5

Lake and Lake Bottoms	Shasta Lake	Trinity Lake	Iron Canyon Reservoir	Totals Acres (Shasta + Trinity + Iron Canyon) Alt 2	Total Acres (Shasta + Trinity) Alt 1, 4, 5
Total Lake Acres	**28,403**	**15,644**	**429**	**44,476**	**44,047**
Perimeter miles	402.4	148.6	10.9	561.9	551
Perimeter feet	2,124,672	784,608	57,552	2,966,832	2,909,280
Estimated Perimeter Acres 50 foot border	2,439	901	66	3,405	3,339
Estimated Perimeter Acres 100 foot border	4,878	1,801	132	6,811	6,679
Estimated Perimeter Acres 150 foot border	7,316	2,702	198	10,216	10,018
Zone of Influence					
Acres in 60-meter ZoI	9,053.2	3,381.0	428.5	12,862.6	12,434
Late-successional Forest (LSF) in 60-meter ZoI	2,563.4	1,680.2	188.8	4,432.4	4,244
Acres in 300-Meter ZoI	34,700.3	17,522.0	1,145.7	53,367.9	52,222
Acres in ¼ mile ZoI	43,676.5	34,698.0	1,491.6	79,866.2	78,375
LSF in ¼ mile ZoI	13,337.7	10,353.9	1,099.3	24,790.8	23,692

Table 3.05-11. Acres of species habitat potentially affected acres in *Shasta Lake* bottom Zone of Influence (ZoI)

Acres of species habitat potentially affected - Direct, Indirect and Cumulative effects in the 60-meter Zone of Influence (300-meter for the Bald Eagle)	Total species habitat Admin Boundary (acres)	Total species habitat within area of analysis – area of current cross country access (acres)	Species Habitat in Zone of Influence (60 meter or 300 meter) Direct and Indirect (acres)	% of total habitat within lake buffer ZoI D/I	% of total habitat in within area of analysis – area of current cross country access
Goshawk	**1,319,587**	**898,474**	4,222	46.6%	0.47%
Northern spotted owl	**954,575**[45]	**598,985**	448	4.9%	0.07%
Fisher	**1,243,503**	**782,525**	3,231	35.7%	0.41%
Marten	**456,372**	**321,863**	381	4.2%	0.12%
Bear	**255,684**	**149,547**	400	4.4%	0.27%
Mule Deer	**359,784**	**219,732**	1,279	14.1%	0.58%
Elk	**163,697**	**101,885**	1,060	11.7%	1.04%

[45] We do not currently have modeling for NSO habitat on private lands within the administrative boundaries of the Forest. This figure is modeled from FS ownership.

Acres of species habitat potentially affected - Direct, Indirect and Cumulative effects in the 60-meter Zone of Influence (300-meter for the Bald Eagle)	Total species habitat Admin Boundary (acres)	Total species habitat within area of analysis – area of current cross country access (acres)	Species Habitat in Zone of Influence (60 meter or 300 meter) Direct and Indirect (acres)	% of total habitat within lake buffer ZoI D/I	% of total habitat in within area of analysis – area of current cross country access
Bald eagle (300 m ZoI)	**375,656**	**218,134**	5,855	64.7%	2.68%
Hairy Woodpecker	**416,852**	**239,578**	598	6.6%	0.25%
Pileated Woodpecker	**828,629**	**517,993**	1,583	17.5%	0.31%

Note: "Cumulative acres" subtracts those areas of overlap with routes that have been previously evaluated in order to isolate those acres not accounted for in other portions of the analysis and to avoid double counting acres.

Shasta Lake has limited potential for some of the focal species. Goshawk do not commonly nest in the area, northern spotted owls have never been found near the lake and their potential for habitat is very limited, marten tend to prefer higher elevation areas with more snowfall, mule deer are found in abundance around the lake, and elk are found only in the upper reaches of the McCloud and Pitt arms. However, Shasta Lake harbors California's largest population of nesting eagles, offers excellent winter habitat to mule deer, and provides abundant opportunity for hairy woodpeckers. Fisher have recently been found in unexpected habitats around the lake (Lindstrand III 2006) and may be using these areas as transitional habitat or opportunistically for the prey in the area. The pileated woodpecker is not common in this area, but does occur. Black bear can occur intermittently and occasionally appear in campgrounds for opportunistic foraging.

Table 3.05-12. Acres of species habitat potentially affected acres in *Trinity Lake* bottom Zone of Influence (ZoI)

Acres potentially affected - Direct, Indirect and Cumulative effects in the 60-meter Zone of Influence (300-Meter for the Bald Eagle)	Total species habitat admin (acres)	Total species habitat within area of analysis – area of Current Cross Country access (acres)	Species Habitat in Zone of Influence (60 meter or 300 meter) Direct and Indirect (acres)	% of total habitat within lake buffer ZoI - D/I	% of total habitat in within area of analysis – area of current cross country access
Goshawk	**1,319,587**	**898,474**	1,057	31.3%	0.12%
Northern spotted owl	**954,57546**	**598,985**	876	25.9%	0.15%
Fisher	**1,243,503**	**782,525**	1,987	58.8%	0.25%
Marten	**456,372**	**321,863**	1,289	38.1%	0.40%
Bear (OHV def)	**255,684**	**149,547**	86	2.5%	0.06%

[46] We do not currently have modeling for NSO habitat on private lands within the administrative boundaries of the Forest. This figure is modeled from FS ownership.

Acres potentially affected - Direct, Indirect and Cumulative effects in the 60-meter Zone of Influence (300-Meter for the Bald Eagle)	Total species habitat admin (acres)	Total species habitat within area of analysis – area of Current Cross Country access (acres)	Species Habitat in Zone of Influence (60 meter or 300 meter) Direct and Indirect (acres)	% of total habitat within lake buffer ZoI - D/I	% of total habitat in within area of analysis – area of current cross country access
Mule Deer	**359,784**	**219,732**	181	5.3%	0.08%
Elk	**163,69747**	**101,885**	106	3.1%	0.10%
Bald eagle (300- m ZoI)	**375,656**	**218,134**	2,209	65.4%	1.01%
Hairy Woodpecker	**416,852**	**239,578**	232	6.9%	0.10%
Pileated Woodpecker	**828,629**	**517,993**	1,359	40.2%	0.26%

Note: "Cumulative acres" subtracts those areas of overlap with routes that have been previously evaluated in order to isolate those acres not accounted for in other portions of the analysis and to avoid double counting acres.

Trinity Lake is higher in elevation and has quite a different vegetation cover. It is bordered by LSRs and Critical Habitat for the NSO and has abundant amounts of suitable northern spotted owl habitat. Although owls do not tend to nest close to the lake, they are found regularly in drainages leading up from the lake. In the professional opinion of local biologists, northern spotted owls will enter the 60-meter zone of influence around the lake only intermittently for dispersal and possibly foraging because of the presence of anthropogenic influences from existing uses (traffic, human presence etc) and the availability of interior stand habitat away from the lake edge. Fisher and marten are also found in the area, and intermittently venture into the 60-meter zone of influence, although sightings of them on the lake bottom are very rare. Bear also use this area and frequently appear in the campgrounds on the west side of the lake. Bear are likely to be using the 60-meter zone of influence around the lake for walking corridors, water access and to harass camping parties. Elk are not found at Trinity Lake although there is suitable habitat at the north end of the lake. Bald eagles also nest on the lake and are frequently seen foraging in the bays. Both the hairy woodpecker and the pileated occur around the lake and will use snags found within the 60-meter zone of influence.

[47] Note that the California Department of Fish and Game determine that the range of the elk does not cover the entire Forest and only covers about 110,000 acres of a portion of the northern sections of the Forest. In regards to the lake bottoms 60-meter zone of influence, only about 109 acres of habitat are both within the range of the species and suitable. We have taken a more conservative approach in our analysis and have chosen to look at the entire forest realizing that much of the Forest has the potential to support elk even if those populations are not currently there.

Table 3.05-13. Acres of species habitat potentially affected acres in *Iron Canyon* Reservoir bottom Zone of Influence (ZoI)

Acres potentially affected - Direct, Indirect and Cumulative effects in the 60-meter Zone of Influence (300-meter for the Bald Eagle)	Total species habitat admin (acres)	Total species habitat within area of analysis – area of Current Cross Country access (acres)	Species Habitat in Zone of Influence (60 meter or 300 meter) Direct and Indirect (acres)	% of total habitat within lake buffer ZoI - D/I	% of total habitat in within area of analysis – area of current cross country access
Goshawk	**1,319,587**	**898,474**	172	40.2%	0.02%
Northern spotted owl	**954,57548**	**598,985**	132	30.7%	0.02%
Fisher	**1,243,503**	**782,525**	142	33.2%	0.02%
Marten	**456,372**	**321,863**	108	25.3%	0.03%
Bear (OHV def)	**255,684**	**149,547**	3	0.8%	0.00%
Mule Deer	**359,784**	**219,732**	11	2.6%	0.01%
Elk	**163,69749**	**101,885**	1	0.3%	0.00%
Bald eagle (300-m ZoI)	**375,656**	**218,134**	912	212.7%	0.42%
Hairy Woodpecker	**416,852**	**239,578**	32	7.4%	0.01%
Pileated Woodpecker	**828,629**	**517,993**	152	35.4%	0.03%

Note: "Cumulative acres" subtracts those areas of overlap with routes that have been previously evaluated in order to isolate those acres not accounted for in other portions of the analysis and to avoid double counting acres.

Iron Canyon Reservoir is the smallest of the three reservoirs/lakes, but like Trinity is located at a higher elevation and offers more varieties of habitat. Goshawk occur here and forage in the forest around the lake although they are unlikely to spend much time in the zone of influence. Northern spotted owls also occur here and can find suitable nesting and roosting habitat in drainages up from the lake. Both fisher and marten occur here as well as mule deer. Elk can come to the reservoir at times. Both hairy and pileated woodpeckers occur here. Bald eagles also come to Iron Canyon Reservoir although they do not nest with the regularity of the Shasta Lake eagles.

[48] We do not currently have modeling for NSO habitat on private lands within the administrative boundaries of the Forest. This figure is modeled from FS ownership.

[49] Note that the California Department of Fish and Game determine that the range of the elk does not cover the entire Forest and only covers about 110,000 acres of a portion of the northern sections of the Forest. In regards to the lake bottoms 60-meter zone of influence, only about 109 acres of habitat are both within the range of the species and suitable. We have taken a more conservative approach in our analysis and have chosen to look at the entire forest realizing that much of the Forest has the potential to support elk even if those populations are not currently there.

Table 3.05-14. *Total* acres of species habitat potentially affected in Shasta and Trinity Lake and Iron Canyon Reservoir bottom Zones of Influence (ZoI) for Alternatives 1, 2, 4, and 5

	Total species habitat admin (acres)	Total species habitat within area of analysis – area of Current Cross Country access (acres)	Total Alt 2, Mod Alt 2 including Shasta and Trinity Lakes Direct and Indirect (acres)	Total Alt 2, including Shasta and Trinity Lakes Cumulative (Subtracts overlapping acres)	Total Alt 1, 4 and 5 Shasta and Trinity Lakes and Iron Canyon Reservoir Direct and Indirect (acres)	Total Alt 1, 4 and 5 Shasta and Trinity Lakes and Iron Canyon Reservoir Cumulative (acres)
Goshawk	1,319,587	898,474	5,280	5,219	5,452	5,392
Northern spotted owl	954,575[50]	598,985	1,324	1,307	1,455	1,438
Fisher	1,243,503	782,525	5,218	5,174	5,360	5,316
Marten	456,372	321,863	1,670	1,670	1,779	1,779
Bear (OHV def)	255,684	149,547	486	465	489	468
Mule Deer	359,784	219,732	1,460	1,460	1,471	1,471
Elk	163,697[51]	101,885	1,165	1,165	1,167	1,167
Bald eagle (300- m ZoI)	375,656	218,134	8,064	8,275	8,976	9,187
Hairy Woodpecker	416,852	239,578	829	796	861	828
Pileated Woodpecker	828,629	517,993	2,942	2,937	3,093	3,088

Note: "Cumulative acres" subtracts those areas of overlap with routes that have been previously evaluated in order to isolate those acres not accounted for in other portions of the analysis and to avoid double counting acres.
Note: Alternative 3 does not propose adding lake bottom use to the NFTS and does not have any cumulative effects related to lake bottom use.

Alternative 2 propose to include Shasta and Trinity Lake lake bottoms as open areas but do not propose to include the Iron Canyon Reservoir areas. Alternative 1 would not prohibit use of Shasta or Trinity Lake or Iron Canyon Reservoir lake bottoms while Alternatives 4 and five would actively permit their use. Alternative 3 would prohibit use of all three reservoirs for motor vehicle cross country travel.

Alternative 2

Alternative 2 prohibits public motor vehicle travel off designated NFTS roads, trails, and areas except as allowed by permit or other authorization. Approximately 44.20 miles of road and motorized trails would be added to the NFTS and areas below the high-water mark on Shasta Lake (28,403 acres of lake surface, 402 miles of access) and Trinity Lake (15,644 acres lake surface, 149 miles of access) would be open to highway-legal vehicles only with a maximum speed limit of 15 miles per hour. Actual acres of open areas vary depending on water levels and season of use restrictions and miles of access depend on access points, obstacles and topography.

[50] We do not currently have modeling for NSO habitat on private lands within the administrative boundaries of the Forest. This figure is modeled from FS ownership.
[51] Note that the California Department of Fish and Game determine that the range of the elk does not cover the entire Forest and only covers about 110,000 acres of a portion of the northern sections of the Forest. In regards to the lake bottoms 60-meter zone of influence, only about 109 acres of habitat are both within the range of the species and suitable. We have taken a more conservative approach in our analysis and have chosen to look at the entire forest realizing that much of the Forest has the potential to support elk even if those populations are not currently there.

Routes added to the NFTS would be maintained by NFTS standards. This includes management of hazard trees. Hazard trees that are felled along routes in LSRs would be left on the ground. This will benefit all focal species by increasing important habitat components.

Under this alternative, parking and dispersed camping would be allowed within one vehicle length of a designated route. The disturbance effect would be minimal and short-term, given that parking and/or camping is temporary and would not be over 30 feet from the edge of a travel route.

Alternative 2: Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

This alternative would prohibit motor vehicle cross-country travel on 1,599,062 acres, and reduce disturbance to the focal species within this group. In the long-term (20 years), focal species habitat would be expected to passively recover from soil and vegetation impacts caused by unmanaged motorized travel, including cross country travel and the associated routes. Additionally, future route proliferation would also be stopped. The potential impacts discussed under alternative 1 from cross-country travel would not occur. The focal species would not be affected by disturbance, habitat fragmentation, or indirect impacts to prey or food resources from cross-country vehicle travel. Compared to alternative 1, there would be less potential for breeding disturbance and less stress and behavior change from cross-country travel

Motorized cross-country travel open areas in lake bottoms are proposed for addition to the NFTS under this alternative. These areas are currently used under cross-country travel. Adding these currently used lake bottom areas could potentially include (depending on lake levels, time of year and existing Limited Operating Periods, and barriers to travel such as streams and steep banks) as many as 402 miles of accessible areas on Shasta Lake and 149 miles on Trinity Lake for a total of 551 miles of potential route use (below high watermark). Actual acres of use though are highly variable and depend on many variables. As a reference, Shasta Lake covers about 28,403 acres and Trinity Lake covers about 15,644 acres. Although it is highly unlikely that either of these lakes would draw down so far as to expose their entire bed for OHV use, the entirety of both lakes are used regularly for motorized watercraft and offer a similar disturbance profile relative to wildlife concerns.

None of the lake bottom areas are vegetated and because of regular flooding, do not have the potential to develop suitable habitat for any of the focal species.

Table 3.05-15. Alternative 2: Prohibition of cross country travel measurement indicator 1 and 5 for focal species of the late-successional group for direct/indirect effects.

Indicator			1	5	5
Species Group	**Species**	**Total acres of habitat within administrative boundaries of the Forest**	**Total Acres of Habitat available to cross-country travel (no wilderness)**	**Acres of Habitat within 60 meter Influence Zone (Bald Eagle has 300 meter zone) of Lake Bottom Areas (Shasta and Trinity Lakes) Added as Open Areas – Overlapping areas included [52]**	**Acres of Habitat within 60 meter Influence Zone (Bald Eagle has 300 meter zone) of Lake Bottom Areas (Shasta and Trinity Lakes) Added as Open Areas[53] - Overlapping areas excluded**
Late-Successional Forest (LSF)	**Northern goshawk**	**1,319,587**	**0**	3,728	3,353
	Northern spotted owl	**954,575[54]**	**0**	1,329	1,462
	Pacific fisher	**1,243,503**	**0**	1,662	1,487
	American marten	**456,372**	**0**	1,678	1,518
Wide-ranging	**Black bear**	**255,684**	**0**	328	252
Ungulate	**Mule Deer**	**359,784**	**0**	1,656	1,385
	Elk	**163,697[55]**	**0**	1,123	1,123
Riparian	**Bald Eagle**	**375,656**	**0**	49,485	30,619
Cavity-dependent	**Hairy Woodpecker**	**416,852**	**0**	768	599
	Pileated woodpecker	828,629	**0**	2,819	2,523

Late-Successional Forest Focal Group

Implementation of Alternative 2 would prohibit cross-country travel on about 898,000 acres of northern goshawk habitat, 598,000 acres of northern spotted owl habitat, 782,000 acres of fisher habitat and about 321,000 acres of marten habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel.

[52] This first set of figures includes all suitable habitats within the 60-meter or 300 meter zone of influence for each species.

[53] Note that the zones of influence on the official or NFTS routes overlap to some degree with the unauthorized routes. Where these zones overlap, the impact of the unauthorized route is being already considered in the existing route. Although there may be an additional cumulative effect with the proximity of two roads, most likely these roads are connected and activity on one is the same as activity on the other. This second column for Indicator 5 has subtracted the overlapping acreage of the zones of influence of the existing NFTS roads and trails and the existing county, State and private roads. Subtracting these acreages prevents them from being double counted in the cumulative effects.

[54] We do not currently have modeling for NSO habitat on private lands within the administrative boundaries of the Forest. This figure is modeled from FS ownership.

[55] Note that the California Department of Fish and Game determine that the range of the elk does not cover the entire Forest and only covers about 110,000 acres of a portion of the northern sections of the Forest. In regards to the lake bottoms 60-meter zone of influence, only about 109 acres of habitat are both within the range of the species and suitable. We have taken a more conservative approach in our analysis and have chosen to look at the entire forest realizing that much of the Forest has the potential to support elk even if those populations are not currently there.

Wide-Ranging Focal Group

This alternative would prohibit cross-country travel on 150,000 acres of habitat for the black bear, the wide-ranging focal species, and would prevent disturbance to bears and alterations of their habitat from cross-country travel. Alternative 2 would prohibit off-road vehicle use that could affect bears and their habitat though direct disturbance, trampling of habitat elements or indirect impacts to bear through impacts on their prey or food resources.

Ungulate Focal Group

This alternative would prohibit cross-country travel on 219,000 acres of the available habitat, of mule deer habitat and 101,000 acres of the available habitat, of elk habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. Mule deer and elk would not be affected by disturbance, collision, or indirect impacts to food resources due to off-road vehicle use.

Riparian Focal Group

This alternative would prohibit cross-country travel on 218,000 acres of focal species (bald eagle) habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. The focal species would not be affected by disturbance, habitat fragmentation, or indirect impacts to prey or food resources from cross-country vehicle travel.

Cavity-Dependent Focal Group

This alternative would prohibit cross-country travel on 239,000 acres of the available habitat, of hairy woodpecker habitat and 517,000 acres of the available habitat, of pileated woodpecker habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. Hairy woodpeckers and pileated woodpeckers would not be affected by disturbance, collision, or indirect impacts to prey or food resources due to off-road vehicle use.

Alternative 2: Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

This alternative would add approximately 44 miles of routes to the NFTS. Table 3.05-16 displays the route mileage of the proposed route additions within habitats used by the focal species. These route additions are offset in the long-term by the prohibition on cross-country travel and the passive restoration that is expected to occur on the routes not added to the NFTS that would have begun to improve habitat conditions for ungulate species. In this alternative the impacts from the additions to the route system are substantially reduced compared to the impacts of alternative 1, and augmented additionally by the cessation of impacts from cross-country travel. Overall, impacts from this alternative should be a reduction in effects to habitat by offsetting the addition of 44.2 miles to the NFTS with the passive

restoration of 1,208 miles of unauthorized routes, and eliminating the potential habitat degradation from cross-country travel.

In addition, motor vehicle use of about 551 miles[56] of lake bottoms (areas below high-water mark) would be allowed on Shasta Lake and Trinity Lake. Limiting vehicles to 15 mph and requiring highway legal configurations will limit the disturbance and noise to below the current use conditions. Limiting lake bottom use is likely to cause some increase in other activity on neighboring NFTS roads and trails and may increase watercraft use near to shore as recreationists seek access to favorite areas. Continued use as proposed under this alternative, however, represents an increase in general noise exposure from the full closure alternatives, but not significantly due to continued use on the lake itself by watercraft, continued use on neighboring NFTS roads and trails and general background noise from other activity.

Table 3.05-16. Alternative 2: Direct/Indirect effects measurement indicators 3, 4 and 5

Indicator		3	4	5		5
Species Group	**Species**	**Miles of Routes Added to the NFTS within Habitat on NF**	**# of TES Sites Within ½ Mile of Added Routes**	**Acres of Habitat Affected by Added Routes (Habitat Influence Zone) (Square Miles)[1]**		**Percent of Habitat Affected By Added Routes (Habitat Influence Zone)***
LSF	**Northern goshawk**	13.3	1	634	0.99	0.07%
	Northern spotted owl	7.5	2	387	0.61	0.06%
	Pacific fisher	7.2	0	401	0.63	0.05%
	American marten	3.0	0	154	0.24	0.05%
Wide-ranging	**Black bear**	9.6	N/A	474	0.74	0.32%
Ungulate	**Mule Deer**	16.0	N/A	791	1.24	0.36%
	Elk	11.8	N/A	545	0.85	0.53%
Riparian	**Bald Eagle**	2.2	1	1,027	1.61	0.47%
Cavity-dependent	**Hairy Woodpeckers**	7.8	N/A	354	0.55	0.15%
	Pileated Woodpecker	4.5	N/A	244	0.38	0.05%

* Habitat influence zone is a 300 meter buffer around routes for bald eagle and a 60 meter buffer around routes for all other species. The percent of habitat is calculated by comparing it to all habitat within the forest ownership including wilderness.

Late-Successional Forest Focal Species

This alternative would add about 8 miles of routes within LSRs on the STNF, or 381 acres within the 60 meter habitat influence zone. The addition of these routes would affect the focal species mostly through disturbance. This alternative would reduce the potential for disturbance by reducing route mileage within northern goshawk habitat by approximately 448 miles, within northern spotted owl habitat by 341 miles, within fisher habitat by 356 miles and within marten habitat by 148 miles over the existing condition.

In addition, existing unauthorized, off-road routes impact five different Late Successional Reserves, nineteen spotted owl critical habitat units, and nine spotted owl core areas. Five documented goshawk

[56] Lake bottom acreages cannot be reliably measured – they are highly variable and continuously changing. Mileages may be reasonably accurate, but do not represent the width of a typical roadway.

sites are located within ½ mile of existing unauthorized, off-road routes (Table 3.05-16). In addition to these documented sites, Alternative 2 would prohibit cross country motor vehicle travel on:

- 448 miles of unauthorized routes that occur in suitable northern goshawk habitat while adding only 13 miles of routes in suitable goshawk habitat to the NFTS,
- 341 miles of unauthorized routes that occur in northern spotted owl habitat while adding only 7 miles of routes in suitable northern spotted owl habitat to the NFTS;
- 356 miles of unauthorized routes that occur in suitable fisher habitat while adding only 7 miles of routes in suitable fisher habitat to the NFTS;
- And 148 miles of routes within suitable marten habitat while adding only 3 miles of routes in suitable marten habitat to the NFTS.

Although Alternative 2 potentially influences 634 acres of goshawk habitat, 387 acres of NSO habitat, 154 acres of marten habitat and 401 acres of fisher habitat in the 60-meter zone of influence to be affected by authorizing new routes, it prohibits similar influence on over 750,000 acres of goshawk habitat, 480,000 acres of NSO habitat, over 650,000 acres of fisher habitat, and over 265,000 acres of marten habitat. Each addition is less than 0.01% of the amount of habitat potentially affected under the no-action alternative.

Two northern spotted owl territories and one goshawk site are located within ½ mile of routes proposed to be added to the NFTS in this alternative (see Table 3.05-16). Routes proposed for addition to the NFTS under this alternative also include routes in five Late-Successional Reserves (Table 3.05-17), two northern spotted owl core areas (Table 3.05-18), and multiple northern spotted owl critical habitat units (Table 3.05-19).

In addition to the existing seasonal closures that affect 220 NFTS routes, seasonal closures are proposed under this alternative for one additional route (Table 3.05-20). This is specific to one goshawk nest site. Routes within close proximity to goshawk sites will have a limited operating period from February 1 to August 15. Therefore, this alternative would have no effect on northern goshawk from the use of added routes within ½ mile of a goshawk nest site. Seasonal closure would be added protection for 13 percent of known goshawk nest sites (see appendix D for a full list of routes).

Table 3.05-17. Alternative 2: Routes proposed for addition to the NFTS within late successional reserves (LSRs)

Route No.	Miles in LSR RC 330	Miles in LSR RC 331	Miles in LSR RC 332	Miles in LSR RC 334	Miles in LSR RC 357
JG30				0.18	
JG31				0.21	
JM244				0.10	
JM44				0.15	
NRA1				0.26	
PM2004	0.32				
PM702	0.04				
RM1036	0.52				

Route No.	Miles in LSR RC 330	Miles in LSR RC 331	Miles in LSR RC 332	Miles in LSR RC 334	Miles in LSR RC 357
SFMU4	0.02				
SFMU6	0.02				
SFMU7	0.01				
TC1098			0.05		
TC1238			0.04		
TC1249			0.06		
TC319	0.12				
TC828	0.08				
TRMU2			0.54		
TRMU3			0.15		
TRMU5			0.19		
TRMU6			0.14		
U29N28C		0.51			
U31N02Q		0.28			
U35N85A				0.02	
U40N13D					0.10
U4N12D	3.29				
UT29N30HA	0.23				
Totals	**4.64**	**0.79**	**1.16**	**0.92**	**0.10**
Grand Total: 7.6 miles					

Table 3.05-18. Alternative 2: Routes proposed for addition to the NFTS and associated mileage within designated NSO core areas

Route ID	Within NSO Core Area[a]	Miles	Grand Total within a core area
TC1249	3935	0.06	**0.06**
TC899	9106	0.02	**0.02**
Total			**0.08**

a - ID is last 4 numbers of GIS layer in Attribute table CMN_OBS_CN
b - Added 0109 twice

Table 3.05-19. Alternative 2: Routes proposed for addition to the NFTS within northern spotted owl designated critical habitat units (CHUs)[a]

Route ID	Shasta/McCloud CHU (2008)	Shasta/Trinity Lakes CHU (2008)	South Fork Mountain Divide CHU (2008)	Western Klamath/Siskiyou Mountains CHU (2008)	1992 Designated CHUs
JG30		0.18			
JG31		0.21			
JM244		0.10			
JM44		0.15			
mc090					0.88
mc091					0.20
mc092					0.22
mc097					0.10
mc098					0.31
mc102					0.67
mc104					0.17
mc105					0.05
mc106					0.26
mc110					0.44
mc115					0.74
NRA1[57]		0.26			
pc025					2.10

[57] NRA1 is physically located in critical habitat, but has been determined to have "No Effect" on critical habitat.

Route ID	Shasta/McCloud CHU (2008)	Shasta/Trinity Lakes CHU (2008)	South Fork Mountain Divide CHU (2008)	Western Klamath/Siskiyou Mountains CHU (2008)	1992 Designated CHUs
pc026					0.21
pm2004					0.32
PM702			0.04		
SFMU4			0.02		
SFMU6			0.02		
TC1004					0.12
TC1098				0.05	
TC1238				0.04	
TC1249				0.06	
TC1829					0.14
TC828			0.08		
TRMU5				0.19	
TRMU6				0.14	
U29N28C				0.51	
U31N02Q				0.28	
U35N85A		0.02			
U40N13D[58]	0.10				
U4N12D			2.82		
UT29N30HA					0.80
	0.10	**0.92**	**2.96**	**1.26**	**7.73**
Grand Total = 12.97 miles					

a - Note: In 1992 the Fish and Wildlife Service determined critical habitat for the owl. In 2008, the Service revised the original designations. In 2009, the FWS requested the courts to allow them to withdraw the 2008 designation. In order to ensure we have adequately analyzed all critical habitat designations, we have included both of these critical habitat designations here for analysis.

Table 3.05-20. Alternative 2: Route proposed for addition to the NFTS with limited operating period (LOP) for goshawk

Route ID	Miles	LOP	Season of Use
TC1249	0.06	Feb 1–Aug 15	Aug 16–Jan 31

Alternative 2 proposes to allow lake bottom use at Trinity and Shasta Lakes. The lake bottoms are those areas bordering reservoirs that are exposed and barren during periods of low water. When the water is low, recreationists have access to the lake bottoms at roads, marinas and trails that reach the lake shore edge. Trinity Lake has about 149 miles of perimeter of which about 127 miles (about 85%) are already within a quarter mile of a currently used NFTS road. Typically, entry points occur variably around the lake, with at least 23 points easily recognizable. Not all areas of the lake are accessible and continuous passage along the lake shore is commonly blocked by streams, steep walls, and other obstructions.

Under Alternative 2, only 2 known sites are within ½ mile of the proposed routes and the territories of two reproducing owls are within the ½ mile buffer around Trinity Lake (as well as within the ¼ mile buffer more commonly used for disturbance issues with the owl). Twenty northern spotted owl survey sightings have taken place within ½ mile of the lake edge and none of those were confirmed nesting or reproducing. There are no known spotted owl sightings or nest sites within ½ mile of Shasta Lake. There are no known goshawk sightings or nest sites within ½ mile of either lake.

[58] U40N13D is physically located in NSO critical habitat, but has been determined to have “No Effect” on critical habitat.

Very few den sites for the marten or fisher are known on the Forest and none occur within ½ mile of either Shasta or Trinity Lake. Sixteen fisher sighting have been reported within ½ mile of Shasta Lake, three from the 1980's and thirteen from recent surveys (Lindstrand III 2006). Two of these were seen in the 1960s in chaparral and the third was recorded on remote camera near one of the marinas. Three fisher have been reported from within ½ mile of Trinity Lake. Marten have not been seen in either site and would not be expected at Shasta Lake due to the elevation and would be thought unusual at Trinity.

In the DEIS, Trinity Lake contained a Limiting Operating Period for the NSO to reduce the disturbance potential for this species. Although the perimeter is not all accessible by motorized vehicle traffic, the entire lake is generally accessible to motorized watercraft. Without any buffering of vegetation, sound carries well over water and motorized watercraft around the lake creates irregular patterns of disturbance similar to off-road vehicles.

About 13 miles or about 8.7% of the perimeter has a high probability of having NSO present within a quarter mile of the lake edge.[59] An additional 13 miles has a moderate probability of finding owls. Of the high and moderate probability areas, about 11 miles of shoreline are not readily accessible.

However, the area already has a high baseline of disturbance due to proximal roads and high lake traffic. Most of the lake bottom use occurs late in the season when levels are low. In contrast, owls are most sensitive to disturbance when lake levels are high and access is more restricted. Damiani et. al. (2007) (Damiani 2007) looked at 19 years of demographic data on the Shasta-Trinity and Six Rivers National Forests and compared it with known disturbances in the area. They found that noise conducted in the breeding season did not have immediate effects on the reproductive output of NSO. This is consistent with Delaney studies on the Mexican Spotted owl and the northern spotted owl (Delaney, Grubb et al. 1997; Delaney and Grubb 2001). However, the data did suggest that in high quality habitat, disturbance could have a cumulative negative effect only seen over a full decade of disturbance. It wasn't clear, however, whether those effects are caused by the noise or by changes in habitat quality. Additionally, all of the action alternatives that allow motor vehicle access on the lake bottoms have speed limits of 15 mph (alternative 2) or 10 mph (alternatives 4 and 5) and use is for access to the water's edge for water based recreation, not as OHV play areas. In the professional opinion of local Forest Service biologists, motor vehicle use under these conditions will be substantially quieter than higher speeds, associated with an OHV play area and are not likely to reach noise levels documented by Delaney (2001) that would be cause for concern. Given these elements, the addition of a limited operating period (LOP)

[59] This is determined by applying the 'baseline' model to the lake edges to estimate probabilities of owls occurring in any given area (Zabel, C. J., L. M. Roberts, et al. (1999). A collaborative approach in adaptive management at a large landscape scale. *Predicting Species Occurrences: Issues of Accuracy and Scale*, Zabel, C., J. Dunk, et al. (2000). "Analysis of the effectiveness of various northern spotted owl definitions at predicting their presence or absence in California." Northwestern Naturalist 81(2): 93-94; Zabel, C. J., J. R. Dunk, et al. (2003). "Northern spotted owl habitat models for research and management application in California (USA)." Ecological Applications **13**(4): 1027-1040.)

for northern spotted owls along the Trinity Lake margins (lake bottom) as suggested in the Draft EIS is not likely to provide any additional protection for the owl and has been removed.

Similarly, the DEIS also proposed some LOPs on routes for the northern spotted owl that have been reconsidered in this analysis. As stated above, NSO appear to be relatively less sensitive to disturbance than was previously believed. Although they may respond both behaviorally and physiologically to local disturbances they do not appear to affect the breeding or reproduction of the owl. Chronic noise such as the development of a new marina or staging area may have more serious consequences for the owl, but Alternative 2 does not propose these kinds of facilities. For more detail concerning this decision, please see the "Changes between the DEIS and FEIS Applicable to All Alternatives" section at the beginning of this chapter.

About 35 miles of 2008 NSO critical habitat and about 32 miles of 1992 NSO critical habitat borders Trinity Lake and the Lake bottom areas. The actual critical habitat areas are not part of the proposal and their principal component elements will not be affected by lake bottom recreational use. The lake bottoms themselves are outside of the critical habitat borders and are not capable of growing suitable northern spotted owl habitat due to regular flooding. Because these areas are outside of designated critical habitat and will not affect the principal component elements of critical habitat, their use will not affect critical habitat and are within the conditions set by the programmatic consultation developed with the U.S. Fish and Wildlife Service for motor vehicle management. Typically, "no effect" determinations for effects to critical habitat do not require consultation with the FWS.

This alternative would add routes to the NFTS, and would prohibit cross-country travel and discontinue use of unauthorized routes. Species in this group could be impacted by the additional miles of routes added to the NFTS. However, the physical habitat impact would be small. The 13.3 miles of routes added to the NFTS in northern goshawk and the 7.5 miles of route in northern spotted owl habitat in this alternative are equivalent to a habitat influence zone of about 600 acres for the northern goshawk and about 400 acres for the northern spotted owl. For marten and fisher, the habitat area affected by adding routes to the NFTS equates to about 150 and 400 acres respectively. These route additions are offset at the 20-year, long-term point by the prohibition on motor vehicle cross-country travel on approximately 1.6 million acres and the passive restoration that is expected to occur on the routes not added to the NFTS that would have begun to improve habitat conditions for late-successional species. In this alternative the impacts from the route system are substantially reduced compared to the impacts of alternative 1, and augmented additionally by the cessation of impacts from motor vehicle cross-country travel.

Wide-Ranging Focal Species

About 44 miles of routes (9.6 miles within black bear habitat) would be added to the NFTS. The 9.6 miles of routes added to the NFTS that are located within black bear habitat under this alternative results in a habitat influence zone of 160 acres.

Lake bottom use on Shasta and Trinity Lakes would continue to affect 465 acres of high quality black bear habitat, 395 acres of which are already within the zone of influence of an existing NFTS or other authorized road, within the 60 meter zone of influence or about 2.6% of the entire 60-meter zone of influence or less than 0.5% of either the amount of bear habitat on the Forest or the amount of bear habitat on the Forest currently available for cross-country motorized vehicle use.

As was mentioned before, bears are wide-ranging and adaptable and will utilize a variety of habitat types depending on conditions. They can be relatively irresponsive to disturbance (as attested to by the presence of black bears in many of our campgrounds) and are likely to continue to use the areas adjacent to the lake bottoms and are likely to be able to cross the open areas for water or easy passage.

Ungulate Focal Species

Twelve miles would be added to the NFTS in elk habitat and 16 miles within mule deer habitat (Table 3.05-16). This alternative would reduce the potential for disturbance by reducing route mileage within deer and elk habitat by approximately 277 and 174 miles, respectively, over the existing condition. The 16 and 12 miles of routes added to the NFTS in deer and elk habitat, are equivalent to a habitat influence zone of 791 and 545 acres, respectively. Although mule deer occur through the Forest, elk currently only occur in more highly restricted areas. They do occur in the upper reaches of the Pitt and McCloud arms of Shasta Lake, and have potential to occur on both Trinity Lake and Iron Canyon Reservoir. We have conservatively analyzed potential impact to elk by looking at their full potential range.

Within the 60 meter buffer around Shasta Lake, there are 1,279 acres of key mule deer habitat (14.1% of the total buffer) and 181 acres (5.3% of the total) on Trinity Lake. Lake bottom activity is unlikely to be a disturbance factor for deer – they acclimatize easily to nearby disturbance and are unlikely to be affected by the activity itself. Similar to their use of roadside areas, deer may use the margins of the lake bottom areas for grazing. These margins receive more sunlight and can be valuable forage for deer. Deer may occasionally cross the larger barren area to drink water from the lake itself, exposing themselves to possible collisions with OHV. Slower speed limits, and high visibility and differential use times (deer tend to be active in the early morning and early evening whereas higher OHV activity happens mid-day) reduce the probability of collisions considerably. Forest Service law enforcement on both Shasta and Trinity Lakes have no record of collisions actually occurring between recreationists and deer on the lake in the last 10 years.

Elk prefer somewhat different habitats than deer and have less key habitat around the lakes. Shasta Lake has about 1,060 acres (11.7% of total buffer) of potential key elk habitat in the 60-meter buffer around the lake and about 106 (3.1% of the total buffer) acres around Trinity Lake. Elk are less common than deer, but also acclimatize readily to non-threatening disturbance. They are large animals and even less likely to collide with vehicles than deer. Although they will also come to the lake margins to drink, they are rarely sighted near the lake shore when the water is drawn down and have alternative water sources in the uplands.

Riparian Focal Species

This alternative would reduce the potential for disturbance by reducing route mileage within bald eagle habitat by approximately 123 miles, over the existing condition. Of the 44 miles of routes added to the NFTS, 2.2 miles are within bald eagle habitat (Table 3.05-16). These 2.2 miles of routes are equivalent to a habitat influence zone of 1,027 acres, or 0.47 percent of the total bald eagle habitat on the forest.

One bald eagle nest site is located within ½ mile of a route proposed for addition to the NFTS (JM72 which is 0.06 miles). This route will have a limiting operating period of January 1 to August 15 to avoid disturbance effects. Therefore, this alternative would have no effect on bald eagle from the use of added routes.

Under this alternative, motor vehicle use of lake bottoms (areas below high-water mark) would be allowed on Shasta Lake and Trinity Lake. Existing limited operating periods of January 1 to August 15 would be applied to Shasta Lake and Trinity Lake to reduce the disturbance potential of this species during critical nesting and brood rearing seasons. See Table 3.05-11 for the total amount of acres. Some other restrictions on this area include a 15 mph speed limit restriction for resource protection, and highway-legal vehicles only.

Table 3.05-21. Alternative 2: Total open area acres restricted for bald eagle protection

Open Areas	Bald Eagle Acres
Shasta Lake Area	2,205
Trinity Lake Area	649
Total	**2,854**

Cavity-Dependent Focal Species

This alternative would add 8 miles of routes in hairy woodpecker habitat and 4.5 miles of routes in pileated woodpecker habitat to the NFTS (Table 3.05-16). This alternative would reduce the potential for disturbance by reducing route mileage within the hairy woodpecker habitat by approximately 264 miles and pileated woodpecker habitat by approximately 237 miles over the existing condition.

Hairy woodpeckers have about 796 acres of habitat within the 60-meter zone of influence around Shasta and Trinity Lakes, or about 6% of the total acreage within the zone of influence, less than 0.1% of the total habitat available on the Forest. Although data regarding their sensitivity to disturbance is limited, hairy woodpecker's practice of occasionally excavating the sides of buildings and their presence in developed areas suggest that they are relatively insensitive to these kinds of disturbances and are unlikely to be affected strongly by OHV activity in the lake bottoms. Safety concerns may lead to some felling of snags at the edges of the lake bottoms, but give the large acreages outside of the zone of influence and the inherent dynamics of snags, this is not likely to be significant. Given the Forest type in this area, an unharvested forest may have as many as 344 snags 10" dbh and over on any given 40 acres area (about 8.6 snags per acre), likely to be clumped so that 40% or 16 acres may have 6 snags per acre, 9 acres may have no snags at all, 12 acres may have 12 per acre, 3 acres may have as many as 300 per acre and less

than one acre may have as many as 49 per acre (Mellen, Marcot et al.). If every quarter mile of lake frontage represents the edge of a 40 acre block, then the removal of 2 snags over 10 inches dbh in that frontage would only represent a 0.6% reduction in snags through that area. Even if as many as 10 snags per quarter mile were removed, it would still be a reduction of only 3% throughout the 40 acre block. Given the flexibility of the hairy woodpecker and the variability of snag occurrence in this area, lake bottom use is unlikely to significantly affect this species' use of snags in the area.

Similar to the hairy woodpecker, pileated woodpeckers are considered somewhat insensitive to anthropogenic disturbance, although individuals may vary (Bull and Jackson 1995) they are not likely to be significantly disturbed by OHV activity at the lake margins.

They use larger snags than the hairy woodpecker (20" dbh) and a generally have a larger territory. Snags this large are less common in the typical landscape and in unharvested woodland of the type that provides habitat for the pileated woodpecker, we may expect to find about 138 snags 20" dbh and greater per 40 acres block, distributed in such as way that 13 acres may have no snags at all, 4 acres may have 2 snags per acre, 16 acres may have 4 snags per acre, 6 acres may have 8 snags per acre and 1 acre may have as many as 18 snags per acre. Removal of 2 snags of this size over a quarter mile length of lake margin would reduce the snag levels by about 1.5%.

Alternative 2: Cumulative Effects

Cumulative effects must take into account present and reasonably foreseeable actions (identified in Appendix B). Present and reasonably foreseeable projects include ongoing and future timber harvest, vegetation restoration, fuels management, grazing allotments, road management including closures and decommissioning, recreation use, fire salvage, and mining reclamation which could have effects that would mitigate or add to the effects of this action. In addition, unplanned events such as wildfires and tree mortality related to periodic droughts will continue to affect habitat. Road maintenance and hazard tree removal will continue on the existing NFTS, as well as the routes that are added to the system under this alternative, and will continue to potentially affect the 60 meter habitat influence zone. Many of the above actions also have the potential to increase road density temporarily (i.e., forest product projects with timber harvest, fuels management projects, pre-commercial thinning projects, grazing allotments, and mining). The primary effects of increases in road density are related to increase disturbance and habitat fragmentation.

Table 3.05-22. Alternative 2: Total NFTS with Alternative 2 routes, measurement indicators 2, 3, 4 and 5

Indicators	2	3	4	5		5
Species	**Density of Routes Within Habitat[1]**	**Combined Miles of NFTS and Unauthorized Routes within Habitat on NF**	**Number of sensitive sites within ½ mile of *Existing*[2] NFTS and unauthorized routes for TES Species**	**Acres of Habitat Affected by Combined Routes (Habitat Influence Zone) (Square Miles)**		**Percent of Habitat Affected By Route (Habitat Influence Zone)[3]**
Northern goshawk	2.29	3,221	83	149,300	233	16.62% - Low
Northern spotted owl	2.84	2,661	2798	118,666	185	19.81% - Low
Pacific fisher	2.24	2,734	224	132,015	206	16.87% - Low
American marten	2.29	1,154	137	55,915	87	17.37% - Low
Black bear	3.23	755	N/A	32,993	52	22.06% - Low
Mule Deer	3.60	1,237	N/A	54,522	85	24.81% - Low
Elk	3.88	617	N/A	26,994	42	26.49% - Low
Bald eagle	2.97	1,011	15	150,077	234	68.80% - High
Hairy Woodpecker	3.84	1,438	N/A	59,754	93	24.94% - Low
Pileated Woodpecker	2.23	1,806	N/A	84,513	132	16.32% - Low

[1] Density of routes measured to the area of the Forest where cross country travel is not prohibited.
[2] "Existing" NFTS and unauthorized routes refers to the current, authorized road and trail system including both official Forest Service roads and other publically or privately owned authorized roads and trails.
[3] The % of habitat affected by the route is calculated using the amount of habitat found within the 60-meter and 300-meter zones of influence for both the routes and the lake bottoms and dividing it by the amount of habitat found within the area of the Forest where cross country travel is not prohibited.

The present and reasonably foreseeable actions in appendix B include 5.60 miles of routes proposed for addition to the NFTS, 0.46 miles of new construction and 186 miles of NFTS roads proposed to be closed, abandoned, or decommissioned. This would result in a net decrease of 180 miles of routes. This proportion of the total proposed actions forest-wide is not expected to have significant impacts. Furthermore, the routes added to the NFTS do not constitute a change to habitat, but rather are an existing condition where vegetation change impact has already occurred and where conditions would continue into the future.

The Shasta-Trinity NF (forest ownership only) currently contains about 842,042 acres of late-successional forest as defined by the LRMP. The current NFTS includes 1,885 miles of routes within late-successional habitat. The combined miles of NFTS and existing unauthorized routes within habitat for each focal species are identified in Table 3.05-22.

Compared to Table 3.05-9, the cumulative effects of the no action alternative, alternative 2 reduces most of the indicators with the exception of the miles of all routes (because routes are not added but left open to general off-road travel, they are not counted in miles or as routes in Alternative 1). This alternative is expected to provide a measurable reduction in cumulative effects from disturbance by substantially reducing the area of habitat influence. Vehicle-related impacts from this alternative may

aggregate with other impacts occurring on the landscape, but these cumulative impacts would still be less than the no action alternative.

Cumulative Effects Indicator 2: Density of Roads, Motorized Trails and Open Routes

Route density was averaged forest-wide, to give an approximate coarse measure of habitat effects (see Table 3.05-22). The type of impacts to species depends on the type of route, amount and type of use, and season of use (Gaines 2003). Ouren and Watts (2005) concluded that proximity of secondary routes to arterial roads, highways, and population centers has a large influence on the intensity of use on these routes; the utility of road density analysis at the low-use end of the spectrum diminishes. Route density thresholds for the focal species are not well understood. Route densities therefore are presented to compare relative effects between the alternatives. Under this alternative which prohibits cross-country travel and unauthorized routes, route density is 2.29 miles/square mile for goshawk, 2.84 for spotted owl miles/square mile, 2.24 miles/square mile for fisher, 2.29 miles/square mile for marten, and 3.23 miles/square mile for black bear, 2.97 miles/square mile for eagle, 3.84 miles/square mile for hairy woodpecker and 2.23 miles/square mile for pileated woodpecker.[60]

Cumulative Effects Indicator 3: Miles of Motorized Routes

Table 3.05-23. Alternative 2: Miles of all current NFTS and proposed routes and the amount of habitat within the zone of influence for each focal species

Species	Miles of Routes (Current NFTS plus the added routes)	Acres of Suitable Habitat in 60-meter (or 300-meter for the bald eagle) Zone of Influence for all current NFTS routes plus added routes.	Square Miles of Suitable Habitat in 60-meter (or 300-meter for the bald eagle) Zone of Influence for all current NFTS routes plus added routes.
Northern goshawk	3,221	149,300	233
Northern spotted owl	2,661	118,666	185
Pacific fisher	2,734	132,015	206
American marten	1,154	55,915	87
Black bear	755	32,993	52
Mule Deer	1,237	54,522	85
Elk	617	26,994	42
Bald eagle	1,011	150,077	234
Hairy Woodpecker	1,438	59,754	93
Pileated Woodpecker	1,806	84,513	132

As shown in Table 3.05-23, up to 99% of the effects of routes on the Forest are from the currently authorized, existing National Forest Transportation System. The proposed routes add very little additional effect, incrementally, to the existing system.

The routes added under this alternative would require maintenance under the NFTS, including hazard tree removal. In addition to road maintenance impacts, other present and reasonably foreseeable impacts on the forest include vegetation management, prescribed fire, and grazing (Appendix B).

[60] Lake bottom areas are variable in their width and an edge effect to the lake itself. We have not included lake bottom areas into the road density calculations.

Removal of trees during road maintenance (hazard tree removal) has the potential to impact late-successional focal species. Generally, these species are affected negatively by actions that reduce the average tree size, or reduce canopy closure. Long-term trends have generally been negative for the late-successional focal species group, as can be seen by the listing of the northern spotted owl as "Threatened," and by the identification of Forest Service "Sensitive" species such as northern goshawk, marten, and fisher.

Vegetation management and prescribed fire have the potential to impact the wide-ranging focal species by removing important habitat elements such as downed logs, snags, hollow trees and mature shrubs that are used for cover, or that are important to the life histories of prey. Generally, this group of species is affected negatively by extensive mechanical and prescribed fire treatments that reduce these important habitat elements; although some elements, such as snags and down logs, can be increased by the application of prescribed fire.

Vegetation treatments and grazing have the potential to impact species in the ungulate focal species group by removing forage, impeding the growth of forage, or altering vegetative structure that provides cover. Generally, this group of species is affected negatively by extensive grazing, and mechanical and prescribed fire treatments that reduce these important habitat elements.

Removal of trees has the potential to impact riparian focal species. Past trends for this group have generally been negative, but have improved greatly for bald eagles (hence their delisting). Generally, this group of species is affected negatively by actions that reduce the average tree size.

Vegetation management and prescribed fire has the potential to impact species in the cavity-dependent species group by removing important habitat elements, such as downed logs, snags, and hollow trees, or that are important to the life histories of prey. Generally, this group of species is affected negatively by extensive mechanical treatments that reduce these important habitat elements; although some elements, such as snags and down logs, can be increased by the application of prescribed fire. Conversely, the species in this group tend to benefit from wildfires, prescribed fire, insect outbreaks and densely stocked timber stands. The benefits from these conditions are a result of higher quantities of snags, stressed trees and higher insect populations that provide improved foraging for these primarily insectivorous species.

Timber harvest and mechanical fuels treatments must meet minimum retention requirements for down logs and snags, thereby ameliorating the potential negative effects to cavity-dependent species from direct removal of snags. However, reduced stand density from timber harvest results in stronger trees that are more resistant to insects. The lower rates of mortality in treated stands thus result in lower densities of snags and ultimately, downed logs. This effect can last 20 years or more until stand density increases sufficiently to cause tree stress and death. Snag density is encouraged through the retention of existing snags, but as snags fall, the reduced snag recruitment rate can result in areas being below target levels of snag density. This is detrimental to those cavity nesters depending on snags for forage and nesting

substrates. Prescribed fire, wildfire, and insect attacks create additional snags and down logs. Stand-replacing wildfire can create pulses of large quantities of snags and snag related resources such as insects that may infest snags post-fire. Some species, such as the black-backed woodpecker, are highly opportunistic and can flock in these areas in large numbers and at high densities for up to five years after a fire. At the same time, stand-replacing wildfire, while providing a pulse of snags, can remove all living trees, leaving an area poorly suited for decades for cavity nesters that prefer snags as a component within living forests. To the extent that snag-removing activities exceed snag-creating activities, there may be a long-term decline in habitat quality for cavity-dependent species. Alternative 2 however does not significantly affect these larger Forest-scale trends and the additional effect caused by adding routes is overwhelmingly counterbalanced by the prohibition of general off road travel and the reduction of use on existing unauthorized routes.

Alternative 2 reduces the cumulative impacts relative to the no action alternative. Relative to other actions on the Forest such as timber harvest and fuel treatments, and relative to natural process on the forest such as wildfire, senescence and succession, the cumulative effects are insignificant.

Lake bottoms on Shasta and Trinity Lakes adds about 551 miles of variable width routes to the system. Again these areas are edge features to the lake themselves, located on barren ground and do not directly affect habitat on the Forest.

Cumulative Effects Indicator 4: Number of Known Threatened, Endangered or Sensitive (TES) Species Sites

There are an estimated 83 goshawks sites within a half mile of NFTS, other official routes or an added route on the Forest, two of which are within a half mile of the proposed additions. There are an estimated 2798 northern spotted owl sites within a half mile of an NFTS, other official route or one of the proposed routes, 2 of which are within a half mile of the proposed routes. There are 224 known fisher and 137 known marten sites within one half mile of an NFTS, other official or proposed route. There are no known fisher or marten sites within a half mile of any of the proposed routes considered under alternative 2. There are 15 known bald eagle sites within a half mile of NFTS, other official routes or an added route on the Forest, one of which is within a half mile of the proposed additions.

Cumulative Effects Indicator 5: Acres of Habitat in the Zone of Influence

Table 3.05-22 indicates that according to the ranking system developed by Gaines et al. (2003), existing NFTS and added routes in Alternative 2 impact less than 30% of the available suitable habitat for most of the focal species (exceptions being the bald eagle); therefore, the human influence is ranked as low. This would indicate a low level of impact from. Route-associated effects such as edge effects, snag and downed log reduction, and habitat loss and fragmentation resulting from route-associated factors (Gaines et al. 2003) produce only a low level of impact. The exception is the bald eagle. The habitat influence zone for bald eagle includes 69% of the species habitat on the forest; therefore, the cumulative human influence rank is high for this species under this alternative. Most of the effects revealed by this

cumulative habitat influence analysis are from the existing approved transportation system, with only 0.65% [61]of these effects being attributed to the added routes and the rest to the existing transportation system routes. Note that had we chosen to analyze these species at a forest wide scale, these high levels of influence would have been substantially reduced.

Alternative 3

Alternative 3 would prohibit public motor vehicle travel off designated NFTS roads, trails, and areas, except as allowed by permit or other authorization. Also, no additions would be made to the NFTS under this alternative and no change would be made to the NFTS under this alternative. The Forest Plan would be amended to edit the statement that (page 3-16), "The Forests' OHV Plan designates 239,175 acres to cross-country travel. An additional 1,383,596 acres restrict OHV use to existing roads and trails because of highly erodible soils, steep terrain, critical wildlife habitat, or other resource conflicts. About 500,000 acres on the Forests are closed to OHVs, primarily because of wilderness designation." The following amendment adds the following sentences to Standard and Guidelines for Recreation 16(e) on page 4-24 of the Shasta-Trinity National Forest LRMP to make the Forest Plan consistent with Subpart B of the Travel Management Rule:

> *Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest Motorized Vehicle Use Map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest Motor Vehicle User Map is prohibited unless otherwise part of a permitted activity or administrative use.*

Alternative 3: Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

This alternative would prevent disturbance to the focal species within this group by prohibiting cross-country travel on approximately 1,599,471 acres, thus reducing disturbance to focal species. In the long-term (20 years), focal species habitat would be expected to passively recover from soil and vegetation impacts caused by unmanaged motorized travel, including cross country travel and the associated routes. Additionally, future route proliferation would also be stopped. The potential impacts discussed under alternative 1 from motorized cross-country travel would not occur.

[61] Calculated by dividing 44 (miles added) by total routes for this alternative (6760 mile existing + 44 added)

Table 3.05-24. Alternative 3: Prohibition of cross country travel measurement indicator 1 for focal species of the late-successional group for direct/indirect effects.

Indicator			1	5
Species Group	**Species**	**Total acres of habitat within administrative boundaries of the Forest**	**Total Acres of Habitat available to cross-country travel (no wilderness)**	**Acres of Habitat within 60 foot Influence Zone of Lake Bottom Areas (Shasta and Trinity Lakes) Added as Open Areas**
Late-Successional Forest (LSF)	**Northern goshawk**	**1,319,587**	**0**	0
	Northern spotted owl	**954,575**[62]	**0**	0
	Pacific fisher	**1,243,503**	**0**	0
	American marten	**456,372**	**0**	0
Wide-ranging	**Black bear**	**255,684**	**0**	0
Ungulate	**Mule Deer**	**359,784**	**0**	0
	Elk	**163,697**[63]	**0**	0
Riparian	**Bald Eagle**	**375,656**	**0**	0
Cavity-dependent	**Hairy Woodpecker**	**416,852**	**0**	0
	Pileated woodpecker	**828,629**	**0**	0

This alternative would not add any unauthorized routes or open areas to the NFTS; therefore, implementation of Alternative 3 would result in a beneficial effect of 2,254 acres of road prism area being passively restored, since 1,255 miles of existing unauthorized routes would no longer receive motor vehicle use. There are currently 264 miles of unauthorized routes within Late Successional Reserves. Under Alternative 3, the use of all 264 miles of these existing unauthorized routes within LSRs would be stopped, allowing the areas to begin recovering naturally.

Under this alternative, lake bottom use would be prohibited, restricting use on as many as 402 miles of accessible areas on Shasta Lake, 149 miles on Trinity Lake and 11 miles on Iron Canyon Reservoir for a total of 562 miles of currently used or potentially used routes. Actual acres of use is highly variable and varies considerably between seasons, lake levels, access areas and other factors. As a reference, lake bottom access by motorized vehicles would be restricted on Shasta Lake covers about 28,403 acres and Trinity Lake covers about 15,644 acres. Although it is highly unlikely that either of these lakes would draw down so far as to expose their entire bed for OHV use, the entirety of both lakes are used regularly for motorized watercraft and offer a similar disturbance profile.

None of the lake bottom areas are vegetated and because of regular flooding, do not have the potential to develop suitable habitat for any of the late-successional species. However, due to existing noise levels

[62] We do not currently have modeling for NSO habitat on private lands within the administrative boundaries of the Forest. This figure is modeled from the existing FS ownership.

[63] Note that the California Department of Fish and Game determine that the range of the elk does not cover the entire Forest and only covers about 110,000 acres of a portion of the northern sections of the Forest. In regards to the lake bottoms 60-meter zone of influence, only about 109 acres of habitat are both within the range of the species and suitable. We have taken a more conservative approach in our analysis and have chosen to look at the entire forest realizing that much of the Forest has the potential to support elk even if those populations are not currently there.

on nearby roads and from watercraft, disturbance levels to neighboring habitat areas is not likely to result in a significant difference between this alternative and any of the others.

Late-Successional Forest Focal Group

This would result in cross-country travel prohibition on about 899,000 acres of northern goshawk habitat, 599,000 acres of northern spotted owl habitat, 782,000 acres of pacific fisher habitat and 322,000 acres of American marten habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. The focal species would not be affected by disturbance, habitat fragmentation, or indirect impacts to prey or food resources from cross-country vehicle travel. Compared to alternative 1, there would be less potential for breeding disturbance and less stress and behavior change from cross-country travel

In addition, existing unauthorized routes impact five different Late Successional Reserves, nineteen spotted owl critical habitat units, and nine spotted owl core areas. Five documented goshawk sites are located within ½ mile of existing unauthorized, off-road routes (Table 3.05-8). In addition to these documented sites, 461 miles of unauthorized off-road routes occur in suitable northern goshawk habitat, 348 miles of unauthorized, off-road routes occur in northern spotted owl habitat, 363 miles of unauthorized, off-road routes occur in suitable fisher habitat and 151 miles of unauthorized routes occur in marten habitat. Under Alternative 1, disturbance effects would continue with the use of these routes. Alternative 3 would restrict this use.

Wide-Ranging Focal Group

This alternative would prohibit cross-country travel on 150,000 acres of wide-ranging focal species habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. The focal species would not be affected by disturbance, trampling or indirect impacts to prey or food resources due to off-road vehicle use.

Ungulate Focal Group

This alternative would prohibit cross-country travel on 220,000 acres of mule deer habitat and 102,000 acres of elk habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. Mule deer and elk would not be affected by disturbance, collision, or indirect impacts to food resources due to off-road vehicle use.

Riparian Focal Group

This would result in cross-country travel prohibition on 218,134 acres of focal species (bald eagle) habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. Under this alternative, compared to alternative 1, there would be less potential for bald eagle breeding disturbance, and less stress and behavior change from cross-country travel.

Cavity-Dependent Focal Group

This alternative would prohibit cross-country travel on 240,000 acres of hairy woodpecker habitat and 518,000 acres of pileated woodpecker habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. Hairy woodpeckers and pileated woodpeckers would not be affected by disturbance, collision, or indirect impacts to prey or food resources due to off-road vehicle use. In addition, snags and down logs would accumulate over time, and eventually the abandoned route sites would become suitable for foraging.

Alternative 3: Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

No additions to the NFTS are proposed under this alternative so there would be no direct or indirect effects.

Alternative 3: Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

This alternative proposes no changes to NFTS. There would be no direct or indirect effects.

Alternative 3: Cumulative Effects

There are no direct or indirect effects for action 2, the authorization of new routes (currently unauthorized routes), or action 3, adding facilities under the NFTS and changes to the existing NFTS. With no direct or indirect effects for these two actions, there are no cumulative effects for these two actions under this alternative.

However, action 1, the prohibition of cross country motor vehicle travel, reduces the current environmental effects. Cumulative effects must take into account this reduction of effect in relation to present and reasonably foreseeable actions (identified in Appendix B). Indicators 2 (density of routes within habitat), 3 (miles of routes within habitat), 4 (number of TES sites within ½ mile of routes), and 5 (acres of habitat or percent of habitat affected by routes) go down from the current, effective condition (as described in Alternative 1) by prohibiting cross-country vehicle use. Under Alternative 3, cumulative effects refer to the reduction of effects plus whatever effects are anticipated from reasonably foreseeable actions as measured by the indicators.

Present and reasonably foreseeable projects include ongoing and future timber harvest, vegetation restoration, fuels management, grazing allotments, road management including closures and decommissioning, recreation use, fire salvage, and mining reclamation which could have effects that would add to the effects of this action. In addition, unplanned events such as wildfires and tree mortality related to periodic droughts will continue to affect habitat.

Road maintenance and hazard tree removal will continue on the existing NFTS, but no routes will be added to the system under this alternative, so no additional maintenance impacts will occur. Many of the above actions also have the potential to increase road density temporarily (i.e., forest product projects

with timber harvest, fuels management projects, pre-commercial thinning projects, grazing allotments, and mining). The primary effects of increases in road density are related to increased disturbance and habitat fragmentation. This alternative would not increase official road density[64] but would reduce the effective road density.[65]

The present and reasonably foreseeable actions in appendix B include 5.60 miles of routes proposed for addition to the NFTS, 0.46 miles of new construction and 186 miles of NFTS roads proposed to be closed, abandoned, or decommissioned. This would result in a net decrease of 180 miles of routes. This proportion of the total proposed actions forest-wide is not expected to have significant impacts. No routes will be added in this alternative, so no additional vehicle-related impacts will occur.

Table 3.05-25. Alternative 3: Total NFTS with Alternative 2 routes, measurement indicators 2, 3, 4 and 5

Indicators	2	3	4	5		5
Species	**Density of NFTS Routes Within Habitat[1]**	**Combined Miles of NFTS and added Unauthorized Routes within Habitat on NF[66]**	**Number of TES sensitive sites within ½ mile of *Existing** NFTS and routes for TES Species[67]**	**Acres of Habitat Affected by Combined NFTS Routes (Habitat Influence Zone) (Acres and Square Miles)**		**Percent of Habitat Affected By Routes (Habitat Influence Zone)**
Northern goshawk	2.28	3,207	85	144,032	225.05	16.03%
Northern spotted owl	2.83	2,653	3018 (nesting and observations) 1,098 known territories	117,132	183.02	19.56%
Pacific fisher	2.29	2,727	224 (dens and observations)	126,940	198.34	16.22%
American marten	2.23	1,151	137 (dens and observations)	54,249	84.76	16.85%
Black bear	3.19	746	N/A	32,144	50.22	21.49%
Mule Deer	3.56	1,221	N/A	52,494	82.02	23.89%
Elk	3.80	605	N/A	25,455	39.77	24.98%
Bald eagle	2.96	1,009	48	143,966	224.95	66.00%
Hairy Woodpecker	3.82	1,430	N/A	58,794	92	24.54%
Pileated Woodpecker	2.23	1,801	N/A	81,598	127	15.75%

Alternative 4 – Minimize Impacts to Natural Resources and Roadless Areas

Alternative 4 would prohibit public motor vehicle travel off designated NFTS roads, trails, and areas would be prohibited, except as allowed by permit or other authorization. It would also add approximately

[64] "Official road density" refers to the density of only those approved, authorized routes that are part of the NFTS (or other authorized individual or entity) and under direct management control.
[65] "Effective road density" is the density of the approved, authorized NFTS routes combined with the unauthorized routes. Wildlife respond to the actual, effective use of these routes rather than the administrative designation.
[66] Note that this alternative does not add any routes to the NFTS, therefore the number in this column are the amount of habitat in the NFTS within the area of accessible cross country travel.
[67] Note that one-half mile buffers on all existing NFS roads and trails covers almost 90% of the Forest.

15.56 miles of new NFTS roads and motorized trails (1.2% of the total miles of unauthorized roads and trails). Areas below the high-water mark on Shasta Lake (28,403 acres of lake surface, 402 miles of access), Trinity Lake (15,644 acres lake surface, 149 miles of access) and Iron Canyon Reservoir (15,644 acres lake surface, 149 miles of access) would be open to highway-legal vehicles only with a maximum speed limit of 10 miles per hour to protect cultural resources. Actual acres of open areas vary depending on water levels and season of use restrictions. Topography further limits access to motor vehicles. Seasonal restrictions would apply to portions of two routes (1.03 miles) to protect wildlife and watersheds. See alternative 2 for seasonal restrictions by route and alternative. Note that the seasonal restrictions analyzed in the DEIS for the Trinity Lake Area and the Iron Canyon Reservoir Area to protect nesting and young northern spotted owls in habitat adjacent to the reservoirs have been eliminated in this alternative. Further analysis by the STNF Wildlife Biologist found that the seasonal restrictions proposed in the DEIS would not be effective. Existing seasonal restrictions would continue to apply to the Shasta Lake Area for nesting bald eagles.

Motorized mixed-use is also proposed on 23 road segments totaling 30.41 miles. These segments are existing NFTS operational maintenance level 3 roads selected for their connections with roads and trails allowing all vehicle classes and their contribution to creating loops and extended rides for motorized recreation and access opportunities. All vehicle operators on these roads, including those driving non-highway legal vehicles, must possess a valid driver's license in accordance with Forest Service Manual 7700, Chapter 7730, Section 7731.2(5). The operational maintenance level will remain unchanged.

The Forest Plan would also be amended. The Forest Plan currently states (page 3-16), "The Forests' OHV Plan designates 239,175 acres to cross-country travel. An additional 1,383,596 acres restrict OHV use to existing roads and trails because of highly erodible soils, steep terrain, critical wildlife habitat, or other resource conflicts. About 500,000 acres on the Forests are closed to OHVs, primarily because of wilderness designation." This amendment adds the following sentences to Standard and Guidelines for Recreation 16(e) on page 4-24 of the Shasta-Trinity National Forest LRMP to make the Forest Plan consistent with Subpart B of the Travel Management Rule:

> *Motorized travel, including OHV/ATV use, is permitted only on designated routes shown on the Shasta-Trinity National Forest Motorized Vehicle Use Map. As required by 36 CFR 161.13, Subpart B, motorized cross-country travel on routes that are not designated on the Forest Motor Vehicle User Map is prohibited unless otherwise part of a permitted activity or administrative use.*

Alternative 4: Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

This alternative would prohibit cross-country travel on 1,599,277 acres, and reduce disturbance to the focal species. In the long-term (20 years), focal species habitat would be expected to passively recover from soil and vegetation impacts caused by unmanaged motorized travel, including cross country travel

and the associated routes. Additionally, future route proliferation would also be stopped. The potential impacts discussed under alternative 1 from cross-country travel would not occur.

Continuing the current lake bottom use could potentially include (depending on lake levels, time of year and existing Limited Operating Periods, and barriers to travel such as streams and steep banks) as many as 402 miles of accessible areas on Shasta Lake and 149 miles on Trinity Lake and about 11 miles on Iron Canyon Reservoir for a total of 562 miles of potential route use. Actual acres of use though are highly variable and depend on many variables. As a reference, Shasta Lake covers about 28,403 acres, Trinity Lake covers about 15,644 acres and Iron Canyon Reservoir covers about 429 acres. Although it is highly unlikely that any of these lakes would draw down so far as to expose their entire bed for OHV use, the entirety of both lakes are used regularly for motorized watercraft and offer a similar disturbance profile. None of the lake bottom areas are vegetated and because of regular flooding, do not have the potential to develop suitable habitat for any of the focal species.

Table 3.05-26. Alternative 4: Prohibition of cross country travel measurement indicator 1 for focal species of the late-successional group for direct/indirect effects

Indicator			1	5
Species Group	**Species**	**Total acres of habitat within administrative boundaries of the Forest**	**Total Acres of Habitat available to cross-country travel**	**Acres of Habitat within 60 foot (300-foot for the Bald Eagle) Influence Zone of Lake Bottom Areas (Shasta and Trinity Lakes and Iron Canyon Reservoir) Added as Open Areas**
Late-Successional Forest (LSF)	**Northern goshawk**	**1,319,587**	**0**	5,392
	Northern spotted owl	**954,575**[68]	**0**	1,438
	Pacific fisher	**1,243,503**	**0**	5,316
	American marten	**456,372**	**0**	1,779
Wide-ranging	**Black bear**	**255,684**	**0**	468
Ungulate	**Mule Deer**	**359,784**	**0**	1,471
	Elk	**163,697**[69]	**0**	1,167
Riparian	**Bald Eagle**	**375,656**	**0**	9,187
Cavity-dependent	**Hairy Woodpecker**	**416,852**	**0**	828
	Pileated woodpecker	**828,629**	**0**	3,088

Late-Successional Forest Focal Group

Implementation of Alternative 4 would prohibit cross-country travel on about 899,000 acres of northern goshawk habitat, 599,000 acres of northern spotted owl habitat, about 783,000 acres of Pacific fisher habitat and about 322,000 acres of American marten habitat, and would prevent disturbance and habitat

[68] We do not currently have modeling for NSO habitat on private lands within the administrative boundaries of the Forest. This figure is modeled from the FS ownership.

[69] Note that the California Department of Fish and Game determine that the range of the elk does not cover the entire Forest and only covers about 110,000 acres of a portion of the northern sections of the Forest. In regards to the lake bottoms 60-meter zone of influence, only about 109 acres of habitat are both within the range of the species and suitable. We have taken a more conservative approach in our analysis and have chosen to look at the entire forest realizing that much of the Forest has the potential to support elk even if those populations are not currently there.

alteration to the focal species within this group from cross-country travel. Within the prohibited acres, the focal species would not be affected by disturbance, habitat fragmentation, or indirect impacts to prey or food resources from cross-country vehicle travel. Compared to alternative 1, there would be less potential for breeding disturbance, and less stress and behavior change from cross-country travel.

Wide-Ranging Focal Group

This would result in cross-country travel prohibition on about 150,000 acres of wide-ranging focal species habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. The focal species would not be affected by disturbance, trampling or indirect impacts to prey or food resources due to off-road vehicle use.

Ungulate Focal Group

This would result in cross-country travel prohibition on 220,000 acres of mule deer habitat and 102,000 acres of elk habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. Mule deer and elk would not be affected by disturbance, collision, or indirect impacts to food resources due to off-road vehicle use.

Riparian Focal Group

This would result in cross-country travel prohibition on 218,000 acres of focal species (bald eagle) habitat and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. The focal species would not be affected by disturbance, habitat fragmentation, or indirect impacts to prey or food resources from cross-country vehicle travel. Under this alternative, compared to alternative 1, there would be less potential for breeding disturbance and less stress and behavior change from cross-country travel.

Cavity-Dependent Focal Group

This would result in cross-country travel prohibition on 240,000 acres of hairy woodpecker habitat and 518,000 acres of pileated woodpecker habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. Hairy woodpeckers and pileated woodpeckers would not be affected by disturbance, collision, or indirect impacts to prey or food resources due to off-road vehicle use.

Alternative 4: Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Under this alternative, 15.56 miles of routes would be added to the NFTS. Table 3.05-27 displays the route mileage within habitats used by the focal species. The effects would be similar to alternative 2, but with fewer miles added thereby increasing the beneficial effects of passive restoration of unauthorized routes and less overall disturbance. Overall, impacts from this alternative are minor because of the widely dispersed nature of the added routes.

Under this alternative, motor vehicle use of lake bottoms (areas below high-water mark) would be allowed on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir. The lake bottoms are those areas bordering reservoirs that are exposed and barren during periods of low water. When the water is low, recreationists have access to the lake bottoms at roads, marinas and trails that reach the lake shore edge. Trinity Lake has about 149 miles of perimeter of which about 127 miles (about 85%) are already within a quarter mile of a currently used NFTS road. Typically, entry points occur variably around the lake, with at least 23 points easily recognizable. Not all areas of the lake are accessible and continuous passage along the lake shore is commonly blocked by streams, steep walls, and other obstructions.

Parking and dispersed camping would be allowed within one vehicle length of designated routes including the 15.56 miles of additional route proposed in Alternative 4. The disturbance effect would be minimal and short-term given the parking and/or camping is temporary and would not be over 30 feet from the edge of a travel route.

Table 3.05-27. Alternative 4: Direct/Indirect effects measurement indicators 3, 4 and 5

Indicator		3	4	5		5
Species Group	**Species**	**Miles of Routes Added to the NFTS within Habitat on NF**	**# of TES Sites within ½ mile of Added Routes**	**Acres of Habitat Affected by Added Routes (Habitat Influence Zone) (Square Miles)[1]**		**Percent of Habitat Affected by Added Routes (Habitat Influence Zone)[1]**
LSF	**Northern goshawk**	3.5	1	179	0.28	0.02%
	Northern spotted owl	1.2	2	68	0.11	0.01%
	American marten	0.4	0	80	0.13	0.01%
	Pacific fisher	1.4	0	32	0.05	0.01%
Wide-ranging	**Black bear**	3.1	N/A	134	0.21	0.09%
Ungulate	**Mule Deer**	5.4	N/A	297	0.46	0.14%
	Elk	1.2	N/A	66	0.10	0.06%
Riparian	**Bald Eagle**	0.0	1	41	0.06	0.02%
Cavity-dependent	**Hairy Woodpeckers**	5.7	N/A	269	0.42	0.11%
	Pileated Woodpecker	0.8	N/A	41	0.06	0.01%

[1] Habitat influence zone is a 300 meter buffer around routes for bald eagle and a 60 meter buffer around routes for all other species.

Late-Successional Forest Focal Group

This alternative would not add any miles of routes in LSRs. LSRs cover over 515,000 acres on the Forest. Off-road travel prevents the re-growth and development of late-successional habitat on the routes themselves, fragmenting further existing habitat and limiting to some degree the primary management purpose of LSRs, the recovery and maintenance of late-successional and old-growth habitats. Currently there are about 264 miles of unauthorized routes that currently exist within LSRs that would continue to receive motor vehicle use under continued cross-country travel. Under continued cross-country travel, new routes could be developed in these areas as well. Under Alternative 4, the use of all unauthorized routes within LSRs would be stopped, allowing the areas to begin recovering naturally, and further development of routes would be prohibited.

Under the no action alternative, disturbance effects would continue with unauthorized routes including, unauthorized, off-road routes in five different Late Successional Reserves, nineteen spotted owl critical habitat units, and nine spotted owl core areas. In addition, there are four documented goshawk sites located within ½ mile of existing unauthorized routes. In addition, 461 miles of unauthorized, off-road routes occur in suitable northern goshawk habitat, 348 miles of unauthorized, off-road routes in northern spotted owl habitat, and 363 miles of unauthorized, off-road routes in suitable fisher habitat and 151 miles occurs in suitable marten habitat (Table 3.05-8). Alternative 4 would restrict this use eliminating over 99.9% of the current use and permitting only 3.5 miles of use in goshawk habitat, 1.2 miles in northern spotted owl habitat, 1.4 miles in fisher habitat and 0.4 miles in marten habitat (see Table 3.05-27).

Under alternative 4, two northern spotted owl territories (see Table 3.05-27) and one goshawk site are located within ½ mile of added routes (see Table 3.05-27). In addition to the existing seasonal closures which affect 220 NFTS routes, there would be seasonal closures on one additional route under this alternative. This is specific to one goshawk nest site. A limited operating period of February 1 to August 15 for goshawk would be placed on the route near the goshawk nest to avoid disturbance effects. Therefore, this alternative would have no effect on northern goshawk from the use of added routes within ½ mile of a goshawk or owl nest site.

Existing season of use restrictions would continue on Shasta Lake to protect nesting bald eagles. Other restrictions on this use are a 10 mph speed limit restriction for cultural resource protection and highway-legal vehicles only. If these mitigation measures are ineffective then the area would be closed while site specific measures are developed.

Table 3.05-28. Alternative 4: Routes proposed for addition to the NFTS and associated mileage within designated NSO core areas

Route ID	NSO Core Area[a]	Miles	Grand Total within a core area
MC090	6,262	0.08	**0.08**
RM789	1,616	0.10	**0.58**
RM790	1,616	0.10	
RM791	1,616	0.16	
RM792	1,616	0.03	
Total			**0.66**

Table 3.05-29. Alternative 4: Route proposed for addition to the NFTS with limited operating period (LOP) for goshawk

Route ID	Miles	LOP	Season of Use
MC090	0.16	Feb 1–Aug 15	Aug 16–Jan 31

In the DEIS, Trinity Lake and Iron Canyon Reservoir contained a Limiting Operating Period for the NSO to reduce the disturbance potential of this species. After careful consideration and habitat analysis it was determined that these specific LOPs are not needed for the protection of the NSO along Trinity Lake or Iron Canyon Reservoir.

Although the perimeter is not all accessible by motorized vehicle traffic, the entire lake is generally accessible to motorized watercraft. Without any buffering of vegetation, sound carries well over water and motorized watercraft around the lake create irregular patterns of disturbance similar to off-road vehicles.

About 13 miles or about 8.7% of the perimeter has a high probability of having NSO present within a quarter mile of the lake edge. An additional 13 miles has a moderate probability of finding owls. Of the high and moderate probability areas, about 11 miles of shoreline are not readily accessible.

However, the area already has a high baseline of disturbance due to proximal roads and high lake traffic. Most of the lake bottom use occurs late in the season when levels are low. In contrast, owls are most sensitive to disturbance when lake levels are high and access is more restricted. Damiani et. al. (2007) (Damiani 2007) looked at 19 years of demographic data on the Shasta-Trinity and Six Rivers National Forests and compared it with known disturbances in the area. They found that noise conducted in the breeding season did not have immediate effects on the reproductive output of NSO. This is consistent with Delaney studies on the Mexican Spotted owl and the northern spotted owl (Delaney, Grubb et al. 1997; Delaney and Grubb 2001). However, the data did suggest that in high quality habitat, disturbance could have a cumulative negative effect only seen over a full decade of disturbance. It wasn't clear, however, whether those effects are caused by the noise or by changes in habitat quality. Given these elements, the addition of a limited operating period (LOP) for northern spotted owls along the Trinity Lake margins (lake bottom) as suggested in the Draft EIS is not likely to provide any additional protection for the owl and has been removed in the final.

About 35 miles of 2008 NSO critical habitat and about 32 miles of 1992 NSO critical habitat borders Trinity Lake and the Lake bottom areas. The actual critical habitat areas are not part of the proposal and their principal component elements will not be affected by lake bottom recreational use because the lake bottoms themselves are outside of the critical habitat borders and are not capable of growing suitable northern spotted owl habitat due to regular flooding. Because these areas are outside of designated critical habitat and will not affect the principal component elements of critical habitat, their use will not affect critical habitat and are within the conditions set by the programmatic consultation developed with the U.S. Fish and Wildlife Service for motor vehicle management. Typically, "no effect" determinations for effects to critical habitat do not require consultation with the FWS.

This alternative would add 15.56 miles of routes to the NFTS, and would prohibit cross-country travel and discontinue use of unauthorized routes. Species in this group could be impacted by the additional miles of routes added to the NFTS. However, the physical habitat impact would be small. These route additions are offset at the 20-year, long-term point by the prohibition on cross-country travel and the passive restoration that is expected to occur on the routes not added to the NFTS that would have begun to improve habitat conditions for late-successional species. In this alternative the impacts from the route system are substantially reduced compared to the impacts of alternative 1, and augmented additionally by the cessation of impacts from cross-country travel.

About 179 acres of suitable northern goshawk habitat lie within the 60-meter zone of influence for routes proposed for NFTS inclusion in this alternative. For northern spotted owls, about 68 acres occur in the habitat influence zone, about 80 acres of habitat occurs for the fisher and about 32 acres occurs in marten habitat.

Wide-Ranging Focal Group

Under this alternative, 15.56 miles of routes would be added to the NFTS, but only 3.1 miles within black bear habitat. Compared to alternative 1, this alternative would reduce the route mileage (relative to unauthorized route use) within black bear habitat by approximately 152 miles (by 98%) relative to the current use patterns.

As was mentioned before, bears are wide-ranging and adaptable and will utilize a variety of habitat types depending on conditions. They can be relatively irresponsive to disturbance (as attested to by the presence of black bears in many of our campgrounds) and are likely to continue to use the areas adjacent to the lake bottoms and are likely to be able to cross the open areas for water or easy passage. Given the speed limitations in these areas and the high visibility, it is highly unlikely that collisions would occur.

Ungulate Focal Group

This alternative adds 15.56 miles of routes to the NFTS, including 5 miles in deer habitat and 1 mile in elk habitat. Compared to alternative 1, this alternative would reduce the route mileage within deer and elk habitat by approximately 287 and 185 miles (98% and 99% respectively). The proposed routes affect (60-meter zone of influence) approximately 297 and 66 acres, respectively.

Shasta and Trinity Lakes and Iron Canyon Reservoir offer about 562 miles of periphery potentially open to off-highway vehicle recreation. About 13% of the acreage within the buffers on the three lakes would be considered prime deer habitat and about 10.3% would be considered prime elk habitat. Although none of the lake bottom areas are themselves suitable habitat for either deer or elk, deer may use the margins of the lake bottom areas for grazing. These margins receive more sunlight and can be valuable forage for deer. Deer may occasionally cross the larger barren area to drink water from the lake itself, exposing themselves to possible collisions with OHV. Slower speed limits, and high visibility and differential use times (deer tend to be active in the early morning and early evening whereas higher OHV activity happens later in the day) reduce the probability of collisions considerably. Forest Service law enforcement on both Shasta and Trinity Lakes have no record of collisions actually occurring between recreationists and deer on the lake in the last 10 years.

Currently, elk only occur on the upper reaches of the Pitt and McCloud arms of Shasta Lake. Given their current occurrence, direct impacts are highly unlikely. However, elk have the potential to occur throughout the lake areas and our analysis will focus on possible impacts from lake bottom use should elk expand their range into those areas.

Elk prefer somewhat different habitats than deer and have less key habitat around the lakes. Shasta Lake has about 1,060 acres (11.7% of total buffer) of potential key elk habitat in the 60-meter buffer around the lake and about 106 (3.1% of the total buffer) acres around Trinity Lake. Elk are less common than deer, but also acclimatize readily to non-threatening disturbance. They are large animals and even less likely to collide with vehicles than deer. Although they will also come to the lake margins to drink, they are rarely sighted near the lake shore when the water is drawn down and have alternative water sources in the uplands.

Riparian Focal Group

This alternative would add 15.56 miles of routes to the NFTS, but none in bald eagle habitat. Compared to alternative 1, this alternative would reduce the route mileage within bald eagle habitat by approximately 125 miles.

Alternative 4 would also add about 562 miles of lake bottom areas on Shasta and Trinity Lakes and Iron Canyon Reservoir. Although riparian areas are usually defined by their proximity to water, their value to wildlife generally requires the more abundant and productive vegetation (relative to similar types not found next to water) found near water and the microclimate changes that occur near water. The lake bottoms however, are barren and do not have the characteristics of riparian vegetation. Although their microclimates may be slightly different than a similar upland, barren sites, their exposure limits the ability of wildlife to take advantage of this characteristic. For these reasons, we will not consider lake bottoms as characteristic of riparian areas. In the case of our focal species, the bald eagle, they do not use these lake bottom areas and in fact, the retreat of the water every year from the lake banks just removes the foraging areas further from eagle nesting and perching sites.

There is one eagle nest that has periodically been found at Iron Canyon Reservoir. It is an intermittent site and is not protected with an LOP or limited access order. This intermittent sighting of an eagle will not be counted in our overall tallies of eagle sites although we will count suitable bald eagle habitat found around Iron Canyon reservoir. See Table 3.05-30 for the total amount of acres open to lake bottom use in bald eagle habitat.

Table 3.05-30. Alternative 4: Total open area acres with bald eagle protection

Open Areas	Bald eagle acres
Shasta Lake Area	2,205
Trinity Lake Area	649
Iron Canyon Reservoir Area	0
Total	**2,854**

Cavity-Dependent Focal Group

Under this alternative, 15.56 miles of routes would be added to the NFTS; including 6 miles in hairy woodpecker habitat, and 0.8 miles in pileated woodpecker habitat (Table 3.05-27). Compared to alternative 1, this alternative would reduce the route mileage within hairy woodpecker habitat by approximately 266 miles and within pileated woodpecker habitat by approximately 241 miles. The added

routes in hairy and pileated woodpecker habitat for this alternative pass through approximately 269 and 41 acres, respectively of species habitat (60-meter zone of influence). This alternative reduces the affected habitat of the hairy woodpecker by 98.1% and reduces the affected habitat of the pileated woodpecker by 99.7%.[70]

Hairy woodpeckers have about 861 acres of habitat within the 60-meter zone of influence around Shasta and Trinity Lakes and Iron Canyon Reservoir, or about 7% of the total acreage within the zone of influence, less than 0.1% of the total habitat available on the Forest. Although data regarding their sensitivity to disturbance is limited, hairy woodpecker's practice of occasionally excavating the sides of buildings and their presence in developed areas suggest that they are relatively insensitive to these kinds of disturbances and are unlikely to be affected strongly by OHV activity in the lake bottoms.

Safety concerns may lead to some felling of snags at the edges of the lake bottoms, but give the large acreages outside of the zone of influence and the inherent dynamics of snags, this is not likely to be significant. Given the Forest type in this area, an unharvested forest may have as many as 344 snags 10" dbh and over on any given 40 acres area (about 8.6 snags per acre), likely to be clumped so that 40% or 16 acres may have 6 snags per acre, 9 acres may have no snags at all, 12 acres may have 12 per acre, 3 acres may have as many as 300 per acre and less than one acre may have as many as 49 per acre (Mellen, Marcot et al.). If every quarter mile of lake frontage represents the edge of a 40 acre block, then the removal of 2 snags over 10 inches dbh in that frontage would only represent a 0.6% reduction in snags through that area. Even if as many as 10 snags per quarter mile were removed, it would still be a reduction of only 3% throughout the 40 acre block. Given the flexibility of the hairy woodpecker and the variability of snag occurrence in this area, lake bottom use is unlikely to significantly affect this species' use of snags in the area.

Similar to the hairy woodpecker, pileated woodpeckers are considered somewhat insensitive to anthropogenic disturbance, although individuals may vary (Bull and Jackson 1995) they are not likely to be significantly disturbed by OHV activity at the lake margins.

Pileated woodpeckers have as much as 3,094 acres (24% of the total in the zone of influence) of suitable habitat along the 60-meter margin of the lakes. They use larger snags than the hairy woodpecker (20" dbh) and a generally have a larger territory. Snags this large are less common in the typical landscape and in unharvested woodland of the type that provides habitat for the pileated woodpecker, we may expect to find about 138 snags 20" dbh and greater per 40 acres block, distributed in such as way that 13 acres may have no snags at all, 4 acres may have 2 snags per acre, 16 acres may have 4 snags per acre, 6 acres may have 8 snags per acre and 1 acre may have as many as 18 snags per acre. Removal of 2 snags of this size over a quarter mile length of lake margin would reduce the snag levels by about 1.5%.

[70] Note that we have only compared the affected areas with acres affected by unauthorized routes and not with the larger acreage represented by potential cross country travel outside of public developed, unauthorized routes. Also, since lake bottom areas are not effective habitat in themselves and are qualitatively different from typical cross country routes or roads, we have counted the lake bottom acreages separately.

Alternative 4: Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Motorized mixed-use is proposed for 30.41 miles of existing ML 3 roads. Changes to class of use are not expected to have any detectable impact on wildlife. The disturbance, whether from an auto, truck, or ATV, is assumed to be the same for this analysis. Changing the mix of use is not expected to have any impacts on wildlife.

Alternative 4: Cumulative Effects

Cumulative effects must take into account present and reasonably foreseeable actions (identified in Appendix B). Present and reasonably foreseeable projects include ongoing and future timber harvest, vegetation restoration, fuels management, grazing allotments, road management including closures and decommissioning, recreation use, fire salvage, and mining reclamation which could have effects that would mitigate or add to the effects of this action. In addition, unplanned events such as wildfires and tree mortality related to periodic droughts will continue to affect habitat. Road maintenance and hazard tree removal will continue on the existing NFTS, as well as the routes that are added to the system under this document, and will continue to potentially affect the 60 meter habitat influence zone. Many of the above actions also have the potential to increase road density temporarily (i.e., forest product projects with timber harvest, fuels management projects, pre-commercial thinning projects, grazing allotments, and mining). The primary effects of increases in road density are related to increase disturbance and habitat fragmentation.

The present and reasonably foreseeable actions in appendix B include 5.60 miles of routes proposed for addition to the NFTS, 0.46 miles of new construction and 186 miles of NFTS roads proposed to be closed, abandoned, or decommissioned. This would result in a net decrease of 180 miles of routes. This proportion of the total proposed actions forest-wide is not expected to have significant impacts. Furthermore, the routes added to the NFTS do not constitute a change to habitat, but rather are an existing condition where vegetation change impact has already occurred and where conditions would continue into the future. Vehicle-related impacts from this alternative may aggregate with other impacts occurring on the landscape, but these cumulative impacts would still be less than the no action alternative.

Table 3.05-31. Alternative 4: Total NFTS with Alternative 4 routes, measurement indicators 2, 3, 4 and 5.

Indicators	2	3	4	5		5
Species	**Density of Routes Within Habitat[1]**	**Combined Miles of NFTS and Unauthorized Routes within Habitat on NF**	**Number of sensitive sites within ½ mile of *Existing* NFTS and unauthorized routes for TES Species**	**Acres of Habitat Affected by Combined Routes (Habitat Influence Zone) (Square Miles)**		**Percent of Habitat Affected By Route (Habitat Influence Zone)[1]**
Northern goshawk	2.29	3,211	83	148,968	233	16.58% Low
Northern spotted owl	2.84	2,654	2798	118,434	185	19.77% Low
Pacific fisher	2.23	2,729	224	131,802	206	16.84% Low
American marten	2.29	1,151	137	55,879	87	17.36% Low
Black bear	3.21	749	N/A	32,654	51	21.84% Low
Mule Deer	3.57	1,226	N/A	54,034	84	24.59% Low
Elk	3.81	606	N/A	26,516	41	26.03% Low
Bald eagle	2.96	1,009	39	149,174	233	68.39% High
Hairy Woodpecker	3.83	1,435	N/A	59,685	93	24.91% Low
Pileated Woodpecker	2.23	1,802	N/A	84,416	132	16.30% Low

[1] Habitat influence zone is a 300 meter buffer around routes for bald eagle and a 60 meter buffer around routes for all other species.

Cumulative Effects Indicator 2

Route density was averaged within the area of cross country travel accessibility and within the habitat of the focal species in order to give an approximate coarse measure of habitat effects for focal species (Table 3.05-31). The type of impacts to these species depends on the type of route, amount and type of use, and season of use (Gaines 2003). Ouren and Watts (2005) concluded that proximity of secondary routes to arterial roads, highways, and population centers has a large influence on the intensity of use on these routes; the utility of road density analysis at the low-use end of the spectrum diminishes. Route density thresholds for late-successional species are not well understood. Route densities therefore are presented to compare relative effects between the alternatives. Under this alternative which does prohibit cross-country travel on unauthorized routes, cumulative route density is 2.29 miles/square mile for goshawk, 2.84 miles/square mile for spotted owl, and 2.23 miles/square mile for the fisher, 2.29 miles/square mile, for the marten, 3.21 miles/square mile for black bear, 3.57 miles/square mile for deer, 3.81 miles/square mile for elk, 2.96 miles/square mile for bald eagle, 3.83 miles/square mile for hairy woodpecker and 2.23 miles/square mile for pileated woodpecker.

Cumulative Effects Indicator 3

The routes added under this alternative would require maintenance under the NFTS, including hazard tree removal. In addition to road maintenance impacts, other present and reasonably foreseeable impacts on the forest include vegetation management, prescribed fire, and grazing (Appendix B).

Removal of trees during road maintenance (hazard tree removal) has the potential to impact late-successional focal species. Generally, these species are affected negatively by actions that reduce the average tree size, or reduce canopy closure. Long-term trends have generally been negative for the late-successional focal species group, as can be seen by the listing of the northern spotted owl as "Threatened," and by the identification of Forest Service "Sensitive" species such as northern goshawk, marten, and fisher.

Vegetation management and prescribed fire have the potential to impact the wide-ranging focal species by removing important habitat elements such as downed logs, snags, hollow trees and mature shrubs that are used for cover, or that are important to the life histories of prey. Generally, this group of species is affected negatively by extensive mechanical and prescribed fire treatments that reduce these important habitat elements; although some elements, such as snags and down logs, can be increased by the application of prescribed fire.

Vegetation treatments and grazing have the potential to impact species in the ungulate focal species group by removing forage, impeding the growth of forage, or altering vegetative structure that provides cover. Generally, this group of species is affected negatively by extensive grazing, and mechanical and prescribed fire treatments that reduce these important habitat elements.

Removal of trees has the potential to impact riparian focal species. Past trends for this group have generally been negative, but have improved greatly for bald eagles (hence their delisting). Generally, this group of species is affected negatively by actions that reduce the average tree size.

Vegetation management and prescribed fire has the potential to impact species in the cavity-dependent species group by removing important habitat elements, such as downed logs, snags, and hollow trees, or that are important to the life histories of prey. Generally, this group of species is affected negatively by extensive mechanical treatments that reduce these important habitat elements; although some elements, such as snags and down logs, can be increased by the application of prescribed fire. Conversely, the species in this group tend to benefit from wildfires, prescribed fire, insect outbreaks and densely stocked timber stands. The benefits from these conditions are a result of higher quantities of snags, stressed trees and higher insect populations that provide improved foraging for these primarily insectivorous species. Timber harvest and mechanical fuels treatments must meet minimum retention requirements for down logs and snags, thereby ameliorating the potential negative effects to cavity-dependent species from direct removal of snags; however, reduced stand density from timber harvest results in stronger trees that are more resistant to insects. The lower rates of mortality in treated stands thus result in lower densities of snags and ultimately down logs. This effect can last 20 years or more until stand density increases sufficiently to cause tree stress and death. Snag density is encouraged through the retention of existing snags, but as snags fall, the reduced snag recruitment rate can result in areas being below target levels of snag density. This is detrimental to those cavity nesters depending on snags for forage and nesting substrates. Prescribed fire, wildfire, and insect attacks create additional snags and

down logs. At the same time, stand-replacing wildfire, while providing a pulse of snags, can remove all living trees, leaving an area poorly suited for cavity nesters for decades. To the extent that snag-removing activities exceed snag-creating activities, there may be a long-term decline in habitat quality for cavity-dependent species.

Alternative 4 reduces the cumulative impacts relative to the no action alternative. However, bear in mind that even the no action alternative effects, relative to the effects on vegetation and habitat, may be limited in scope and intensity in comparison to other actions occurring on the landscape, such as timber harvest and fuel treatments.

Cumulative Effects Indicator 4

Indicator 4 measures the cumulative influence of the proposed additions to the NFTS on TES sites for each TES species within one-half mile of a route as well as the influence of the current system of routes and any routes proposed for the reasonably foreseeable future. Alternative 4 marginally reduces the number of TES sites within the ½ mile buffer of the roads system. The reductions are so small as to be insignificant. Most TES sites are within the buffer of existing NFTS routes (98.8% of northern goshawk sites, 99.9% of northern spotted owl sites, 100% of fisher and marten sites, and 97.9% of bald eagle sites for this alternative), so this alternative would not add significantly to the number of TES sites in the ½ mile buffer.

In general, the prohibition of cross-country travel and the addition of 15.56 miles of new routes into the NFTS will result in a reduction of effective road mileage by 98.8%.

Cumulative Effects Indicator 5

Table 3.05-31 indicates that, according to the ranking system developed by Gaines et al. (2003), existing NFTS and added routes in Alternative 2 impact less than 30% of the available suitable habitat for most of the focal species; therefore, the human influence is ranked as low. This indicates low levels of impact from edge effects, snag and downed log reduction, and habitat loss and fragmentation resulting from route-associated factors (Gaines et al. 2003). The exception is the bald eagle. The habitat influence zone for bald eagle includes 68% of the species habitat on the forest, therefore, ranking the cumulative human influence rank as high for this species under this alternative. Note that almost all of these effects derive from the existing approved transportation system, with only 0.24% [71] of these effects being attributed to the added routes.

Alternative 5 – Improved Access and Motorized Recreation Opportunities

Alternative 5 would prohibit public motor vehicle travel off designated NFTS roads, trails, and areas would be prohibited, except as allowed by permit or other authorization. This alternative would also add 219 routes totaling 106.12 miles of new NFTS roads and motorized trails. Areas below the high-water

[71] Calculated by dividing 16 (miles added) by total routes for this alternative (6760 mile existing + 16 added).

mark on Shasta Lake (28,403 acres of lake surface, 402 miles of access) and Trinity Lake (15,644 acres lake surface, 149 miles of access) would be open to all vehicles with a maximum speed limit of 10 miles per hour. These acres of open areas include the entire lake bottoms. Actual acres of open areas vary depending on water levels and season of use restrictions. Topography further limits access to motor vehicles. Seasonal restrictions would apply to 75 routes (28.99 miles) to protect wildlife and watersheds. Existing seasonal restrictions would continue to apply to the Shasta Lake Area for nesting bald eagles.

Motorized mixed-use is proposed on 23 road segments totaling 30.41 miles. These segments are existing NFTS operational maintenance level 3 roads selected for their connections with roads and trails allowing all vehicle classes, and their contribution to creating loops and extended rides for motorized recreation and access opportunities. All vehicle operators on these roads, including those driving non-highway legal vehicles, must possess a valid driver's license in accordance with Forest Service Manual 7700, Chapter 7730, Section 7731.2(5). The operational maintenance level will remain unchanged. See Table 2-10 in Chapter 2, the Alternatives section of this final EIS, under alternative 4 for a complete list of roads proposed for motorized mixed-use.

Two non-significant Forest Plan amendments would be incorporated, including one that limits motorized travel to designated routes and modifies a standard and guideline for heritage resource management to provide access to seven specified routes.

Alternative 5: Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

This alternative would prevent disturbance to the focal species within this group by prohibiting motor vehicle cross-country travel on about 1,598,619 acres. In the long-term (20 years), focal species habitat would be expected to passively recover from soil and vegetation impacts caused by unmanaged motorized travel, including cross country travel and the associated routes. Additionally, future route proliferation would also be stopped. The potential impacts discussed under alternative 1 from cross-country travel would not occur.

Table 3.05-32. Alternative 5: Prohibition of cross country travel measurement indicator 1 for focal species of the late-successional group for direct/indirect effects

Indicator			1	5
Species Group	**Species**	**Total acres of habitat within administrative boundaries of the Forest**	**Total Acres of Habitat available to cross-country travel (no wilderness)**	**Acres of Habitat within 60 foot Influence Zone of Lake Bottom Areas (Shasta and Trinity Lakes) Added as Open Areas**
Late-Successional Forest (LSF)	**Northern goshawk**	**1,319,587**	**0**	5,392
	Northern spotted owl	**954,575**	**0**	1,438
	Pacific fisher	**1,243,503**	**0**	5,316
	American marten	**456,372**	**0**	1,779
Wide-ranging	**Black bear**	**255,684**	**0**	468

Indicator			1	5
Species Group	**Species**	**Total acres of habitat within administrative boundaries of the Forest**	**Total Acres of Habitat available to cross-country travel (no wilderness)**	**Acres of Habitat within 60 foot Influence Zone of Lake Bottom Areas (Shasta and Trinity Lakes) Added as Open Areas**
Ungulate	**Mule Deer**	**359,784**	**0**	1,471
	Elk	**163,697**	**0**	1,167
Riparian	**Bald Eagle**	**375,656**	**0**	9,187
Cavity-dependent	**Hairy Woodpecker**	**416,852**	**0**	828
	Pileated woodpecker	**828,629**	**0**	3,088

Continuing the current lake bottom use could potentially include (depending on lake levels, time of year and existing Limited Operating Periods, and barriers to travel such as streams and steep banks) as many as 402 miles of accessible areas on Shasta Lake and 149 miles on Trinity Lake and about 11 miles on Iron Canyon Reservoir for a total of 562 miles of potential route use. Actual acres of use though are highly variable and depend on many variables. As a reference, Shasta Lake covers about 28,403 acres, Trinity Lake covers about 15,644 acres and Iron Canyon Reservoir covers about 429 acres. Although it is highly unlikely that any of these lakes would draw down so far as to expose their entire bed for OHV use, the entirety of both lakes are used regularly for motorized watercraft and offer a similar disturbance profile. None of the lake bottom areas are vegetated and because of regular flooding, do not have the potential to develop suitable habitat for any of the focal species.

Late-Successional Forest Focal Group

This would result in cross-country travel prohibition on about 898,000 acres of northern goshawk habitat, 599,000 acres of northern spotted owl habitat, 783,000 of pacific fisher habitat, and 322,000 acres of American marten habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. The focal species would not be affected by disturbance, habitat fragmentation, or indirect impacts to prey or food resources from cross-country vehicle travel. Compared to alternative 1, there would be less potential for breeding disturbance and less stress and behavior change from cross-country travel.

In addition to these documented sites, alternative 5 would prohibit the further use of 435 miles (94.3% of the total miles of routes) of unauthorized routes that occur in suitable northern goshawk habitat, 332 miles (95.5% of the total) of unauthorized routes that occur in northern spotted owl habitat, 350 miles (96.6% of the total) of unauthorized routes that occur in suitable fisher habitat, and 147 mile of unauthorized routes that occur in suitable marten habitat (97.1% of the total). Under Alternative 1, disturbance effects would continue with the use of these routes. Alternative 5 would restrict this use.

Wide-Ranging Focal Group

This would result in cross-country travel prohibition on about 150,000 acres of wide-ranging focal species habitat. The prohibition would prevent disturbance and habitat alteration to the focal species within this

group from cross-country travel. The focal species would not be affected by disturbance, trampling or indirect impacts to prey or food resources due to off-road vehicle use.

Ungulate Focal Group

This would result in cross-country travel prohibition on about 220,000 acres of mule deer habitat and 102,000 acres of elk habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. Mule deer and elk are highly unlikely to be affected by disturbance, collision, or indirect impacts to food resources due to off-road vehicle use.

Riparian Focal Group

This would result in cross-country travel prohibition on 218,000 acres of focal species (bald eagle) habitat, and would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. The focal species would not be affected by disturbance, habitat fragmentation, or indirect impacts to prey or food resources from cross-country vehicle travel. Under this alternative, compared to alternative 1, there would be less potential for breeding disturbance and less stress and behavior change from cross-country travel.

Cavity-Dependent Focal Group

This would result in cross-country travel prohibition on 240,000 acres of hairy woodpecker habitat and 518,000 acres of pileated woodpecker habitat . Prohibiting cross-country travel on this amount of acreage would prevent disturbance and habitat alteration to the focal species within this group from cross-country travel. Hairy woodpeckers and pileated woodpeckers would not be affected by disturbance, collision, or indirect impacts to prey or food resources due to off-road vehicle use.

Alternative 5: Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

This alternative would add approximately 106.11 miles of routes to the NFTS and would prohibit motor vehicle cross-country travel and use of unauthorized routes. Some impacts to focal species would occur because of the additional routes added to the NFTS. This alternative has the greatest impact of the action alternatives because it adds the most miles of routes. These route additions are however offset at the 20-year, long-term point by the recovery of unauthorized routes not added to the NFTS that would have begun to move towards habitat for focal species. The miles of routes added to the system in this alternative are displayed in Table 3.05-33 for each of the focal species.

Table 3.05-33. Alternative 5: Direct/Indirect effects measurement indicators 3, 4 and 5

Indicator		3	4	5		5
Species Group	**Species**	**Miles of Routes Added to the NFTS within Habitat on NF**	**# of TES Sites Within ½ mile of Added Routes**	**Acres of Habitat Affected by Added Routes (Habitat Influence Zone) (Square Miles)[1]**		**Percent of Habitat Affected by Added Routes (Habitat Influence Zone)[1]**
LSF	**Northern goshawk**	26.0	4	1,314	2.05	0.15%
	Northern spotted owl	15.6	9	814	1.27	0.14%
	Pacific fisher	12.4	0	711	1.11	0.09%
	American marten	4.3	0	252	0.39	0.08%
Wide-ranging	**Black bear**	19.1	N/A	897	1.40	0.60%
Ungulate	**Mule Deer**	34.0	N/A	1,690	2.64	0.77%
	Elk	22.3	N/A	1,079	1.69	1.06%
Riparian	**Bald Eagle**	3.9	1	1,605	2.51	0.74%
Cavity-dependent	**Hairy Woodpeckers**	24.0	N/A	1,153	1.80	0.48%
	Pileated Woodpecker	7.9	N/A	474	0.74	0.09%

[1] Habitat influence zone is a 300 meter buffer around routes for bald eagle and a 60 meter buffer around routes for all other species.

Under this alternative, motor vehicle use of lake bottoms (areas below high-water mark) would be allowed on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir. Some other restrictions on this use are a 10 mph speed limit restriction for resource protection with all vehicle classes allowed. The lake bottoms are those areas bordering reservoirs that are exposed and barren during periods of low water. When the water is low, recreationists have access to the lake bottoms at roads, marinas and trails that reach the lake shore edge. Trinity Lake has about 149 miles of perimeter of which about 127 miles (about 85%) are already within a quarter mile of a currently used NFTS road. Typically, entry points occur variably around the lake, with at least 23 points easily recognizable. Not all areas of the lake are accessible and continuous passage along the lake shore is commonly blocked by streams, steep walls, and other obstructions.

Although the perimeter is not all accessible by motorized vehicle traffic, the entire lake is generally accessible to motorized watercraft. Without any buffering of vegetation, sound carries well over water and motorized watercraft on the lake create irregular patterns of disturbance similar to off-road vehicles.

Hazard trees that are felled along routes in LSRs (see Table 3.05-34) would be left on the ground. This will benefit all focal species by increasing important habitat components.

Parking and dispersed camping would be allowed within one vehicle length of a designated route. The disturbance effect would be minimal and short-term, given the parking and/or camping is temporary and would not be over 30 feet from the edge of a travel route.

Late-Successional Forest Focal Group

This alternative would add 106.12 miles of routes to the NFTS, although it would only add eight miles (see Table 3.05-34) of routes within LSRs on the STNF. There are currently 264 miles of unauthorized routes within LSRs; this alternative would close 256 miles of unauthorized routes or about 97 percent of

all unauthorized routes within the LSR. The added routes' habitat influence zone is 1,314 acres in goshawk habitat, 814 in northern spotted owl habitat, and 711 acres in fisher habitat and 252 in marten habitat (Table 3.05-33). The effects of these changes to the NFTS are the same as those listed above for alternative 2. The miles of routes added to the system in this alternative are displayed in Table 3.05-33 for each of the focal species.

Table 3.05-34. Alternative 5: Routes proposed for addition to the NFTS within late successional reserves (LSRs)

Route No.	Miles in LSR RC 330	Miles in LSR RC 331	Miles in LSR RC 332	Miles in LSR RC 334	Miles in LSR RC 357
JG30				0.18	
JG31				0.21	
JM244				0.10	
JM44				0.15	
NRA1				0.26	
PM2004	0.32				
PM702	0.04				
RM1036	0.52				
SFMU4	0.02				
SFMU6	0.02				
SFMU7	0.01				
TC1098			0.05		
TC1238			0.04		
TC1249			0.06		
TC319	0.12				
TC828	0.08				
TRMU2			0.54		
TRMU3			0.15		
TRMU5			0.19		
TRMU6			0.14		
U29N28C		0.51			
U31N02Q		0.28			
U35N85A				0.02	
U40N13D					0.10
U4N12D	3.29				
UT29N30HA	0.23				
Totals	**4.64**	**0.79**	**1.16**	**0.92**	**0.10**
Grand Total: 7.6 miles					

Table 3.05-35. Alternative 5: Measurement indicators 3, 4, and 5 for direct/indirect effects for Late Successional Forest group

Indicators		3	4	5	5
Species Group	**Species**	**Miles of Routes Added to the NFTS within Habitat on NF**	**# of TES Sites Within ½ Mile of Added Routes**	**Acres of Habitat Affected by Added Routes (Habitat Influence Zone) (Square Miles)[1]**	**Percent of Habitat Affected By Added Routes (Habitat Influence Zone)[1]**
Late-Successional Forest (LSF)	**Northern goshawk**	26.0	4	1,314	0.15%
	Northern spotted owl	15.6	9	814	0.14%
	Pacific fisher	12.4	0	711	0.09%
	American marten	4.3	0	252	0.08%

[1] Habitat influence zone is a 60 meter buffer around routes

Tables 3.05-7 through 3.05-14 show impacts for the no action alternative. Although Alternative 5 permits roads within 1,314 acres of goshawk habitat, 814 acres of NSO habitat, 711 acres of fisher habitat and 252 acres of marten habitat in the 60-meter zone of influence, it prohibits similar influence on over 748,000 acres of goshawk habitat, 480,000 acres of NSO habitat, over 650,000 acres of fisher habitat and over 265,000 acres of marten habitat. Each addition is less than 0.01% of the amount of habitat potentially affected under the no-action alternative. Additionally, over 422 fisher sightings have been seen on or near the Forest, all of whom would be potentially within the influence zone of full cross country travel. Since 1972 over 3000 survey sightings of the northern spotted owl have occurred on the Forest, 340 of which were confirmed reproduction. Of these 340 reproductive sightings, 302 are already within the ½ mile road buffer for the existing NFTS roads used in this analysis.

Nine northern spotted owl core areas (Table 3.05-36), and four goshawk sites (Table 3.05-37) are located within ½ mile of routes proposed to be added to the NFTS in this alternative (see Table 3.05-35). Routes proposed for addition to the NFTS under this alternative also include 29 routes in five Late-Successional Reserves (Table 3.05-34), and multiple northern spotted owl critical habitat units (Table 3.05-38). In addition to these documented sites, Alternative 5 would prohibit motor vehicle use on 435 miles of unauthorized roads in suitable northern goshawk habitat, 332 miles of unauthorized routes in suitable northern spotted owl habitat, 351 miles in suitable fisher habitat and 146 miles of unauthorized routes in suitable marten habitat. Under Alternative 1, disturbance effects would continue with the use of these routes. Alternative 5 would restrict this use.

In addition to the existing seasonal closures that affect 220 NFTS routes, seasonal closures are proposed under this alternative for four additional routes (Table 3.05-37). This is specific to two goshawk nest sites. Those routes within close proximity to goshawk sites will have a limited operating period from February 1 to August 15. Therefore, this alternative would have no effect on northern goshawk from the use of added routes within ½ mile of a goshawk nest site. Seasonal closure would be added protection for 13 percent of known goshawk nest sites (see appendix D for a full list of routes).

Table 3.05-36. Alternative 5: Routes proposed for addition to the NFTS and associated mileage within designated NSO core areas

Route ID	Within NSO Core Area	Miles	Grand Total within a core area
MC090	6262	0.08	**0.08**
RM1101	8941	0.07	**0.07**
RM1206	5716	0.47	**0.47**
RM1210	5542	0.07	**0.19**
RM1211	5542	0.12	
RM145	0109	0.26	**0.77**[b]
RM146	0109 9443	0.51 0.11	**0.61**[b]
RM789	1616	0.10	**0.58**
RM790	1616	0.10	
RM791	1616	0.16	
RM792	1616	0.03	
RM793	1616	0.19	
TC1249	3935	0.06	**0.06**
TC899	9106	0.02	**0.02**
	Total		**2.34**

Table 3.05-37. Routes proposed for addition to the NFTS with limited operating period (LOP) for goshawk

Route ID	Miles	LOP	Season of Use
EA284	0.68	Feb 1–Aug 15	Aug 16–Jan 31
MC090	0.16	Feb 1–Aug 15	Aug 16–Jan 31
U40N50A	0.15	Feb 1–Aug15	Aug 16–Jan 31
TC1249	0.06	Feb 1–Aug 15	Aug 16–Jan 31

Table 3.05-38. Alternative 5: Routes proposed for addition to the NFTS within northern spotted owl designated critical habitat units (CHUs)[a]

Route ID	Shasta/McCloud CHU (2008)	Shasta/Trinity Lakes CHU (2008)	South Fork Mountain Divide CHU (2008)	Western Klamath/ Siskiyou Mountains CHU (2008)	1992 Designated CHUs
JG30		0.18			
JG31		0.21			
JM244		0.10			
JM44		0.15			
mc090					0.88
mc091					0.20
mc092					0.22
mc097					0.10
mc098					0.31
mc102					0.67
mc104					0.17
mc105					0.05
mc106					0.26
mc110					0.44
mc115					0.74
NRA1		0.26			
pc025					2.10
pc026					0.21
pm2004					0.32
PM702			0.04		
SFMU4			0.02		
SFMU6			0.02		

Route ID	Shasta/McCloud CHU (2008)	Shasta/Trinity Lakes CHU (2008)	South Fork Mountain Divide CHU (2008)	Western Klamath/ Siskiyou Mountains CHU (2008)	1992 Designated CHUs
TC1004					0.12
TC1098				0.05	
TC1238				0.04	
TC1249				0.06	
TC1829[72]					0.14
TC828			0.08		
TRMU5				0.19	
TRMU6				0.14	
U29N28C				0.51	
U31N02Q				0.28	
U35N85A		0.02			
U40N13D	0.10				
U4N12D			2.82		
UT29N30HA					0.80
	0.10	**0.92**	**2.96**	**1.26**	**7.73**
Grand Total = 12.97 miles					

a - Note: In 1992 the Fish and Wildlife Service determined critical habitat for the owl. In 2008, the Service revised the original designations. In 2009, the FWS requested the courts to allow them to withdraw the 2008 designation. In order to ensure we have adequately analyzed all critical habitat designations, we have included both of these critical habitat designations here for analysis.

About 13 miles or about 8.7% of the perimeter of Trinity Lake has a high probability of having NSO present within a quarter mile of the lake edge. An additional 13 miles has a moderate probability of finding owls. Of the high and moderate probability areas, about 11 miles of shoreline are not readily accessible.

Iron Canyon Reservoir has about 1,975 acres of late-successional habitat within its ½ mile buffer. Its entire area is within the 1992 designation of critical habitat for the NSO and all but a small portion of the 2008 designation also covers this reservoir and its ½ mile buffer. Its 60-meter zone of influence contains about 172 acres of goshawk habitat, 132 acres of NSO habitat, 142 acres of fisher habitat and 108 acres of marten habitat.

In the DEIS, Trinity Lake and Iron Canyon Reservoir contained a Limiting Operating Period for the NSO to reduce the disturbance potential of this species. After careful consideration and habitat analysis it was determined that these specific LOPs are not needed for the protection of the NSO along Trinity Lake or Iron Canyon Reservoir.

Trinity Lake already has a high baseline of disturbance due to proximal roads and high lake traffic. Most of the lake bottom use occurs late in the season when levels are low. In contrast, owls are most sensitive to disturbance when lake levels are high and access is more restricted. Damiani et. al. (2007) (Damiani 2007) looked at 19 years of demographic data on the Shasta-Trinity and Six Rivers National Forests and compared it with known disturbances in the area. They found that noise conducted in the

[72] TC1829 is physically located in critical habitat; however it has been evaluated as “No Effecct” because it is located on a gravel bar and is incapable of becoming habitat.

breeding season did not have immediate effects on the reproductive output of NSO. This is consistent with Delaney studies on the Mexican Spotted owl and the northern spotted owl (Delaney, Grubb et al. 1997; Delaney and Grubb 2001). However, the data did suggest that in high quality habitat, disturbance could have a cumulative negative effect only seen over a full decade of disturbance. However, it was not clear whether those effects are caused by the noise or by changes in habitat quality. Given these elements, the addition of a limited operating period (LOP) for northern spotted owls along the Trinity Lake margins (lake bottom) as suggested in the Draft EIS is not likely to provide any additional protection for the owl and has been removed in the final.

About 35 miles of 2008 NSO critical habitat and about 32 miles of 1992 NSO critical habitat borders Trinity Lake and the Lake bottom areas. The actual critical habitat areas are not part of the proposal and their principal component elements will not be affected by lake bottom recreational use. The lake bottoms themselves are outside of the critical habitat borders and are not capable of growing suitable northern spotted owl habitat due to regular flooding. Because these areas are outside of designated critical habitat and will not affect the principal component elements of critical habitat, their use will not affect critical habitat and are within the conditions set by the programmatic consultation developed with the U.S. Fish and Wildlife Service for motor vehicle management. Typically, “no effect” determinations for effects to critical habitat do not require consultation with the FWS.

The 26 miles of routes added to the NFTS in northern goshawk and the 15.6 miles added in northern spotted owl habitat in this alternative are equivalent to a habitat influence zones of 1,314 acres and 814 acres. For fisher, the habitat area affected by adding routes to the NFTS equates to about 711 acres and about 252 acres for marten. These route additions are offset at the 20-year, long-term point by the prohibition on cross-country travel and the passive restoration that is expected to occur on the routes not added to the NFTS that would have begun to improve habitat conditions for late-successional species. In this alternative the impacts from the route system are substantially reduced compared to the impacts of alternative 1, and augmented additionally by the cessation of impacts from cross-country travel.

Existing season of use restrictions would continue on Shasta Lake to protect nesting bald eagles. Other restrictions on this use are a 10 mph speed limit restriction for cultural resource protection and highway-legal vehicles only. If these mitigation measures are ineffective then the area would be closed while site specific measures are developed.

Wide-Ranging Focal Group

This alternative would add 106.12 miles of routes to the NFTS, including 19.1 miles (Table 3.05-33) in black bear habitat, resulting in a habitat influence zone of 897 acres[73] (11.7% of the total acreage in the

[73] Note that the acreage figures for the Zones of Influence are not necessarily a simple multiplication of the 120-meter zone on both sides of the road by the mileage of the road. Overlap between roads that lay close enough to intersect frequently reduces the figure in order to prevent double-counting of zones. Likewise, buffer end caps can increase the figure, partial polygons can decrease the figure as well.

zone of influence of all unauthorized routes). The effects of these changes to the NFTS are the same as those listed above for alternative 2.

Ungulate Focal Group

This alternative would add 106.12 miles of routes to the NFTS including 34 miles in deer habitat and 22 miles in elk habitat (Table 3.05-33). This zone includes 1,690 acres mule deer habitat (0.77% of the total deer habitat on the Forest) and 1,079 acres of elk habitat (1.06% of total elk habitat). The effects of these changes to the NFTS are the same as those listed above for alternative 2.

Shasta and Trinity Lakes and Iron Canyon Reservoir offer about 551 miles of periphery potentially open to off-highway vehicle recreation. About 13% of the acreage within the buffers on the three lakes would be considered prime deer habitat and about 10.3% would be considered prime elk habitat. Although none of the lake bottom areas are themselves suitable habitat for deer or elk, deer may use the margins of the lake bottom areas for grazing. These margins receive more sunlight and can be valuable forage for deer. Deer may occasionally cross the larger barren area to drink water from the lake itself, exposing themselves to possible collisions with OHV. Slower speed limits, and high visibility and differential use times (deer tend to be active in the early morning and early evening whereas higher OHV activity happens later in the day) reduce the probability of collisions considerably. Forest Service law enforcement on both Shasta and Trinity Lakes have no record of collisions actually occurring between recreationists and deer on the lake in the last 10 years.

Currently, elk only occur on the upper reaches of the Pitt and McCloud arms of Shasta Lake. Given their current occurrence, direct impacts are highly unlikely. However, elk have the potential to occur throughout the lake areas and our analysis will focus on possible impacts from lake bottom use should elk expand their range into those areas.

Elk prefer somewhat different habitats than deer and have less key habitat around the lakes. Shasta Lake has about 1,060 acres (11.7% of total buffer) of potential key elk habitat in the 60-meter buffer around the lake and about 106 (3.1% of the total buffer) acres around Trinity Lake. Elk are less common than deer, but also acclimatize readily to non-threatening disturbance. They are large animals and even less likely to collide with vehicles than deer. Although they will also come to the lake margins to drink, they are rarely sighted near the lake shore when the water is drawn down and have alternative water sources in the uplands.

Riparian Focal Group

This alternative would add 106.12 miles of routes to the NFTS, with 3.9 miles in bald eagle habitat (Table 3.05-33). In addition, one sensitive bald eagle site is located within ½ mile of an added route under this alternative (Table 3.05-33). The 3.9 miles of added routes in bald eagle habitat results in 1,605 acres in the 300-meter habitat influence zone, or 0.74% percent of the total eagle habitat on the forest and 1.93% of the bald eagle habitat outside of wilderness.

One bald eagle nest site is located within ½ mile of an added route (Table 3.05-33). A limiting operating period of January 1 to August 15 for the eagle would be placed on this route to avoid disturbance effects. Therefore, this alternative would have no effect on bald eagle from the use of added routes.

Under this alternative, motor vehicle use of lake bottoms (areas below high-water mark) would be allowed on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir. Existing limiting operating periods of January 1 to August 15 would continue on Shasta Lake and Trinity Lake to reduce the disturbance potential of this species during the critical nesting and brood rearing seasons. Although there are intermittent sighting of a bald eagle on Iron Canyon Reservoir, we don't have records for nesting. See Table 3.05-39 for the total amount of acres of bald eagle habitat in open lake bottom areas.

Table 3.05-39. Alternative 5: Total open area acres with bald eagle protection

Open Areas	Bald eagle acres
Shasta Lake Area	2,205
Trinity Lake Area	649
Iron Canyon Reservoir Area	0
Total	**2,854**

Cavity-Dependent Focal Group

This alternative would add 106.12 miles of routes to the NFTS, including 24 miles in hairy woodpecker habitat and 7.9 miles in pileated woodpecker habitat (Table 3.05-33). The effects of these changes to the NFTS are the same as those listed above for alternative 2. Within the 60-meter zone of influence for these species, there are about 1,153 acres of suitable habitat for the hairy woodpecker (about 0.48% of the total habitat) and about 474 acres of habitat for the pileated woodpecker (about 0.09% of the total habitat).

Hairy woodpeckers have about 861 acres of habitat within the 60-meter zone of influence around Shasta and Trinity Lakes and Iron Canyon Reservoir, or about 6% of the total acreage within the lake side zone of influence, and less than 0.1% of the total habitat available on the Forest and about 6.7% of the area in the Zones of Influence. Although data regarding their sensitivity to disturbance is limited, hairy woodpecker's practice of occasionally excavating the sides of buildings and their presence in developed areas suggest that they are relatively insensitive to these kinds of disturbances and are unlikely to be affected strongly by OHV activity in the lake bottoms.

Safety concerns may lead to some felling of snags at the edges of the lake bottoms, but given the large acreages outside of the zone of influence and the inherent dynamics of snags, this is not likely to be significant. Given the Forest type in this area, an unharvested forest may have as many as 344 snags 10" dbh and over on any given 40 acres area (about 8.6 snags per acre), likely to be clumped so that 40% or 16 acres may have 6 snags per acre, 9 acres may have no snags at all, 12 acres may have 12 per acre, 3 acres may have as many as 300 per acre and less than one acre may have as many as 49 per acre (Mellen, Marcot et al.). If every quarter mile of lake frontage represents the edge of a 40 acre block, then the removal of 2 snags over 10 inches dbh in that frontage would only represent a 0.6% reduction in snags

through that area. Even if as many as 10 snags per quarter mile were removed, it would still be a reduction of only 3% throughout the 40 acre block. Given the flexibility of the hairy woodpecker and the variability of snag occurrence in this area, lake bottom use is unlikely to significantly affect this species' use of snags in the area.

Similar to the hairy woodpecker, pileated woodpeckers are considered somewhat insensitive to anthropogenic disturbance, although individuals may vary (Bull and Jackson 1995) they are not likely to be significantly disturbed by OHV activity at the lake margins.

Pileated woodpeckers have as much as 3,094 acres (24.1% of the total in the zone of influence) of suitable habitat along the 60-meter margin of the lakes. They use larger snags than the hairy woodpecker (20" dbh) and a generally have a larger territory. Snags this large are less common in the typical landscape and in unharvested woodland of the type that provides habitat for the pileated woodpecker, we may expect to find about 138 snags 20" dbh and greater per 40 acres block, distributed in such as way that 13 acres may have no snags at all, 4 acres may have 2 snags per acre, 16 acres may have 4 snags per acre, 6 acres may have 8 snags per acre and 1 acre may have as many as 18 snags per acre. Removal of 2 snags of this size over a quarter mile length of lake margin would reduce the snag levels by about 1.5%. These impacts would primarily be a slight lowering of available snags adjacent to routes and occasional disturbance of foraging due to passing vehicles. These impact differences are limited in scope and intensity.

Alternative 5: Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Motorized mixed-use is proposed on 30.41 miles of existing ML 3 roads. Changes to class of use are not expected to have any detectable impact on wildlife. The disturbance, whether from an auto, truck, or ATV, is assumed to be the same for this analysis. Changing the mix of use is not expected to have any impacts on wildlife.

Alternative 5: Cumulative Effects

Cumulative effects must take into account present and reasonably foreseeable actions (identified in appendix B). Present and reasonably foreseeable projects include ongoing and future timber harvest, vegetation restoration, fuels management, grazing allotments, road management including closures and decommissioning, recreation use, fire salvage, and mining reclamation which could have effects that would mitigate, or add to the effects of this action. In addition, unplanned events such as wildfires and tree mortality related to periodic droughts will continue to affect habitat. Road maintenance and hazard tree removal will continue on the existing NFTS, as well as on the routes added to the system under this document, and will continue to potentially affect the 60 meter habitat influence zone. Many of the above actions also have the potential to increase road density temporarily (i.e., forest product projects with timber harvest, fuels management projects, pre-commercial thinning projects, grazing allotments, and

mining). The primary effects of increases in road density are related to increase disturbance and habitat fragmentation.

The present and reasonably foreseeable actions in appendix B include 5.60 miles of routes proposed for addition to the NFTS, 0.46 miles of new construction and 186 miles of NFTS roads proposed to be closed, abandoned, or decommissioned. This would result in a net decrease of 180 miles of routes as a result of reasonably foreseeable actions described in Appendix B. This proportion of the total proposed actions forest-wide is not expected to have significant impacts. Furthermore, the routes added to the NFTS do not constitute a change to habitat, but rather are an existing condition where vegetation change impact has already occurred and where conditions would continue into the future. Vehicle-related impacts from this alternative may aggregate with other impacts occurring on the landscape, but these cumulative impacts would still be less than the no action alternative.

Table 3.05-40. Alternative 5: Total NFTS with Alternative 5 routes, measurement indicators 2, 3, 4 and 5

Indicators	2	3	4	5		5
Species	**Density of Routes Within Habitat[1]**	**Combined Miles of NFTS and Unauthorized Routes within Habitat on NF**	**Number of sensitive sites within ½ mile of *Existing** NFTS and unauthorized routes for TES Species**	**Acres of Habitat Affected by Combined Routes (Habitat Influence Zone) (Square Miles)**		**Percent of Habitat Affected By Route (Habitat Influence Zone)[1]**
Northern goshawk	2.30	3,234	83	150,104	235	16.71% Low
Northern spotted owl	2.85	2,669	2798	119,180	186	19.90% Low
Pacific fisher	2.24	2,740	224	132,433	207	16.92% Low
American marten	2.30	1,155	137	56,098	88	17.43% Low
Black bear	3.27	765	N/A	33,417	52	22.35% Low
Mule Deer	3.66	1,255	N/A	55,426	87	25.22% Low
Elk	3.94	627	N/A	27,529	43	27.02% Low
Bald eagle	2.97	1,012	40	150,738	236	69.10% High
Hairy Woodpecker	3.88	1,454	N/A	60,569	95	25.28% Low
Pileated Woodpecker	2.24	1,809	N/A	84,849	133	16.38% Low

Habitat influence zone is a 300 meter buffer around routes for bald eagle and a 60 meter buffer around routes for all other species.

Cumulative Effects Indicator 2

Route density was averaged forest-wide to give an approximate coarse measure of habitat effects for focal species (Table 3.05-40). The type of impacts to these species depends on the type of route, amount and type of use, and season of use (Gaines 2003). Ouren and Watts (2005) concluded that proximity of secondary routes to arterial roads, highways, and population centers has a large influence on the intensity of use on these routes; the utility of road density analysis at the low-use end of the spectrum diminishes. Route density thresholds for focal species are not well understood. Route densities therefore are presented to compare relative effects between the alternatives. Under this alternative, which prohibits cross-country

travel on unauthorized routes, route density is 2.30 miles/square mile for goshawk, 2.85 miles/square mile for spotted owl, 2.24 miles/square mile for fisher, 2.30 miles/square mile for marten, 3.27 miles/square mile for black bear, 3.66 miles/square mile for deer, 3.94 miles/square mile for elk, 2.97 miles/square mile for bald eagle, 3.88 miles/square mile for hairy woodpecker and 2.24 miles/square mile for pileated woodpecker.

Cumulative Effects Indicator 3

The routes added under this alternative would require maintenance under the NFTS, including hazard tree removal. In addition to road maintenance impacts, other present and reasonably foreseeable impacts on the forest include vegetation management, prescribed fire, and grazing (Appendix B).

Removal of trees during road maintenance (hazard tree removal) has the potential to impact late-successional focal species. Generally, these species are affected negatively by actions that reduce the average tree size, or reduce canopy closure. Long-term trends have generally been negative for the late-successional focal species group, as can be seen by the listing of the northern spotted owl as "Threatened," and by the identification of Forest Service "Sensitive" species such as northern goshawk, marten, and fisher.

Vegetation management and prescribed fire have the potential to impact the wide-ranging focal species by removing important habitat elements such as downed logs, snags, hollow trees and mature shrubs that are used for cover, or that are important to the life histories of prey. Generally, this group of species is affected negatively by extensive mechanical and prescribed fire treatments that reduce these important habitat elements; although some elements, such as snags and down logs, can be increased by the application of prescribed fire.

Vegetation treatments and grazing have the potential to impact species in the ungulate focal species group by removing forage, impeding the growth of forage, or altering vegetative structure that provides cover. Generally, this group of species is affected negatively by extensive grazing, and mechanical and prescribed fire treatments that reduce these important habitat elements.

Removal of trees has the potential to impact riparian focal species. Past trends for this group have generally been negative, but have improved greatly for bald eagles (hence their delisting). Generally, this group of species is affected negatively by actions that reduce the average tree size.

Vegetation management and prescribed fire has the potential to impact species in the cavity-dependent species group by removing important habitat elements, such as downed logs, snags, and hollow trees, or that are important to the life histories of prey. Generally, this group of species is affected negatively by extensive mechanical treatments that reduce these important habitat elements; although some elements, such as snags and down logs, can be increased by the application of prescribed fire. Conversely, the species in this group tend to benefit from wildfires, prescribed fire, insect outbreaks and densely stocked timber stands. The benefits from these conditions are a result of higher quantities of

snags, stressed trees and higher insect populations that provide improved foraging for these primarily insectivorous species. Timber harvest and mechanical fuels treatments must meet minimum retention requirements for down logs and snags, thereby ameliorating the potential negative effects to cavity-dependent species from direct removal of snags; however, reduced stand density from timber harvest results in stronger trees that are more resistant to insects. The lower rates of mortality in treated stands thus result in lower densities of snags and ultimately down logs. This effect can last 20 years or more until stand density increases sufficiently to cause tree stress and death. Snag density is encouraged through the retention of existing snags, but as snags fall, the reduced snag recruitment rate can result in areas being below target levels of snag density. This is detrimental to those cavity nesters depending on snags for forage and nesting substrates. Prescribed fire, wildfire, and insect attacks create additional snags and down logs. At the same time, stand-replacing wildfire, while providing a pulse of snags, can remove all living trees, leaving an area poorly suited for cavity nesters for decades. To the extent that snag-removing activities exceed snag-creating activities, there may be a long-term decline in habitat quality for cavity-dependent species.

Alternative 5 has reduced cumulative impacts relative to the no action alternative. Keep in mind that the effects of the no action alternative although much larger than any of the action alternatives, are also limited in scope and intensity in comparison to both natural and anthropogenic actions, such as timber harvest, fuels treatments and wildfire, occurring on the landscape.

Cumulative Effects Indicator 4

Indicator 4 measures the cumulative influence of the proposed additions to the NFTS on TES sites for each TES species within one-half mile of a route as well as the influence of the current system of routes and any routes proposed for the reasonably foreseeable future. Alternative 5 marginally reduces the number of TES sites within the ½ mile buffer of the roads system. The reductions are so small as to be insignificant. Most TES sites are within the buffer of existing NFTS routes (94.1% of northern goshawk sites, 99.7% of northern spotted owl sites, 100% of fisher and marten sites, and 97.9% of bald eagle sites for this alternative), so this alternative would not add significantly to the number of TES sites in the ½ mile buffer.

In general, the prohibition of cross-country travel and the addition of 15.56 miles of new routes into the NFTS will result in a reduction of ‘new’ road mileage by about 92% (relative to just the unauthorized routes). Relative to the existing road system, this alternative reduces the effective road mileage by about 14%.

Cumulative Effects Indicator 5

Table 3.05-40 indicates that according to the ranking system developed by Gaines et al. (2003), existing NFTS and added routes in Alternative 5 impact less than 30% of the available suitable habitat for most of the focal species; therefore, the human influence is ranked as low. This would indicate a low level of impact from edge effects, snag and downed log reduction, and habitat loss and fragmentation resulting

from route-associated factors (Gaines et al. 2003). The exception is the bald eagle. The habitat influence zone for bald eagle includes 69.1%[74] of the species habitat on the forest, therefore, the cumulative human influence rank is moderate for this species under this alternative. Most of the effects revealed by this cumulative habitat influence analysis are from the existing approved transportation system, with only 1.54% [75] of these effects being attributed to the added routes and the rest to the existing transportation system routes.

Migratory Birds

Within the National Forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales and ensuring that bird conservation is addressed when planning for land management activities.

Under the National Forest Management Act (NFMA), the Forest Service is directed to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." (P.L. 94-588, Sec 6 (g) (3) (B)). The January 2000 USDA Forest Service (FS) Landbird Conservation Strategic Plan, followed by Executive Order 13186 in 2001, in addition to the Partners in Flight (PIF) specific habitat Conservation Plans for birds and the January 2004 PIF North American Landbird Conservation Plan all reference goals and objectives for integrating bird conservation into forest management and planning.

One-hundred and ninety four of the approximately 237 bird species that occur on the Forest are considered migratory birds under the Migratory Bird Species Act. They occur throughout the Forest, from double-crested cormorants in lakes and ponds at lower altitudes to grey-crowned rosy finches found on the snow fields of Mount Shasta.

As part of the Travel Management process, the Shasta-Trinity National Forest inventoried and assessed existing unauthorized routes within Forest boundaries. The Motorized Travel Management Plan for the Shasta-Trinity NF proposes five alternatives (including the "no action" alternative) and one modified alternative (Modified Alternative 2). Each of these action alternatives prohibits general cross country motorized vehicle travel. All the alternatives (except Alternative 3) included proposals for including some existing amount of currently unauthorized routes into the NFTS, and proposes some changes in existing route use. None of the action alternatives propose new road or trail construction or development, and none of the action alternatives will change the distribution and or abundance of habitats available to migratory birds.

Changes in road and trail authorization are not anticipated to contribute to a measurable increase in use levels, but the prohibition of cross-country travel is expected to result in significantly less use across

[74] The eagle has a very high human influence ratio because it not only has a much larger zone of influence, 300 meters as opposed to 60-meters, but it's habitat is more highly constrained to buffer areas around lakes and streams capable of supporting eagles.
[75] Calculated by dividing 106 (miles added) by total routes for this alternative (6760 mile existing + 106 added).

the landscape. Therefore, habitat functionality is expected to remain similar to or more than pre-decisional levels, and levels of disturbance related to use are expected to remain similar to or less than pre-decisional levels.

Any future new construction, reconstruction and maintenance of system roads or trails will be conducted under a separate NEPA analysis and decision.

Threatened and Endangered Species Determination

Northern Spotted Owl

In accordance with the Endangered Species Act of 1973, as amended, and in agreement with the U.S. Fish and Wildlife Service, the Shasta-Trinity Motorized Vehicle Management Project utilized the programmatic agreement for consultations[76] which does not require that a Biological Assessment be submitted to the Fish and Wildlife Service for "May Affect, Not Likley to Adversely Affect" determinations.

Alternative 1 does not prohibit cross-country travel; there are currently about 348 miles of unauthorized routes within NSO nesting, roosting and foraging habitat (see Table 3.05-8). This alternative may affect individual northern spotted owls as cross-country travel could contribute disturbance or direct effects that may cause impacts to breeding and reproductive activities. Alternative 2, Modified Alternative 2, Alternative 4, and Alternative 5 would all prohibit cross-country motorized vehicle travel, but would add mileage (7.5, 5.5, 1.2 and 15.6 miles, respectively) within suitable NSO habitat to the NFTS. Because alternatives 2, Modified Alternative 2, 4, and 5 add routes within suitable habitat, there may be some disturbance effects to individual spotted owls but the extent of disturbance to individual animals is expected to be minimal due to the relative ability of NSO to accommodate some level of OHV disturbance and the effects to the large population is expected to be minimal due to the relative small amount of miles added. Currently, a little more than 75% of the suitable northern spotted owl nesting, roosting and foraging habitat on National Forest lands outside of wilderness is within one-quarter mile of an authorized road; the addition of routes in the action alternatives .

The 60-meter habitat influence zone acreage represented by the added routes are 387, 301, 68 and 814 acres for alternatives 2, Modified Alternative 2, Alternative 4, and Alternative 5, respectively, or no more than 0.14 percent of total northern spotted owl habitat on the forest. Nine historic spotted owl nests are within ½ mile of proposed routes. Alternative 3 would have no increase in effect because motorized cross-country vehicle travel would be prohibited and no additional routes would be added to the NFTS within NSO habitat.

[76] July 2, 2007 Memorandum from the Regional Forester on Route Designation and T&E Species Criteria and the December 27, 2006 letter from Alexandra Pitts, the U.S. Fish and Wildlife Service Deputy Manager for the California/Nevada Operations Office regarding Route Designation Project Design Criteria.

Motor vehicle use of lake bottoms (areas below high-water mark) would be allowed under alternative 2 on Shasta Lake and Trinity Lake and under alternatives 4 and 5 on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir. Lake bottom use would not affect directly any NSO habitat and would indirectly affect these areas through noise disturbance. Within a quarter mile of the lake bottom areas, about 2,778 acres of northern spotted owl nesting, roosting and foraging habitat exists of which only 289 acres would be considered nesting and roosting. These areas are almost exclusively high up the Pit River arm and well out of the way of typical lake bottom use areas. Trinity Lake offers about 6,834 acres of suitable nesting, roosting and foraging (NRF) habitat within a quarter mile of its shores, 5,163 acres of which are nesting and roosting quality. Iron Canyon Reservoir in turn harbors about 1,120 acres of NRF habitat within a quarter mile of its shores, 409 of which are considered nesting and roosting. Only about 6.4% of the Shasta lake quarter mile buffer offers any northern spotted owl habitat, whereas almost 32% of Trinity Lake's quarter mile margin contains suitable northern spotted owl habitat and over 75% of Iron Canyon Reservoir's margins are suitable nesting and roosting habitat. Together the three reservoirs contain about 1.6% of the available NRF northern spotted owl habitat within the area of analysis – the area currently open to cross country access.

As documented earlier, researchers have documented responses of NSO to various levels of noise and have looked at demographic response under typical forest-level noise regimes. Based on the documentation cited earlier in the analysis of the northern spotted owl, we determine that alternatives 2, modified alternative 2, 4, and 5 "May Affect but are Not Likely to Adversely Affect" the northern spotted owl and would also be expected to benefit the owl because of the prohibition on motor vehicle cross-country travel that ends the proliferation of unplanned OHV routes. Alternative 3 would have "No Effect" to northern spotted owls or their habitat and would likely benefit the owl. Alternatives 2, modified alternative 2, 4, and 5 have a beneficial effect on habitat compared to the no action alternative because of the prohibition on motor vehicle cross-country travel. There will be fewer miles of routes in LSRs and critical habitat units as a result of the action. Passive restoration of off road areas formerly used by recreationists will improve late-successional habitat for those routes which are not added to the system. Alternative 1 is likely to adversely affect northern spotted owls because of the continued proliferation of unplanned routes associated with unregulated motor vehicle cross country travel.

Sensitive Species Determinations

Northern Goshawk

In accordance with Forest Service Manual direction (FSM 2671.2 and 2672.42), a BE[77] for the northern goshawk was prepared for the Shasta-Trinity National Forest Motorized Travel Management analysis and is hereby incorporated by reference.

[77] Janet Moser, Biological Evaluation for the Shasta-Trinity National Forest Motorized Vehicle Management EIS, 2009. Included in the Project record and in the Final EIS.

Alternative 1 may affect individual northern goshawks as cross-country travel could contribute disturbance or direct effects that may cause impacts to breeding and reproductive activities. Alternative 2, modified Alternative 2, Alternative 4, and Alternative 5 would prohibit cross-country motorized vehicle travel, but would add mileage (13.3, 9.6, 3.5 and 26 miles, respectively) within northern goshawk habitat to the NFTS. Because alternatives 2, modified alternative 2, 4, and 5 add mileage to the NFTS, there may be some disturbance effects to individual goshawks, but the extent of disturbance is expected to be minimal due to the relatively small amount of miles added. The habitat influence zone acreage represented by the additional routes are 634, 502, 179, and 1,314 acres for alternatives 2, Modified Alternative 2, Alternative 4, and Alternative 5, respectively, or no more than 0.15% of total northern goshawk habitat on the forest. Four goshawk nest sites are within ½ mile of proposed routes. Limited operating periods of February 1 to August 15 would be added to these routes. Alternative 3 would have no increase in effect as cross-country motor vehicle travel would be prohibited and no additional routes would be added to the NFTS within northern goshawk habitat.

Alternatives 1, modified alternative 2, 4, and 5 may impact individual northern goshawks or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population.

Alternative 3 would not affect northern goshawk or their habitats.

Alternatives 2, modified alternative 2, 4, and 5, show a beneficial effect compared to the existing condition in alternative 1, because of the ban on cross-country travel. There will be fewer miles of routes in LSRs and critical habitat units as a result of the action. Passive restoration of unauthorized routes will occur and improve late-successional habitat for those routes that are not added to the system. Direct harm or disturbance to breeding activities would be avoided with a limited operating period.

American Marten and Pacific Fisher

In accordance with Forest Service Manual direction (FSM 2671.2 and 2672.42), a BE[78] for American marten and Pacific fisher was prepared for the Shasta-Trinity National Forest Motorized Travel Management Project and is hereby incorporated by reference.

Alternative 1 may affect individual marten and fisher because cross-country travel could contribute disturbance or direct effects that may cause impacts to breeding and reproductive activities. Alternatives 2, modified alternative 2, 4 and 5 would have limited impacts above the existing NFTS route system as motorized cross-country vehicle travel would be prohibited. Alternatives 2, modified alternative 4 and 5 would add about 3, 0.6, 0.4, and 4.3 miles of additional routes respectively to the NFTS within marten habitat. These same alternatives would add 7.2, 3.7, 1.4 and 12.4 miles of road, respectively, within fisher habitat to the NFTS. This results in 154, 40, 32 and 252 acres of marten habitat within the respective 60-

[78] Janet Moser, Biological Evaluation for the Shasta-Trinity National Forest Motorized Vehicle Management EIS, 2009. Included in the Project record and in the Final EIS.

meter zones of influence and 401, 243, 80 and 711 acres of fisher habitat within the same zones. None of these are greater than 0.09% of the total habitat within the travel access area of the Forest. Alternatives 2, modified alternative 2, 4, and 5 would therefore have extremely limited effects on marten or fisher. Alternative 3 would have no increase in effect on marten and fisher as cross-country motor vehicle travel would be prohibited and no additional routes would be added to the NFTS within marten and fisher habitat.

Alternative 1 may impact individual American marten and Pacific fisher or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population. Alternatives 2, modified alternative 2, 3, 4, and 5 would have “no impact” to American marten and Pacific fisher. Alternatives 2, modified alternative 2, 3, 4 and 5 show beneficial effects compared to the existing condition in alternative 1 because of the ban on cross-country travel. There will be fewer miles of routes in LSRs and critical habitat units as a result of the action. Passive restoration of unauthorized routes will occur and improve late-successional habitat for those routes which are not added to the system.

Summary of Effects Analysis across All Alternatives

Table 3.05-41 displays the comparison of effects of wildlife indicators and rankings of alternatives for each indicator. In the following table, rankings are scored on a scale of 1 to 5 from greatest (1) to least (5) impact. See chapter 3.15 for a comparison of measurement indicators and discussion environmental consequences for modified alternative 2.

Table 3.05-41. Terrestrial biota indicators for all alternatives[79]

Indicator: Terrestrial Biota	Alternatives					
Indicator	**Alt 1****	**Alt 2**	**Mod Alt. 2**	**Alt 3**	**Alt 4**	**Alt 5**
1 - Acres open to motor vehicle use	1,599,122	0	0	0	0	0
1 - Miles of Unauthorized Routes	1,252	0	0	0	0	0
1 - Miles of Unauthorized Lake Bottom Use	562	0	0	0	0	0
1 - Miles of routes added to the transportation system.	0	44.2	35.7	0.0	15.6	106.1
1 - Miles of Lake Bottom Use Added to the transportation system	0	551.0	551.0	0.0	561.9	561.9
1 - Total Miles Added to system (Routes + Lake Bottom)	0.0	595.2	586.7	0.0	577.4	668.0
2 - Density of added roads, motorized trails and open routes for northern goshawk	0.32810	0.00951	0.00683	0.00000	0.00251	0.01855
2 - Density of added roads, motorized trails and open routes for northern spotted owl	0.37148	0.00797	0.00592	0.00000	0.00124	0.01667
2 - Density of added roads, motorized trails and open routes for Pacific fisher	0.29654	0.00590	0.00302	0.00000	0.00113	0.01010
2 - Density of added roads, motorized trails and open routes for marten	0.29991	0.00597	0.00114	0.00000	0.00075	0.00859
2 - Density of added roads, motorized trails and open routes for black bear	0.66170	0.04093	0.02385	0.00000	0.01316	0.08181
2 - Density of added roads, motorized trails and open routes for mule deer	0.85088	0.04660	0.03694	0.00000	0.01578	0.09897
2 - Density of added roads, motorized trails and open routes for elk	1.16725	0.07422	0.06856	0.00000	0.00746	0.14038
2 - Density of added roads, motorized trails and open routes for bald eagle	0.36792	0.00635	0.00447	0.00000	0.00000	0.01135
2 - Density of added roads, motorized trails and open routes for hairy woodpecker	0.72692	0.02084	0.02650	0.00000	0.01534	0.06399
2 – Density of added roads, motorized trails and open routes for pileated woodpecker	0.29853	0.00560	0.00349	0.00000	0.00101	0.00978
2 - Density of all roads, motorized trails and open routes for northern goshawk	2.61	2.29	2.29	1.89	2.29	2.30
2 - Density of all roads, motorized trails and open routes for northern spotted owl	3.21	2.84	2.84	2.83	2.84	2.85
2 - Density of all roads, motorized trails and open routes for Pacific fisher	2.53	2.24	2.23	2.23	2.23	2.24
2 - Density of all roads, motorized trails and open routes for marten	2.59	2.29	2.29	2.29	2.29	2.30
2 - Density of all roads, motorized trails and open routes for black bear	3.85	3.23	3.22	3.19	3.21	3.27
2 - Density of all roads, motorized trails and open routes for mule deer	4.41	3.60	3.59	3.56	3.57	3.66
2 - Density of all roads, motorized trails and open routes for elk	4.97	3.88	3.87	3.80	3.81	3.94
2 - Density of all roads, motorized trails and open routes for bald eagle	3.33	2.97	2.96	2.96	2.96	2.97
2 - Density of all roads, motorized trails and open routes for hairy woodpecker	4.55	3.84	3.85	3.82	3.83	3.88

[79] See Chapter 3.15 for Modified Alternative 2 analysis.

Indicator: Terrestrial Biota	Alternatives					
Indicator	Alt 1**	Alt 2	Mod Alt. 2	Alt 3	Alt 4	Alt 5
2 – Density of all roads, motorized trails and open routes for pileated woodpecker	2.52	2.23	2.23	2.23	2.23	2.24
(The following fields do not include lake bottom miles)						
3 - Miles of motor vehicle routes at analytical scale (area of cross country travel) within habitat for late-successional species group–northern goshawk	3,668	3,221	3,217	3207	3,211	3,234
3 - Miles of motor vehicle routes at analytical scale (area of cross country travel) within habitat for late-successional species group–northern spotted owl	3,001	2,661	2,659	2,653	2,654	2,669
3 - Miles of motor vehicle routes at analytical scale (area of cross country travel) within habitat for late-successional species group–Pacific fisher	3,090	2,734	2,731	2,727	2,729	2,740
3 - Miles of motor vehicle routes at analytical scale (area of cross country travel) within habitat for late-successional species group–American marten	1,302	1,154	1,151	1,151	1,151	1,155
3 - Miles of motor vehicle routes at analytical scale (area of cross country travel) within habitat for wide-ranging species group–black bear	900	755	751	746	749	765
3 - Miles of motor vehicle routes at analytical scale (area of cross country travel) within habitat for ungulate group–mule deer	1,513	1,237	1,234	1,221	1,226	1,255
3 - Miles of motor vehicle routes at analytical scale (area of cross country travel) within habitat for ungulate group–elk	791	617	616	605	606	627
3 - Miles of motor vehicle routes at analytical scale (area of cross country travel) within habitat for riparian species group–bald eagle	1,134	1,011	1,010	1,009	1,009	1,012
3 - Miles of motor vehicle routes at analytical scale (area of cross country travel) within habitat for cavity-dependent species group–hairy woodpecker	1,702	1,438	1,440	1,430	1,435	1,454
3 - Miles of motor vehicle routes at analytical scale (area of cross country travel) within habitat for cavity-dependent species group–pileated woodpecker	2,043	1,806	1,804	1,801	1,802	1,809
3 – Miles of motor vehicle routes added within habitat for late-successional species group-northern Goshawk	461	13.3	9.6	0.0	3.5	26.0
3 – Miles of motor vehicle routes added within habitat for late-successional species group-northern spotted owl.	348	7.5	5.5	0.0	1.2	15.6

Indicator: Terrestrial Biota	Alternatives					
Indicator	**Alt 1****	**Alt 2**	**Mod Alt. 2**	**Alt 3**	**Alt 4**	**Alt 5**
3 – Miles of motor vehicle routes added within habitat for late-successional species group-Pacific fisher.	363	7.2	3.7	0.0	1.4	12.4
3 – Miles of motor vehicle routes added within habitat for late-successional species group-American marten.	151	3.0	0.6	0.0	0.4	4.3
3 – Miles of motor vehicle routes added within habitat for wide-ranging species group-black bear.	155	9.6	5.6	0.0	3.1	19.1
3 – Miles of motor vehicle routes added within habitat for ungulate species group-mule deer	292	16.0	12.7	0.0	5.4	34.0
3 – Miles of motor vehicle routes added within habitat for ungulate species group-elk	186	11.8	10.9	0.0	1.2	22.3
3 – Miles of motor vehicle routes added within habitat for riparian species group-bald eagle	125	2.2	1.5	0.0	0.0	3.9
3 – Miles of motor vehicle routes added within habitat for cavity-dependent species group-hairy woodpecker	272	7.8	9.9	0.0	5.7	24.0
3 – Miles of motor vehicle routes added within habitat for cavity-dependent species group-pileated woodpecker	242	4.5	2.8	0.0	0.8	7.9
4 - Number of sensitive sites within ½ mile of added routes for threatened, endangered and sensitive species	15	5	4	0	7	15
5 – Acres of habitat in Zone of Influence, late-successional species– northern goshawk Direct and Indirect	24,858	634	502	0	179	1,314
5 - Acres of habitat in Zone of influence, late-successional species– northern spotted owl Direct/Indirect	18,434	387	301	0	68	814
5 - Acres of habitat in Zone of Influence, Late-Successional species– Pacific fisher Direct/Indirect	20,047	401	243	0	80	711
5 - Acres of habitat in Zone of influence, late-successional species– marten Direct/Indirect	8,329	154	40	0	32	252
5 - Acres of habitat in Zone of influence, wide-ranging species–Black bear Direct/Indirect	7,674	474	329	0	134	897
5 - Acres of habitat in Zone of influence, ungulate species–mule deer Direct/Indirect	14,422	791	660	0	297	1,690
5 - Acres of habitat in Zone of influence, ungulate species–elk Direct/Indirect	8,378	545	511	0	66	1,079
5 - Acres of habitat in Zone of influence (300 meters) , riparian species–bald eagle Direct/Indirect	40,237	1,027	925	0	41	1,605
5 - Acres of habitat in Zone of influence, cavity-dependent species– hairy woodpecker Direct/Indirect	13,786	354	467	0	269	1,153
5 - Acres of habitat in Zone of influence, cavity-dependent species– pileated woodpecker Direct/Indirect	13,020	244	190	0	41	474

Indicator: Terrestrial Biota	Alternatives					
Indicator	**Alt 1****	**Alt 2**	**Mod Alt. 2**	**Alt 3**	**Alt 4**	**Alt 5**
5 - Acres of habitat in Zone of influence*, late-successional species–northern goshawk - Cumulative	174,282	149,300	149,168	144,032	148,968	150,104
5 - Acres of habitat in Zone of influence, late-successional species–northern spotted owl - Cumulative	137,005	118,666	118,580	117,132	118,434	119,180
5 - Acres of habitat in Zone of Influence, Late-Successional species–Pacific fisher - Cumulative	152,303	132,015	131,856	126,940	131,802	132,433
5 - Acres of habitat in Zone of influence, late-successional species–marten - Cumulative	64,357	55,915	55,801	54,249	55,879	56,098
5 - Acres of habitat in Zone of influence, wide-ranging species–Black bear - Cu Acres of habitat in mulative	40,285	32,993	32,848	32,144	32,654	33,417
5 - Zone of influence, ungulate species–mule deer - Cu Acres of habitat in mulative	68,387	54,522	54,391	52,494	54,034	55,426
5 - Zone of influence, ungulate species–elk - Cumulative	34,999	26,994	26,961	25,455	26,516	27,529
5 - Acres of habitat in Zone of influence, riparian species–bald eagle - Cumulative	193,391	150,077	149,975	143,966	149,174	150,738
5 - Acres of habitat in Zone of influence, cavity-dependent species–hairy woodpecker - Cumulative	73,408	59,754	59,867	58,794	59,685	60,569
5 - Acres of habitat in Zone of influence, cavity-dependent species–pileated woodpecker - Cumulative	97,706	84,513	84,459	81,598	84,416	84,849

*Measured as the percent of habitat within the habitat influence zone or zone of influence. The amount of suitable habitat within the habitat influence zone is divided by the total amount of suitable habitat forest-wide to determine the proportion of habitat that could be influenced by available routes. Less than 30 percent suitable habitat within habitat influence buffer is a low level of human influence. Thirty to 50 percent within the habitat influence buffer is a moderate level of human influence. More than 50 percent within the habitat influence buffer is a high level of human influence.
** There are no added routes in Alternative 1. Figures reported in this column refer to unauthorized routes.

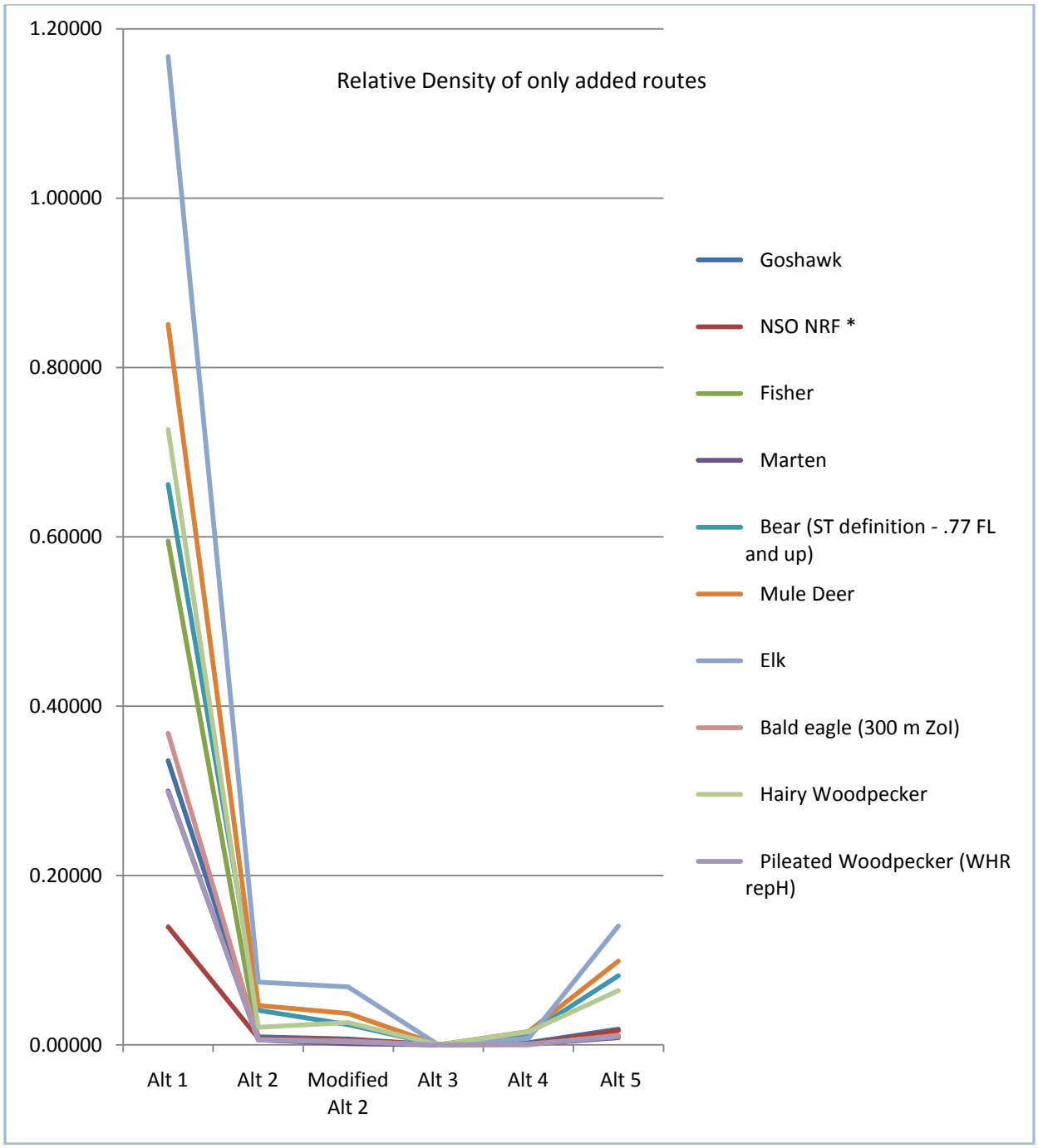


Figure 3.05-7. Relative Density of only added routes.

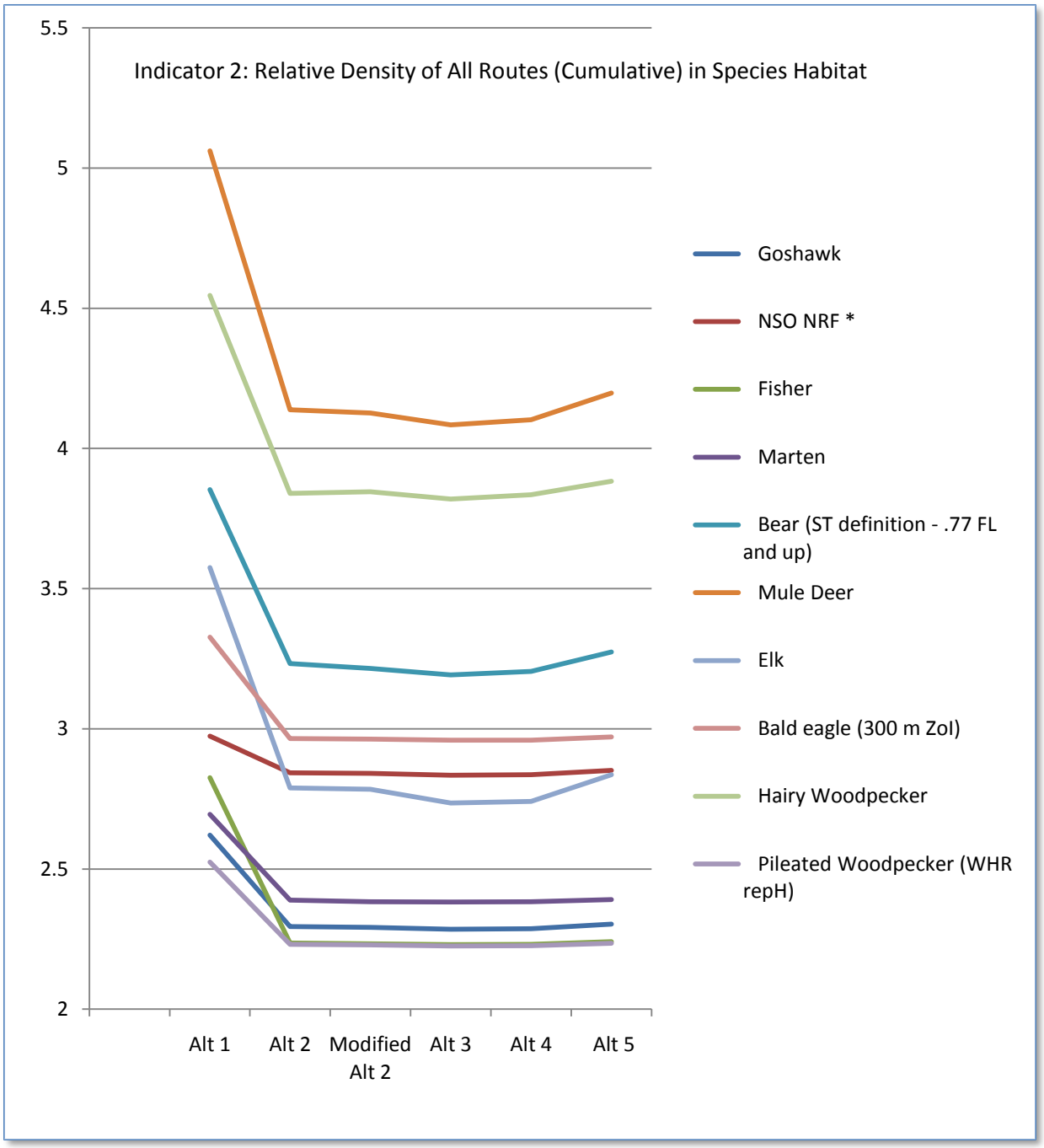


Figure 3.05-8. Relative Densities of all routes (NFTS, Private, State, County) plus proposed added routes for each alternative. Note that at this scale, all the action alternatives for each species are roughly comparable whereas the no action alternative leaves a significantly higher density of routes in each species habitat.

Table 3.05-42. Comparison of effects to terrestrial wildlife indicators and rankings of alternatives for each indicator (Ranked highest impact = 1 and lowest = 6)

Indicators: Terrestrial Wildlife	Rankings of Alternatives for Each Indicator[1]					
	Alt 1	Alt 2	Mod. Alt 2	Alt 3	Alt 4	Alt 5
Density of motor vehicle routes at the forest level	1	3	4	6	5	2
Acres open to motor vehicle use and miles of routes added to the NFTS within terrestrial wildlife habitat	1	3	4	6	5	2
Miles of motor vehicle routes at forest-wide scale and within the habitat for each species group	1	3	4	6	5	2
Number of sensitive sites for TES species within ½ mile of an added route or area	1	4	5	6	3	2
The proportion of a species (or species group's) habitat that is affected by motor vehicle routes	1	3	4	6	5	2
Average for terrestrial wildlife	1	3	4	6	5	2

[1] "Rankings" are a simple numeric ranking relative to the environmental impact of each factor from '1' being the most impactful to '6' being the least.

Compliance with the Forest Plan and Other Direction

Endangered Species Act (ESA)

In 2007, the U.S. Fish and Wildlife Service and the U.S. Forest Service developed regional programmatic project design criteria (PDC) for the designation of roads, trails and areas for recreational wheeled motorized vehicle use. [80] The criteria states that:

> *Staging areas are farther than ¼ mile from northern spotted owl nests. Or, staging areas within ¼ mile of occupied northern spotted owl nests are closed during the nesting season: February 1 through July 9.*

The Shasta-Trinity National Forest fully considered these design criteria into the project proposals. There are no designated staging areas within ¼ mile of suitable northern spotted owl nesting and roosting habitat.

Furthermore, by eliminating impacts to northern spotted owl Critical Habitat, the Forests are able to maintain either a *No Effect* or *May Affect, Not Likely to Adversely Affect* determination under the Endangered Species Act without further FWS consultation or the need for a full Biological Assessment. Current system roads, trails, and areas are not subject to these criteria or consultation.

Alternatives, 2, modified alternative 2, 4, and 5 "May Affect" but are "Not Likely to Adversely Affect" the northern spotted owl or its habitat. Alternative 3 would have "No Effect" to northern spotted

[80] July 2, 2007 Memorandum from the Regional Forester on Route Designation and T&E Species Criteria and the December 27, 2006 letter from Alexandra Pitts, the U.S. Fish and Wildlife Service Deputy Manager for the California/Nevada Operations Office regarding Route Designation Project Design Criteria.

owls or their habitat. With the exception of Alternative 1, none of the proposed action alternatives are likely to adversely affect the northern spotted owl. Alternatives 2 and 5 propose about 13 miles of roads and trails for inclusion into the NFTS that occur in designated NSO critical habitat (5.25 miles within the 2008 designation and 7.72 miles within the 1992 designation). Modified Alternative 2 proposes two that although they are located within the boundaries of the critical habitat units are located on sites that are not currently suitable habitat and are in fact, incapable of becoming suitable habitat. Routes placed on these sites have been informally reviewed with Mr. Lyle Lewis and Mr. Keith Paul of the U.S. Fish and Wildlife Service in order to consider the biologist's opinion.

Forest Service Manual and Handbooks (FSM/H 2670)

All alternatives comply with the Forest Service Manual and Handbooks. Impacts to Forest Service sensitive species have been analyzed to ensure management activities do not create a significant trend toward Federal listing or loss of viability. This assessment is documented in the BE.

Shasta-Trinity National Forest LRMP

All alternatives comply with the STNF LRMP. The management prescriptions for terrestrial wildlife habitats were considered during the analysis process. Alteration to habitat components of management indicator assemblages was also considered. The record of decision for the 1995 Shasta-Trinity National Forest LRMP identified the following standards and guidelines applicable to motorized travel management and terrestrial wildlife which would be considered during the analysis process.

Within Threatened, Endangered and Sensitive (TES) species habitat:

- Survey and evaluate habitat for TES species at the project level in coordination with the USFWS. Limited operating periods would be placed in LSRs or riparian reserves, as appropriate.
- Manage and protect potential bald eagle and peregrine falcon sites for future occupancy.
- Require limited operating periods adjacent to active eagle and goshawk nesting sites until the young have fledged.

For the STNF Travel Management Project, each proposed route addition was evaluated for their potential to impact threatened, endangered and sensitive species habitat. Where required by the Forest Plan, appropriate mitigation measures were developed in the form of annual limited operating periods for the routes that occur within a ½ mile of any known eagle or goshawk nest. No bald eagle habitat will be altered by any action in this analysis.

For this project, each proposed route addition was evaluated for the potential to occur within late-successional reserve habitat. Those routes that did fall within the late-successional reserve were further analyzed to determine if they were beneficial to the LSR. It was determined that the routes that did occur within the LSR were beneficial due to the assumptions that the impacts already exist, there will be fewer

miles of routes in LSRs as a result of the action, and that with passive restoration unauthorized routes will recover and improve late-successional habitat for those routes which are not added to the system.

The STNF LRMP Standard and Guideline VII D4 (page 4-44) states that OHV use may occur only on designated trails. This use will be located and scheduled to avoid conflicts with wildlife objectives.

3.06. Cultural Resources

Introduction

In 1966, Congress declared that the Federal government "administer federally owned, administered, or controlled prehistoric and historic resources in a spirit of stewardship for the inspiration and benefit of present and future generations" (National Historic Preservation Act (NHPA) (16 U.S.C. 470-1(3)). This need was made more explicit when the National Historic Preservation Act was amended in 1980 and section 110 was added to expand and underscore Federal agency responsibility for identifying and protecting Historic Properties and avoiding unnecessary damage to them. Many Historic Properties are fragile, and once damaged or destroyed; they cannot be repaired or replaced.

Section 106 of the National Historic Preservation Act compels Federal agencies to consider the effect of its undertakings on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (36 CFR 60) (Historic Properties). The Travel Management Rule requires that the effects on cultural resources be considered, with the objective of minimizing damage when designating roads, trails, and areas for motor vehicle use on National Forest System lands (36 CFR 212.55(a), 212.55(b)(1)).

The recent release of Chapter 2360 of the Forest Service Manual changes usage of certain terminology used in this section. Generally, the new terminology for this section is "cultural resources;" however, the previous term "heritage resources" is still used when referring to existing published documents, programmatic agreements, and previous survey reports or site forms. For this document, the terms refer to the same general set of historic and prehistoric resources. We have tried to follow new Forest Service Manual direction where it does not conflict with existing terminology and documentation.

Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

The Forest Service is directed to identify, evaluate, treat, protect, and manage Historic Properties by several laws. However, the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.), provides comprehensive direction to federal agencies about their historic preservation responsibilities. Executive Order 11593, Protection and Enhancement of the Cultural Environment, also includes direction about the identification and consideration of Historic Properties in federal land management decisions.

The National Historic Preservation Act of 1966 extends the policy in the Historic Sites Act of 1935 (49 Stat. 666; 16 U.S.C. 461-467) to include resources that are of State and local significance, expands the National Register of Historic Places (NRHP, or sometimes referred to as the "National Register"), and establishes the Advisory Council on Historic Preservation and State Historic Preservation Officers. National Historic Preservation Act Section 106 directs all Federal agencies to take into account effects of their undertakings (actions, financial support, and authorizations) on properties included in or eligible for the National Register. The Advisory Council on Historic Preservation's (ACHP) regulations (36 CFR 800)

implements National Historic Preservation Act Section 106. The National Historic Preservation Act Section 110 sets inventory, nomination, protection, and preservation responsibilities for federally-owned Historic Properties.

The Forest Service's policy for compliance with section 106 of the National Historic Preservation Act in travel management with respect to route designation for motor vehicle use was issued in 2005 (USDA Forest Service Policy for Section 106 of the National Historic Preservation Act Compliance in Travel Management: Designated Routes for Motor Vehicle Use). This policy was developed in consultation with the Advisory Council on Historic Preservation. It outlines minimal requirements for considering possible effects to Historic Properties that may be associated with designating routes and areas as part of a national forest's transportation system. This policy statement recognizes that forests with programmatic agreements for compliance with section 106 of the National Historic Preservation Act will follow the terms of those agreements.

Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's implementing regulations, Protection of Historic Properties (36 CFR Part 800), require that federal agencies consider the effect of their undertakings on Historic Properties, and that agencies provide the council with an opportunity to comment on those undertakings. Programmatic agreements (36 CFR 800.14(b)) provide alternative procedures for complying with 36 CFR 800. Forest Service Region 5, in which the Shasta-Trinity National Forest is located, has such an agreement, entitled: Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, U.S.D.A. Forest Service, Intermountain Region's Humboldt-Toiyabe National Forest, California State Historic Preservation Officer, and Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for Designating Motor Vehicle Routes and Managing Motorized Recreation on the National Forests in California (USDA Forest Service 2006). This agreement (the Motorized Recreation PA) defines the area of potential effect (APE) (36 CFR 800.4(a)(1)) and includes a strategy outlining the requirements for cultural resource inventory, evaluation of Historic Properties, and effects determinations. It also includes protection and resource management measures that may be used where effects may occur. The Motorized Recreation PA contains provisions for amendment as needed to provide additional requirements or address Forest-specific issues. The Pacific Southwest Region, in consultation with the California State Historic Preservation Officer and the Advisory Council on Historic Preservation, has developed an amendment (appendix E of the Motorized Recreation PA) to modify the heritage strategy and add procedures for considering and mitigating motorized vehicle effects to cultural resources within reservoirs (i.e., in areas exposed when water levels are drawn down). This analysis follows the amended Motorized Recreation PA requirements in the FEIS.

Executive Order 11593, Protection and Enhancement of the Cultural Environment, issued May 13, 1971, directs Federal agencies to inventory cultural resources under their jurisdiction, to nominate to the National Register of Historic Places all federally owned properties that meet the criteria, to use due

caution until the inventory and nomination processes are completed, and to assure that Federal plans and programs contribute to preservation and enhancement of non-federally owned properties.

Compliance with Laws, Policies, Direction, and the Land and Resource Management Plan (LRMP)

All alternatives under consideration for this action shall comply with Federal law, regulation, and Forest Service direction and policy (Forest Service Manual and Handbook). The Motorized Recreation PA has described the streamlined compliance process developed for this class of undertakings. However, only alternatives 3 and 4 comply with the "Heritage Resources" Management Prescription XI (D, 8) of the Forest LRMP standards and guidelines (page 4-51). This LRMP management prescription prohibits OHV use (the plan mentions only OHVs, not the more inclusive 'motor vehicles.') within cultural resources sites that meet one or more of three conditions, in addition to being eligible to the National Register of Historic Places: (1) the site has known or potential scientific values that are highly important or unique and are conducive to long-term study, (2) the site has a potential for interpretation of cultural resource values to Forest visitors, or (3) the site has cultural importance to Native Americans. A small subset of the resources on the STNF were determined to meet the above criteria and were identified during the Forest LRMP development. The forest Heritage Resources Manager has identified these cultural resources and provided them for analysis. The management prescription within the Forest LRMP provisions do not allow for OHV use through cultural resources sites even if protection measures occur. Therefore any alternative that proposes a route or action within the boundary of these cultural resources would require the LRMP to be amended. In addition, the change in status from unauthorized route to NFTS road or trail would require approval specifically by the forest supervisor (Heritage Resources Management Prescription XI (D, 6)) which would be the result of this analysis if an action alternative is selected.

The act of November 18, 1965 that established the Whiskeytown-Shasta-Trinity National Recreation Area orders the secretaries of agriculture and interior to manage their respective units to provide (1) public outdoor recreation benefits; (2) conservation of scenic, scientific, historic, and other values contributing to public enjoyment; and (3) such management, utilization, and disposal of renewable natural resources as in the judgment of the respective secretary will promote or is, compatible with, and does not significantly impair, public recreation and conservation of scenic, scientific, historic, or other values contributing to public enjoyment. Any activity authorized by the results of this analysis should comply with this act.

Effects Analysis Methodology

Assumptions Specific to Cultural Resources Analysis

1) Unauthorized, user-created routes and areas have already affected Historic Properties within route/area prisms.
2) Under the action alternatives, use will continue at current levels or increase over time on the designated system with the prohibition of cross-country motor vehicle travel.

3) No distinction was made during the analysis between routes described as "roads" or as "trails" or between various motorized vehicle classes, as the effects to Historic Properties were considered to be similar in scope, extent, and overall impact.
4) Monitoring and survey will reveal route-specific differences. A 30-meter buffer was used for the analysis of all routes, regardless of vehicle class or width (USDA Forest Service 2006) (Motor Vehicle PA reference).
5) Due to the fluctuating level of water on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir, a limited number of cultural resources revisits were conducted during the EIS process. As a result of data collected from cultural resource revisits and based on the amended motorized recreation PA strategies, a process of adaptive management that progresses from protective measures to site or area closures as needed to ensure protection of lake bottom cultural resource sites will be implemented (USDA Forest Service 2006) (Motor Vehicle PA; appendix E).
6) The proposal to change the existing NFTS to allow motorized mixed-use on maintenance level 3 roads is not considered an undertaking subject to National Historic Preservation Act Section 106 compliance (USDA Forest Service 2005). Motor vehicles can already use NFTS roads. Allowing or prohibiting non-highway vehicle use will have no direct, indirect, or cumulative effect on cultural resources on existing road prisms. As such, the effects on cultural resources from changes to the NFTS will not be discussed further in this report.

Data Sources

1) Site-specific cultural resource inventories.
2) Existing information from cultural resource records, historic archives, maps, and GIS spatial layers.

Cultural Resources Indicators

1) Degree to which the integrity of historic property values are diminished.
2) Number of Historic Properties within the APE (30 meters on either side of route) of unauthorized routes or below the high-water marks of the reservoirs at risk from ongoing use.
3) Average number of Historic Properties per acre at risk if new routes or areas are created.

Cultural Resources Methodology by Action

1. Direct and Indirect Effects of the Prohibition of Cross-Country Motor Vehicle Travel

Short-term Timeframe: 1 year.

Long-term Timeframe: 20 years.

Spatial Boundary: Forest scale where motor vehicle use is not already prohibited by law (e.g., wilderness). In the no-action alternative, 1,632,316 acres allow for cross-country travel by motor vehicles. These acres do not include any land in wilderness.

Indicators: (2)Number of Historic Properties within the APE (30 meters on either side of route) of unauthorized routes or below the high-water marks of the reservoirs at risk from ongoing use**;** (3) the average number of Historic Properties per acre that would be protected from any new routes created in the future without a prohibition (estimate of indirect effects).

Methodology: GIS analysis to identify: (1) the number of Historic Properties at risk within existing unauthorized routes (estimate of on-going direct and indirect effects curtailed); and (2) the average number of Historic Properties per acre that would be protected from any new routes created in the future without a prohibition (estimate of indirect effects).

Rationale: Motorized Recreation PA.

2. Direct and Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS

Short-term Timeframe: 1 year.

Long-term Timeframe: 20 years.

Spatial Boundary: Location of historic property.

Indicator: (1) Degree to which the integrity of historic property values are diminished, related to: location, design, setting, materials, workmanship, feeling, or association.

Methodology: Uses existing data from cultural resource site atlas, historic archives, maps, site record files, and GIS spatial layers, and information obtained from archaeological inventories of unauthorized routes to identify cultural resources in the area of potential effect that may have direct, indirect, or cumulative effects.

Rationale: Motorized Recreation PA.

3. Changes to the Existing NFTS (This Can Include Deletions of Facilities and Changing the Vehicle Class and Season of Use).

None of these actions is considered an undertaking subject to National Historic Preservation Act Section 106 compliance (USDA Forest Service 2005). Motor vehicles can already use NFTS roads. Allowing or prohibiting non-highway vehicle use will have no direct, indirect, or cumulative effect on cultural resources.

4. Cumulative Effects

Short-term Timeframe: Not applicable; cumulative effects analysis will be done only for the long-term time frame.

Long-term Timeframe: 20 years.

Spatial Boundary: Forest administrative boundary (outside of designated wilderness).

Indicator(s): (1) Degree to which the integrity of historic property values are diminished, related to: location, design, setting, materials, workmanship, feeling, or association.

Methodology: The cumulative effects of each alternative (all actions) will describe the additive impact of the alternatives to the existing forest situation. Under the no-action alternative, adverse impacts are expected to be higher than under the action alternatives. Implementation of future actions will adhere to law, regulation, and policy that require protection of cultural resources and mitigation of any potential adverse effects.

Rationale: Motorized Recreation PA.

When assessing effects to cultural resources under Section 106 of the NHPA, an undertaking can have no effect, no adverse effect, or an adverse effect. An adverse effect to a historic property can occur when an undertaking directly or indirectly causes alterations in its character or use. An adverse effect on a historic property occurs when an undertaking alters its important characteristics and is measured by the degree to which it diminishes its location, design, setting, materials, workmanship, feeling, or association (Integrity Measures) (36 CFR 800.5(a)(1)). These integrity measures can also be used to characterize the nature of any potential effects, whether they are direct, indirect, or cumulative effects; and their severity, whether they are negligible, minor, moderate, or major. The degree to which historic property values are diminished will be used to measure the direct, indirect, and cumulative effects of motor vehicle use on the proposed additions to the NFTS. Table 3.06-1 provides a crosswalk of effects findings required under NEPA and the National Historic Preservation Act.

Table 3.06-1. Comparison of Effect Categories under NEPA and NHPA

NEPA	NHPA	Severity
None	No Effect	None – Negligible
Direct Effect	No Adverse Effect	Minor – Moderate – Major
	Adverse Effect	Minor – Moderate – Major
Indirect Effect	No Adverse Effect	Minor – Moderate – Major
	Adverse Effect	Minor – Moderate – Major
Cumulative Effect	No Adverse Effect	Minor – Moderate – Major
	Adverse Effect	Minor – Moderate – Major

Affected Environment/Environmental Consequences

Affected Environment

The Shasta-Trinity National Forest is the setting for a number of interesting and important cultural manifestations. Almost 4,000 cultural resources have been recorded thus far, ranging in age from prehistoric to 20th century. The following sections provide information concerning the nature of these resources.

The Prehistoric Context

The Shasta-Trinity National Forest lies at the far northern end of the Central Valley of California. There is not a single, unifying prehistoric cultural chronology for the Central Valley region. Specifically, the causes and chronology of culture change in the northern Sacramento Valley remain imprecisely defined (Rosenthal et al. 2007; page 150). However, four basic time periods have been proposed in the Sacramento Valley based on calibration curves applied to radiocarbon findings, generally described below and displayed in Table 3.06-2.

Paleoindian (11550 to 8550 B.C.)

Archaeologists have not identified direct evidence of Paleoindian occupation in the northern Sacramento Valley. However, diagnostic fluted projectile points have been found at surface locations in the southern end of the Central Valley. Such points have been dated elsewhere to Paleoindian times, but the surface finds in the Sacramento Valley have not been datable due to the lack of association with datable materials or geological strata (Rosenthal et al. 2007; page 151). California, as a whole, may not have had a Paleoindian population as large as in other parts of North America, due to the environment's inability to support large populations of the megafauna[81] that Paleoindian populations are presumed to have depended (Chartkoff 1984; page 50).

Within the study area, one fluted point base was found in the backdirt of an excavation within Samwel Cave (SHA-49). This cave, along with Potter Creek Cave (SHA-48), has yielded Pleistocene fauna. However, neither cave yielded cultural material in clear association with these fauna (Byrd et al. 2008; page 9).

Lower Archaic (8550 to 5550 B.C.)

Evidence of Central Valley occupation during the Lower Archaic occupation consists almost entirely of isolated finds. Only one Central Valley site has been found that dates to this period, and it lies at the southern end of the valley, far from the study area. This period is represented by a variety of flaked stone crescents and stemmed projectile points (Rosenthal et al. 2007; page 151).

Middle Archaic (5550 to 550 B.C.)

Unlike earlier periods, this period is represented by sites in the northern Sacramento Valley. This tradition is characterized by an abundance of cobble tools used for chopping, pounding, mulling and scraping. Ovens and hearths filled with rocks are common, as are many types of projectile points. Projectile points represented include stemmed, notched, thick-leaf, and narrow concave base darts. Found occasionally are perforated stone plummets, incised slate, and tabular pendants (Rosenthal et al. 2007; page 153).

[81] Pleistocene megafauna are the set of species of large animals – mammals, birds and reptiles – that lived on Earth during the Pleistocene.

Upper Archaic (550 B.C. to A.D. 1100)

Many Upper Archaic sites have been excavated in the northern region of the Sacramento Valley (Rosenthal et al. 2007). The Upper Archaic is characterized by specialized technologies including Haliotis ornaments, Olivella beads, and ceremonial blades. New types of bone implements and bone tools also become common during this period, including ornaments, tubes, and wands (Rosenthal et al. 2007).

Emergent (A.D. 1100-Contact)

The Emergent period's artifact assemblages are marked by a break from technologies associated with the Archaic periods. The artifacts present suggest cultural traditions similar to those found at the time of contact with Europeans. More complex social forms are suggested by a wide variety of burial types. Bow and arrow technology replaced the atlatl and dart technology of earlier periods. Large towns developed, and exploitation of riverine resources is evidenced by fish weirs (Rosenthal et al. 2007; page 157). Fishing equipment is more common than previous periods, and includes gorge hooks, bone fishhooks, and many types of harpoons. Structural remains and house floors have been found preserved in sites dating to this period (Rosenthal et al. 2007; page 158). Large amounts of fish bone, as well as a diverse assemblage of bird and mammal remains, are found in residential sites. After A.D. 1000, mortars and pestles become very common. The northern Sacramento Valley sites exhibit an abundance of manzanita, pine nuts, and acorns throughout the entire period (Rosenthal et al. 2007; page 159).

Table 3.06-2. Summary of Central Valley prehistoric cultural chronology

Period	Dates	Diagnostics
Paleoindian	11,550–8550 B.C	Fluted projectile points as isolated finds
Lower Archaic	8550–5550 B.C.	Crescent and stemmed projectile points (only one site in area)
Middle Archaic	5550–550 B.C.	Cobble tools; stemmed, notches, thick-leaf, and narrow concave base darts; incised slate; tabular pendants; ovens and hearths
Upper Archaic	550 B.C–A.D.1100	Haliotis ornaments; Olivella beads; ceremonial blades; bone tools
Emergent	A.D. 1100–Contact	Variety of burial types; bow and arrow technology; fish weirs; gorge hook, bone hooks, harpoons; structural remains; house floors; large amounts of faunal remains; mortars and pestles; manzanita, pine nuts, acorns

The Historic Context

Contact

The study area was not explored by nonnatives until 1821, when the Mexican Governor of California began exploring California's northern territories to find settlement sites and establish defensible territory. The Governor, Don Luis Arguello, also hoped to find a river connecting the Pacific Ocean to Great Salt Lake. Arguello's expedition made it as far north as present day Redding (Byrd et al. 2007).

Following this expedition, the next series of visitations to the area were for commercial purposes. Peter Skene Ogden, a Hudson's Bay trapper, traveled to the vicinity of Mount Shasta, and is reported to

have given the mountain its current name in 1827. In 1828, the American explorer Jedediah Smith reached the Sacramento Valley from the east. The Hudson's Bay Company, as well as American trappers, gathered furs from the northern Sacramento Valley as late as 1846. The trappers brought European diseases with them, against which the natives had no defense. As much as 75 percent of the native population of the Sacramento Valley was decimated by a malaria epidemic in the 1830s (Byrd et al. 2007). The California Indian populations declined by an estimated 95 percent between 1770 and 1900 (Chartkoff and Chartkoff 1984).

In addition to disease; the eventual collapse of the native societies was due to restricted access to resources, as well as the disruption of regional interactions necessary to sustain their cultures. The resources that supported their way of life became inaccessible, as they were increasingly appropriated by European settlement (Chartkoff and Chartkoff 1984). Mexico granted land in the upper Sacramento Valley to a Pearson B. Reading in 1846. The settlers' livestock destroyed the natural foods eaten by the Wintu, the native group present in the study area. Also in 1846, Captain J.C. Fremont oversaw the slaughter of a group of 175 Wintu and Yana. Two more massacres occurred shortly thereafter. In 1850, the local European Americans poisoned a supposed "friendship feast," killing 100 Wintu. In 1851, miners massacred about 300 Wintu and burned down their meeting house (Lapena 1978). Despite treaties enacted to ensure their safety, government troops attacked the Wintu repeatedly, including a six-month "Wintoon War" in 1858 and 1859. This war resulted in the deaths of 100 Wintu, and relocation of 300 more. Wintu continued to be forcibly marched to coastal reservations through the 1860s, leaving an estimated population of only 1,000 in the 1870s. By 1910 their population had dwindled to 310 (Lapena 1978).

Other Native American tribes in the general area, such as the Achumavi and Shasta, were likewise adversely affected by intrusions into their territories beginning in the mid-19th century. Silver (1978) states, for example, "By the 1870s, the Shasta way of life had been badly shattered." Regarding the Achumavi (Pit River) tribe, Olmsted and Stuart (1978) state that they "suffered a large reduction in population from aboriginal times."

Mining

As with other areas of Northern California, the 1849 gold rush led to an intense period of mineral exploitation and settlement in the study area. Miners initially panned or dry-dug for gold. In the 1850s, hydraulic excavation became commonplace, and remained the prominent method of mining until the 1880s. At this time, hydraulic mining was limited by the state to protect the Sacramento Valley's agricultural lands from flooding (Byrd et al. 2007). In order to offset these limitations, gold-bearing quartz was sought via drift mining. Drift mining was accomplished by cutting into the side of a slope, instead of tunneling vertically. Dredging operations were also utilized. Mounds, tunnels, and dredger tailings are left over from these activities, which took place well into the mid-twentieth century (Byrd et al.; 2007).

In 1862, copper was discovered in the area, and eventually a 30-mile-long copper belt was located in the mountains north of Redding. Large mining companies built mines, smelters, and stamp mills in the 1890s to take advantage of this resource. Towns were built in support of this industry. The copper mining remained profitable into the early 1900s, but environmental concerns and declining copper prices ended the mining by the 1920s (Byrd et al. 2007). While some small-scale mining continued; exploiting such materials as iron, zinc, gravel, and limestone; the collapse of the copper mining industry marked the end of mining as a major industry in the area (Byrd et al. 2007).

Lumber

Cedar, red fir, white pine, and sugar pine were being harvested before mining began in the study area. However, demand for lumber increased substantially during the gold rush, as it was needed for both fuel and building materials. Initially, logs were floated down the Sacramento River in the spring, after being felled in the winter. With the outbreak of the Civil War and the discovery of gold in Idaho, a boom in demand for lumber occurred in the 1860s (Byrd et al. 2007).

The creation of the V-flume and a railroad through Redding and Red Bluff facilitated quicker transportation of lumber in the 1870s. The V-flume allowed lumber to be sent directly to transportation centers or mills in the valley. While some mills still operated in the mountains, the technological advances also allowed milling to be concentrated in the valley (Byrd et al. 2007). Emerging markets, such as preparation for World War I, and mobilization for World War II, kept lumber in demand in the area (Byrd et al. 2007).

Forest Service

The Shasta National Forest was established in 1905 and the Trinity National Forest in 1907, both by proclamations of President Theodore Roosevelt. The two national forests were combined into one administrative unit, the Shasta-Trinity National Forest, in 1954. The Forest Service manages land with a multiple-use mandate, so recreation, hunting, logging, mining, and grazing all occur. The Forest manages five federally designated wildernesses: Castle Crags, Chanchellula, Mount Shasta, Trinity Alps and Yolla Bolly-Middle Eel. Shasta Lake and Trinity Lake are part of the Whiskeytown-Shasta-Trinity National Recreation Area. The Trinity River is a designated wild and scenic river. Finally, of course, Mount Shasta, at 4,322 meters (14,179 feet), dominates the landscape of the surrounding countryside.

The existing condition of cultural resources on the STNF varies considerably depending upon current uses. Prehistoric camp or habitation sites were often located in proximity to resources that are being exploited, such as water, game and fish, or edible plants. Such locations were usually valued by historic settlers as well, often leading to disturbance or destruction of the prehistoric features and materials. Special-use prehistoric sites such as quarries or shrines may be isolated from areas suitable for habitation by either prehistoric or historic settlers, and thus tend to be better preserved, if more difficult to recognize. Historic resources, especially linear sites such as logging railroad grades and roads or trails are often in

the exact locations used currently for motorized recreation use. Historic railroad grades are especially prevalent in the Shasta-McCloud Management Unit. In many cases, the integrity of these linear historic resources has been compromised by a century or more of adaptive re-use. In a number of cases, routes under consideration cross the railroad grades at right angles, representing negligible potential effect to the resources. In other cases, routes under consideration have been established on top of old railroad grades that no longer have integrity as Historic Properties.

Environmental Consequences

The project was conducted as a site-specific evaluation, for which there are two levels of analysis. First, there is site-specific analysis of the individual routes and lake bottom areas proposed for addition to the NFTS. This detailed analysis is by route and area is included as Tables L-5 (routes) and L-6 (lake bottoms) in appendix L. This analysis sought to identify **at risk** Historic Properties within the APE. A cultural resources report was produced that details the entire process of the cultural resources analysis (USDA Forest Service Mountain Heritage Associates 2010). The cultural resource specialist assessed each individual route proposed for addition to the NFTS at a level sufficient to support the effects analysis and identify any necessary site-specific mitigations to **at risk** cultural resources. Additionally the lake bottom areas were assessed by Forest cultural staff in accordance with the newly amended Motorized Recreation PA.

Some specific information on individual cultural resources is not provided in the NEPA analysis. Releasing information about the nature and location of Archaeological and Historic resources or Traditional Cultural Properties (cultural resources) is restricted under Section 304 of the National Historic Preservation Act (16 U.S.C. 470w-3) and Section 9 of the Archaeological Resources Protection Act (16 U.S.C. 470hh; 36CFR296.18).

Second, there is the analysis of each alternative as a whole, which is informed by the site-specific route analysis noted above and other information. The discussion of the direct, indirect, and cumulative effects of each alternative is summarized. The effects of the alternatives are described separately for three discreet actions and then combined to provide the total direct and indirect effects of each alternative. The combination of these discreet actions is then added to the past, present, and reasonably foreseeable actions in the cumulative effects analysis. The three discreet actions common to all action alternatives are: (1) The prohibition of cross-country motor vehicle travel; (2) The addition of facilities (unauthorized roads, trails, and/or areas) to the National Forest Transportation System (NFTS); and (3) Changes to the existing NFTS, such as changes to allowable vehicle classes on particular existing roads or trails.

Routes

As directed by the Motorized Recreation Programmatic Agreement, the routes proposed in this analysis (219 routes totaling 106.12 miles), were analyzed in detail for cultural resources. These routes represent the maximum number of routes proposed for addition to the NFTS and include all routes from all

alternatives. Electronic data sources, GIS, and paper records in the form of reports, site atlases, and site forms were all examined. Additionally, the preliminary alternative 2 routes were surveyed and associated sites were monitored during the early phases of alternative development. The Motorized PA requires specific analysis of all proposed actions, but only where management actions are proposed. Because they are not proposed for addition to the NFTS, the 1,632,316 acres currently open to cross-country travel by motor vehicles which encompass the 1,252 miles of unauthorized routes on the forest were not analyzed in detail, as allowed for in the Motorized Recreation PA. However a general analysis from the Forest's 2006 data for the Secretary of the Interior's Report to Congress listed 3,351 sites recorded on 893,722 acres of survey land or approximately one site per 266.7 acres. This data indicates approximately 6000 cultural resources could exist on areas open to cross-country travel. The existing cultural resources data prevents more precise estimate of Forest-wide site density. All 219 routes would be added to the NTFS in alternative 5. In alternative 2, 88 of the 219 routes (44.20 miles) would be added to the NFTS. In alternative 4, 26 of the 219 routes (15.56 miles) would be added to the NFTS. Table L-5 provides a list of the routes analyzed in detail and the results of the analysis. Table L-6 details the lake bottom areas that are discussed below. The analysis conducted on these routes included presence or absence of previously identified cultural resource sites and linear features, and any potential effects. Protection measures from the Motorized Recreation PA were then applied where appropriate.

As identified in Tables L-5 and L-6, type of effect is either none, direct, indirect, cumulative or any combination. The nature of effect refers to resource-specific effects like erosion, down-cutting, rutting, displacement, disturbance, damage, deterioration, vandalism, looting, removal/alteration of historic structure, or visual/audible/atmospheric effects to historic setting or cultural landscape/Traditional Cultural Properties. The nature of effect is summarized in the tables and is described in general. Detailed site effects are in the original site documentation and are restricted. Severity of effect is limited to negligible, minor, moderate, or major as determined from site visits or literature review. In addition, the presence or absence of cultural resources surveys was combined with evaluation of survey completeness and adequacy to determine if additional surveys were required. The Motorized Recreation PA directs the Shasta-Trinity National Forest to collect and analyze data and survey routes for the presence of cultural resources within the APE. The PA determines the timing and conditions under which surveys must take place. Routes identified as not requiring survey are those that have been completely surveyed to the standards outlined in the Motorized Recreation PA. Routes requiring survey are determined to be "priority survey" based on the lack of existing cultural survey combined with motorized vehicle use level greater than light use. Light use is defined as less than 25 vehicles per week in the Motorized Recreation PA. A deferred survey strategy is proposed for routes that the Forest has identified as receiving light use for vehicles. These routes will be deferred for cultural resources survey until such a time as periodic monitoring identifies changes in vehicle use levels that could result in effects to Historic Properties. If use frequencies change in ways that could have effects on Historic Properties, Forests shall complete inventories of designated routes or specifically defined areas to identify *at-risk* Historic Properties.

Cultural Resources Survey Requirements

Of the 219 routes analyzed, 99 have been completely surveyed, 96 routes have no previous survey, and 24 routes have been partially surveyed. There are 33 routes documented as receiving greater than light use and 186 are documented by the Forest as receiving light use. Of the 33 receiving greater than light use, all have been completely surveyed. Of the 186 routes receiving light use, 66 have been completely surveyed; the remaining120 routes will have a deferred survey strategy applied consistent with the PA. All routes with greater than light use have been surveyed as required prior to the project decision being signed as per the provisions of the Motorized Recreation PA. All unsurveyed routes with light use shall receive deferred survey at the discretion of the heritage resources manager, as described above. The routes that have been completely surveyed to the standards in the Motorized Recreation PA do not require further survey. Table 3.06-3 summarizes the status of route surveys.

Table 3.06-3. Summary of Route Survey Status

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Adequate Survey Coverage					
# routes that have been completely surveyed	0	77	0	3	99
# routes that have been partially surveyed	0	4	0	2	24
# routes that have not been surveyed	0	7	0	21	96
Total # of routes	**0**	**88**	**0**	**26**	**219**
Motor Vehicle Use Level					
light	0	63	0	25	186
> light	0	25	0	1	33
Total	**0**	**88**	**0**	**26**	**219**
Survey Type					
Deferred Survey	0	11	0	23	120
Priority Survey (all have been completed)	0	0	0	0	0
No Survey required	0	77	0	3	99
Total	**0**	**88**	**0**	**26**	**219**

Historic Properties within the Proposed Route Area of Potential Effect (APE)

Of the 219 routes analyzed in alternative 5, 42 routes have Historic Properties within 30 meters that might be affected by the addition of routes to the NFTS (located within the area of potential effect). Of the 88 routes in alternative 2 that are proposed for addition to the NFTS, 15 routes have Historic Properties within the area of potential effect. None of the 26 routes proposed for addition to the NFTS in alternative 4 have any sites or unrecorded linear features within the area of potential effect.

Table 3.06-4. Summary of Route and Historic Property Data

Routes	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
# routes with Historic Properties <30 meters	0	15	0	0	42
# routes with no Historic Properties <30 meters	0	73	0	26	177
Total # of routes	**0**	**88**	**0**	**26**	**219**
Historic Properties					
# priority heritage assets	0	5	0	0	6
# non priority heritage assets	0	10	0	0	27
Total # of Historic Properties <30 meters from routes	**0**	**15**	**0**	**0**	**33**

Cultural resource protection measure recommendations were assigned based on the Motorized Recreation PA and site-specific data. Tables L-5 and L-6 represent the best data available at the time of analysis, and has been updated in the FEIS with 2009 field surveys, including recording the historic linear sites identified in the initial analysis. Each cultural resource was analyzed and protection measures from the Motorized Recreation PA were proposed, if required for protection or mitigation of effects. Two routes (SE476 and SE477), proposed for inclusion in alternatives 2 and 5, intersect a large cultural resource site and do not allow for the application of protection measures outlined in the Motorized Recreation PA. If these two routes are selected for inclusion, potential adverse effects will require the STNF Heritage Resources Manager to consult with the State Historic Preservation Officer to determine specific protection measures or to evaluate the site for inclusion in the National Register of Historic Places. This site is also an LRMP Prescription XI heritage resource.

Priority surveys, site recordation, final protection measure determination, and the associated heritage resources report have been prepared for this undertaking prior to making NEPA decisions to designate routes.

Of the 219 routes in alternative 5, seven routes intersect with the six STNF LRMP Heritage Resources Management Prescription XI sites (Table 3.06-5). Field visits determined specific protection measures that would be required by the Motorized Recreation PA to mitigate the effects of the proposed actions on these cultural resources. In order to designate these routes and apply these protection measures, an amendment to the Land and Resource Management Plan will be required and is proposed.

Table 3.06-5. Routes with LRMP Heritage Resources Management Prescription XI sites

Route Number	Protections (Preliminary, Pending Site Visits)
SE314	None required, as route will not affect the site. Forest Plan Amendment still required.
SE476	No effective resource protection measures available in the PA
SE477	No effective resource protection measures available in the PA
SFMU13	Place barriers to protect site integrity outside of existing route.
SW256	Place barriers to protect site integrity outside of existing route.
U42N18A	Use vegetative screening to protect site integrity outside of existing route.
U42N18B	Place barriers to protect site integrity.

Proposed Areas for Motorized Recreation below High-Water Marks

There are three areas proposed for motor vehicle travel below the high-water mark (lake bottom areas) that were analyzed in detail. These areas lie between the high-water mark to whatever the waterline is at a particular time at Shasta Lake, Trinity Lake, and Iron Canyon Reservoir (hereafter referred to as lake bottom areas). For this effects analysis all sites below high-water marks were considered, including those that have not been exposed since lake/reservoir creation. These three lake bottom areas are proposed for motorized recreation under various alternatives. Alternative 1 adds no lake bottom motorized recreation areas, nor does it restrict current unmanaged motor vehicle uses. Alternative 2 adds Shasta Lake and Trinity Lake as managed open areas for motor vehicle use. Alternative 3 adds no lake bottom motorized recreation areas, and prohibits motor vehicle travel below the high-water marks. Alternatives 4 and 5 add Shasta Lake, Trinity Lake, and Iron Canyon Reservoir as areas for motor vehicle travel below the high-water marks.

The proposed Shasta Lake Area includes 28,403 acres and has 200 known archaeological sites. The proposed Trinity Lake Area includes 15,644 acres and has 113 known archaeological sites. The proposed Iron Canyon Reservoir Area includes 429 acres and has nine known archaeological sites. Table 3.06-6 summarizes the number of cultural resources sites at or below the high-water marks of Shasta Lake, Trinity Lake, and Iron Canyon Reservoir, and whether they could be affected by any of the proposed alternatives. The table also identifies what protection measures are proposed for **at risk** resources.

Table 3.06-6. Summary of lake bottom sites

At Risk	Protection Measures required	Iron Canyon Reservoir	Shasta	Trinity	Total
Yes	Yes	9	65*	17	**91**
No: Ineligible to NRHP	No	0	8	0	**8**
No: No access by motorized vehicle	No	0	63	0	**63**
No: No motorized vehicle use observed	No	0	33	0	**33**
No: Site not observed (Sites are below water; this includes sites below the BOR fluctuation zone)	No	0	31	96	**127**
Total		**9**	**200**	**113**	**322**
At Risk Historic Properties					
Barriers	Yes	9	3*	0	**12**
Protection Measures from Motorized Recreation PA amendment (initially vehicle class and speed limit restrictions)	Yes	0	62	17	**79**
Total		**9**	**65**	**17**	**91**

* includes one LRMP Prescription XI site.

The lake bottom sites will be managed through adaptive management as specified in the Motorized Recreation PA, as amended in appendix E of the PA. See Chapter 2 for a detailed discussion on the adaptive management approach planned to protect cultural resources. The primary protection measures

for lake bottoms will include speed limits restrictions and vehicle class restrictions. All 322 known cultural resources in the lake bottom areas are considered Historic Properties. The STNF identified 91 sites in the lake bottom area of potential effect that are **at risk** and will require protection measures and monitoring. Three sites on Shasta Lake will require barriers in addition to the speed limit and vehicle class restrictions applied to protect the 62 remaining cultural resources. Nine sites in Iron Canyon Reservoir will require barriers in addition to speed limit vehicle class restrictions. Seventeen sites on Trinity Lake will be protected through speed limit and vehicle class restrictions initially. The majority of these sites were directly observed or recently recorded, allowing for protection measure development. Motor vehicle use was noted on cultural resources in three lake bottom areas as detailed in Table L-6.

An additional 63 sites were identified as not requiring any protection measure for various reasons, including the lack of access to sites by motor vehicles (outside of lake bottom area of potential effect). The forest identified 33 sites that show no evidence of motor vehicle impacts to the resource and are therefore not **at risk**. These sites do not at present require protection measures. The Motorized Recreation PA amendment directs a monitoring strategy for evaluating the effectiveness of the protection measures. All cultural resources subjected to protection measures outlined in Table L-6 will be monitored as outlined in appendix L. If monitoring cultural resources indicates adverse effects are likely to occur, further protection measures will be employed using the approved protection measures in the PA, including area closures. If these protection measures are not effective, then appropriate additional protection measures will be developed in consultation with SHPO.

The remaining 127 sites are currently not exposed at low water and were not accessible for study. Forest archaeologists do not expect these sites to become exposed during normal management conditions. These sites will be monitored if water levels drop to a point where the sites are exposed. At that time the lake bottom adaptive management strategy outlined in the amendment to the Motorized PA will be applied to the cultural resources.

Effects Analysis of the Alternatives

Alternative 1 – No Action

Alternative 1 proposes no additions or changes to the NFTS. The current uses would continue, including unmanaged cross-country motor vehicle travel across the landscape and lake bottoms, and use of the unauthorized routes. No seasonal or vehicle class restrictions, speed limits, or other mitigation measures would be implemented if this alternative were selected.

Direct and Indirect Effects of the Continuation of Cross-Country Motor Vehicle Travel

Indicators: (2) Number of Historic Properties within 30 meters on either side of unauthorized routes or below the high-water marks of the reservoirs at risk from ongoing use. (3) The average number of Historic Properties per acre that would be protected from any new routes created in the future without a prohibition (estimate of indirect effects).

Because cross-country travel would continue under alternative 1 (no action), all cultural resources on or near the routes and lake bottom areas analyzed in detail (alternative 5) will likely continue to deteriorate, possibly at an accelerated rate as more motor vehicle use occurs. In addition to the maximum action alternative, open cross-country motor vehicle travel occurs on 1,632,316 acres of land, including the 1,252 miles of known unauthorized routes. This unrestricted use makes it difficult to quantify when and where cultural resources will be impacted by motor vehicles over the long-term. Using existing data, at least 332 sites are known to exist within 30 meters of the unauthorized routes, and an additional 322 sites are known to exist within the lake bottoms. The analysis revealed 91 **at risk** lake bottom sites that would have continuing adverse effect from motor vehicle use. The number of sites located in the cross-country use areas cannot be determined because there is limited survey and site data on most of that area. Only a small percentage of 1,632,316 acres of land currently open to cross-country motor vehicle travel and the 1,252 miles of known unauthorized route have been surveyed for cultural resources. In addition, new unauthorized routes would continue to be created, potentially causing damage to additional recorded and unrecorded cultural resources.

All known and unknown cultural resources on or near unauthorized routes and within the area currently open to cross-country motor vehicle travel (including the open reservoir areas) are **at risk** from ongoing use. Direct and indirect effects include continued compaction of soils and erosion, down-cutting, rutting, displacement, disturbance, damage, deterioration, vandalism, looting, removal/alteration of historic structure and materials, visual and auditory alteration to the historic setting or cultural landscape/traditional cultural property, and others. A general analysis from the Forest's 2006 data for the Secretary of the Interior's Report to Congress listed 3,351 sites recorded on 893,722 acres of survey land or approximately one site per 266.7 acres. This data indicates approximately 6,000 cultural resources could exist on areas open to cross-country travel. The existing cultural resources data prevents more precise estimate of Forest-wide site density.

In alternative 1, impacts to known resources will be continuous and greater than the maximum action alternative (alternative 5), because of the use of existing routes, the creation of new unauthorized routes, and because cross-country use would continue. Since this alternative is not considered an action by the Motorized Recreation PA (no routes being added to the NFTS), no standard resources protection measures would be applied, and no surveys would be conducted for this alternative. Additionally, impacts from increasing use on unauthorized routes by the public on a wide array of sites over a large area would be unmanageable for limited forest cultural resources staff.

No routes or open areas would be added to the NFTS, and no other changes made to the NFTS under this alternative.

Cumulative Effects

Indicator: (1) Degree to which the integrity of historic property values are diminished, related to location, design, setting, materials, workmanship, feeling, or association.

The continued unregulated cross-county travel would be a reasonably foreseeable and on-going use, and has the greatest potential for creating cumulative adverse impacts to cultural resources. The integrity of cultural resources would continue to diminish without protections or mitigations.

Since all present and future planning projects with potential to impact cultural resources, including future NFTS additions, will be subject to National Historic Preservation Act section 106 compliance and other historic preservation law, the potential effects to Historic Properties would be identified and mitigated. No cumulative effects are expected, nor will the integrity of cultural resources be diminished as a result of present and reasonably foreseeable future projects as described in appendix B.

Alternative 1 National Historic Preservation Act Compliance

The decision to implement alternative 1 would continue to cause **adverse effects** to Historic Properties under section 106 of National Historic Preservation Act and 36 CFR 800, and directly conflicts with the Forest Plan management prescriptions for cultural resources.

Alternative 2 – Proposed Action

This alternative proposes to add 88 routes totaling 44.20 miles and two open areas totaling 44,047 acres to the NFTS. Lake bottom use is restricted to highway-legal vehicles with a speed limit of 15 miles per hour to protect cultural resources.

Under alternative 2 (proposed action), deterioration of all cultural resources (with the exception of one Prescription XI site on routes SE476 and SE477) on or near the proposed routes would be minimized, and the cultural resources may be beneficially affected when appropriate standard resources protection measures are adopted. Using the standard resource protection measures would halt the degradation of site integrity on all but the one cultural resource. The Motorized Recreation PA also requires monitoring to detect condition change at the sites on routes added to the NFTS, and additional standard protection measures (or closures) would be applied, if site conditions were found to have deteriorated.

Motor vehicle use will be controlled below the high-water marks at Shasta Lake and Trinity Lake. The HRM has determined that the use of 15 mph speed limit and vehicle class restrictions to highway legal vehicles only is an appropriate initial protection measure for the lake bottom cultural resources (USDA Forest Service 2006). The adaptive management and monitoring of the lake bottoms will determine if site conditions are changing (if this alternative is selected) and different protection measures would be applied if necessary to protect cultural resources.

Direct and Indirect Effects of the Prohibition of Cross-Country Motor Vehicle Travel

Indicator: (2) Number of Historic Properties within the APE (30 meters on either side of route) of unauthorized routes or below the high-water marks of the reservoirs at risk from ongoing use. (3) The

average number of Historic Properties per acre that would be protected from any new routes created in the future without a prohibition (estimate of indirect effects).

Tables L-5 and L-6 in appendix L lists the proposed routes and areas potentially affecting known cultural resources in alternative 2. There are 15 Historic Properties **at risk** within 15 surveyed routes proposed in alternative 2, and an unknown number of cultural resources along 11 deferred survey routes. Eighty-two cultural resources on the lake bottoms are **at risk** from ongoing unmanaged motor vehicle use.

There is one cultural resource per 51 acres of surveyed routes and the sites on routes that receive light use are not considered at risk under the Motorized Recreation PA (USDA Forest Service 2006). There is one site per 141 areas of lake bottom area, and one site per 537 acres that are at risk.

The prohibition of motor vehicle use off designated NFTS roads, trails, and areas would have a beneficial effect on cultural resources throughout the forest in the short and long terms. It would curtail on-going effects as discussed in alternative 1 and reduce the risk and threat to Historic Properties that would occur if use were to continue on all unauthorized roads and trails. It would also help eliminate potential effects resulting from the creation of any new routes if cross-country motor vehicle use was not prohibited. Under this prohibition, all future permitted or other authorized motor vehicle travel off designated NFTS routes will be subject to NHPA Section 106 compliance and potential effects to Historic Properties can be identified at that time.

Motor vehicle use confined to newly designated roads, trails, and open areas allows the Forest Service to identify all cultural resources **at risk**, and monitor and mitigate effects according to the Motorized Recreation PA. Cultural resources within the APE of additions to the NFTS will be protected. Effects to cultural resources located on unauthorized routes not added to the NFTS, such as the continued compaction of soils and erosion, down-cutting, rutting, displacement, disturbance, damage, deterioration, vandalism, looting, removal/alteration of historic structure and materials, and visual and auditory alteration to the historic setting or cultural landscape/traditional cultural property, will be reduced as the unauthorized use is curtailed.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Indicator: (1) Degree to which the integrity of historic property values are diminished, related to location, design, setting, materials, workmanship, feeling, or association.

If the alternative 2 routes listed in Tables L-5 and L-6 in appendix L were added to the NFTS and the two lake bottom use areas designated, the integrity of approximately 15 Historic Properties within the APE would be diminished unless protection measures are implemented.

Tables L-5 and L-6 list the current severity of effects to cultural resources within the proposed routes. Direct and indirect adverse effects from most route designations would be mitigated by application of standard resources protection measures. Protection recommendations from the General and Standard Protection Measures in the Motorized Recreation PA are found in Tables L-5 and L-6. The exception is one site that would be adversely impacted by two proposed routes, SE476 and SE477, for which there is no effective resource protection measures available in the PA. The integrity of the site, a Forest Plan Prescription XI cultural resource with a major severity of effect (Table L-5), would diminish further if motor vehicle travel continues on these routes with no mitigation. As an alternative to the General and Standard Protection Measures in the Motorized Recreation PA, consultation with California SHPO may be conducted to determine alternative protection measures available for this resource.

It is likely that designation of unauthorized routes would increase use on the designated routes. Monitoring of route use levels with follow-up protection measures will be needed to ameliorate effects. If route use increase is identified through monitoring of use levels, deferred surveys of routes would likely result in the identification of additional sites, and thus require additional standard resources protection measures to be applied to newly identified cultural resources. Surveys of routes with use levels greater than light use have been completed and the information required in the Motorized Recreation PA is available to the responsible official for consideration while signing a record of decision.

Table L-6 lists the severity of the effects to known cultural resources on the lake bottoms. All effects to sites on the lake bottoms would be mitigated using speed limit and vehicle class restrictions upon designation, depending on the alternative, followed by other approved protection measures or area closures if it is determined by monitoring that closures are necessary. The Motorized Recreation PA, appendix E generally directs the procedures required for lake bottom protection and monitoring. Details regarding the adaptive management approach planned are in chapter 2. Since motor vehicle use would continue on the two lake bottom areas, sites subject to protection measures would require continual monitoring. See appendix L for monitoring information.

The effects of speed limits, vehicle class restrictions, and seasonal restrictions are discussed below in Effects Common to all Alternatives.

Cumulative Effects

Indicator: (1) Degree to which the integrity of historic property values are diminished, related to location, design, setting, materials, workmanship, feeling, or association.

The prohibition of cross-country motor vehicle travel eliminates the ongoing potential for integrity loss of cultural resources across the landscape, including at least 317 sites on unauthorized routes not proposed for this alternative. Since all present and future planning projects with potential to impact cultural resources, including future NFTS additions, will be subject to National Historic Preservation Act section 106 compliance, the potential effects to Historic Properties would be identified and mitigated. No

cumulative effects are expected, nor will the integrity of cultural resources be diminished as a result of present and reasonably foreseeable future projects as described in appendix B.

Alternative 2 National Historic Preservation Act Compliance

If SE476 and SE477 are omitted, alternative 2 would likely be considered an undertaking with **no adverse effect** under section 106 of the National Historic Preservation Act and 36 CFR 800, since all known or anticipated effects to Historic Properties would then be mitigated. If the two routes are selected and designated, alternative 2 would have potential **adverse effects** and require further consultation with SHPO.

Table 3.06-7. Alternative 2 (proposed action) – effects to cultural resources by proposed routes

Route ID	Type of Effect[a]	Nature of Effect	Severity of Effect
JM244	D	This road and many trails cross the site, causing possible erosion, artifact collection or displacement, and other disturbance	Moderate
PM2004	D	Road passes directly into site	Moderate
SE476	D, I, C	Segment runs right through site 201 and it is about 50 meters across to 378. The Wheeler Ranch sites are large, complex, multi-component properties with considerable remaining data potential	Major
SE477	D, I, C	Segment runs right through site 201 and it is about 50 meters across to 378. The Wheeler Ranch sites are large, complex, multi-component properties with considerable remaining data potential.	Major
TRMU5	D, I, C	Site was revisited and is being vandalized	Moderate
TRMU6	D, I, C	Site was revisited and is being vandalized	Moderate
RM1036	D, I, C	Trail goes right through site, causing erosion, disturbance, and possible vandalism	Moderate and Negligible

a - D = Direct effect; I = indirect effect; C = cumulative effect; cumulative effects based on on-going unmanaged motorized use in alternative 1.
Note: See appendix L for details regarding general and specialized protection measures in the Motorized Recreation PA.

Alternative 3 – Cross-County Travel Prohibition Only – No Additions to the Existing NFTS

Alternative 3 proposes no additions to the NFTS. No roads, trails, or areas would be designated. Cross-country travel would be prohibited across the Forest as well as below the high-water mark on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir. This prohibition of cross-country motor vehicle travel below the high-water mark is intended to enhance nonmotorized recreation and protect cultural resources which are adversely affected by increasing motorized use.

Direct and Indirect Effects of the Prohibition of Cross-Country Motor Vehicle Travel

Indicator: (2) Number of Historic Properties within the APE (30 meters on either side of route) of unauthorized routes or below the high-water marks of the reservoirs at risk from ongoing use. (3)The

average number of Historic Properties per acre that would be protected from any new routes created in the future without a prohibition (estimate of indirect effects).

As described in alternative 1, at least 332 cultural resource sites are known to exist in the inventoried area of potential effect of unauthorized routes, and an additional 322 sites are known to exist on the lake bottoms. The analysis revealed 91 at risk lake bottom sites that would not have continuing adverse effects from motor vehicle use if this alternative is selected. No sites are at risk from this alternative, because there will be no new routes or areas designated and the cross-country travel prohibition would protect approximately one site per 266.7 acres removed from vehicle use.

Under alternative 3, all cultural resources on or near the unauthorized routes and across the landscape currently open to cross-county travel, including the lake bottoms, will have significantly reduced visitation. Some visitation will still occur though other Forest uses like hiking, equestrian travel, and biking.

The prohibition of motor vehicle use off designated NFTS roads, trails, and areas would have a beneficial effect on cultural resources throughout the forest in the short and long terms. It would curtail on-going effects as discussed in alternative 1 and reduce the risk and threat to Historic Properties that would occur if use were to continue on all unauthorized roads and trails. It would also help eliminate potential effects resulting from the creation of any new routes and trails if cross-country motor vehicle use was not prohibited. Under this prohibition, all future permitted or other authorized motor vehicle travel off designated NFTS routes will be subject to NHPA Section 106 compliance and potential effects to Historic Properties can be identified at that time.

Effects to cultural resources located on unauthorized routes off the NFTS, such as the continued compaction of soils and erosion, down-cutting, rutting, displacement, disturbance, damage, deterioration, vandalism, looting, removal/alteration of historic structure and materials, and visual and auditory alteration to the historic setting or cultural landscape/traditional cultural property, will be reduced.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Indicator: (1) Degree to which the integrity of historic property values are diminished, related to location, design, setting, materials, workmanship, feeling, or association.

Since no routes or open areas would be added to the NFTS, there would be no direct and indirect effects to known cultural resources as a result of this alternative. The integrity of cultural resources may improve as a result of reduced motor vehicle access across the landscape and lake bottoms. Because no routes are being added to the NFTS, no protection measures would be applied to any Historic Properties.

There are no changes to the existing NFTS proposed in this alternative.

Cumulative Effects

Indicator: (1) Degree to which the integrity of historic property values are diminished, related to location, design, setting, materials, workmanship, feeling, or association.

The prohibition of cross-country motor vehicle travel eliminates the ongoing potential for integrity loss of cultural resources across the landscape due to motor vehicle use and from increased visitation by the public. There are no direct or indirect effects of alternative 3. Since all present and future planning projects with potential to impact cultural resources, including future NFTS additions are subject to National Historic Preservation Act section 106 compliance; the potential effects to Historic Properties would be identified and mitigated. No cumulative effects are expected, nor will the integrity of cultural resources be diminished as a result of present and reasonably foreseeable future projects as described in appendix B.

Alternative 3 National Historic Preservation Act Compliance

Alternative 3 would likely be considered **no adverse effect** under section 106 of the National Historic Preservation Act and 36 CFR 800, since no additional effects would be created by this action alternative and existing effects would be reduced.

Alternative 4 – Minimize Impacts to Natural Resources and Roadless Areas

This alternative proposes to add 26 routes totaling 15.56 miles and three open areas totaling 44,476 acres to the NFTS. Lake bottom use is restricted to highway-legal vehicles with a speed limit of 10 miles per hour to protect cultural resources.

Direct and Indirect Effects of the Prohibition of Cross-Country Motor Vehicle Travel

Indicators: (2) Number of Historic Properties within the APE (30 meters on either side of route) of unauthorized routes or below the high-water marks of the reservoirs at risk from ongoing use. (3)The average number of Historic Properties per acre that would be protected from any new routes created in the future without a prohibition (estimate of indirect effects).

None of the proposed routes affect previously recorded cultural resources or known linear sites or features No sites are at risk from routes, because there are no known cultural resources within 30 meters of the routes proposed under this alternative and sites on routes that receive light use are not considered **at risk** under the Motorized Recreation PA (USDA Forest Service 2006). Approximately 91 cultural resources on the lake bottoms are **at risk** from ongoing unmanaged motor vehicle use. There is one site per 138 areas of lake bottom area, and one site per 542 acres that are at risk. Initial site protection measures on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir sites are found in Table L-6 and are consistent with this alternative (lake bottom use is restricted to highway-legal vehicles with a speed limit of 10 miles per hour). The HRM has determined that the use of 15 mph speed limit and vehicle class

restrictions to highway legal vehicles only is an appropriate initial protection measure for most of the lake bottom cultural resources (USDA Forest Service 2006). In some cases, barriers will be added as well.

Since cross-country travel would be prohibited, no unrecorded cultural resources located between designated routes would be affected by such activities. This alternative would reduce the potential effects to Historic Properties by prohibiting cross-country travel. The direct and indirect effects of the prohibition of cross-country travel for alternative 4 are the same as those described in alternative 2.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Indicator: (1) Degree to which the integrity of historic property values are diminished, related to location, design, setting, materials, workmanship, feeling, or association.

All routes within this alternative with greater than light use were completely surveyed for cultural resources and no previously recorded cultural resources or known linear sites or features would be directly or indirectly affected by implementation of alternative 4. Proposed routes with light use were designated for having deferred surveys conducted (Table 3.06-3). Deferred survey routes would likely result in the identification of additional sites, and thus require standard resources protection measures. Surveys of selected routes with use levels greater than light use were completed prior to the responsible official signing a record of decision for this project, and any potential adverse effects will be mitigated with protection measures as per the Motorized Recreation PA. If the standard resource protection measures are implemented, further loss of integrity would be minimized.

It is likely that designation of unauthorized routes would increase use on the routes. However, since no cultural resources are known on any of the routes identified for this alternative, there are no direct or indirect effects.

Table L-6 in appendix L lists the severity of the effects to known cultural resources on the lake bottoms. All effects to sites on the lake bottoms would be mitigated using speed limit and vehicle class restrictions upon designation, followed by area closures as described in the Motorized Recreation PA, appendix E, if it is determined from motoring that closures are required for resources protection. Monitoring is described in chapter 2 and appendix L.

The effects of speed limits and vehicle class restrictions are discussed below in Effects Common to all Alternatives.

Cumulative Effects

Indicator: (1) Degree to which the integrity of historic property values are diminished, related to location, design, setting, materials, workmanship, feeling, or association.

The prohibition of cross-country motor vehicle travel eliminates the ongoing potential for integrity loss of cultural resources across the landscape. Since all present and future planning projects with potential to impact cultural resources, including future NFTS additions are subject to National Historic Preservation Act section 106 compliance; the potential effects to Historic Properties would be identified and mitigated. No cumulative effects are expected, nor will the integrity of cultural resources be diminished as a result of present and reasonably foreseeable future projects as described in appendix B.

Alternative 4 National Historic Preservation Act Compliance

Alternative 4 would likely be considered an undertaking with **no adverse effect** under section 106 of the National Historic Preservation Act and 36 CFR 800.

Alternative 5 – Improved Access and Motorized Recreation Opportunities

Alternative 5 proposes to add the most routes, 219, totaling 106.12 miles, and three open areas totaling 44,476 acres to the NFTS. All vehicle classes (highway-legal and non-highway-legal) would be allowed on the lake bottoms with a speed limit of 10 miles per hour to protect cultural resources.

Direct and Indirect Effects of the Prohibition of Cross-Country Motor Vehicle Travel

Indicators: (2) Number of Historic Properties within the APE (30 meters on either side of route) of unauthorized routes or below the high-water marks of the reservoirs at risk from ongoing use. (3) The average number of Historic Properties per acre that would be protected from any new routes created in the future without a prohibition (estimate of indirect effects).

Table 3.06-8 describes the effects of proposed routes on known cultural resources in alternative 5. Table 3.06-8 includes only routes where effects were determined to be occurring. A complete list of alternative 5 routes can be found in tables L-5 and L-6. There are 33 cultural resources at risk within 42 surveyed routes proposed in alternative 5, and an unknown number of cultural resources at risk along deferred surveyed routes. There are 24 routes that require protection measures for Historic Properties. Ninety-one cultural resources on the lake bottoms are **at risk** from ongoing unmanaged motor vehicle use.

There is one cultural resource per 29.98 acres of surveyed routes under this alternative and the sites on routes that receive light use are not considered **at risk** under the Motorized Recreation PA (USDA Forest Service 2006). There is one site per 138 areas of lake bottom area, and one site per 542 acres that are at risk.

The prohibition of motor vehicle use off designated NFTS and areas would have a beneficial effect on cultural resources throughout the forest in the short and long terms. It would curtail on-going effects as described in alternative 1 and reduce the risk and threat to Historic Properties that would occur if use were to continue on all unauthorized roads and trails. It would also help eliminate potential effects resulting from the creation of any new routes and trails if cross-country motor vehicle use was not prohibited.

Under this prohibition, all future permitted or other authorized motor vehicle travel off designated NFTS routes will be subject to NHPA Section 106 compliance and potential effects to Historic Properties can be identified at that time.

Motor vehicle use confined to newly designated roads, trails, and open areas allows the Forest Service to identify all cultural resources at risk, and monitor and mitigate effects according to the Motorized Recreation PA. Cultural resources within the additions to the NFTS will be protected. Effects to cultural resources located on un authorized route, such as the continued compaction of soils and erosion, down-cutting, rutting, displacement, disturbance, damage, deterioration, vandalism, looting, removal/alteration of historic structure and materials, and visual and auditory alteration to the historic setting or cultural landscape/traditional cultural property, will be reduced.

Table 3.06-8. Alternative 5 (improved access and motorized recreation opportunities) – effects to cultural resources

Route ID	Type of Effect	Nature of Effect	Severity of Effect
EA345	I, C	Route starts at site 488 boundary and site 537 alignment, but does not cross either, will not affect spur 220H, may affect spur 220P by slightly disturbing a portion of the spur	Negligible
JM244	D, I, C	This road and many other trails cross the site, causing possible erosion, artifact collection or displacement and other disturbance	Moderate
PM2004	D, I, C	Road passes directly into site	Moderate
RM1036	D, I, C	Road goes right through site	Moderate
SE476	D, I, C	Segment runs right through site 201 and it is about 50 m across to 378; the Wheeler Ranch sites are large, complex, multi-component properties with considerable remaining data potential	Major
SE477	D, I, C	Segment runs right through site 201 and it is about 50 meters across to 378; the Wheeler Ranch sites are large, complex, multi-component properties with considerable remaining data potential	Major
SE512	D	Road and site intersect	Minor
TRMU5	D, I, C	Portion of road lies directly on site	Moderate
TRMU6	D, I, C	Portion of road lies directly on site; possible erosion, down-cutting, rutting, displacement, disturbance	Moderate
U42N15K	D, I, C	Runs right through the middle of the site; no effect to spur	Moderate
U42N15M	D, I, C	Runs along a portion of site	Minor
U42N15MC	D, I, C	Runs right through site	Moderate
U42N18A	D, I, C	Could cause increased erosion	Minor
U42N18AA	D	Crosses RR grades, possible erosion	Negligible
U42N18B	D, I, C	Road passes through site, possible erosion, displacement, and other disturbance	Moderate
U42N73A	I (possible)	May be impacted by camping	Negligible
U42N73AA	D	Site 252 is only crossed	Negligible
U42N84C	D	Crosses RR grades	Negligible
UOHV01X	I (possible)	Route starts right at site boundary	Negligible
UT29N30HA	D	Yes; trail crosses the Humboldt Trail	Negligible

Route ID	Type of Effect	Nature of Effect	Severity of Effect
WE006	D	Abuts the RR grade	Negligible
WE007	D	Abuts the RR grade	Negligible
WE019	D	Negligible	Negligible
WE022	D	Crosses RR grades	Negligible
WE039	D	Crosses site boundaries	Minor
WE043	D	Crosses RR grade site 252	Negligible
WE540	D, I, C	Erosion, displacement, and other disturbance likely	Major
WE542	D (possible)	Some erosion	Minor

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Indicator: (1) Degree to which the integrity of historic property values are diminished, related to location, design, setting, materials, workmanship, feeling, or association.

Table 3.06-8 describes the effects and severity of proposed routes on known cultural resources in alternative 5. Since the number of routes considered for designation in this alternative is greatest, the direct and indirect effects to known and unknown cultural sites will require the most additional deferred survey, standard resource protection measures, and monitoring of any alternative. Adhering to standard resources protection measures would prevent degradation of site integrity on all but one cultural resource. Protection recommendations from the General and Standard Protection Measures in the Motorized Recreation PA are found in Tables L-5 and L-6. The exception is one site that would be adversely impacted by two proposed routes, SE476 and SE477, for which there are no effective resource protection measures in the PA. The integrity of the site, a Forest Plan Prescription XI cultural resource with a major severity of effect would diminish further if motor vehicle travel continues there with no mitigation. As an alternative to the General and Standard Protection Measures in the Motorized Recreation PA, consultation with California SHPO may be conducted to determine alternative protection measures available for this resource.

The integrity of approximately 33 cultural resources within the APE would be diminished under alternative 5 unless projection measures are implemented. Most direct and indirect effects to known cultural resources would be mitigated by application of standard resources protection measures identified in the PA, and monitoring will be required to recognize unanticipated uses and effects. Deferred surveys of routes with only light use would likely result in the identification of additional sites, and thus require additional standard resources protection measures. Surveys of selected routes with use levels greater than light use have been completed and the information required in the Motorized Recreation PA is available to the responsible official for signing a record of decision.

It is likely that designation of unauthorized routes would increase use on those routes. Monitoring with follow-up standard resource protection measures would be needed to ameliorate effects and minimize any further loss of integrity to cultural resources.

Table L-6 lists the severity of the effects to known cultural resources on the lake bottoms. The HRM has determined that the use of 15 mph speed limit and vehicle class restrictions to highway legal vehicles only is an appropriate initial protection measure for the lake bottom cultural resources (USDA Forest Service 2006). Under this alternative, which proposes just speed limit restrictions and no vehicle class restrictions, the effects to sites on the lake bottoms would not be fully mitigated. The HRM has determined that the addition of vehicle class restrictions upon designation, followed by area closures if it is determined by monitoring that closures are necessary, are required to meet the Motorized Recreation PA as amended. The Motorized Recreation PA, appendix E, details the procedures required for lake bottom protection and monitoring. The description of the alternatives, including the planned adaptive management approach, is in chapter 2. Since motor vehicle use would continue on the three lake bottom areas, sites subject to standard resources protection measures would require continual monitoring.

The effects of speed limits and vehicle class restrictions are discussed below in Effects Common to all Alternatives.

Cumulative Effects

Indicator: (1) Degree to which the integrity of historic property values are diminished, related to location, design, setting, materials, workmanship, feeling, or association.

The prohibition of cross-country motor vehicle travel eliminates the ongoing potential for loss of integrity of cultural resources across the landscape, including at least 297 sites on unauthorized routes not proposed for this alternative. Since all present and future planning projects with potential to impact cultural resources, including future NFTS additions will be subject to National Historic Preservation Act section 106 compliance, the potential effects to Historic Properties would be identified and mitigated. No cumulative effects are expected, nor will the integrity of cultural resources be diminished as a result of present and reasonably foreseeable future projects as described in appendix B.

Alternative 5 National Historic Preservation Act Compliance

If SE476 and SE477 are omitted, alternative 2 would likely be considered an undertaking with **no adverse effect** under section 106 of the National Historic Preservation Act and 36 CFR 800, since all known or anticipated effects to Historic Properties would then be mitigated. If the two routes are selected and designated, alternative 5 would have potential adverse effects and require further consultation with SHPO.

The HRM has determined that the use of 15 mph speed limit and vehicle class restrictions to highway legal vehicles only is an appropriate initial protection measure for the lake bottom cultural resources

(USDA Forest Service 2006). Since this alternative does not propose vehicle class restrictions in addition to speed limits, it does not meet the requirements of the Motorized Recreation PA as amended. This would have potential adverse effects and require further consultation with SHPO.

Effects Common to All Action Alternatives

Motor Vehicle Use below High-water Marks at Shasta Lake, Trinity Lake, and Iron Canyon Reservoir

Motor vehicle travel below the high-water marks at two or three lakes (Shasta Lake, Trinity Reservoir, and Iron Canyon Reservoir), depending on the alternative, is proposed under alternatives 2, 4, and 5. Cultural resources information was analyzed as follows. The Iron Canyon Reservoir sites were identified in GIS by selecting known sites within 100 meters of the lake boundary. Additional paper records related to the area were also examined. The Trinity Reservoir sites were identified by the same GIS selection method, and from additional paper site records. The location information on the site records varied in quality, but in general, only had a township and range. However, most records indicated they were within the reservoir area. No survey area data were available, but the site records most likely came from a report by Adan E. Treganza in 1952 (the site records had a 1952 date), and were recorded by "A.E.T." The report was not available except by reference. The Shasta Lake sites were obtained using the GIS selection method. A recent study of Shasta Lake cultural resources (Byrd et al. 2008) provided additional information.

Table 3.06-9 is a summary of previous surveys that identified cultural resources within 100 meters of Shasta Lake, Trinity Reservoir, and Iron Canyon Reservoir.

Table 3.06-9. Survey record for the Shasta Lake, Trinity Reservoir, and Iron Canyon Reservoir areas

	Number of Sites	Survey Record
Shasta Lake	200	R200005145801006 – unnamed inventory
		Byrd et al. (2008). Cultural Resources Alternatives Assessment for the Shasta Lake Water Resources Investigation, Shasta and Tehama Counties, California. appendix A This report includes complete review of previous references
Trinity Reservoir	113	Treganza 1952 (not available except by reference)
Iron Canyon Reservoir	9	R1976051400039 – unnamed inventory
		R1981051400531 – Norearnide Timber Sale
		R1996051400937 – Iron Canyon Watershed Restoration Project

In Shasta Lake approximately 200 known cultural resources sites have been previously identified within 100 meters of the lake high-water-mark using GIS. Many of these would never emerge above water unless the lake was completely drained. Nevertheless, some of these sites could be affected by motor vehicle use in low-water years. The Pacific Southwest Regional Forester has consulted with the California State Historic Preservation Officer and Advisory Council on Historic Preservation regarding an

amendment to the Motorized Recreation PA that modifies the lake bottom area heritage strategy and adds procedures for identifying and mitigating possible effects to cultural resources in these reservoir areas. The Forest shall comply with all requirements of the amended Motorized Recreation PA regardless of which alternative is selected and apply an adaptive management strategy as outlined in the amendment, and described in chapter 2. Any effects to any cultural resource sites through motor vehicle use below the high-waterline of these three lakes shall be mitigated through the standard and specialized measures agreed to in the amendment. Any cultural resource surveys required by the amendment will be conducted in accordance with its schedule and other requirements.

Alternatives 2, 4, and 5 propose speed limits in the reservoir open areas for motor vehicles of either 15 mph (alternative 2) or 10 mph (alternatives 4 and 5). The proposal for a speed limit is based on the function of the proposed open areas below high water on Shasta Lake, Trinity Lake and Iron Canyon Reservoir. The proposed open areas are not intended to be used for hill climbing, jumping, fast turns, high speed, etc., but to provide access to recreation activities on the lake shore while conserving natural, historic and archeological objects.

Since there are numerous recorded cultural resource sites on all of the lake bottoms, lower vehicle speed minimizes the risk of damage to any of these sites by effectively preventing hill climbing, jumping, fast turns, and mud bogging. Alternative 2 proposes a 15 mph speed limit and allows highway-legal vehicles only. This is lowered to 10 mph for highway-legal vehicles in alternative 4 and all vehicle classes in alternative 5. The difference between 10 and 15 mph is to provide an even greater level of resource protection and risk management. Implementing speed limits and vehicle class restrictions will not eliminate access but will mitigate potential impacts.

Vehicle Class Restrictions: The proposed open areas are not intended to be used by vehicles for hill climbing, jumping, fast turns, high speed, etc., but to provide access to recreation activities on the lake shore while conserving natural and cultural resources. Alternatives 2 and 4 include only highway-legal vehicles to minimize the likelihood of vehicles primarily designed for off-road uses being operated in a manner that impacts cultural resources. Alternative 5 permits all vehicle classes which will allow access to a larger area of the lake bottoms and increase the potential for adverse effects to cultural resources. However, these effects will be monitored and mitigated according to the protection measures outlined in appendix E of the Motorized Recreation PA. Therefore, due to the lack of vehicle class restrictions, alternative 5 may require further SHPO consultation to ensure site protection. The HRM has determined that the minimum initial protection measures from the amended PA will include vehicle class restrictions.

Route Analysis

Parking and camping would be allowed within one vehicle length of each route. Since the cultural resources effect analysis considered each route with a buffer of 30 meters, all parking and camping areas associated with each route have been included in the analysis of each action alternative.

No distinction was made during the analysis between routes described as roads or as trails or among various motorized vehicle classes, because the effects to Historic Properties in or near the proposed routes were considered to be of similar scope, extent, and overall impact. Monitoring and surveys will reveal route-specific differences. A 30-meter buffer was used for the analysis of all routes, regardless of vehicle class or width, with the assumption that adverse effects could result anywhere within the buffer.

Seasonal restrictions on proposed routes are intended to protect wildlife and watersheds. There would be no measurable effect to cultural resources as a result of these seasonal restrictions. There may be a minor beneficial effect as vehicle traffic is curtailed for part of the year.

Summary of Effects Analysis across All Alternatives

Table 3.06-10 displays the measurement indicator values and results for cultural resources by alternative.

Table 3.06-10. Measurement indicator values by alternative

Alternative	Measurement Indicator		
	1. Degree to which the integrity of historic property values are diminished.	**2. Number of Historic Properties within the APE (30 meters on either side of route) of unauthorized routes or below the high-water marks of the reservoirs at risk from ongoing use.**	**3. Average number of Historic Properties per acre at risk if new routes or areas are created.**
Alternative 1	The continued unregulated cross-county travel would be a reasonably foreseeable and on-going use, and has the greatest potential for creating cumulative adverse impacts to cultural resources. The integrity of cultural resources would continue to diminish without protections or mitigations.	Using existing data, at least 332 sites are known to exist within 30 meters of known unauthorized routes, and an additional 322 sites (91 at risk) are known to exist within the lake bottoms.	A general analysis from the Forest's 2006 data for the Secretary of the Interior's Report to Congress listed 3,351 sites recorded on 893,722 acres of survey land or approximately one site per 266.7 acres. This data indicates approximately 6000 cultural resources could exist on areas open to cross-country travel.
Alternative 2	Potential direct, indirect, and cumulative effects to 15 Historic Properties may diminish their integrity	There are 15 Historic Properties known along the alternative 2 routes.	There is one cultural resource per 51 acres of surveyed routes. There is one site per 141 areas of Lake Bottom area, and one site per 537 acres that are at risk.

Alternative	Measurement Indicator		
	1. Degree to which the integrity of historic property values are diminished.	**2. Number of Historic Properties within the APE (30 meters on either side of route) of unauthorized routes or below the high-water marks of the reservoirs at risk from ongoing use.**	**3. Average number of Historic Properties per acre at risk if new routes or areas are created.**
Alternative 3	Under alternative 3, all cultural resources on or near the unauthorized routes and across the landscape currently open to cross-county travel, including the lake bottoms, will have significantly reduced visitation. The prohibition of motor vehicle use off designated NFTS roads, trails, and areas would have a beneficial effect on cultural resources throughout the forest in the short and long terms.	As described in alternative 1, at least 332 cultural resource sites are known to exist in the inventoried area of potential effect of unauthorized routes, and an additional 322 sites (91 at risk) are known to exist on the lake bottoms. The number of sites located in the cross-country use areas (currently 1,632,316 acres of land) cannot be determined because there is limited survey and site data on most of that area.	No sites are at risk from route, because there will be no new routes or areas created under this alternative.
Alternative 4	Since cross-country travel would be prohibited, no unrecorded cultural resources located between designated routes would be affected by such activities. This alternative would reduce the potential effects to Historic Properties by prohibiting cross-country travel.	None of the proposed routes affect previously recorded cultural resources or known linear sites or features. Approximately 91 cultural resources on the lake bottoms are at risk from ongoing unmanaged motor vehicle use.	No sites are at risk from route, because there are no known cultural resources within 30 m of the routes under this alternative. There is one site per 138 areas of Lake Bottom area, and one site per 542 acres that are at risk.
Alternative 5	If the routes listed considered under alternative 5 were added to the NTFS and the three lake bottom use areas designated, the integrity of the 35 cultural resources within the APE would be diminished unless projection measures are implemented.	There are 33 cultural resources at risk within surveyed routes proposed in alternative 5, and an unknown number of cultural resources at risk along deferred surveyed routes. Approximately 91 cultural resources on the lake bottoms are at risk from ongoing unmanaged motor vehicle use.	There is one cultural resource per 29.98 acres of surveyed routes under this alternative. There is one site per 138 areas of Lake Bottom area, and one site per 542 acres that are at risk.
Summary	Alternative 3 is the most beneficial to cultural resources under this indicator, followed by alternative 4, modified alternative 2, alternative 2, alternative 5, and alternative 1.	Alternative 3 is the most beneficial to cultural resources under this indicator, followed by alternative 4, modified alternative 2, alternative 2, alternative 5, and alternative 1.	Alternative 3 is the most beneficial to cultural resources under this indicator, followed by alternative 4 with the same value, modified alternative 2, alternative 2, alternative 5, and alternative 1.

Table Notes: The existing cultural resources data prevents more precise estimate of Forest-wide site density.
Sites on routes that receive light use are not considered at risk under the Motorized Recreation PA (USDA Forest Service 2006).

Table 3.06-11 compares each alternative in terms of three criteria of effects. The results of the analysis suggest that alternative 3 has the least impact (highest score) to cultural resources, and alternative 1 has the greatest impact (lowest score). These results are unsurprising since all alternatives except alternative 1 provide some degree of protection to cultural resources that is heretofore non-existent.

Alternative 4, the action designed to minimize impacts to natural resources and roadless areas, has the second-lowest impact to cultural resources.

In the following table, rankings are scored on a scale of 1 to 5 from most (1) to least (5) impact.

Table 3.06-11. Comparison of effects to cultural resources

Indicators – Cultural Resources	Rankings of Alternatives for Each Indicator				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Degree to which the integrity of historic property values are diminished	1	3	5	4	2
Number of Historic Properties within unauthorized routes at risk from ongoing use	1	3	5	4	2
Average number of Historic Properties protected per acre	1	3	5	4	2
Average for cultural resources	1	3	5	4	2

Compliance with the Forest Plan and Other Direction

All alternatives under consideration for this action shall be in compliance with Federal law, regulation, and Forest Service direction and policy (Forest Service Manual and Handbook). The Motorized Recreation PA as amended has described the streamlined compliance process developed for this class of undertaking.

However, only alternatives 3 and 4 currently appear to comply with the Heritage Resources Management Prescription XI of the Forest LRMP Standards and Guidelines (D-8 on page 4-51 of the Forest Plan). This prescription prohibits OHV use within cultural resources sites that meet one or more of three conditions in addition to being eligible to the National Register of Historic Places: the site has known or potential scientific values that are highly important or unique and are conducive to long-term study, or the site has a potential for interpretation of cultural resource values to Forest visitors, or the site has cultural importance to Native Americans. No provisions seem to be available in the prescription for allowing OHV use through cultural resources sites even if protection measures occur, unless the LRMP is amended. Therefore, each site within the area of potential effect for the alternatives would need to be evaluated and avoided by proposed routes or a Forest Plan amendment would be required.

The proposed Forest Plan amendment would allow particular routes (SE314, SE476, SE477, SFMU13, SW256, U42N18A, and U42N18B) to be designated in close proximity to Prescription XI cultural sites. If the Forest Plan amendment is approved, alternatives 2 and 5 would then comply with the Forest Plan. However, alternatives 2 and 5 have routes (SE476, SE477) that would adversely affect one of the Prescription XI sites. Addition of these routes would require consultation with the California SHPO to address the effects not mitigated by the Motorized Recreation PA provisions.

In addition, the change in status from unauthorized route to designated Forest road or trail would require approval specifically by the Forest Supervisor (Heritage Resources Management Prescription XI (D, 6)).

Alternatives 2, 4, and 5 also have a Prescription XI site located in a lake bottom open area proposed for vehicle use. This site will be protected by the installation of barriers and will not allow vehicle use within the site boundary (Motorized Recreation PA). Alternatives 2 and 4 are in compliance with Prescription XI of the Forest Plan for this site since they restrict the use of vehicles in Shasta Lake to highway legal vehicles only.

Alternative 5 does not propose vehicle class restrictions in addition to speed limits to protect cultural resources in the reservoir open areas. It therefore does not meet the requirements of the Motorized Recreation PA as amended. This would have potential adverse effects to cultural resources and require further consultation with SHPO.

3.07. Botanical Resources

Introduction

Of the Forest Service Regions, the Pacific Southwest Region contains the largest assemblage of sensitive plant species in comparison to its land base. Of the more than 8,000 vascular plant species occurring in California, well over half are known to occur on National Forest System (NFS) lands. This is due to topography, geography, geology and soils, climate, and vegetation, the same factors that account for the exceptionally high endemic flora of the State. Over 100 plant species are found only on NFS lands and nowhere else in the world (Powell 2001).

Management of plant, lichen and fungi species and habitat, and maintenance of a diversity of plant communities, is an important part of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on NFS lands must be planned and implemented so that they do not jeopardize the continued existence of threatened or endangered species or lead to a trend toward listing or loss of viability of Forest Service sensitive species. In addition, management activities should be designed to maintain or improve habitat for rare plants and natural communities to the degree consistent with multiple-use objectives established in each forest LRMP. Key parts include: developing and implementing management practices to ensure that species do not become threatened or endangered because of Forest Service actions; maintaining viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on NFS lands; and developing and implementing management objectives for populations and/or habitats of rare species. The Pacific Southwest Region has over 425 rare plant species to manage.

Management decisions related to motor vehicle travel can affect plant, lichen and fungi species, their habitats, and natural communities. Effects include, but are not limited to, death or injury to plants and habitat modification, habitat fragmentation, and habitat quality, including increased risk of weed introduction and spread, changes in hydrology, increased erosion, compaction, and sediment, risk to pollinators, loss of vegetation, over collection, or other factors reducing or eliminating plant growth and reproduction (Trombulak and Frissel 2000). The Forest Service provides a process and standard through which rare plants receive full consideration throughout the planning process, reducing negative impacts on species and enhancing opportunities for mitigation by developing and implementing management objectives for populations and/or habitats of sensitive species. It is Forest Service policy to minimize damage to soils and vegetation, avoid harassment to wildlife, and avoid significant disruption of wildlife habitat while providing for public motor vehicle use on NFS lands (FSM 2353.03(2)). Therefore, management decisions related to motor vehicle travel on NFS lands must consider effects to plant, lichen, and fungi species, and their habitats.

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Direction relevant to the proposed action as it affects botanical resources includes:

Endangered Species Act (ESA). The Endangered Species Act of 1973 (16 USC 1531 et seq.) requires that any action authorized by a federal agency not be likely to jeopardize the continued existence of a threatened or endangered (TE) species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the ESA, as amended, requires the responsible federal agency to consult the USFWS and the National Marine Fisheries Service concerning TE species under their jurisdiction. It is forest service policy to analyze impacts to TE species to ensure management activities are not be likely to jeopardize the continued existence of a TE species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. This assessment is documented in a biological assessment (BA) and is summarized or referenced in this chapter.

E.O. 13112 Invasive Species 64 FR 6183 (February 8, 1999) - To prevent and control the introduction and spread of invasive species.

Forest Service Manual and Handbooks (FSM/H 2670) - Forest Service Sensitive (FSS) species are species identified by the regional forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on national forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a significant trend toward federal listing or loss of viability. This assessment is documented in a biological evaluation (BE) and is summarized or referenced in this chapter.

The Northwest Forest Plan (NWFP) – The Bureau of Land Management and Forest Service adopted standards and guidelines for the management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl, commonly known as the Northwest Forest Plan. The NWFP included measures for management of known sites, site-specific pre-habitat disturbing surveys, and/or landscape scale surveys for about 400 rare and/or isolated species. The standards and guidelines for these mitigation measures are known as survey and manage.

On September 30, 2002, the Secretaries of Agriculture and Interior entered into a settlement agreement with Douglas Timber Operators and the American Forest Resource Council concerning a lawsuit involving the 2001 Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines. The settlement agreement required the Agencies to examine, in a Supplemental Environmental Impact Statement (SEIS) an alternative “that replaces the Survey and Manage mitigation requirements with existing Forest Service and BLM special status species programs to achieve the goals of the Northwest Forest Plan through a more streamlined

process." The selected alternative in the January 2004 Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measures Standards and Guidelines was alternative 2.

The March 2004 Record of Decision to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines documents this decision and the reasons for selecting alternative 2. This alternative discontinued the survey and manage program and assumed transfer of selected survey and manage taxa to Agency Special-Status Species Programs (SSSP).

A coalition of environmental and conservation groups filed suit against the Departments of Agriculture and Interior challenging the 2004 decision to eliminate the Survey and Manage program. On August 1, 2005, Judge Pechman issued an Order (Northwest Ecosystem Alliance et al. v. Mark E. Rey et al., No. 04-844P, W.D. Wash) that found the agencies deficient in three areas. On January 9, 2006, Judge Pechman set aside the 2004 Record of Decision and reinstated the January 2001 Record of Decision including any amendments or modifications to the 2001 ROD that were in effect as of March 21, 2004. On October 11, 2006, the court modified the January 9, 2006 injunction to provide relief to the federal agencies; it allowed for four exemptions to the Survey and Manage mitigation measure. These four exceptions did not include actions proposed herein. To address the deficiencies identified in the August 1, 2005 Order, the agencies prepared a Supplement to the 2004 Final Supplemental Environmental Impact Statement (FSEIS) to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines (June 2007).

On July 24 and 25, 2007, the FS and BLM, respectively, signed Records of Decision adopting the proposed action of the June 2007 FSEIS eliminating the Survey and Manage standards and guidelines once again.

On July 22, 2008, a coalition of environmental and conservation groups (Conservation Northwest et. al.) filed suit against the 2007 Final SEIS and Records of Decision, and the biological opinion of the U.S. Fish and Wildlife Service. On September 22, 2008, the Federal agencies filed their response to the plaintiffs' complaint with the U.S. District Court Western District of Washington.

On July 24, 2007, the Under Secretary of the Department of Agriculture signed a new Survey and Manage Record of Decision that removed the survey and manage requirements from all of the National Forests' land and resource management plans (LRMPs) within the range of the northern spotted owl. However, since the court in Northwest Ecosystem Alliance et al v. Mark Rey et al, Civ. No. 04-844, Western District of Washington has not yet granted the government's motion to lift the modified October 11, 2006, the action alternatives herein were designed to be consistent with the 2001 Survey and Manage ROD as modified by subsequent annual species reviews as allowed by the modified October 11, 2006 injunction.

To be in compliance with the 2001 Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measure Standards and Guidelines (USDA and USDI 2001), projects must have pre-disturbance surveys conducted if the activity is potentially considered to be habitat-disturbing. "Habitat-disturbing activities are defined as those disturbances likely to have a significant negative impact on the species' habitat, its life cycle, microclimate, or life support requirements" (USDA USDI 2001 - Standards and Guidelines, p. 22). Species-specific standards and guidelines from the Northwest Forest Plan are identified below under species effects analysis.

Recovery plans for Threatened and Endangered species

The plans for *Arabis macdonaldiana* (USDI Fish and Wildlife Service 1990) and vernal pool species including *Orcuttia tenuis* (USDI Fish and Wildlife Service 2005) list goals and objectives for the recovery of threatened and endangered species in general, but do not address populations on the Shasta-Trinity National Forest specifically.

Forest-wide Standards and Guidelines for Sensitive and Endemic plants (LRMP 4-14)

Standards and guidelines applicable at the project level are:

- 4a. Map, record, and protect essential habitat for known and newly discovered sensitive and endemic plant species until conservation strategies are developed.
- 4b. Analyze the potential effects of all ground-disturbing projects on sensitive and endemic plants and their habitat. Mitigate project effects to avoid a decline in species viability at the Forest level.
- 4c. Monitor the effects of management activities on sensitive and endemic plants. If monitoring results show a decline in species viability, alter management strategy.

Effects Analysis Methodology

The analysis of effects on rare plant species was a three-step process (FSM 2672.43). In the first step, all rare species that are known or are believed to have potential to occur in the analysis area were identified. Existing Forest records, GIS and tabular data from the California Natural Diversity Database (California Department of Fish and Game 2009), the California On-line Inventory of Rare and Endangered Plants of California (California Native Plant Society 2009), and the Jepson Manual (Hickman 1993) were reviewed to determine known locations, range, and habitat requirements for each species. A list of species to include in the analysis was compiled using the Arcata U.S. Fish and Wildlife Office on-line species list search page (USDI 2009); the USDA Forest Service Region 5 Sensitive Species List (USDA Forest Service 2006); and the list of survey-and-manage species to be protected through survey and management standards and guidelines, for which suitable habitat exists within, and whose range includes, the STNF which includes results of annual species reviews that occurred in 2001, 2002 and 2003. Species considered in this analysis are listed in the affected environment section below.

The second step was field reconnaissance surveys. New surveys were not performed for this project, therefore existing data was used where available Existing surveys were performed for other projects, but in some cases overlapped routes in the proposed action and alternative 5. Field surveys have been conducted over the past five years on approximately 0.05 miles of inventoried unauthorized routes in the proposed action and 2.8 miles in alternative 5. Field surveys were conducted at the time of year when plants were evident and identifiable. Additionally, information on rare plants from past field surveys, monitoring, and personal field observations were utilized during the analysis.

This information was used in step three of the analysis, where data were imported into a geographic information system (GIS) and used to analyze the proximity of known occurrences and suitable habitat to routes, as well as to identify effects and develop mitigation measures. For those inventoried unauthorized routes that have not been surveyed, but are proposed for addition to the National Forest Transportation System (NFTS) in one or more action alternatives; existing information from the STNF rare plant database files, California Natural Diversity Database records, and from Forest GIS vegetation coverage were used to analyze the potential effects to known occurrences or to potential suitable habitat. Geospatial data from the California Natural Diversity Database was clipped to the National Forest Lands layer. This data was then combined with the STNF data to analyze the most up to date data at the time of the analysis. These polygons were given project specific identifiers for the purpose of tracking and protecting them throughout this project.

Table 3.07-1. Wildlife habitat relationship types used to define forest habitat

WHR Code	Habitat Type	WHR Code	Habitat Type
Forest Habitat Types		**Riparian Habitat Types**	
ASP	Aspen	FEW	Fresh emergent wetland
CPC	Closed-cone pine-cypress	LAC	Lacustrine
DFR	Douglas-fir	MRI	Montane riparian
EPN	Eastside pine	VRI	Valley foothill riparian
JPN	Jeffrey pine	WTM	Wet meadow
JUN	Juniper	**Chaparral Habitat Types**	
KMC	Klamath mixed conifer	ADS	Alpine dwarf shrub
LPN	Lodgepole pine	BBR	Bitterbrush
MHC	Montane Hardwood	CRC	Chemise-redshank chaparral
PPN	Ponderosa pine	LSG	Low sage
RFR	Red fir	MCH	Mixed chaparral
SCN	Subalpine conifer	MCP	Montane chaparral
SMC	Sierran mixed conifer	SGB	Sagebrush
WFR	White fir	**Grassland/Woodland Habitat Types**	
Serpentine Habitat Type		AGS	Annual grass
	Serpentine bedrock layer[a]	BOP	Blue oak-foothill pine
Barren Habitat Type		BOW	Blue oak woodland
Barren	Barren	CPC	Closed-cone pine-cypress
		PGS	Perennial grass
		VOW	Valley oak woodland

a - Serpentine habitat was defined by using the Serpentine Bedrock layer that was used in screening all alternatives for resource impacts. This layer follows the Region 5 protocol for determining possible serpentine soils.

General habitat analysis was performed mostly by using the existing vegetation layer for the STNF and querying using the WHRTYPE field. Table 3.07-1 lists the Wildlife Habitat Relationship (WHR) types that were used to define the Forest Habitat.

Assumptions specific to botanical resources analysis

1) Vehicle use on and off established routes has affected or has the potential to affect rare plant populations, either directly by damage or death to individual plants from motor vehicles (stem breaking, crushing, etc.).
2) Direct effects occur within a zone 30 feet on either side of the route's edge because of the need for parking and pulling off to allow another vehicle to pass. This zone, in many cases, is shortened due to barriers to off route accessibility from steep topography, impenetrable vegetation, boulders or outcrops. Indirect effects occur from 30 to 100 feet either side of the route's edge.
3) Motor vehicle use is unlikely to impact certain rare plant habitats due to the steep or rocky nature of the surrounding terrain; motor vehicle use is more likely to impact other rare plant habitats, such as meadows and lava caps, which exist on gentle slopes or flat terrain with little or no vegetation or natural barriers to motor vehicles.
4) Without specific prevention and/or control measures, invasive nonnative plants (weeds) will continue to spread along and within surfaced (e.g., paved or aggregate) and unsurfaced (e.g., native surface) motorized vehicle roads, trails and areas. For more detail, see the nonnative invasive species (noxious weeds) section in the chapter.
5) Effects from all vehicles are assumed to be equal; therefore, changes in vehicle class will have negligible impacts on rare plants or their associated habitats.
6) Effects from changing vehicle class on routes currently on the National Forest Transportation System (NFTS) will have negligible impacts on rare plants and their associated habitats.
7) Motor vehicle use of unsurfaced roads, trails and areas will increase sediment production and erosion. As use increases, sediment production and erosion will increase.
8) All routes in special interest areas, including botanical areas, were excluded from consideration from action alternatives. Therefore, botanical areas will not be affected.

Data Sources

1) Route-specific botanical data (e.g., threatened, endangered, and sensitive (TES) species and habitats) including results of route-specific surveys of rare species.
2) Unauthorized route inventories collected in step 1 of travel management planning, and associated tabular data sets.
3) GIS layers of the following data: unauthorized routes, rare plant and survey-and-manage species, and the Forest GIS vegetation coverage. Data used for this analysis comes from the Shasta-Trinity National Forest NRIS database, which is a spatial database compiled from data collected through the

2008 field season. New data received from a contractor that has not been entered into the NRIS database was also used, and affected plant populations were given project specific temporary site identification pending their entry into the database. Additionally, plant records in the California Natural Diversity Database that were not in NRIS, but on Forest Service Lands, were clipped out and added to the rare plants shapefile used for spatial queries. These records were also given temporary, project specific identifiers to facilitate project analysis and any necessary mitigation measures.

4) California Natural Diversity Database records (CDFG 2008).

Botanical Resources Indicators

The following indicator measures related to motor vehicle routes located in or near rare plant occurrences were used to assess the impacts of the alternative.

- Number of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species sites within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).
- Acres of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).
- Miles of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.
- Number of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.

Suitable unoccupied habitat is used as a proxy for known sites in a general discussion of the project effects on species with no known sites. For this part of the analysis the indicator is solely the acres of suitable unoccupied habitat affected by each alternative. Species were aggregated into generalized habitat groupings or guilds to facilitate this discussion.

Botanical Resources Methodology by Action

1. Direct/indirect effects of the prohibition of cross-country motorized vehicle travel.

Short-term timeframe: Time of implementation to one year. Short-term effects include immediate effects from changes in travel management that will be evident within the first year of implementation.

Long-term timeframe: 1 to 20 years. Climate change, unforeseeable future projects, demographic changes, etc. make assumptions beyond this time frame speculative. These timeframes will apply for each action proposed in all alternatives.

Spatial boundary: Shasta-Trinity National Forest System lands within 100 feet of inventoried unauthorized routes in addition to the entire area of cross-country travel.

Indicator(s): See above.

Methodology: GIS analysis of added routes and TES plant sites.

2. Direct/Indirect Effects of adding inventoried unauthorized routes to the National Forest Transportation System (NFTS or system), including identifying seasons of use and vehicle class.

Short-term timeframe: Time of implementation to one year. Short-term effects include immediate effects from changes in travel management that will be evident within the first year of implementation.

Long-term timeframe: 1 to 20 years. Climate change, unforeseeable future projects, demographic changes, etc. make assumptions beyond this time frame speculative. These timeframes will apply for each action proposed in all alternatives.

Spatial boundary: Shasta-Trinity National Forest System lands within 100 feet of inventoried unauthorized routes.

Indicator(s): See above.

Methodology: GIS analysis of added routes and TES plant sites.

3. Changes to the existing NFTS, including allowing mixed-use or changing vehicle class.

Short-term timeframe: Time of implementation to one year. Short-term effects include immediate effects from changes in travel management that will be evident within the first year of implementation.

Long-term timeframe: 1 to 20 years. Climate change, unforeseeable future projects, demographic changes, etc. make assumptions beyond this time frame speculative. These timeframes will apply for each action proposed in all alternatives.

Spatial boundary: Shasta-Trinity National Forest System lands within 100 feet of inventoried unauthorized routes.

Indicator(s): See above.

Methodology: GIS analysis of added routes and TES plant sites.

4. Cumulative Effects

Short-term timeframe: Time of implementation to one year. Short-term effects include immediate effects from changes in travel management that will be evident within the first year of implementation.

Long-term timeframe: 1 to 20 years. Climate change, unforeseeable future projects, demographic changes, etc. make assumptions beyond this time frame speculative. These timeframes will apply for each action proposed in all alternatives.

Spatial boundary: Shasta-Trinity National Forest System lands within 100 feet of inventoried unauthorized routes.

Indicator(s): See above.

Methodology: GIS analysis of added routes and TES plant sites with consideration of past, present, and reasonably foreseeable future actions.

Affected Environment/Environmental Consequences

Affected Environment

The STNF is centrally located in northern portion of the state of California. Federally-owned lands within the proclaimed forest boundary amount to over 2.5 million acres. Elevations range from 1,000 to 14,162 feet. The forest contains portions of two California floristic province regions: Northwestern (includes portions of the North Coast, Klamath Ranges, and North Coast Ranges sub regions) and Cascade Ranges (includes portions of the Cascade Ranges Foothills, High Cascade Range sub regions). A small inclusion of the Great Basin province Modoc Plateau region is found on the east side of the forest (Hickman 1993). A result of this wide array of habitats is high plant diversity. A checklist developed in 1996 catalogued 1,558 vascular plant species (approximately 24 percent of the 6,394 species in California) that either had a vouchered collection in the Supervisor's Office herbarium, or were listed in reports from project-level surveys.

The STNF features many diverse areas such as the Porcupine Butte management area in the northeastern part of the forest. This area features the lava caps with ponderosa pine-bitterbrush associations at lower elevations and white fir forests at higher elevations. Several wilderness areas are found on the forest and are indicative of the diversity of the STNF. The Castle Crags Wilderness has sheer granite cliffs and spires along an east-west ridge. There are large brushfields with scattered mixed conifer in the drainages. Large areas of outcrops with no vegetation exist. Several sensitive plants are found here and two are named for the location. The Mount Shasta Wilderness is the most recognizable feature of the forest, ranging from 8000 to 14,162 feet in elevation. Most of the area is above treeline, but large stands of red fir and whitebark pine grow at lower elevations. Vegetation is typically low-growing forbs and dwarf shrubs. Two sensitive species are known from the area.

The Trinity Alps Wilderness is a large wilderness in the northwest of the STNF. This rugged mountainous area, which ranges from 2,000 to 9,000 feet in elevation, contains many unique geological features, lakes, and rivers. Conifers dominate above 4,000 feet while oaks and other hardwoods dominate lower slopes. Manzanita and other types of brush can be dominant in burned areas. Eleven different sensitive species occur in riparian areas, rock outcrops, and on ultramafic (serpentine) soils. The Yolla Bolly-Middle Eel Wilderness ranges from 2,600 to 7,863 feet in elevation. Low elevation vegetation consists of pine-oak, oak-woodland, chemise-chaparral, and at mid elevations, mixed conifer types. True fir stands with inclusions of glades typify the higher elevations. The Upper Trinity management area ranges from 2,400 to 9,000 feet in elevation. This area is characterized by steep mountainous terrain, the upper Trinity River, the East Fork of the Trinity River, and the presence of high amounts of ultramafic soils. Vegetation is generally mixed conifer and evergreen brush at lower elevations, with true fir and lodgepole pine at higher elevations. The large amount of ultramafic soils makes this management area very diverse botanically. There is a high proportion of wet to mesic ultramafic sites. Nine sensitive plant species occur in this management area along with botanically rich environments such as Darlingtonia seeps, which are exceptionally diverse botanically.

Rare Species

Rare plant species as referred to in this analysis include federally listed as well as sensitive and endemic species. The Shasta-Trinity National Forest provides habitat for 1,558 vascular plant taxa, of which 55 are considered rare plants (endangered, threatened, sensitive, forest plan endemics, or survey-and-manage species) on the Shasta-Trinity National Forest. Rare species also include five fungi, seven bryophytes, and three lichens.

Two federally listed plant species are listed for counties found within the analysis area: *Arabis macdonaldiana* (McDonald's rock-cress, an endangered species) and *Orcuttia tenuis* (slender Orcutt grass, a threatened species). These species are not known to occur within the boundary of the Shasta-Trinity National Forest. There are no federally listed threatened, endangered, proposed or candidate species in the analysis area, in this case all Forest Service lands on the STNF (see Table 3.07-2). Therefore, there will be no further discussion of federally listed or proposed plant species in this document.

Sensitive plant species are those species identified by the USDA Forest Service Region 5 regional forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution, or such low numbers or limited distribution that special management consideration is required to maintain their presence and viability, regardless of current trend (FSM 2670.5, FSH 2609.25, 1.31). A viable population is defined as one that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range within the planning area (FSM 2670.5).

Forest Plan endemic species are rare species confined wholly or mostly to the Shasta-Trinity National Forest. These are afforded the same protection as sensitive species by mandate of the Shasta-Trinity Land and Resource Management Plan (LRMP) (USDA, 1995). Four non-sensitive plants are endemic to the Shasta-Trinity National Forest. These are: *Eriogonum libertini* (Dubakella buckwheat), *Ericameria ophitidis* (serpentine goldenbush), *Ageratina shastensis* (Shasta ageratina), and *Arnica venosa* (Shasta County arnica). Note that two species have undergone taxonomic revision since the LMRP was written. *Ageratina shastensis* (Shasta ageratina) was formerly named *Eupatorium shastense* (Shasta eupatory), and *Ericameria ophitidis* (serpentine goldenbush) was formerly named *Haplopappus ophitidis* (serpentine haplopappus) in the LRMP.

Survey and manage vascular plants, bryophytes, lichens, and fungi are the last group of species to be analyzed. Forest-wide standards and guidelines for "Survey and Manage" old-growth associated species were revised in January 2001 and described in the Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures, Standards and Guidelines (2001). Survey and manage categories were redefined based on species characteristics and relative rarity. Species were grouped as either rare or uncommon and by their need for pre-disturbance surveys prior to ground-disturbing activities. Ten species requiring pre-disturbance surveys are considered to have suitable habitat within northern California: *Ptilidium californicum* (Pacific fuzzwort), *Tetraphis geniculata* (no common name), *Schistostega pennata* (goblin's gold), *Buxbaumia viridis* (bug-on-a-stick), *Cypripedium montanum* (mountain lady's-slipper), *Cypripedium fasciculatum* (fascicled lady's- slipper), *Botrychium minganense* (Mingan moonwort), *Botrychium montanum* (mountain moonwort), *Eucephalis vialis* (wayside aster), *Leptogium cyanescens* (no common name). All the survey and manage species listed above are also Region 5 (R5) sensitive species with the exception of *Tetraphis geniculata, Schistostega pennata*, *Eucephalis vialis*, and *Leptogium cyanescens*. *Botrychium montanum* (mountain moonwort), while an R5 sensitive species, is not on the STNF sensitive species list. Effects to species were analyzed in the biological evaluation conducted for this project. Field surveys for survey and manage plant species, excluding fungi, were conducted concurrent with sensitive plant surveys.

Currently, there is one federally listed endangered, one federally listed threatened, 59 Region 5 sensitive, four Forest Plan endemics, and five species which are exclusive to the survey and manage list designated as having potential habitat on the forest. Some of these species are only suspected to occur at this point, as potential habitat may exist, but no occurrences have been documented. For most species, an occurrence refers to a relatively discreet group of individuals, separated from the next nearest group of the same species by at least ¼ mile. Of the 70 species designated as rare on the forest, 49 sensitive and four Forest Plan endemic species (53 total) are known to occur within the analysis area for this project (the entire forest boundary). There are 478 mapped occurrences of threatened, endangered, and sensitive species, and 233 mapped occurrences of Forest Plan endemic species within the STNF boundary (Table 3.07-2). Table 3.07-2 lists all rare species that are considered to have potential habitat on the STNF. Also included are the listings, number of STNF occurrences, and reason for dropping the species from analysis, if appropriate. Reasons for dropping the species from analysis consist of:

A- Species that have no known occurrences on the STNF were dropped from the analysis because it is unknown if these species exist on the forest.

B- Species occur on rotting logs, boles of trees, or in the forest canopy. Continued use of existing unauthorized routes will not affect these species.

C- *Boletus pulcherrimus, Dendrocollybia racemosa, Sowerbyella rhenana,* and *Phaeocollybia olivacea* are fungi. *Sowerbyella rhenana* is a saprobic fungi meaning that they are decomposers, thriving on the litter and duff of the forest floor. Litter saprobes can extend over a large area via mycelial networks. Saprobes habitat consist of relatively shady and moist to mesic mature stands with various sized litter (including some coarse woody debris). *Boletus pulcherrimus* and *Phaeocollybia olivacea* are mycorrhizal fungi. Mycorrhizal fungi form interdependent relationships with their host tree, exchanging nutrients, mineral and water. *Dendrocollybia racemosa* is parasitic on decaying fungi. Common to all of these fungal groups are habitat conditions characterized by shady, mature stands with conifer or hardwood hosts and ample organic substrate (e.g. leaf, needle, woody debris). Networks of fungal hyphae or mycelia (the body of the fungus) group together into strands. These networks scavenge nutrients from the surrounding soils, acting as an extension to the root system. These hyphae can grow to infect nearby plant roots and can eventually connect neighboring plants. This network facilitates carbon transfer from the host to the fungus. Networks also facilitate water transfer. Persistence at an occurrence is dependent upon suitable microclimate conditions and available substrate.

Management that retains living trees (the host) and the important underground linkages for mycorrhizal fungi via the myceliel network will maintain habitat parameters for mycorrhizal species. Likewise, management that retains overstory canopy and the litter and coarse woody debris of the forest floor will maintain habitat parameters for saprobes.

Effects within 30 feet of highly disturbed route surfaces are primarily the result of vehicles parking or pulling over to let others by. These actions will not result in changes to suitable microclimatic conditions or remove substrate. Because continued cross-country travel on inventoried routes at current rates of use, proposed changes to existing NFTS routes, and the prohibition of cross-country travel would not remove overstory canopy or alter microclimatic conditions, these species were removed from further analysis.

Continued cross-country travel on inventoried unauthorized routes at current rates of use, proposed changes to the existing NFTS, prohibition of cross- country travel, and indirect effects 30 to 100 feet from either inventoried unauthorized or NFTS routes will not have a significant negative impact on the survey-and-manage species' habitat, life cycle, microclimate, or life support requirements (USDA, USDI 2001). Hence, pre-disturbance surveys for survey and manage species are not required, and only known survey and manage sites within 30 feet of inventoried routes will be included in this analysis.

D- *Hydrothyria venosa* is an aquatic lichen. Where populations occur, individuals are generally few in number. It is found in cold unpolluted streams in mixed conifer forests. Threats are activities that increase stream flows or sedimentation, that scour the gravels and rocks on which the lichen is attached, or that change either the water chemistry or the stream channel, or causes excessive alteration of riparian vegetation thereby increasing water temperature. Stream crossings on inventoried unauthorized routes have been altered from past motor vehicle use and it is unlikely that they provide suitable habitat, hence this species was removed from further analysis.

E- These species occur on cliffs, rock outcrops, and vertical roadcuts. Continued use of inventoried unauthorized routes will not affect these species.

Table 3.07-2. Species considered in analysis, status, known occurrences, and habitats

Species [Taxon][a] Plant Code	Status[b]	Number of mapped occurrences on the STNF	Reason dropped from analysis[c]
***Arabis macdonaldiana*, (McDonald's rock-cress) [V] ARMA33**	E	0	A
***Orcuttia tenuis* (Slender Orcutt grass) [V] ORTE**	T	0	A
***Anisocarpus scabridus* (scabrid alpine tarplant) [V] ANSC14**	S	1	
***Boletus pulcherrimus* (red-pored bolete) [F] BOPU4**	S	2	C
***Botrychium crenulatum* (Scalloped moonwort) [V] BOCR**	S	1	
***Botrychium minganense* (Mingan moonwort) [V] BOMI**	S, S&M	2	
***Botrychium pinnatum* (Northwestern moonwort) [V] BOPI**	S	1	
***Botrychium virginainum* (rattlesnake fern) [V] BOVI**	S	0	A
***Buxbaumia viridis* (Bug-on-a-stick) [NV] BUVI**	S, S&M	2	B
***Calochortus greenei* (Greene's mariposa lily) [V] CAGR**	S	1	
***Calochortus longebarbatus* var*. longebarbatus* (Long-haired star tulip) [V] CALOL**	S	11	
***Calystegia atriplicifolia* ssp*. buttensis* (Butte County morning glory) [V] CAATB**	S	3	
***Campanula shetleri* (Castle Crags harebell) [V] CASH3**	S	7	E
***Campanula wilkinsiana* (Wilkins' harebell) [V] CAWI8**	S	25	
***Chaenactis suffrutescens* (Shasta chaenactis) [V] CHSU**	S	21	
***Clarkia borealis* spp*. borealis* (northern clarkia) [V] CLBOB**	S	27	
***Collomia larsenii* (talus collomia) [V] COLA8**	S	2	
***Cordylanthus tenuis* ssp*. pallescens* (pallid bird's beak) [V] COTEP2**	S	18	
***Cudonia monticola* (no common name) [F] CUMO2**	S	0	A
***Cypripedium fasciculatum* (clustered lady's-slipper) [V] CYFA**	S, S&M	11	
***Cypripedium montanum* (Mountain lady's-slipper) [V] CYMO2**	S, S&M	19	
***Dendrocollybia racemosa* (branched collybia) [F] DERA5**	S	0	A,C
***Draba carnosula* (Mt. Eddy draba) [V] DRCA6**	S	8	
***Epilobium oreganum* (Oregon willowherb) [V] EPOR**	S	8	
***Eriastrum tracyi* (Brandagee's woolly-star) [V] ERBR3**	S	1	
***Eriogonum alpinum* (Trinity buckwheat) [V] ERAL**	S	16	
***Eriogonum ursinum* var*. erubescens* (blushing wild buckwheat) [V] EUURE**	S	2	
***Erythronium citrinum* var*. roderickii* (Roderick's fawnlily) [V] ERCIR**	S	31	

Species [Taxon][a] Plant Code	Status[b]	Number of mapped occurrences on the STNF	Reason dropped from analysis[c]
Frasera umpquaensis **(Umpqua green-gentian) [V] FRFA**	S	6	
Fritillaria eastwoodiae **(Butte County frittilaria) [V] FREA**	S	3	
Harmonia doris- nilesiae **(Niles' madia) [V] HADO2**	S	21	
Harmonia stebbins **(Stebbins' madia) [V] HAST10**	S	6	
Hydrothyria venosa **(veined water lichen) [L] HYVE7**	S	1	D
Iliamna latibracteata **(California wild hollyhock) [V] ILLA2**	S	3	
Ivesia pickeringii **(Pickering's ivesia) [V] IVPI**	S	2	E
Ivesia longibracteata **(Castle Crags ivesia) [V] IVLO**	S	1	
Leptosiphon nuttallii **ssp*. howellii*** **(Mt. Tedoc linanthus) [V] LENUH**	S	4	E
Lewisia cantelovii **(Cantelow's lewisia) [V] LECA11**	S	4	E
Meesia triquetra **(Three-ranked hump-moss) [NV] METR70**	S	0	A
Meesia uliginosa **(Broad-nerved hump-moss) [NV] MEUL70**	S	0	A
Mielichoferia elongata **(elongate copper moss) [NV] MIMIE**	S	2	E
Minuartia rosei **(Peanut sandwort) [V] MIRO3**	S	20	
Minuartia stolonifera **(Scott Mountain sandwort) [V] MIST9**	S	0	A
Montia howellii **(Howell's montia) [V] MOHO**	S	2	
Neviusia cliftonii **(California snow-wreath) [V] NECL**	S	13	
Ophioglossum pusillum **(Northern adder's-tongue fern) [V] OPPU3**	S	0	A
Parnassia cirrata **var*. intermedia*** **(fringed grass-of- Parnassus) [V] PAFII**	S	3	
Penstemon filiformis **(thread leaved beardtongue) [V] PEFI2**	S	51	
Phacelia cookei **(Cooke's phacelia) [V] PHCO20**	S	5	
Phacelia greenei **(Scott Valley phacelia) [V] PHGR2**	S	1	
Phaeocollybia olivacea **(no common name) [F] PHOL**	S	3	D
Polemonium chartaceum **(Mason's sky pilot) [V] POCH3**	S	2	
Ptilidium californicum **(Pacific fuzzwort) [NV] PTCA5**	S, S&M	16	B
Raillardella pringlei **(showy raillardella) [V] RAPR**	S	29	
Rorippa columbiae **(Columbia yellow cress) [V] ROCO3**	S	2	
Sedum paradisum **(Canyon Creek stonecrop) [V] SEPA15**	S	16	E
Silene occidentalis **ssp*. longistipitata*** **(long-stiped campion) [V] SIOCL**	S	0	A
Smilax jamesii **(English Peak greenbriar) [V] SMJA**	S	40	
Sowerbyella rhenana **(stalked orange peel fungus) [F] SORH**	S	2	C
Sulcaria badia **(Bay horsehair lichen) [L] SUBA**	S	0	A,B
Ageratina shastensis **(Shasta ageratina) [V] AGSH2**	FPE	23	E
Arnica venosa **(Shasta County arnica) [V] ARVE**	FPE	75	
Ericameria ophitidis **(serpentine goldenbush) [V] EROP2**	FPE	77	
Eriogonum libertini **(Dubakella buckwheat) [V] ERLI4**	FPE	58	
Botrychium montanum **(mountain moonwort) [V] BOMO**	S&M	0	A
Eucephalus vialis **(wayside aster) [V] EUVI8**	S&M	0	A
Leptogium cyanescens **(skin lichen) [L] LECY60**	S&M	0	A
Schistostega pennata **(goblin's gold) [NV] SCPE9**	S&M	0	A
Tetraphis geniculata **(no common name) [NV] No plant code**	S&M	0	A

a - Taxon: [V]-Vascular Plant, [NV]– Non-vascular plant, [F]- Fungi, [L]- Lichen
b - Status: E – Federally listed Endangered, T – Federally listed Threatened, S – Forest Service Sensitive, FPE-Forest Plan Endemic, S&M – Survey and Manage

Aggregating Rare Species for Analysis of Effects

While the 40 rare species remaining in this analysis vary widely in their ecological requirements and life history characteristics, many occur in similar broad habitat types where the effects of motorized vehicle use are comparable. For purpose of this analysis, STNF rare species were assigned to plant-habitat groupings or "guilds" (USDA Forest Service 2003). Rare species often occur in more than one habitat guild; for example a species may occur in a spatially-defined group, such as a riparian forest, while also relying on the availability of a temporally brief habitat, such as tree-fall gaps, for seedling establishment (USDA Forest Service 2003). The following guilds have been selected to represent the rare species being addressed in this analysis:

- Forest (F): includes species inhabiting shaded, protected microclimates and undisturbed substrates.
- Riparian areas (R): includes species found along streams, springs, and wet meadows.
- Serpentine (S): includes those species restricted to serpentine rocks and soils that contain high levels of heavy metals and low availability of plant nutrients.
- Barren (B): includes those species found in very open, sparsely vegetated, and in some cases barren communities, e.g. rock fields, ridge tops, and talus slopes.
- Chaparral (C): includes species inhabiting areas dominated by shrubs.
- Grassland/Woodland (G): includes species found in areas dominated by grasses or grass-oak woodland areas.

Habitat Guild Descriptions

The following describes the six habitat guilds (see Table 3.07-3).

Forest Habitat Guild (F)

Plant and fungi species that are dependent on interior or late-seral forest communities rely on shade, protected microclimates, and infrequently disturbed substrates. Because of mycorrhizal associations, species that are dependent on interior forest are generally intolerant of edge effects that change the temperature, moisture, and other microclimate conditions. Threats to the species in this guild include activities that disrupt litter and duff; alter soil characteristics; reduce shade and moisture; and create openings and bare soil that increase the risk of weed introduction and spread.

Riparian Habitat Guild (R)

These are areas immediately bordering the edges of streams, rivers, lakes, or other water sources. Riparian vegetation is often characterized by species that are intolerant of high moisture stress and tolerant of seasonal flooding, such as willow and aspen. It can be found under dense canopies of mixed

conifer forest, in aspen groves, and along the borders of streams in montane meadows. Most riparian forest stands are even-aged, reflecting their flood-mediated, episodic reproduction.

Riparian areas are often hotspots for plant and wildlife diversity. Riparian vegetation plays a vital role in the ecological functioning of the riparian system, which includes: stabilization of the stream bank; moderation of stream light intensity and water temperatures; delivery of large woody debris to stream habitats; filtration of sediment; and maintenance of water quality. For this analysis, wet meadows are also being included in the riparian areas habitat.

Serpentine Habitat Guild (S)

This guild includes plants that grow on serpentine (ultramafic) rocks and soils. Serpentine soils are characterized by low levels of key plant nutrients such as calcium, nitrogen, and phosphorous and exceptionally high levels of iron, magnesium, and toxic trace elements. Serpentine soils are generally shallow and rocky, with low water-holding capacity and rooting depths. The vegetation in these plant communities tends to be sparse, slow-growing, and stunted.

The harsh conditions in serpentine communities give rise to a unique and diverse assemblage of plant species, a high number of which are serpentine-endemics or rare. California's serpentine flora is considered the richest in the temperate zone; it consists of hundreds of species that are largely or entirely confined to serpentine substrates (Safford, Viers, and Harrison 2005). Motor vehicles negatively affect this plant community and the rare species it supports by reducing vegetative cover, creating disturbed soils that are vulnerable to increased erosion, and by introducing weeds.

Barren Habitat Guild (B)

This guild is characterized by open, sparsely vegetated habitats that include rock outcrops, ridge tops, cliffs, and talus slopes. The plant species that grow in these harsh environments are adapted to little soil, limited nutrients, and low water availability. Species in this guild are also generally poor competitors. In many of these areas, particularly where the terrain is steep, the habitat is highly susceptible to erosion.

Chaparral Habitat Guild (C)

A typical chaparral plant community consists of densely-growing evergreen oaks and other drought-resistant shrubs. It often grows so densely that it is all but impenetrable to large animals and humans. This, and its generally arid condition, makes it notoriously prone to wildfires. Although many chaparral plant species require some fire cue (heat, smoke, or charred wood) for germination, chaparral plants are not "adapted" to fire per se. Rather, these species are adapted to particular fire regimes involving season, frequency, intensity and severity of the burn. Nonnatives (grasses in particular) can be a threat to this community with disturbance.

Grassland/Woodland Habitat Guild (G)

This guild is characterized by open, grassy areas ranging from open grasslands to the oak woodland savannah. The plant species that grow in these environments are adapted open canopy, and are generally poor competitors.

Table 3.07-3. Species analyzed and habitats

Species	Habitat(s)
Anisocarpus scabridus **(scabrid alpine tarplant)**	B
Botrychium crenulatum **(Scalloped moonwort)**	F, R
Botrychium minganense **(Mingan moonwort)**	F
Botrychium pinnatum **(Northwestern moonwort)**	F, R
Calochortus greenei **(Greene's mariposa lily)**	F, C, G
Calochortus longebarbatus var. longebarbatus **(Long-haired star tulip)**	F, R,
Calystegia atriplicifolia **ssp.** ***buttensis*** **(Butte County morning glory**	F
Campanula wilkinsiana **(Wilkins' harebell)**	R
Chaenactis suffrutescens **(Shasta chaenactis)**	B, S, R
Clarkia borealis **spp.** ***borealis*** **(northern clarkia)**	G, F
Collomia larsenii **(talus collomia)**	B,
Cordylanthus tenuis **ssp.** ***pallescens*** **(pallid bird's beak)**	B, F
Cypripedium fasciculatum **(clustered lady's-slipper)**	F
Cypripedium montanum **(Mountain lady's-slipper)**	F,R
Draba carnosula **(Mt. Eddy draba)**	B, S
Epilobium oreganum **(Oregon willowherb)**	R, S
Eriastrum tracyi **(Brandegee's woolly-star)**	F, C
Eriogonum alpinum **(Trinity buckwheat)**	B, S
Eriogonum ursinum **var.** ***erubescens*** **(blushing wild buckwheat)**	F, B
Erythronium citrinum **var.** ***roderickii*** **(Roderick's fawnlily)**	F, S
Frasera umpquaensis **(Umpqua green-gentian)**	F, R, C
Fritillaria eastwoodiae **(Butte County Fritilaria)**	F, C
Harmonia doris- nilesiae **(Niles' madia)**	S, C, F
Harmonia stebbinsii **(Stebbins' madia)**	S, C, F
Iliamna latibracteata **(California wild hollyhock)**	F
Ivesia longibracteata **(Castle Crags ivesia)**	B
Minuartia rosei **(Peanut sandwort)**	B, C, S
Montia howellii **(Howell's montia)**	F, R
Neviusia cliftonii **(California snow-wreath)**	F, R
Parnassia cirrata var. intermedia **(fringed grass-of- Parnassus)**	F, R

Species	Habitat(s)
Penstemon filiformis **(thread leaved beardtongue)**	B, S, G, C
Phacelia cookei **(Cooke's phacelia)**	B, C
Phacelia greenei **(Scott Valley phacelia)**	B, S
Polemonium chartaceum **(Mason's sky pilot)**	B
Raillardella pringlei **(showy raillardella)**	R
Rorippa columbiae **(Columbia yellow cress)**	R
Smilax jamesii **(English Peak greenbriar)**	R, F
Arnica venosa **(Shasta County arnica)**	F, C
Ericameria ophitidis **(serpentine goldenbush)**	B, S, C, F
Eriogonum libertini **(Dubakella buckwheat)**	B, S, C

Environmental Consequences

This section describes the general direct, indirect, and cumulative effects related to the measurable items listed under Botanical Resources Methodology by Action. Effects analysis by alternative follows this general section.

General Types of Impacts

Direct Effects

Direct effects occur when plants are physically impacted. Vehicles traveling on or parking off of the route surface can result in death, altered growth, or reduced seed set through physically breaking, crushing, or uprooting plants (Wilshire, Shipley, and Nakata 1978, Cole and Bayfield 1993). Off-highway motor vehicle travel can reduce perennial and annual plant cover, plant density, and above-ground biomass (Bolling and Walker 2000).

Direct effects are dependent upon the intensity and timing of disturbance. For example, direct impacts to an annual plant that has already gone to seed would not be as adverse as direct impacts to an annual plant that has not set seed (Ouren et al. 2007). Effects are also dependent upon the number of plants at a specific location and the proportion of the occurrence impacted. Repeated damage to sensitive species and other native plants can lead to the degradation of habitat and eventually to the replacement of native plant species, including sensitive plants, with species more adapted to frequent disturbance, such as invasive weeds.

Indirect Effects

Indirect effects on rare species are effects that are separated from an action in either time or space. Indirect effects from off-highway motor vehicle travel may include changes in vegetation composition by creating edge habitats (Lovich and Bainbridge 1999). Adverse indirect effects are more likely to occur to those species that are intolerant of disturbance, such as those in the interior forest habitat group. In contrast, for those species that tolerate or are dependent upon some level of disturbance, such as those

species in the chaparral or barren group that inhabit gaps and forest openings, route designation may have less detrimental indirect effects.

Off-highway vehicles have been shown to accelerate plant invasions (Von der Lippe and Kowarik 2007) by reducing native plant vigor and cover (Brooks 1995), creating a competition-free habitat open to invasion, and acting as a vector for seed dispersal. Once established, noxious weeds have the potential to impact rare species indirectly through allelopathy (the production and release of plant compounds that inhibit the growth of other plants) (Bais et al. 2003), as well as through direct competition for nutrients, light, and water (Mack et al. 2000).

Indirect effects to rare plants and native vegetation from off-highway motor vehicle travel are often tied to soil impacts. Soil compaction, erosion, and modification of soil properties can affect the distribution, abundance, growth rate, reproduction, and size of plants (Ouren et al. 2007). For example, studies conducted in the Mohave Desert found significantly less plant cover (Davidson and Fox 1974) and density (Vollmer et al. 1976) in areas frequented by off-highway vehicles.

Soil compaction caused by repeated off-highway motor vehicle travel can result in reduced seed germination (Williams 1967 in Davidson and Fox 1974), seedling survival, soil water infiltration (Wilshire, Shipley, and Nakata 1978), and plant and root growth (Phillips and Kirkham in Davidson and Fox 1974). The effects of soil erosion on plants can include undercutting of root systems as trails are enlarged by erosion; creation of new erosion channels in areas not used by vehicles; wind erosion of adjacent destabilized areas; burial of plants by debris eroded from areas of use; and reduction of the biological capability of the soil by physical modification and stripping of fertile layers (Wilshire, Shipley, and Nakata 1978).

Dust from motor vehicle use has also been shown to decrease native plant cover and vigor by reducing rates of photosynthesis, respiration, transpiration (Spellerberg and Morrison 1998), and water-use efficiency. On heavily traveled roads, dust impacts have been documented up to 10 meters (32 feet) from the roadside and dust layers of up to 10 cm thick found on mosses and other vegetation of low stature (Walker and Everett 1987).

Cumulative Effects

One crucial step in assessing cumulative impacts on a particular resource is to compare the current condition of the resource (rare plants) and the projected changes as a result of management activities (such as off-highway motor vehicle travel along a trail) to the natural variability in the resources and processes of concern (MacDonald 2000). This assessment is particularly difficult for rare plant species because long-term data are often lacking. In addition, the habitats in which many rare plant species are presently found have a long history of disturbance, making an undisturbed reference difficult to find. For some rare plants, particularly those that do not tolerate disturbance or are found under dense canopy conditions, minimizing on-site change is an effective way of reducing the potential for larger-scale

cumulative impact (MacDonald 2000). If the greatest impact on a rare species is both local and immediate, then this is the scale at which the effect is easiest to detect (MacDonald 2000).

The additive effects of past actions (such as off-highway vehicle use, wildfires, wildfire suppression, timber harvest, mining, nonnative plant introductions, and ranching) have shaped the present landscape and corresponding populations of rare plants. However, data describing the past distribution and abundance of rare plant species is extremely limited, making it impossible to quantify the effects of historic activities on the resources and conditions that are present today. Rare plant surveys did not begin until the early 1980s on the STNF. In many cases, even when project-level surveys were conducted, there is very little documentation that describes whether past projects avoided or protected rare plant species during project implementation. In addition to these unknowns, changes have been made to the STNF sensitive species list. Therefore, in order to incorporate the contribution of past activities into the cumulative effects of the proposed route designation project, this analysis uses the current abundance and distribution of rare plant species as a proxy for the impacts of past actions.

Undeniably, past, present, and future activities have and will continue to alter rare plant populations and their habitats to various degrees. These activities include off-highway motor vehicle travel, grazing, timber harvest, fire suppression, prescribed fire, mining, recreational use, road construction, and noxious weed infestation. However, the approach taken in this analysis is that, if direct and indirect effects on rare plant species from motor vehicle route designation are minimal or would not occur, then there would be little or no cumulative effects on the species.

Present and future activities that are associated with the proposed additions to the NFTS could impact rare species growing along or in the vicinity of a designated route. These activities may include routine maintenance, such as brushing, signing, cleaning, or clearing of debris, or increased levels of dispersed camping or recreation along and near routes. Monitoring road and trail conditions, which is required (see chapter 2), will detect if resource damage is occurring to sensitive species, and will instigate the development of species-specific mitigations or closure. The effects of other types of future projects would likely be minimal or similar to those described in the general analysis if existing management guidelines (such as field surveys, protection of known rare species locations, and noxious weed mitigations) remain in place.

Flagging and avoiding rare plants is one of the most frequently used management strategies for reducing the cumulative impacts to known occurrences. While flag-and-avoid management can be effective in reducing cumulative impacts in most projects, it is not a practical mitigation for route designation; therefore alternatives that minimize adverse effects are preferable to alternatives that do not.

Environmental Consequences: Effects of Alternatives on Rare Plant Species by Habitat

The following sections provide a discussion of the direct, indirect, and cumulative effects of each alternative on rare species by habitat guild. Refer to the Botanical Biological Evaluation for the complete

botanical analysis. This incorporates by reference the Botanical Biological Evaluation which is located in the project record. It is important to note that the analysis below represents what is known about motor vehicle impacts along unauthorized routes at this point in time. Designation of a route is expected to concentrate motor vehicle use; this has the potential to increase negative impacts to those rare species and habitats found along established routes. Routes and rare plant occurrences will need to be re-evaluated on a continual basis to assess and address detrimental resource affects.

Only those rare species with the potential to be affected directly or indirectly by the proposed project (that is, those within 100 feet of a proposed road or trail) are discussed in detail in this document. The remainder of the effects discussion, or more specifically the analysis presented for alternative 1, is focused on the more general effects to rare species and habitat guilds from motor vehicle use. The following table summarizes the number of acres of rare plant habitat types by alternative.

Table 3.07-4. Approximate number of acres of rare plant habitat types affected by alternative

Habitat Type	Measure (acres) by Alternative				
	1 (No Action)[a]	2	3	4	5
Forest	2,333,990 (26044)	850	0	300	1910
Riparian	48,229 (177)	14.5	0	0	14.5
Serpentine	153,382 (1928)	0.20	0	0	0.30
Barren	17,033 (534)	10	0	0	26
Chaparral	128,921 (3395)	150	0	71.5	550
Grassland/Woodland	28,712 (1034)	54	0	28.4	108

a - Acres listed are the total of both the unauthorized routes and cross country travel. Number in parentheses represents the value for unauthorized routes only.

Alternative 1 – No action

1. Direct/indirect effects of the prohibition of cross-country motor vehicle travel

This alternative does not prohibit cross country travel or propose to add new routes to the NFTS. No Forest Plan amendment to prohibit cross-country travel is proposed.

Alternative 1 has the greatest negative effect on rare species and habitats (see Table 3.07-5). The largest impact of this alternative is from cross-country travel, which has the potential to affect all but the most inaccessible rare species and habitats (see Table 3.07-6).

Under this alternative, it is impossible to quantify when and where rare plant species and habitats will be impacted by motor vehicles; therefore the analysis below uses the approximately 5,219 miles of unauthorized routes as a representation of current motorized vehicle use on the forest. Effects will only be addressed at the specific level for known sites. Species represented by habitat will undergo effects similar to those described in the General Types of Impacts section above.

Table 3.07-5. Summary of rare species indicator measures for alternative 1 (no action)

Indicator Measure	Value
Number of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species sites within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).	89 sites
Acres of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).	427 acres
Miles of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.	30 miles
Number of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.	203 routes

Unmanaged cross-country motor vehicle use below the high-water marks of Shasta Lake, Trinity Lake, and Iron Canyon Reservoir is examined in this alternative.

Table 3.07-6. Alternative 1, known occurrences within forest boundary, 30 feet of unauthorized routes, 100 feet unauthorized routes, and within open areas below high water marks

Species	Habitat[a]	Number of mapped TES occurrences on STNF	TES occurrences within Alt 1 100-foot buffer	TES occurrences within Alt 1 30-foot buffer	TES occurrences below high water
Anisocarpus scabridus **(scabrid alpine tarplant)**	B	1	0	0	1
Botrychium crenulatum **(Scalloped moonwort)**	F, R	1	0	0	0
Botrychium minganense **(Mingan moonwort)**	F	2	0	0	0
Botrychium pinnatum **(Northwestern moonwort)**	F, R	1	0	0	1
Calochortus greenei **(Greene's mariposa lily)**	F, C, G	1	0	0	1
Calochortus longebarbatus **var. *longebarbatus* (Long-haired star tulip)**	F, R	11	5	5	3
Calystegia atriplicifolia **ssp. *buttensis* (Butte County morning glory**	F	3	0	0	3
Campanula wilkinsiana **(Wilkins' harebell)**	R	25	5	4	4
Chaenactis suffrutescens **(Shasta chaenactis)**	B, S, R	21	3	2	10 (2)
Clarkia borealis **spp. *borealis* (northern clarkia)**	G, F	27	3	2	24 (2)
Collomia larsenii **(talus collomia)**	B	2	0	0	2
Cordylanthus tenuis **ssp. *pallescens* (pallid bird's beak)**	B, F	18	5	5	13
Cypripedium fasciculatum **(clustered lady's-slipper)**	F	11	1	1	10
Cypripedium montanum **(Mountain lady's-slipper)**	F, R	19	1	0	16
Draba carnosula **(Mt. Eddy draba)**	B, S	8	2	1	4
Epilobium oreganum **(Oregon willowherb)**	R, S	8	3	3	3
Eriastrum tracyi **(Brandagee's wooly-star)**	F, C	1	1	1	0
Eriogonum alpinum **(Trinity buckwheat)**	B, S	16	0	0	14
Eriogonum ursinum **var. *erubescens* (blushing wild buckwheat)**	F, B	2	1	1	0
Erythronium citrinum **var. *roderickii* (Roderick's fawnlily)**	F, S	31	2	2	21
Frasera umpquaensis **(Umpqua green-gentian)**	F, R, C	6	3	3	3
Fritillaria eastwoodiae **(Butte County Fritillaria)**	F, C	3	0	0	3
Harmonia doris- nilesiae **(Niles' madia)**	F, C, S	21	6	4	15
Harmonia stebbins **(Stebbins' madia)**	F, C, S	6	0	0	6

Species	Habitat[a]	Number of mapped TES occurrences on STNF	TES occurrences within Alt 1 100-foot buffer	TES occurrences within Alt 1 30-foot buffer	TES occurrences below high water
***Iliamna latibracteata* (California wild hollyhock)**	F	3	1	1	2
***Ivesia longibracteata* (Castle Crags ivesia)**	B	1	0	0	0
***Minuartia rosei* (Peanut sandwort)**	B, C, S	20	8	7	13
***Montia howellii* (Howell's montia)**	F, R	2	0	0	2
***Neviusia cliftonii* (California snow-wreath)**	F, R	13	0	0	11 (5)
***Parnassia cirrata* var. *intermedia* (fringed grass-of- Parnassus)**	F, R	3	0	0	3
***Penstemon filiformis* (thread leaved beardtongue)**	B, S, G, C	51	6	5	36 (1)
***Phacelia cookei* (Cooke's phacelia)**	B, C	5	5	5	0
***Phacelia greenei* (Scott Valley phacelia)**	B, S	1	0	0	0
***Polemonium chartaceum* (Mason's sky pilot)**	B	2	0	0	1
***Raillardella pringlei* (showy raillardella)**	R	29	0	0	8
***Rorippa columbiae* (Columbia yellow cress)**	R	2	2	2	2
***Smilax jamesii* (English Peak greenbriar)**	F, R	40	0	0	27
***Arnica venosa* (Shasta County arnica)**	F, C	75	3	3	42
***Ericameria ophitidis* (serpentine goldenbush)**	B, S	77	3	2	49
***Eriogonum libertini* (Dubakella buckwheat)**	B, S, C	58	20	15	38

a - Habitats: B – Barren; F – Forest; R – Riparian Areas; S – Serpentine; C – Chaparral, G – Grassland/Woodland
b - Numbers in parentheses represent number of rare plant occurrences found within Shasta Lake, Trinity Lake, or Iron Canyon Reservoir.

Forest Habitat Guild

Implementation of alternative 1 has the highest risk of direct and indirect effects to rare species dependent upon interior forest ecosystems. Alternative 1 affects an estimated 2,333,990 acres of forest habitat with unauthorized routes and cross-country travel (Table 3.07-4).There are also 13 rare forest species, with a total of 40 locations, within 100 feet of unauthorized routes (Table 3.07-6). Additionally, 206 rare plant sites are affected solely by motor vehicle cross-country travel.

Rare species that are dependent upon forest communities often require shade, protected microclimates, and infrequently disturbed substrates. Many of these species, particularly the *Cypripedium* species, have complex mycorrhizal associations that require sufficient organic matter in the duff layer. Motor vehicle use within interior forest habitats can alter the temperature, moisture, and other microclimate conditions; disrupt underground mycorrhizal networks; disturb litter and duff layers; change

soil characteristics; and create open areas of bare soil that increase the risk of weed introduction and spread. Increased route and road density in interior forest habitat also has the potential to fragment rare plant populations that are dependent upon closed canopy systems.

The species in the forest habitat group may not be as impacted by cross-country travel as those in the previously discussed species groups (i.e. riparian or serpentine species) due to the higher density and size of trees or other natural barriers to motor vehicle travel that exist in this habitat type; however, the forest species are also highly intolerant of disturbances, such as those from motor vehicles. This latter factor greatly increases the risk to these species from alternative 1.

Riparian Habitat Guild

Alternative 1 affects the most riparian habitat, approximately 48,229 acres (Table 3.07-4). There are also eight rare riparian species, with a total of 30 locations, within 100 feet of unauthorized routes. (Table 3.07-6). Additionally, 93 rare plant sites are affected solely by motor vehicle cross-country travel. These factors, in combination with the allowance for cross-country travel, result in alternative 1 carrying the highest risk of effects to rare species within riparian systems. Unauthorized routes have not been designed to reduce impacts to riparian ecosystems. Motor vehicles traveling on and off of these routes negatively impact riparian species and habitats by reducing the vegetative cover in and around routes, compacting soils, increasing erosion, altering patterns of water flow, and reducing water quality by depositing petroleum products and/or sediment into streams. Removal of vegetation can alter the microclimate and lead to warmer and drier conditions that are not favored by the rare species in this guild. Riparian areas are highly susceptible to invasion from noxious weed species that thrive under wet conditions, such as Canada thistle (*Cirsium arvense*) and perennial pepperweed (*Lepidium latifolium*).

Serpentine Habitat Guild

Alternative 1 affects an estimated 153,382 acres of serpentine habitat with unauthorized routes and cross-country travel (Table 3.07-4).There are also eight rare serpentine species, with a total of 52 locations, within 100 feet of an unauthorized route (Table 3.07-6). Additionally, 209 rare plant sites are affected solely by motor vehicle cross-country travel. Serpentine areas often lack natural barriers to motor vehicles (i.e. dense vegetation), which makes this habitat type particularly inviting to cross-country travel. All of these factors result in alternative 1 carrying the highest risk of effects to rare species within serpentine areas.

Serpentine soils are generally shallow and rocky, with low water-holding capacity and rooting depths. These conditions inhibit plants from developing deep root systems and also increase the vulnerability of serpentine soils to erosion (Whittaker 1954). Motor vehicles negatively affect this unique plant community and the rare species that it supports by creating disturbed soils that are highly vulnerable to increased erosion. In areas where motor vehicle use has occurred, vegetation and soil recovery rates are generally very slow (Harrison et. al 2006). While these nutrient-poor ecosystems tend to be less

vulnerable to invasion by nonnative species than other habitat types (Harrison 1999), motor vehicles still increase the risk of noxious weed introduction and spread in these communities.

Barren Habitat Guild

Alternative 1 affects an estimated 17,033 acres of barren habitat (rock outcrops, ridge tops, cliffs, and talus slope ecosystems) with unauthorized routes and cross-country travel (Table 3.07-4). Nine rare species with a total of 73 locations also occur within 100 feet of unauthorized routes (Table 3.07-6). Additionally, 181 rare plant sites are affected solely by motor vehicle cross-country travel. These factors, in combination with the allowance for cross-country travel, result in alternative 1 carrying the highest risk of effects to rare species within these "barren" ecosystems.

Some of the species in this group grow where natural barriers to motor vehicle use exist, so the likelihood of direct impacts from this alternative is much lower than it is for rare species that grow in more accessible habitat types (i.e. forest openings or serpentine areas). In contrast, other species in this group grow in flatter, more open terrain, where the risk of direct effects from motor vehicle travel is much higher.

In many of these ecosystems, particularly where the terrain is steep, disturbance from motor vehicles can increase the rates of erosion, causing significant indirect impacts to rare species. In addition, plants dependent on barren habitat types generally do not compete well with other vegetation; therefore weed introduction or spread can be a significant risk in those areas with more developed soils.

Chaparral Habitat Guild

Alternative 1 affects an estimated 17,033 acres of chaparral habitat (shrub dominated ecosystems) with unauthorized routes and cross-country travel (Table 3.07-4). In general, these habitats are accessible to and utilized by motor vehicles. This guild contains six species and 47 locations within 100 feet of an unauthorized route (Table 3.07-6). Additionally, 157 rare plant sites are affected solely by motor vehicle cross-country travel.

In general, the rare species in this plant association colonize open areas, multiply rapidly, and persist for a short while. They are often poor competitors, and may persist only until stronger competitors move in and shade them out. Many are well adapted to take advantage of the high-light intensities found along routes. Species in this guild vary in their degree of tolerance to disturbance activities; many tend to be disturbance-followers that increase with infrequent, small-scale disturbances.

The edge of motorized routes may provide open habitat for some rare species; however any beneficial effect to these species (i.e. increased light or low levels of competition) could easily be offset by negative direct effects such as repeated trampling or death of individuals; continual soil disturbance, which could lead to soil erosion and degradation of the seedbed; and noxious weed introduction and spread. Open habitats are highly susceptible to noxious weed invasions, particularly from species such as yellow

starthistle (*Centaurea solstitialis*), knapweed (*Centaurea* species), or annual grasses such as medusahead (*Taeniatherum caput-medusae*).

Grassland/Woodland Habitat Guild

The species in this guild are found in either grass dominated ecosystems or oak savannah. An estimate of the number of miles within grassland/woodland habitat is presented in Table 3.07-4. In general, these habitats are accessible to and utilized by motor vehicles. This guild contains one species, *Clarkia borealis* spp. *borealis* (northern clarkia) and 3 locations within 100 feet of an unauthorized route (Table 3.07-6). Two other species, *Calochortus greenei* and *Penstemon filiformis*, are also members of the Grassland/ Woodland guild. There are 61 rare plant sites affected solely by motor vehicle cross-country travel within this guild.

Clarkia borealis spp. *borealis* inhabits openings in gray pine and oak woodlands, thriving in partial shade with little competition (Nakamura and Nelson 2001). *Calochortus greenei* is found on dry rocky hillsides, bluffs, and flats in openings and stand margins associated with grass-shrub, white oak, and white fir habitats (Nakamura and Nelson 2001). *Penstemon filiformis* is found in rocky openings in lower montane woodlands and coniferous forests on ultramafic substrates (Nakamura and Nelson, 2001). Species in this guild are somewhat ecologically similar to chaparral guild members in that they are often poor competitors that colonize openings. As a result, effects are similar to those discussed above in the chaparral section.

Lake Bottoms: Shasta Lake, Trinity Lake, and Iron Canyon Reservoir

Ten rare plant sites from four species are found in the areas below the high-water mark on Shasta Lake and Trinity Lake (See Table 3.07-6). Two populations of *Clarkia borealis* var. *borealis* (4.98 acres), five populations of *Neviusia cliftonii* (12 acres), two populations of *Chaenactis suffrutescens* (0.80), and one population of *Penstemon filiformis* (0.81 acres) are found below the high water line. No rare plant sites are known from Iron Canyon Reservoir. Continued unmanaged use of lake bottoms has the potential to impact all of the known sites both directly through being ran over by vehicles and indirectly from noxious weed invasion. It is unclear whether these are ephemeral populations that have colonized newly available habitat due to lowered lake levels, or established populations that are mapped below the high water line due to mapping error for the lake boundaries.

2. Direct/Indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

No roads, trails, or areas are proposed in this alternative. No Forest Plan amendment for routes near cultural resource sites is proposed. Alternative 1 does not add new facilities to the NFTS; therefore there will be no effects to rare plants or habitat from this type of action.

3. Direct/Indirect effects of changes to the existing NFTS.

No changes to the existing NFTS are proposed in this alternative, therefore there will be no direct or indirect effects.

4. Cumulative Effects.

Implementation of alternative 1 would not improve conditions for rare species or their habitats. Unmanaged motor vehicle use on the Shasta-Trinity National Forest has the potential for negative direct and indirect effects for the majority of the rare species known to occur on the forest (Table 3.07-2); therefore the potential for cumulative effects to these species is high.

Under this alternative, motor vehicles traveling on and off of unauthorized routes would continue to trample, kill, and uproot rare species. Indirect effects to rare species and their associated habitats could include reduction of native plant cover, creation of edge-habitats, increased rutting, erosion, and soil compaction. One of the largest potential impacts from cross-country motor vehicle traffic is the increased risk of noxious weed introduction and spread. Noxious weeds reduce the quality of native (including rare plant) habitat by displacing native species, altering nutrient and fire cycles, degrading soil structure, and decreasing the quality and availability of forage for wildlife (Mack et al 2000). Noxious weeds are spread by roads, motorized trails, recreational activities (such as camping, hiking, horseback riding, and hunting), and ongoing land management activities. Under this alternative, all but the most inaccessible habitats are at risk of noxious weed invasion and spread from cross-country motor vehicle travel.

Many of the Shasta-Trinity National Forest plant habitat guilds (discussed above) have been degraded or altered by historic human activities. Riparian areas on the Shasta-Trinity National Forest have been altered by water diversions, habitat type conversion (i.e. meadow to annual grassland), intense grazing by domestic livestock, and construction of roads and trails. Serpentine areas and barren, rocky habitats have been impacted by gold and gravel mining, timber harvest, road construction, and recreation. The forest guild across the Shasta-Trinity National Forest has been altered by past timber management practices, wildfire suppression, and road construction. Grassland/woodland have also been heavily impacted by past timber management practices, which tended to favor removal of larger, more dominant trees (i.e. overstory removal). This management practice, as well as the suppression of wildfire, has resulted in a greater number of dense forests that are dominated by small trees and a reduction in open forest habitat across the landscape. Forest openings or edges, which are not a specific habitat type, are continually being created as trees or other vegetation dies. While the specific amount of habitat reduction or alteration is unknown, it can be presumed that these activities and others have impacted rare species directly, indirectly, and cumulatively by reducing the amount of suitable habitat across the Shasta-Trinity National Forest.

Past management activities such as timber harvest, have also created skid trails and temporary roads that often contribute to cross-country travel and the creation of unauthorized routes. The number of forest

users, and subsequently the number of unauthorized routes, continues to grow each year with many having negative impacts to rare species and their habitats. Under this alternative, these negative impacts would not be addressed or mitigated and would continue to occur at an increased rate. These routes and use areas lack the planning and design features that are important for limiting disturbance and damage to sensitive botanical resources.

The effects of present and future projects on rare species would likely be minimal or similar to those described in this analysis if existing management guidelines (such as field surveys, protection of known rare species locations, and noxious weed mitigations) remain in place. Present and foreseeable projects are extensive on a forest –wide basis, and cover a wide array of activities.

Fuel and vegetation management have the potential to affect rare plants and habitats by crushing them during fuel removal activities, burning them during prescribed burns, and increasing risk of competition from non-native invasive species (NNIS) by increasing risk of noxious weed invasion. There are 21 current or foreseeable projects on the forest covering approximately 70,000 acres (See appendix B, Table B-5). TES plant species will be surveyed for and protected during the planning of these projects, reducing the cumulative impacts to known occurrences.

Timber harvest and vegetation treatment projects produce impacts very similar to those of fuel and vegetation treatment, including physically crushing them during harvest activities, increased risk of competition from NNIS by increasing risk of noxious weed invasion, and changes to canopy closure resulting in a change to successional pathways. Two projects listed under vegetation management are for noxious weed treatment. Both projects will have a beneficial cumulative impact to rare plant habitats by preventing the spread and establishment of new population of nonnative invasive species. There are 16 current or foreseeable projects on the forest covering approximately 27,000 acres (See appendix B, Table B-5). TES plant species will be surveyed for and protected during the planning of these projects, reducing the cumulative impacts to known occurrences.

Livestock grazing has the potential to directly affect rare plant species by being eaten or trampled. Additionally, impacts can occur through increased risk of NNIS establishment and the resulting competition. There are currently 14 active allotments covering 402,492 acres. Known sites are protected as appropriate and feasible in range allotments, reducing cumulative impacts from this activity.

Mining has the potential to result in direct effects to rare plant species by vegetation removal. Additionally, indirect effects can result by increased NNIS invasion, changes to hydrology, and changes in successional pathways due to habitat alteration. Four current or foreseeable projects covering an estimated 30 acres are planned for the STNF (See appendix B, Table B-5). TES plant species will be surveyed for and protected during the planning of these projects, reducing the cumulative impacts to known occurrences.

Recreation projects are expected to have a relatively small effect on rare plants, although they have the potential to result in direct effects to rare plant species by vegetation removal in trail reconstruction and trampling from dispersed recreation. Additionally, indirect effects can result by increased NNIS invasion. Two projects are listed in appendix B, Table B-5, however, only the trail relocation project has the potential for affecting rare plants.

Special use projects have the potential to result in direct effects to rare plant species by vegetation removal. Additionally, indirect effects can result by increased NNIS invasion and changes in successional pathways due to habitat alteration. There are 1,740 current and 19 foreseeable projects on the STNF (See appendix B, Table B-5). TES plant species will be surveyed for and protected during the planning of these projects, reducing the cumulative impacts to known occurrences.

Roads maintenance and road management proposals and decisions create a variety of effects. Road maintenance includes activities such as grading, resurfacing, culvert cleaning, hazard tree removal, snow plowing, and slide removal. Roadside management has the potential to affect rare plants by crushing them during tree removal activities and increasing risk of competition from NNIS by increasing risk of noxious weed invasion. TES plant species will be surveyed for and protected during the planning of these projects, reducing the cumulative impacts to known occurrences.

Road management proposals and decisions listed in appendix B, Table B-6 have the potential for short-term effect on rare plant habitat through ground disturbing activities. However, these activities were planned for and appropriate mitigations have been prescribed. There will be a long-term benefit from this activity by reducing the amount of vectoring for NNIS. There are 182.69 miles of roads currently included on NFTS that will be abandoned, closed, or decommissioned. This will result in a long-term benefit from reduced risk of NNIS spread and invasion. There are 3.5 miles of seasonal closure roads that will have no effect. There are 69.36 miles of unauthorized routes that will be abandoned, closed, or decommissioned. This will result in a long-term benefit from reduced risk of NNIS spread and invasion. Additionally, 5.60 miles of unauthorized routes are proposed to be added to the NFTS. The effects of adding routes to the NFTS are discussed in alternative 2 of this document. One important consideration is that these routes will now be managed, possibly resulting in NNIS invasions and other resource concerns being more likely to be detected and managed.

Effects Common to all Alternatives

Vehicle class has no effect on impacts to rare species. Vehicle impacts are mostly from direct effects of driving over plants, or increased risk of NNIS invasion. Vehicle size has a negligible effect on either process. Likewise, speed has no effect on rare species, because effects are derived from the vehicle moving through habitat, not from how fast a vehicle travels through it. Season of use has a negligible effect on rare plant habitat, because closures occur while plants are dormant, not when they are generating seeds. The Forest Plan amendment for routes near heritage sites will have no direct or indirect effects on

rare plant species. The amendment has no specific action that will cause either a negative or positive effect on rare plant species.

Alternative 2 – Proposed Action

Direct and Indirect Effects

Table 3.07-7. Summary of rare species indicator measures for alternative 2

Indicator Measure	Value
Number of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species sites within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).	10 sites
Acres of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).	18.73 acres
Miles of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.	2.29 miles
Number of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.	2 routes

Alternative 2 prohibits cross-country travel (1,599,062 acres), adds approximately 44.2 miles of unauthorized routes (88 total routes) and two open areas to the transportation system, and makes no changes to the existing NFTS. In comparison to the other action alternatives, alternative 2 has the second highest impact on rare species and their habitats among the action alternatives. It has two routes that intersect rare species occurrences or associated habitat. This alternative also has the potential to impact two rare species (one location each) both directly and indirectly. Additionally, this alternative adds areas to allow motor vehicle use below the high-water mark in on two lakes. These areas affect three species of rare plants.

1. Direct/indirect effects of the prohibition of cross-country motor vehicle travel. Prohibition on 1,599,062 acres of NFS lands. Forest Plan amendment to prohibit cross-country travel.

Prohibiting cross-country travel would eliminate possible effects to 391 plant populations of rare plants (Table 3.07-6). Additionally, it would limit impacts to suitable habitat for species in all of the habitat guilds. The forest plan amendment to prohibit cross country travel would have a positive effect on rare plant species by managing recreation on known routes. This greatly reduces the area that needs to be monitored for rare plant impacts or noxious weed invasion. Limiting activities to designated routes enables the treatment of NNIS and the implementation of mitigation measures for rare plant sites.

2. Direct/Indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

The number of known plant sites within 100 feet of an unauthorized route would also be greatly reduced from 89 in alternative 1 to two in alternative 2 (Table 3.07-8). *Harmonia doris- nilesiae* (Niles' madia) has one occurrence that is within 100 feet on a proposed route. None of the occurrence is within 30 feet of the route (the area of direct effects). Only 7.5 percent of the population is within the 100 foot area that is

subject to indirect effects. Indirect effects would be similar to those described above in the section General Types of Impacts. The greatest threat to this population would probably be possible noxious weed invasion. Monitoring for project impacts will mitigate any potential indirect effect. *Ericameria ophitidis* (serpentine goldenbush) has one population within 100 feet of a proposed route (Table 3.07-10). Part of this population is also within the 30 foot area of direct effects. These effects could include death, altered growth, or reduced seed set from physically breaking, crushing, or uprooting plants (Wilshire, Shipley, and Nakata 1978, Cole and Bayfield 1993). Direct effects are described more completely above in the section General Types of Impacts.

This population has 23 percent of its area within the area of indirect effects and 9 percent within the area of direct effects. Monitoring for effects will be necessary to mitigate project impacts. In addition to noxious weed invasion this species could be impacted by direct effects such as having individuals crushed while being driven over or negative impacts to its seed bank resulting from being disturbed by tires and exposed at the wrong time of year.

Areas below high-water mark: Open areas to allow public motor vehicle travel below the high-water mark on Shasta Lake and Trinity Lake would be added. Two populations of *Clarkia borealis var. borealis* (4.98 acres), five populations of *Neviusia cliftonii* (12 acres), and one population of *Penstemon filiformis* (0.81 acres) are found below the high water line. It is unclear if these areas beneath the high-water mark represent stable portions of the population, or are just ephemeral additions that are killed when the lakes rise in level. Additionally, the imprecise nature of the high water line layer could lead to these occurrences being inaccurately mapped below the high water line. *Neviusia cliftonii*, in particular, inhabits shady, cool stream canyons in the foothills surrounding Shasta Lake, and is unlikely to be found in the open habitat provided by the dry down of Shasta Lake. Plants could be impacted by this activity through directly being run over or being outcompeted by spreading NNIS. Monitoring for resource impacts will be needed to ensure that these populations remain on the landscape. Additionally, consultation with botanists will be necessary when designing resource impact mitigations for cultural resources within the lake if monitoring indicates the need to bury sites with gravel. This would result in the death of current plants and the inability of seeds in the seed bank to germinate.

Possible impacts from unauthorized routes to all habitats are greatly reduced compared to alternative 1. The forest habitat would have 850 acres affected, or approximately 0.03 percent of the amount affected in alternative 1 by both the unauthorized routes and cross-country travel. The riparian habitat has 14.5 acres affected, or approximately 0.03 percent of the amount affected in alternative 1 by both the unauthorized routes and cross -country travel. The serpentine habitat has 0.20 acres affected (0.0001 percent of alternative 1). The barrens habitat has 10 acres affected (0.05 percent of alternative 1). The chaparral habitat would have 150 acres affected (0.11 percent of alternative 1). Finally, the grassland/woodland habitat would have 54 acres affected, or 0.18 percent of the amount in alternative 1. This reduction in acres of potential habitat affected would greatly reduce the risk of impacts to species as compared to alternative 1.

Table 3.07-8. Alternative 2, Species present, habitat, status, and number of known occurrences

Species	Habitat	Status	Number of mapped occurrences in Project Area	Alt 2 100 Foot buffer	Alt 2 30 foot buffer
***Harmonia doris- nilesiae* (Niles' madia)**	F,C		21	1	
***Ericameria ophitidis* (serpentine goldenbush)**	B,S		52	1	1

Table 3.07-9. Locations of *Harmonia doris- nilesiae* (Niles' madia) within 100' of the routes proposed under the action alternative 2

Occurrence	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
HADO2STTM002	TC1829		0.10	1.32	X		X

Table 3.07-10. Locations of *Ericameria ophitidis* (serpentine goldenbush) within 100' of the routes proposed under the action alternative 2

Occurrence	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
EROP205140049	RM1036	0.39	0.94	4.07	X		X

3. Direct/Indirect effects of changes to the existing NFTS.

There are no changes to the NFTS proposed in this alternative; therefore there will be no direct, indirect or cumulative effects to rare species.

4. Cumulative Effects.

Both of the rare species sites located within 100 feet of a proposed route and those in the lake bottoms have the potential to be directly or indirectly affected by route designation; therefore these species are also at risk of being cumulatively impacted.

In comparison to the other action alternatives, alternative 2 has the second highest number of acres affected for all of the habitat guilds. Therefore, implementation of this alternative also has the potential to affect suitable habitat for a number of rare species on the Shasta-Trinity National Forest.

Of the five species with the potential to be directly and indirectly impacted by alternative 2, three have less than five percent of their known Shasta-Trinity National Forest locations impacted by the proposed routes. These species are *Harmonia doris- nilesiae, Ericameria ophitidis, and Penstemon filiformis*. Because of this small percentage of occurrences impacted, direct, indirect, and cumulative effects to locations along the proposed routes would likely be minimal. Seven percent of forest-wide populations of *Clarkia borealis* var. *borealis* are potentially affected by the lake bottom travel. This is still a relatively small amount of the total amount of populations that are on the STNF. Five of 13 total populations of *Neviusia cliftonii* are potentially affected travel along the lake bottoms. Due to the high

amount of populations affected, this species will need to be monitored to determine if the populations are below the high water and being affected by motor vehicle travel.

Overall, cumulative effects to rare species under this alternative are far less than those under alternative 1. This is primarily due to the ban on cross-country travel. Additionally, plants are surveyed and managed for during present and future project analysis. The implementation of planning and design features greatly reduces the impacts from current and foreseeable projects.

Alternative 3 – Cross-County Travel Prohibition Only – No Additions to the Existing NFTS

1. Direct/indirect effects of the prohibition of cross-country motor vehicle travel

A Forest Plan amendment to prohibit cross-country travel will close 1,599,471 acres of NFS lands to wheeled motor vehicle use.

Table 3.07-11. Summary of rare species indicator measures for alternative 3

Indicator Measure	Value
Number of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species sites within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).	0 sites
Acres of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).	0 acres
Miles of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.	0 miles
Number of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.	0 routes

Alternative 3 prohibits cross-country travel, adds no unauthorized routes or open areas to the NFTS, and makes no changes to the existing NFTS. In comparison to the other action alternatives, alternative 3 has lowest impact on rare species and their associated habitats. It proposes no additions to the NFTS that intersect rare species occurrences or associated habitat. Prohibiting cross-country travel would eliminate possible effects to 391 plant populations of rare plants (Table 3.07-6). Additionally it would limit impacts to suitable habitat for species in all of the habitat guilds. The number of known plant sites within 100 feet would also be reduced from 89 in alternative 1 to zero in alternative 3 (Table 3.07-10).

2. Direct/indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

No roads, trails, or areas are proposed in this alternative, therefore there will be no direct, indirect or cumulative effects to rare species.

3. Direct/indirect changes to the existing NFTS.

No changes to the existing NFTS are proposed in this alternative, therefore there will be no direct, indirect or cumulative effects to rare species.

4. Cumulative Effects.

Overall, cumulative effects to rare species under this alternative are far less than those under alternative 1 or the other action alternatives. This is primarily due to the ban on cross-country travel and elimination of motor vehicle travel on all unauthorized routes. No unauthorized routes are proposed for addition to the NFTS under this alternative, therefore none of the Shasta-Trinity National Forest rare species are at risk of being cumulatively impacted by alternative 3, since they are not being directly or indirectly affected by actions in this alternative.

Alternative 4 – Minimize Impacts to Natural Resources and Roadless Areas

1. Direct/indirect effects of the prohibition of cross-country motor vehicle travel.

A Forest Plan amendment to prohibit cross-country travel will close 1,599,471 acres of NFS lands to wheeled motor vehicle use.

Table 3.07-12. Summary of rare species indicator measures for alternative 4

Indicator Measure	Value
Number of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species sites within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).	8 sites
Acres of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).	17.3 acres
Miles of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.	0 miles
Number of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.	0 routes

Prohibiting cross-country travel would eliminate possible effects to 391 plant populations of rare plants (Table 3.07-6). Additionally it would limit impacts to suitable habitat for species in all of the habitat guilds. The forest plan amendment to prohibit cross-country travel would have a positive effect on rare plant species by managing recreation on known routes. This greatly reduces the area that needs to be monitored for rare plant impacts or noxious weed invasion. Limiting activities to designated roads, trails, and open areas enables the treatment of NNIS and the implementation of mitigation measures for rare plant sites.

2. Direct/Indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

The addition of approximately 0.88 miles of roads and 14.68 miles of trails are proposed. The number of known plant sites within 100 feet would also be reduced from 106 in alternative 1 to eight in alternative 4 (Table 3.07-11). Possible impacts from motor vehicle use on unauthorized routes to all habitats are greatly reduced compared to alternative 1. The forest habitat would have 300 acres affected (less than one percent of the amount affected in alternative 1).The riparian, serpentine, and barren habitat guilds would be unaffected. The chaparral habitat guild would have 71.5 acres affected (less than one1 percent of

alternative 1). The woodland/grassland habitat guild would have 28.4 acres affected (less than one percent of alternative 1). This reduction of acres of potential habitat would greatly reduce the risk of impacts to species as compared to alternative 1.

Areas below high-water mark: Public motor vehicle travel would be allowed below the high-water mark on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir. Two populations of *Clarkia borealis* var. *borealis* (4.98 acres), five populations of *Neviusia cliftonii* (12 acres), and one population of *Penstemon filiformis* (0.81 acres) are found below the high water line. It is unclear if these areas beneath the high-water mark represent stable portions of the population, or are just ephemeral additions that are killed when the lakes rise in level. Additionally, the imprecise nature of the high water line layer could lead to these occurrences being inaccurately mapped below the high water line. *Neviusia cliftonii*, in particular, inhabits shady, cool stream canyons in the foothills surrounding Shasta Lake, and is unlikely to be found in the open habitat provided by the drawdown of Shasta Lake. Plants could be impacted by this motor vehicle use through directly being run over or being outcompeted by spreading NNIS. Monitoring for resource impacts will be needed to ensure that these populations remain on the landscape. Consultation with STNF botanists will be necessary when designing resource impact mitigations for cultural resources within the lake if monitoring indicates the need to bury sites with gravel. This would result in the death of current plants and the inability of seeds in the seed bank to germinate.

3. Direct/indirect changes to the existing NFTS.

Alternative 4 changes vehicle class on 30.41 miles of existing NFTS Level 3 roads to allow motorized mixed-use (i.e., highway-legal and non-highway-legal motor vehicle use) on the same road segments. Vehicle class has no effect on impacts to rare plants so there would be no effect from this action. See Effects Common to All Alternatives for more information.

4. Cumulative Effects.

Overall, cumulative effects to rare species under this alternative are far less than those under alternative 1 or the other action alternatives. This is primarily due to the ban on cross-country travel and reduction of proposed routes.

Alternative 5 – Improved Access and Motorized Recreation Opportunities

1. Direct/indirect effects of the prohibition of cross-country motor vehicle travel

A Forest Plan amendment to prohibit cross-country travel will close 1,598,619 acres of NFS lands to wheeled motor vehicle use.

Prohibiting cross-country travel would eliminate possible effects to 391 plant populations of rare plants (Table 3.07-6). Additionally it would limit impacts to suitable habitat for species in all of the habitat guilds. The forest plan amendment to prohibit cross-country travel would have a positive effect on

rare plant species by managing recreation on known routes. This greatly reduces the area that needs to be monitored for rare plant impacts or noxious weed invasion. Limiting activities to designated roads, trails, and areas enables the treatment of NNIS and the implementation of mitigation measures for rare plant sites.

Table 3.07-13. Summary of rare species indicator measures for alternative 5

Indicator Measure	Value
Number of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species sites within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).	18 sites
Acres of threatened, endangered and sensitive plant, lichen, bryophyte or fungi species within 100 feet of unauthorized routes (direct effects within 30 feet, indirect effects up to 100 feet).	41.8 acres
Miles of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.	9.49 miles
Number of routes open for motor vehicle use with threatened, endangered and sensitive plant, lichen, bryophyte or fungi species present within 100 feet of the route.	11 routes

2. Direct/Indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

Alternative 5 adds approximately 106.12 miles of unauthorized routes to the NFTS. Of the action alternatives, implementation of alternative 5 has the greatest impact to rare species and their associated habitats. It has the highest number of routes (11 routes) and route miles (9.49 miles) that intersect rare species occurrences or associated habitat. This alternative also has the potential to impact nine rare species (18 locations) both directly and indirectly.

The number of known plant sites within 100 feet would also be greatly reduced from 89 in alternative 1 to 18 in alternative 5 (Table 3.07-13). Eight occurrences are also within 30 feet of proposed routes (Table 3.07-14).

Table 3.07-14. Alternative 5, Species present, habitat, status, and number of known occurrences

Species	Habitat	Status	Number of mapped occurrences in Project Area	Alt 5 100 foot buffer	Alt 5 30 foot buffer
***Clarkia borealis* spp. *borealis* (northern clarkia)**	G, F	S	27	2[a]	2[a]
***Eriastrum tracyi* (Brandagee's wooly-star)**	F, C	S	5	1	1
***Harmonia doris- nilesiae* (Niles' madia)**	S, C, F	S	25	2	
***Neviusia cliftonii* (California snow-wreath)**	F, R	S	13	5[a]	5[a]
***Penstemon filiformis* (thread leaved beardtongue)**	B, S, G, C		51	1[a]	1[a]
***Phacelia cookii* (Cooke's phacelia)**	B, C	S	5	2	2
***Arnica venosa* (Shasta County arnica)**	F, C	FPE	73	1	1
***Ericameria ophitidis* (serpentine goldenbush)**	B, S, C, F	FPE	73	3	2
***Eriogonum libertini* (Dubakella buckwheat)**	B, S, C	FPE	54	1	1

a - These populations are found below the high water line in Shasta and Trinity Lakes.

Harmonia doris- nilesiae (Niles' madia) has two occurrences within 100 feet of a proposed route (Table 3.07-15). None of the occurrence of HADO2STTM002 is within 30 feet of a proposed route (the area of direct effects). Only 7.5 percent of the population is within the 100 foot area that is subject to indirect effects. Indirect effects would be similar to those described above in the section General Types of Impacts. The greatest threat to this population would probably be possible noxious weed invasion. Monitoring for project impacts will mitigate any potential indirect effect. The second population, HADO2STTM001, has less than one percent of its population area within the 100 foot buffer. Any effects are expected to be minimal, but monitoring should take place to detect impacts from indirect effects such as noxious weed invasion.

Table 3.07-15. Locations of *Harmonia doris- nilesiae* (Niles' madia) within 100' of the trails proposed under the action alternative 5

Occurrence	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
HADO2STTM001	RM793		0.000093	2.76			X
HADO2STTM002	TC1829		0.10	1.32	X		X

Ericameria ophitidis (serpentine goldenbush), has three populations within 100 feet of a proposed route (Table 3.07-16). EROP205140005 has approximately two percent of its population area in the 100 foot area and less than one percent of its area in the 30 foot area of direct effects. Effects to this population are expected to be minimal, although monitoring is recommended to mitigate any project effects such as noxious weed invasion. EROP205140049 has 23 percent of its area within the area of indirect effects and nine percent within the area of directs effects. Monitoring for effects will be necessary to mitigate project impacts. In addition to noxious weed invasion this species could be impacted by direct effects such as having individuals crushed while being driven over or negative impacts to its seed bank resulting from being disrupted from tires and exposed at the wrong time. EROP205140054 has 0.01 percent of its population in the indirect effects area and none in the direct effects area. Effects to this population are expected to be minimal, although monitoring is recommended to mitigate any project effects such as noxious weed invasion.

Table 3.07-16. Locations of *Ericameria ophitidis* (serpentine goldenbush) within 100' of the trails proposed under the action alternative 5

Occurrence	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
EROP205140005	RM720	2.04	5.27	266.98			X
EROP205140049	RM1036	0.39	0.94	4.07	X		X
EROP205140054	RM737		0.01	83.32			X

Phacelia cookie (Cooke's phacelia) has two populations within 100 feet of a proposed route (Table 3.07-17). Both are also within the 30 foot area of direct effects. PHCO202005140001 has 0.33 percent of

its population area in the 100 foot area and 0.09 percent of its area in the 30 foot area of direct effects. Effects to this population are expected to be minimal, although monitoring is recommended to mitigate any project effects such as noxious weed invasion. PHCO202005140002 has approximately 8 percent of its population area in the 100 foot area and 2 percent of its area in the 30 foot area of direct effects. Effects to this population are expected to be minimal. Monitoring is recommended to mitigate any project effects such as noxious weed invasion.

Table 3.07-17. Locations of *Phacelia cookie* (Cooke's phacelia) within 100' of the trails proposed under the action alternative 5

Occurrence	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
PHCO202005140001	U42N18B	0.46	1.58	471.50			X
PHCO202005140002	WE039	0.16	0.62	7.89			X

Arnica venosa (Shasta County arnica) has one population within 100 feet of a proposed route (Table 3.07-18). ARVE05140032C has 31 percent of its area within the area of indirect effects and approximately 18 percent within the area of directs effects. Monitoring for effects will be necessary to mitigate project impacts. In addition to noxious weed invasion this species could be impacted by direct effects such as having individuals crushed while being driven over or negative impacts to its seed bank resulting from being disturbed by tires and exposed at the wrong time.

Table 3.07-18. Locations of *Arnica venosa* (Shasta County arnica) within 100' of the trails proposed under the action alternative 5

Occurrence	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
ARVE05140032C	SE512	3.22	5.59	17.93			X

Eriogonum libertini (Dubakella buckwheat) has one population within 100 feet of a proposed route (Table 3.07-19). ERLI405140010 has 0.46 percent of its population area in the 100 foot area and 0.14 percent of its area in the 30 foot area of direct effects. Effects to this population are expected to be minimal, although monitoring is recommended to mitigate any project effects such as noxious weed invasion.

Table 3.07-19. Locations of *Eriogonum libertini* (Dubakella buckwheat) within 100' of the trails proposed under the action alternative 5

Occurrence	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
ERLI405140010	U29N73G	0.32	1.00	215.64			X

Eriastrum tracyi (Brandagee's woolly-star) has one population within 100 feet of a proposed route (Table 3.07-20). ERLI405140010 has 33 percent of its area within the area of indirect effects and approximately 15 percent within the area of directs effects. Monitoring for effects will be necessary to mitigate project impacts. In addition to noxious weed invasion this species could be impacted by direct effects such as having individuals crushed while being driven over or negative impacts to its seed bank from being disturbed by tires and exposed at the wrong time.

Table 3.07-20. Locations of *Eriastrum tracyi* (Brandagee's woolly-star) within 100' of the trails proposed under the action alternative 5

Occurrence	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
ERBR3STTM001	TC1489	0.73	1.66	4.94			X

Areas below high-water mark: Public motor vehicle travel below the high-water mark on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir would be allowed. Two populations of *Clarkia borealis* var. *borealis* (4.98 acres), five populations of *Neviusia cliftonii* (12 acres), and one population of *Penstemon filiformis* (0.81 acres) are found below the high water line. It is unclear if these areas beneath the high-water mark represent stable portions of the population, or are just ephemeral additions that are killed when the lakes rise in level. Additionally, the imprecise nature of the high water line layer could lead to these occurrences being inaccurately mapped below the high water line. *Neviusia cliftonii*, in particular, inhabits shady, cool stream canyons in the foothills surrounding Shasta Lake and is unlikely to be found in the open habitat provided by the dry down of Shasta Lake. Plants could be impacted by this activity through directly being run over or being outcompeted by spreading NNIS. Monitoring for resource impacts will be needed to ensure that these populations remain on the landscape. Consultation with STNF botanists will be necessary when designing resource impact mitigations for cultural resources within the lake if monitoring indicates the need to bury sites with gravel. This would result in the death of current plants and the inability of seeds in the seed bank to germinate.

Possible impacts from unauthorized routes to all habitats are greatly reduced compared to alternative 1. The forest habitat would have 1,910 acres affected, or approximately 0.08 percent of the amount affected in alternative 1. Similarly, the riparian habitat has 14.5 acres affected (0.03 percent of alternative 1). The serpentine habitat has 0.3 acres affected (less than one percent of alternative 1). The barrens habitat has 26 acres affected (less than one percent of alternative 1). The chaparral habitat would have 550 acres affected (0.42 percent of alternative 1). Finally, the grassland/woodland habitat guild would have 108 acres affected, or less than 1 percent of the amount affected in alternative 1. This reduction of acres of potential habitat affected would greatly reduce the risk of impacts to species in alternative 5 as compared to alternative 1.

The largest improvement over alternative 1 is the prohibition of cross-country travel. This reduces vehicle access and impacts to rare plants and their habitats, lowers the risk of noxious weed introduction

and spread throughout the forest, and concentrates use on maintained trails that will be managed and improved to reduce resource damage.

3. Direct/indirect changes to the existing NFTS.

Alternative 5 changes vehicle class on 30.41 miles of existing NFTS Level 3 roads to allow motorized mixed-use (highway-legal and non-highway-legal motor vehicle use) on the same road segments. Vehicle class has no effect on impacts to rare plants so there would be no effect from this action. See Effects Common to All Alternatives for more information.

4. Cumulative Effects.

All of the rare species locations (18 sites) located within 100 feet of a proposed system trail have the potential to be directly or indirectly affected by route designation; therefore these species are also at risk of being cumulatively impacted.

In comparison to the other action alternatives, alternative 5 has the greatest number of miles in all habitat guilds (Table 3.07-4); therefore implementation of this alternative also has the potential to affect suitable habitat for a number of rare species on the Shasta-Trinity National Forest.

Of the nine species with the potential to be directly and indirectly impacted by alternative 5, seven have 25 percent or less of their known Shasta-Trinity National Forest locations impacted by the proposed routes. One species, *Phacelia cookei*, has 40 percent of known locations affected. Because of this large percentage of occurrences impacted, direct and indirect effects to locations along the proposed system trails could have a significant cumulative effect to this species. Five of 13 total populations of *Neviusia cliftonii* are potentially affected by travel along the lake bottoms. Due to the high number of populations affected, this species will need to be monitored closely to determine if the populations are below the high water and being affected by project level effects.

Overall, cumulative effects to rare species under this alternative are far less than those under alternative 1. This is primarily due to the ban on cross-country travel. Additionally, plants are surveyed and managed for during project analysis. The implementation of planning and design features greatly reduces the impacts from current and foreseeable projects. However, of the action alternatives, this alternative has the largest cumulative impact on sensitive rare species due to large number of miles proposed, the amount suitable habitat impacted, and the number of species directly and indirectly affected.

Summary of Effects Analysis across All Alternatives

The following presents an overview of the effects analysis for each alternative (Table 3.07-21). In general, the greater the number of motor vehicle routes (and miles) proposed, the higher the risk and severity of negative impacts to rare species and their associated habitats. Alternative 1 has the greatest negative effect on rare species and habitats, primarily due to the allowance for cross-country travel, which has the

potential to affect all but the most inaccessible rare species and habitats. Out of the action alternatives, alternative 5 impacts the largest number of rare species and botanically sensitive resources. Alternative 3, which designates no unauthorized routes, has the least impact on rare species. In comparison to these alternatives, the impacts from alternative 2 are similar to alternative 5. In the following table, rankings are scored on a scale of 1 to 5 from greatest (1), to least (5) impact.

Table 3.07-21. Comparison of effects to botanical resources

Indicators – Botanical Resources	Rankings of Alternatives for Each Indicator				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles of unauthorized or proposed routes open for public motorized vehicle use within or adjacent to Sensitive rare species sites.	1	3	5	4	2
Number of unauthorized or proposed routes open for public motorized vehicle use within or adjacent to Sensitive rare species sites.	1	3	5	4	2
Acres of rare plant sites or suitable habitat within 100 feet of unauthorized or proposed system routes.	1	3	5	4	2
Total number of rare plant sites within 100 feet of unauthorized or proposed routes.	1	3	5	4	2
Average for botanical resources	1	3	5	4	2

The summary of determinations for species is below (Table 3.07-22). While some species habitat may be affected, the project is not likely to result in a trend toward federal listing or loss of viability for species with unoccupied suitable habitat in the project area. Definitions of acronyms used are as follows:

- WN (FT) – Will not affect this species or its designated critical habitat
- WN – Will not affect the species
- MA (NT) – May affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the species

Table 3.07-22. Summary of species determinations. Shaded cells indicate a "may affect" determination

Species	Alternative				
	1	2	3	4	5
Federally Listed Species					
***Arabis macdonaldiana*, (McDonald's rock-cress)**	WN (FT)	WN (FT)	WN (FT)	WN (FT)	WN (FT)
***Orcuttia tenuis* (Slender Orcutt grass)**	WN (FT)	WN (FT)	WN (FT)	WN (FT)	WN (FT)
Sensitive Species					
***Anisocarpus scabridus* (scabrid alpine tarplant)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
Boletus pulcherrimus (red-pored bolete)	WN	WN	WN	WN	WN
***Botrychium crenulatum* (Scalloped moonwort)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Botrychium minganense* (Mingan moonwort)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Botrychium pinnatum* (Northwestern moonwort)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Botrychium virginainum* (rattlesnake fern)**	WN	WN	WN	WN	WN
***Buxbaumia viridis* (Bug-on-a-stick)**	WN	WN	WN	WN	WN
Calochortus greenei (Greene's mariposa lily)	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)

Species	Alternative				
	1	2	3	4	5
***Calochortus longebarbatus* var. *longebarbatus* (Long-haired star tulip)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Calystegia atriplicifolia* ssp. *Buttensis* (Butte County morning glory)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Campanula shetleri* (Castle Crags harebell)**	WN	WN	WN	WN	WN
***Campanula wilkinsiana* (Wilkins' harebell)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Chaenactis suffretescens* (Shasta chaenactis)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Clarkia borealis* spp. *Borealis* (northern clarkia)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Collomia larsenii* (talus collomia)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Cordylanthus tenuis* ssp. *Pallescens* (pallid bird's beak)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
Cudonia monticula (no common name)	WN	WN	WN	WN	WN
***Cypripedium fasciculatum* (clustered lady's-slipper)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Cypripedium montanum* (Mountain lady's-slipper)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Dendrocollybia racemosa* (branched collybia)**	WN	WN	WN	WN	WN
***Draba carnosula* (Mt. Eddy draba)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Epilobium oreganum* (Oregon willowherb)**	WN	WN	WN	WN	WN
***Eriastrum tracyi* (Brandagee's wooly-star)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Eriogonum alpinum* (Trinity buckwheat)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Eriogonum ursinum var. erubescens* (blushing wild buckwheat)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Erythronium citrinum* var. *rederickii* (Roderick's fawnlily)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Frasera umpquaensis* (Umpqua green-gentian)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Fritillaria eastwoodiae* (Butte County Frittilaria)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Harmonia doris- nilesiae* (Niles' madia)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Harmonia stebbins* (Stebbins' madia)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Howellia aquatilis* (water howellia)**	WN	WN	WN	WN	WN
***Hydrothyria venosa* (veined water lichen)**	WN	WN	WN	WN	WN
***Iliamna latibracteata* (California wild hollyhock)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Ivesia pickeringii* (Pickering's ivesia)**	WN	WN	WN	WN	WN
***Ivesia longibracteata* (Castle Crags ivesia)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Leptosiphon nutallii* ssp. *howellii* (Mt. Tedoc linanthus)**	WN	WN	WN	WN	WN
Lewisia cantelovia (Cantelow's lewisia)	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Meesia triquetra* (Three-ranked hump-moss)**	WN	WN	WN	WN	WN
***Meesia uliginosa* (Broad-nerved hump-moss)**	WN	WN	WN	WN	WN
***Mielichoferia elongata* (elongate copper moss)**	WN	WN	WN	WN	WN
***Minuartia rosei* (Peanut sandwort)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Minuartia stolonifera* (Scott Mountain sandwort)**	WN	WN	WN	WN	WN
***Montia howellii* (Howell's montia)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Neviusia cliftonii* (California snow-wreath)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Ophioglossum pusillum* (Northern adder's-tongue fern)**	WN	WN	WN	WN	WN
***Parnassia cirrata* var. *intermedia* (fringed grass-of-Parnassus)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Penstemon filiformis* (thread leaved beardtongue)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Phacelia cookie* (Cooke's phacelia)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
***Phacelia greenei* (Scott Valley phacelia)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)

Species	Alternative				
	1	2	3	4	5
Phaeocollybia olivacea **(no common name)**	WN	WN	WN	WN	WN
Polemonium chartaceum **(Mason's sky pilot)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
Ptilidium californicum **(Pacific fuzzwort)**	WN	WN	WN	WN	WN
Raillaedella pringlei **(showy raillardella)**	MA (NT)	MA (NT)	WN	WN	MA (NT)
Rorippa columbiae **(Columbia yellow cress)**	WN	WN	WN	WN	WN
Sedum paradisum **(Canyon Creek stonecrop)**	WN	WN	WN	WN	WN
Silene occidentalis **ssp.** ***longistipitata*** **(long-stiped campion)**	WN	WN	WN	WN	WN
Smilax jamesii **(English Peak greenbriar)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
Sowerbyella rhenana **(stalked orange peel fungus)**	WN	WN	WN	WN	WN
Sulcaria badia **(Bay horsehair lichen)**	WN	WN	WN	WN	WN
Ageratina shastensis **(Shasta ageratina)**	WN	WN	WN	WN	WN
Arnica venosa **(Shasta County arnica)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
Ericameria ophitidis **(serpentine goldenbush)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
Eriogonum libertini **(Dubakella buckwheat)**	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
Botrychium montanum **(mountain moonwort)**	WN	WN	WN	WN	WN
Eucephalus vialis **(wayside aster)**	WN	WN	WN	WN	WN
Leptogium cyanescens **(skin lichen)**	WN	WN	WN	WN	WN
Schistostega pennata **(goblin's gold)**	WN	WN	WN	WN	WN
Tetraphis geniculata **(no common name)**	WN	WN	WN	WN	WN

Compliance with the Forest Plan and Other Direction

The proposed action alternatives are consistent with the Forest Plan and other direction. Under these alternatives, sensitive plant species will be monitored and site specific action taken as needed to maintain viability. This is in compliance with the STNF Forest Plan, which states "Monitor the effects of management activities on sensitive and endemic plants. If monitoring results show a decline in species viability, alter management strategy" (see Botany BA/BE Appendix B: Route Risk Assessment for Botanical Species for individual mitigations). This incorporates by reference the route risk assessment for botanical species which is located in the project record.

3.08. Non-native Invasive Plants

Introduction

Vehicle travel is a major factor/vector in the introduction and spread of noxious weeds (also known as nonnative invasive species), so this project affects the population and distribution of these species. Additionally, the Forest Service has determined that invasive species can pose a significant threat to forests and rangelands. The presence of these invaders affects many other resources, such as soil, wildlife habitat, and sensitive plants; so it is important to analyze and understand the effects of this project on noxious weed occurrences.

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Direction relevant to the proposed action in regards to the management and prevention of noxious weeds includes the following.

FSM 2081.03 requires that a weed risk assessment be conducted when any ground-disturbing activity is proposed. Projects having moderate to high risk of introducing or spreading noxious weeds must identify noxious weed control measures to undertake during project implementation.

Executive Order 13112 of Feb. 3, 1999, directs Federal agencies to: prevent the introduction of invasive species; detect and respond rapidly to and control such species; not authorize, fund, or carry out actions that the agency believes are likely to cause or promote the introduction or spread of invasive species unless the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

The Forest Service Strategy for Noxious and Nonnative Invasive Plant Management, entitled Stemming the Invasive Tide (USDA Forest Service 1998), provides a roadmap into the future for preventing and controlling the spread of noxious weeds and nonnative invasive plants by implementing the following goals: (1) to establish and maintain a prevention and education program to minimize the spread of weeds; (2) to enter into cooperative weed management with other agencies, landowners, the general public, and Forest Service permittees; (3) to systematically inventory and map weed infestations and number of acres for the high priority noxious weed; (4) to use an integrated approach to weed control with consideration of the best combination of treatments (chemical, biological, mechanical, and cultural) for each specific situation; and (5) to effectively monitor weed spread and treatment success.

Pacific Southwest Region Noxious Weed Management Strategy (2000) implements goals to reduce the spread of noxious weeds, including: integrated weed management (including emphasizing eradication of new, small infestations while providing for the safety of field personnel); inventorying

weed infestations, consideration of noxious weeds in project planning; prevention and detection plans; education and awareness; coordination; and monitoring, evaluation, and research.

Shasta-Trinity National Forest Land and Resource Management Plan direction for Forest Pests (4-18):

a. When conducting watershed/ecosystem analysis, consider the possible effects that Forest pests may have on management objectives and desired future conditions.

b. Implement an integrated pest management (IPM) program to maintain or reduce forest pest impacts to acceptable levels and to maintain or enhance forest health and vigor. Any decision to use pesticides will require site specific environmental analysis.

The Shasta-Trinity National Forest Forest-wide Manual Treatment of Invasive Plants Project authorizes the use of hand treatment methods to treat noxious weeds throughout the forest.

Best Management Practices- draft best management practices for NNIS control on the Shasta-Trinity National Forest (Nelson 2007) will be followed until Regional best management practices are finalized. BMPs are suggested for administration, prevention, and treatment of NNIS. Additionally, BMPs are provided for specific forest management activities.

Effects Analysis Methodology

Assumptions Specific to Nonnative Invasive Species Analysis

In addition to those listed at the beginning of Chapter 3 of the FEIS, the following assumptions were used in the analysis of noxious weeds:

1) This project is assumed to be a ground-disturbing activity, which requires a weed risk assessment.
2) Existing weed infestations will likely spread and the rate of spread will be increased by vehicular activity. Infestations located along routes where vehicles drive will spread further along the route.
3) Motorized mixed-use would not affect weed spread since there is no evidence that vehicle type affects seed vectoring.
4) Seasonal restrictions would have negligible effect on weed dispersal and spread since primary use would occur during the growing season.
5) Direct effects occur within a zone 30 feet on either side of the route's edge because of the need for parking and pulling off to allow another vehicle to pass. This zone, in many cases, is shortened due to barriers to off route accessibility resulting from steep topography, impenetrable vegetation, boulders or outcrops. Indirect effects occur from 30 to 100 feet either side of the route's edge.

6) Weed prevention measures will continue to be implemented for ground-disturbing activities. Weed treatment will continue to occur as authorized by the forest-wide manual treatment project noted above.
7) Motor vehicles will bring weed seeds and propagative parts from home areas and other areas where they traveled.
8) When completing the risk assessments, the following categories were assigned to determine the risk of noxious weed spread or introduction: high, medium, or low. These categories were assigned based on the following factors:
   a. A high risk of spread or introduction was assigned based on the presence of weed infestations along portions of a route that were heavily used, a high level of invasiveness (i.e. the species was considered an A-rated species by the California Department of Agriculture or invasive by the California Invasive Plant Council), or a lack of inventory or survey of a route. Due to the lack of prior survey data, any road not having a known noxious weed was considered to not be previously surveyed.
   b. The risk of spread was considered medium if noxious weed infestations did not occur directly along a travel route or occurred on a portion of the route where travel was prohibited; treatment mitigations were available and feasible; or the species was listed as a B or C-rated species by the California Department of Agriculture, or was considered to be less invasive and already fairly well-distributed.
   c. The risk of introduction or spread was considered low if existing inventories demonstrated that noxious weed occurrences were not present along the route.

Data Sources

Data used for this analysis comes from the Shasta-Trinity National Forest Natural Resource Information System (NRIS) database, which is a spatial database compiled from data collected through the 2008 field season. New data received from a contractor not yet entered into the NRIS database was also used. This data was in a point format and all sites were buffered to 0.1 acre. Noxious weed surveys take place on the forest concurrently with botanical surveys for ground-disturbing projects. No route-specific surveys for noxious weeds were conducted.

NNIS Indicator for All Alternatives

- Risk of noxious weed spread. Risk is determined by an average of measures such as:
    - Miles of routes added for public motor vehicle use within or adjacent to noxious weed sites
    - Number of routes added for public motor vehicle use within or adjacent to noxious weed sites
    - Acres of noxious weed sites within 100 feet of a proposed route

- Total number of noxious weed occurrences within 100 feet of a proposed route

These measures were chosen because they give the best approximation of the interaction between existing weed occurrences (both in terms of number of occurrences and size of infestations) and routes. A general risk factor was given to all routes based on level of survey and presence of noxious weeds. Alternatives were ranked on a 1 through 5 scale per measure; 1 being the most likely to lead to future spread and establishment of NNIS, and 5 being the least likely. Scores were then averaged for a final risk rating.

NNIS Methodology by Action

The following methodology applies for the following actions.

1. Direct/indirect effects of the prohibition of cross-country motor vehicle travel.

Short-term Timeframe: Time of implementation to1 year. Short-term effects include immediate effects from changes in travel management that will be evident within the first year of implementation.

Long-term Timeframe: 1 to 20 years. Climate change, unforeseeable future projects, demographic changes, etc., make assumptions beyond this timeframe speculative. These timeframes will apply for each action proposed in all alternatives.

Spatial Boundary: STNF lands within 100 feet of inventoried unauthorized routes in addition to the entire area of cross-country travel. The boundary of 100 feet is large enough to account for indirect effects such as the possible spread from known sites to the edge of the route, where they will be more likely to be vectored to other locations.

Indicator(s): Refer to previous “NNIS Indicator for All Alternatives” section.

Methodology: GIS analysis of added routes and NNIS sites

2. Direct/Indirect Effects of adding inventoried unauthorized routes to the National Forest Transportation System (NFTS or system), including identifying seasons of use and vehicle class.

3. Changes to the existing NFTS.

4. Cumulative Effects

Short-term Timeframe: Time of implementation to 1 year. Short-term effects include immediate effects from changes in travel management that will be evident within the first year of implementation.

Long-term Timeframe: 1 to 20 years. Climate change, unforeseeable future projects, demographic changes, etc., make assumptions beyond this timeframe speculative. These timeframes will apply for each action proposed in all alternatives.

Spatial Boundary: STNF lands within 100 feet of inventoried unauthorized routes in addition to the entire area of cross-country travel. The boundary of 100 feet is large enough to account for indirect effects, such as the possible spread from known sites to the edge of the route, where they will be more likely to be vectored to other locations.

Indicator(s): See previous "NNIS Indicator for All Alternatives" section. In addition, the total number of routes open to the public will be considered.

Methodology: GIS analysis of added routes and NNIS sites

Affected Environment

Thirty-four invasive plant species have been documented and are considered to be a management concern for the STNF. These weed species, which are known from about 1,164 locations, occupy a total area of almost 6,761 acres (see Table 3.08-1). Of these known occurrences, 1,009 (or 87 percent) are within 100 feet of an existing Forest Service road (see Table 3.08-2). The weed sites on the STNF range in size from one square foot to over 770 acres, with more than half of infestations (63 percent) occupying an area less than 0.25 acre.

Table 3.08-2 lists all noxious weed species that are known to occur on the STNF. Also included in the table are the ratings from the California Department of Food and Agriculture's noxious weed list (CDFA 2007) and the California Invasive Plant Council's invasive plant inventory (Cal-IPC 2006). The CDFA list divides noxious weeds into three categories: A, B, and C. "A" listed weeds are those for which eradication or containment is required at the State or county level. Eradication or containment of B listed weeds is at the discretion of the County Agricultural Commissioner, and C listed weeds require eradication or containment only when found in a nursery or at the discretion of the County Agricultural Commissioner. In the following table, weeds listed as "NR" are not rated. Cal-IPC categorizes invasive plants as high, moderate, or limited, based on the species' negative ecological, rather than economic or management, impact in California. Species in bold are considered of the highest priority and are actively treated.

Most of these species are either rated as an A list species by the CDFA or as a high impact species by CALIPC. Some exceptions do occur. Both *Bromus tectorum* and *Taeniatherum caput-medusae* are considered too widespread to actively manage and effectively control on the STNF. Conversely, *Isatis tinctoria*, *Nerium oleander*, and *Phytolacca americana* are not highly rated by either organization, but have been found to be a problem on the forest. These species are being managed by early detection/rapid response in order to eradicate them before they become entrenched on the forest.

Table 3.08-1. Noxious weed species found on the Shasta-Trinity National Forest

Species [a]	Common Name	CDFA Rating	Cal-IPC Rating [b]	Number of Locations	Total Acres
Aegilops cylindrica	jointed goatgrass	B	NR	1	**0.10**
Ailanthus altissima	tree of heaven	NR	Moderate	18	**213.04**
Andropogon virginicus	broomsedge bluestem	NR	NR	1	**4.10**
Bromus tectorum	cheatgrass	NR	High	30	**43.88**
Cardaria chalepensis	lenspod whitetop	B	Moderate	2	**1.20**
Carduus nutans	musk thistle	A	Moderate	26	**1526.43**
Carduus pycnocephalus	Italian plumeless thistle	C	Moderate	1	**0.67**
Centaurea diffusa	diffuse knapweed	A	Moderate	32	**1216.49**
Centaurea maculosa	spotted knapweed	A	High	22	**51.88**
Centaurea solstitialis	yellow starthistle	C	High	227	**788.32**
Chondrilla juncea	rush skeletonweed	A	Moderate	2	**14.20**
Cirsium arvense	Canada thistle	B	Moderate	40	**55.29**
Cirsium vulgare	Bull thistle	NR	Moderate	172	**570.01**
Convolvulus arvensis	field bindweed	C	NR	1	**6.41**
Cynoglossum officinale	gypsyflower	NR	Moderate	1	**6.41**
Cytisus scoparius	Scotch broom	C	High	33	**245.38**
Dipsacus fullonum	Fuller's teasel	NR	Moderate	1	**0.28**
Ficus carica	edible fig	NR	Moderate	2	**58.03**
Foeniculum vulgare	sweet fennel	NR	High	10	**0.93**
Genista monspessulana	French broom	C	High	11	**34.84**
Hypericum perforatum	Common St. Johnswort	C	Moderate	67	**317.51**
Isatis tinctoria	dyer's woad	B	Moderate	45	**998.73**
Linaria genistifolia* ssp. *dalmatica	Dalmation toadflax	A	Moderate	9	**71.86**
Nerium oleander	oleander	NR	NR	5	**62.72**
Phytolacca americana	American pokeweed	NR	NR	1	**0.01**
Robina pseudoacacia	black locust	NR	Limited	5	**16.36**
Rubus armeniacus	Himalayan blackberry	NR	High	294	**29.27**
Senecio jacobaea	stinking willie	B	Limited	1	**0.67**
Sorghum halepense	Johnsongrass	C	NR	8	**105.79**
Spartium junceum	Spanish broom	NR	High	18	**170.96**
Taeniatherum caput-medusae	Medusahead	C	High	2	**0.42**
Torilis arvensis	Spreading hedgeparsely	NR	Moderate	41	**4.08**
Tribulus terrestris	puncturevine	C	NR	2	**0.12**
Verbascum thapsus	Common mullein	NR	Limited	33	**144.57**

a - Species in **bold** are considered of the highest priority and are actively treated on the Shasta-Trinity National Forest.
b - California Invasive Plant Council Ratings (CalIPC)
High – Severe ecological impacts, reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Species usually widely distributed ecologically among and within ecosystems.
Moderate – Substantial and apparent, but not severe, ecological impacts; attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent on ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
Limited – Invasive, but either their ecological impacts are minor on a statewide level or information on them is insufficient to justify a higher rating, although they may cause significant problems in specific regions or habitats. Reproductive biology and other attributes result in low to moderate rates of invasion. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Species Occurring Within 100 Feet of a Trail or Road (Includes Unauthorized Routes as well as NFTS Routes)

The following summarizes the noxious weed species that are known to occur within 100 feet of a proposed route. Table 3.08-2 summarizes the species and their proximity to existing roads/trails and unauthorized roads/trails. Species ranked as a high priority for treatment are profiled.

Table 3.08-2. High priority noxious weed species on the Shasta-Trinity National Forest documented within 100 feet of an unauthorized roads/trails or existing system roads/trails and their percentage relative to the total percent and acreage on the Shasta-Trinity National Forest

Species	Number (and Acres) of Infestations within 100' of NFTS Roads/Trails or Unauthorized Routes	% of Known Infestations	% of Total Infested Acres
Ailanthus altissima (tree of heaven)	17 infestations (212.99 acres)	94	**99**
Andropogon virginicus (broomsedge bluestem)	1 infestation (4.1 acres)	100	**100**
Bromus tectorum (cheatgrass)	26 infestations (43.57 acres)	86	**99**
Cardaria chalepensis (lenspod whitetop)	1 infestation (0.28 acres)	50	**23**
Carduus nutans (musk thistle)	24 infestations (1526.09 acres)	92	**99**
Carduus pycnocephalus (Italian plumeless thistle)	1 infestation (0.67 acres)	100	**100**
Centaurea diffusa (diffuse knapweed)	27 infestations (1211.11acres)	84	**99**
Centaurea maculosa (spotted knapweed)	13 infestations (51.02 acres)	59	**98**
Centaurea solstitialis (yellow starthistle)	211 infestations (776.16acres)	93	**98**
Chondrilla juncea (rush skeletonweed)	2 infestations (14.19 acres)	100	**100**
Cirsium arvense (Canada thistle)	31 infestations (51.45 acres)	78	**93**
Cirsium vulgare (bull thistle)	157 infestations (481.95 acres)	91	**85**
Convolvulus arvensis (field bindweed)	1 infestation (6.41 acres)	100	**100**
Cynoglossum officinale (gypsyflower)	1 infestation (6.41 acres)	100	**100**
Cytisus scoparius (Scotch broom)	28 infestations (241.30 acres)	85	**98**
Dipsacus fullonum (Fuller's teasel)	1 infestation (0.28 acres)	100	**100**
Ficus carica (edible fig)	2 infestations (58.03 acres)	100	**100**
Foeniculum vulgare (sweet fennel)	9 infestations (0.92 acres)	90	**98**
Genista monspessulana (French broom)	11 infestations (34.84 acres)	100	**100**

Species	Number (and Acres) of Infestations within 100' of NFTS Roads/Trails or Unauthorized Routes	% of Known Infestations	% of Total Infested Acres
Hypericum perforatum (Common St. Johnswort)	61 infestations (316.56 acres)	91	**99**
Isatis tinctoria (dyer's woad)	38 infestations (998.12 acres)	84	**99**
Linaria dalmatica ssp. *dalmatica* (Dalmatian toadflax)	3 infestations (67.96 acres)	33	**95**
Nerium oleander (oleander)	5 infestations (62.72 acres)	100	**100**
Phytolacca americana (American pokeweed)	1 infestation (0.01 acres)	100	**100**
Robina pseudoacacia (black locust)	3 infestations (16.17 acres)	60	**98**
Rubus armeniacus (Himalayan blackberry)	230 infestations (22.90 acres)	79	**78**
Sorghum halepense (Johnsongrass)	8 infestations (105.87 acres)	100	**100**
Spartium junceum (Spanish broom)	18 infestations (170.96 acres)	100	**100**
Taeniatherum caput-medusae (medusahead)	1 infestation (0.10 acres)	50	**24**
Torilis arvensis (Spreading hedgeparsely)	39 infestations (3.88 acres)	95	**95**
Tribulis terrestris (puncturevine)	1 infestation (0.10 acres)	50	**83**
Verbascum thapsus (Common mullein)	31 infestations (144.14 acres)	94	**99**

A large portion of the STNF is considered relatively free of noxious weeds, with most infestations concentrated along roads (87 percent) or in areas of past and present disturbance, such as timber harvest units, skid trails, temporary roads, unauthorized routes, mining claims, and grazing allotments. The lower elevations on the forest and the mid-elevation valleys contain many of the high noxious weed concentrations. These areas often provide entry points or "seed sources" for weeds moving into the less-invaded parts of the forest.

Motor vehicle travel both on and off of roads and trails has been a part of forest recreation for many years. This activity has created a disturbed condition that greatly increases the vulnerability of the landscape to noxious weed invasion and spread. The STNF has been heavily influenced over the last 150 years by activities that include mining, livestock grazing, timber harvest, fire exclusion, large high-severity wildfires, and nonmotorized recreational activities such as camping, hiking, biking, and horseback riding. Undeniably, the additive effects of recent and past actions have shaped the present landscape and corresponding noxious weed infestations.

Over the past few years, a number of large wildland fires have occurred on the forest. These recent events increase the vulnerability of the landscape to weed establishment and spread by increasing the

availability of resources, such as light and nitrogen, and decreasing competition from native plant species. In their comparison of low-severity and high-severity burns, Turner et al. (1997) found that the density of the invasive Canada thistle after severe surface and crown fires was two to four times greater than the density of Canada thistle after a light surface fire.

Beyond these recent events, the effect of specific past management actions on noxious weed species is largely unknown. Targeted noxious weed surveys at the project-level first began relatively recently on the forest. While it is often difficult to draw definitive conclusions regarding the effects of past project activities on noxious weeds, the high level of past activity, combined with the current level of weed infestation, suggest that past activities have had a significant effect on noxious weed introduction and spread across the STNF.

Environmental Consequences

The following sections provide a discussion of the direct, indirect, and cumulative effects of each alternative on noxious weeds. It is important to note that the analysis below represents what is known about motor vehicle impacts along unauthorized routes at this point in time. Designation of a route is expected to concentrate motor vehicle use; this has the potential to increase the risk of noxious weed introduction and spread. Routes, infestations, and mitigations or control measures will need to be re-evaluated on a continual basis to assess and address the risk from noxious weeds. Refer to the noxious weed risk assessment (NWRA), which is incorporated by reference into this analysis and is located in the project record. The noxious weed risk assessment examines the indicators given in this analysis in addition to measures such as project dependant and project non-dependant factors, such as habitat alteration as a result of the project. One of the major conclusions of the NWRA is that enacting mitigation measures such as treatment of known sites will greatly reduce the spread of NNIS.

Effects Common to all Alternatives

Vehicle class has no effect on impacts to NNIS. Vehicle impacts are mostly from direct effects of driving over plants resulting in an increased risk of NNIS invasion. Vehicle size has a negligible effect on either process. Likewise, speed has no effect on NNIS, because effects are derived from the vehicle moving through habitat, not from how fast a vehicle travels through it. Proposed seasonal closures on route additions are expected to have a negligible effect on weed spread since these roads are open when the noxious weeds are in seed. The proposed seasonal closures occur primarily during the winter months, with some overlap into fall and spring. Motor vehicle use of these routes is often limited by snow conditions during winter months, regardless of an official closure. Forest Plan amendment for routes near heritage sites will have no direct or indirect effects on NNIS. The amendment has no specific action that will cause either a negative or positive effect on NNIS.

Alternative 1 – No Action

Direct/Indirect Effects of the Prohibition of Cross-Country Motor Vehicle Travel

This alternative does not prohibit cross-country travel or propose to add new routes to the NFTS. Alternative 1 carries the highest risk of noxious weed introduction and spread. The largest impact of this alternative is from cross-country travel, which has the potential to introduce new noxious weeds to areas that are not currently infested and to facilitate the expansion of existing occurrences. Under this alternative, it is impossible to quantify when and where noxious weeds would be encountered, spread, or introduced by motor vehicles; therefore, the 1,252 miles of unauthorized roads and trails are used as a proxy for current motor vehicle use on the forest (aside from National Forest Transportation System roads and motorized trails). Of the 5,219 unauthorized routes mapped on the STNF, 306 routes have weed occurrences documented within 100 feet of the route. There are 271 noxious weed occurrences documented within 100 feet of unauthorized routes (Table 3.08-3), and 92.7 miles of unauthorized routes within 100 feet of a known weed occurrence. Additionally, 773 known noxious weed sites totaling 1,051 acres are found in the area of cross-country motor vehicle travel.

Table 3.08-3. Alternative 1 known noxious weed species

Species[a]	Common Name	CDFA Rating	Cal-IPC Rating	Number of Locations	Total Acres
Ailanthus altissima	tree of heaven	NR	Moderate	2	**12.44**
Bromus tectorum	cheatgrass	NR	High	6	**1.48**
Carduus nutans	musk thistle	A	Moderate	15	**297.93**
Centaurea diffusa	diffuse knapweed	A	Moderate	14	**58.35**
Centaurea maculosa	spotted knapweed	A	High	6	**52.49**
Centaurea solstitialis	yellow starthistle	C	High	54	**7.30**
Cirsium arvense	Canada thistle	B	Moderate	6	**6.16**
Cirsium vulgare	Bull thistle	NR	Moderate	41	**44.47**
Cytisus scoparius	Scotch broom	C	High	5	**14.53**
Ficus carica	edible fig	NR	Moderate	1	**6.22**
Foeniculum vulgare	sweet fennel	NR	High	2	**0.17**
Genista monspessulana	French broom	C	High	1	**3.23**
Hypericum perforatum	Common St. Johnswort	C	Moderate	12	**11.20**
Isatis tinctoria	dyer's woad	B	Moderate	9	**88.26**
Nerium oleander	oleander	NR	NR	1	**6.22**
Robina pseudoacacia	black locust	NR	Limited	3	**8.66**

Species[a]	Common Name	CDFA Rating	Cal-IPC Rating	Number of Locations	Total Acres
Rubus armeniacus	Himalayan blackberry	NR	High	65	**5.27**
Sorghum halepense	Johnsongrass	C	NR	3	**10.26**
Spartium junceum	Spanish broom	NR	High	3	**6.30**
Taeniatherum caput-medusae	Medusahead	C	High	1	**0.04**
Torilis arvensis	Spreading hedgeparsely	NR	Moderate	12	**1.03**
Tribulus terrestris	puncturevine	C	NR	1	**0.03**
Verbascum thapsus	Common mullein	NR	Limited	8	**11.63**
Total noxious weeds				**271**	**652.69**
Total high priority noxious weeds				**174**	**540.05**

a - Species in bold are considered of the highest priority and are actively treated

This alternative has the highest number of unauthorized routes considered at "high risk" for weed introduction and spread. Table 3.08-4 summarizes the number of unauthorized routes considered at high risk of weed establishment and spread under alternative 1, which would allow continued motor vehicle travel on these routes.

Table 3.08-4. Alternative 1 risk ratings for unauthorized routes

Indicator (number of unauthorized routes)	Low Risk	Medium Risk	High Risk
A-Listed weed w/in 100 feet of route	0	0	174
No inventory or survey	0	0	4,948
B- or C-listed weed w/in 100 feet of route	0	97	0
Surveyed ≥ 2001; no weeds found	0	0	0
Total	**0**	**97**	**5,122**

Under this alternative, motor vehicles traveling on and off unauthorized routes would continue to create areas of disturbance that are vulnerable to weed invasion, and carry weed seeds and other propagules to new locations (Ouren et al. 2007; Von der Lippe and Kowarik 2007). Noxious weeds would continue to reduce the quality of native plant communities by displacing native species, altering nutrient and fire cycles, degrading soil structure and decreasing the quality and availability of forage for wildlife (Mack et al. 2000). Under this alternative, all but the most inaccessible habitats would be at risk of noxious weed invasion and spread from cross-country motor vehicle travel.

Motor vehicles interact directly and indirectly with noxious weeds primarily in two general ways: (1) Motor vehicles introduce weed propagules to new areas (Trombulak and Frissel 2000), and (2) Motor vehicles alter the landscape by causing disturbance in various forms; for example, by altering local hydrology, compacting soil, raising dust, crushing plants not adapted to disturbance and promoting those which are, and suppressing native vegetation (Brooks and Lair 2005; Gelbard and Harrison 2005; Ouren et al. 2007). In this way, motor vehicles are capable of simultaneously introducing exotic weeds and providing them with habitat (Christen and Matlack 2008).

Table 3.08-5. Known noxious weed species within Shasta Lake, Trinity Lake, and Iron Canyon Reservoir

Species [a]	Common Name	CDFA Rating	Cal-IPC Rating	Number of Locations	Total Acres
Ailanthus altissima	tree of heaven	NR	Moderate	2	**0.0045**
Centaurea solstitialis	yellow starthistle	C	High	12	**0.18**
Cirsium vulgare	Bull thistle	NR	Moderate	5	**0.027**
Cytisus scoparius	Scotch broom	C	High	2	**0.019**
Genista monspessulana	French broom	C	High	2	**0.04**
Hypericum perforatum	Common St. Johnswort	C	Moderate	12	**11.20**
Isatis tinctoria	dyer's woad	B	Moderate	6	**90.60**
Nerium oleander	oleander	NR	NR	1	**0.006**
Rubus armeniacus	Himalayan blackberry	NR	High	42	**2.35**
Sorghum halepense	Johnsongrass	C	NR	1	**0.009**
Spartium junceum	Spanish broom	NR	High	5	**0.25**
Torilis arvensis	Spreading hedgeparsely	NR	Moderate	2	**0.097**
Tribulus terrestris	puncturevine	C	NR	1	**0.06**
Total noxious weeds				**93**	**104.8**
Total high priority noxious weeds				**70**	**93.45**

a Species in bold are considered of the highest priority and are actively treated.

Table 3.08-6. Known noxious weed species within Shasta Lake and Trinity Lake (Iron Canyon Reservoir excluded)

Species [a]	Common Name	CDFA rating	Cal-IPC rating	Number of locations	Total Acres
Ailanthus altissima	tree of heaven	NR	Moderate	2	**0.0045**
Centaurea solstitialis	yellow starthistle	C	High	8	**0.11**
Cirsium vulgare	Bull thistle	NR	Moderate	3	**0.006**
Cytisus scoparius	Scotch broom	C	High	2	**0.019**
Genista monspessulana	French broom	C	High	2	**0.04**
Hypericum perforatum	Common St. Johnswort	C	Moderate	12	**11.20**
Isatis tinctoria	dyer's woad	B	Moderate	6	**90.60**
Nerium oleander	oleander	NR	NR	1	**0.006**
Rubus armeniacus	Himalayan blackberry	NR	High	2	**0.15**
Sorghum halepense	Johnsongrass	C	NR	1	**0.009**
Spartium junceum	Spanish broom	NR	High	5	**0.25**
Torilis arvensis	Spreading hedgeparsely	NR	Moderate	1	**0.083**
Tribulus terrestris	puncturevine	C	NR	1	**0.06**
Total noxious weeds				**46**	**102.5375**
Total high priority noxious weeds				**26**	**91.175**

a Species in bold are considered of the highest priority and are actively treated.

Motor vehicle travel under the high-water marks of Shasta Lake, Trinity Lake, and Iron Canyon Reservoir would continue. These areas are highly susceptible to noxious weed invasion. The combination

of abundant sunlight and no competing vegetation allow highly competitive noxious weeds to colonize newly available areas as the lakes draw down. There are currently thirteen known noxious weeds covering 104.8 acres below the high-water mark of these three lakes (see Tables 3.08-5 and 3.08-6). Noxious weed sites are mostly concentrated at access points to the lakes. The weeds are often killed when the water level rises making the treatment of these weeds a low priority. Because of the fluctuating level of the water on these lakes, the location and acres of noxious weeds can vary annually. Motor vehicle use below the high-water mark on these lakes would likely result in further spread of noxious weeds. It is uncertain how much of this spread would occur outside of the area below the high-water mark.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

No roads, trails, or areas are proposed in this alternative. No Forest Plan amendment for routes near heritage sites is proposed. Alternative 1 does not add new facilities to the NFTS; therefore there will be no effects to NNIS from this type of action.

Direct/Indirect effects of Changes to the Existing NFTS (This Can include Deletions of Facilities and Changing the Vehicle Class and Season of Use)

No changes to the existing NFTS are proposed in this alternative, therefore there would be no direct or indirect effects.

Cumulative Effects

Many forest activities such as livestock grazing, timber harvesting, recreational use, fuels treatments and fire suppression, road and railroad maintenance, and special uses also have the capabilities of introducing noxious weeds and providing them with disturbed habitats upon which they may gain footholds. For a complete list of present and reasonably foreseeable forest activities, refer to appendix B. Mitigations for these management activities would include activities such as pre-project weed surveys, flagging and avoidance of noxious weed occurrences, washing of vehicles and equipment prior to entering the forest, use of weed-free materials, minimizing of ground disturbance, and restoration of disturbed sites with native materials. However, the most effective mitigation for this project will be to treat known noxious weed sites in all action alternatives (see Botany BA/BE, Appendix B: Route Risk Assessment for Botanical Species for Individual Mitigations). Implementation of the integrated weed management strategy (USDA Forest Service 2005) minimizes the risk of noxious weed introduction and spread associated with future foreseeable actions.

Present and foreseeable projects are extensive on a forest-wide basis, and cover a wide array of activities. Fuel and vegetation management have the potential to increase the spread of noxious weeds through the introduction of seeds from other locations, and the alteration of habitat to favor NNIS. There are 21 current or foreseeable projects on the forest covering approximately 70,000 acres (See appendix

B). NNIS will be surveyed for and mitigations proposed during the planning of these projects, reducing the cumulative impacts to risk of spread.

Impacts from timber harvest and vegetation treatment projects are very similar to those of fuel and vegetation treatment, including increase chance of vectoring through project equipment and changes to canopy closure resulting in a favorable environment for NNIS. Two projects listed under vegetation management are for treatment of noxious weeds. Both projects will have a beneficial cumulative impact NNIS risk of spread by preventing vectoring and establishment of new population of nonnative invasive species. There are 16 current or foreseeable projects on the forest covering approximately 27,000 acres (see appendix B). NNIS will be surveyed for and mitigations proposed during the planning of these projects, reducing the cumulative impacts to risk of spread.

Ongoing livestock grazing has the potential to directly affect spreading NNIS through increased vectoring by seeds that adhere to the animals and the resultant ground disturbance associated with cattle. Additionally, increased risk of NNIS establishment can result from selective grazing of native species over more unpalatable NNIS. There are currently 14 active allotments covering 402,492 acres on the STNF. Known noxious weed sites are treated as appropriate and feasible in range allotments, reducing cumulative impacts from this activity.

Mining projects have the potential to result in increased weeds by vegetation removal. Mine sites often have a high amount of ground disturbance, and occasionally seeding is either not successful or cost prohibitive. Four these reasons, mining projects are typically sinks for NNIS. Four current or foreseeable projects covering an estimated 30 acres are planned for the STNF (see appendix B). NNIS will be surveyed for and mitigations proposed during the planning of these projects, reducing the cumulative impacts to risk of spread.

Recreation projects are expected to have a relatively small effect on NNIS spread, although they have the potential to increase weed spread by vegetation removal in trail reconstruction and vectoring from dispersed recreation. Two projects are listed in appendix B; however, only the Greasy Loop Trails relocation project has the potential for affecting NNIS.

Special use projects have the potential to result in direct effects to NNIS spread by vegetation removal. Additionally, indirect effects can result by increased NNIS invasion and changes in successional pathways due to habitat alteration. There are approximately 1,740 ongoing special use permits and 19 foreseeable projects covering on the STNF (see appendix B). NNIS will be surveyed for and mitigations proposed during the planning of these projects, reducing the cumulative impacts to risk of spread.

Road maintenance includes activities such as grading, resurfacing, culvert cleaning, hazard tree removal, snow plowing, and slide removal. Roadside management has the potential to increasing risk of competition from NNIS during tree removal activities by increased vectoring, ground disturbance, and alteration of habitat to favor NNIS species that prefer open areas. NNIS will be surveyed for and

mitigations proposed during the planning of these projects, reducing the cumulative impacts to risk of spread.

Roads proposals and decisions listed in appendix B have the potential to have a short-term effect on NNIS spread through ground-disturbing activities. However, these activities are planned and appropriate mitigations have been prescribed. There are 182.69 miles of NFTS roads that will be abandoned, closed, or decommissioned. This will result in a long-term benefit from reduced risk of NNIS spread and invasion. There are 3.5 miles of seasonal closure roads that will have no effect. There are 69.36 miles of unauthorized routes that will be abandoned, closed, or decommissioned. This will result in a long-term benefit from reduced risk of NNIS spread and invasion. Additionally, 5.60 miles of unauthorized routes are proposed to be added to the NFTS. The effects of adding routes to the NFTS are discussed in alternative 2 of this document. One important consideration is that these routes will now be managed, possibly resulting in NNIS invasions and other resource concerns being more likely to be detected and managed.

The additional effects of the no-action alternative for noxious weeds would be:

- a net increase of disturbed habitat due to motor vehicle use,
- the probability that habitat disturbed due to other forest activities would remain disturbed for longer periods of time as motor vehicle users drive in such areas,
- the augmented ability of weed propagules to travel quickly and distantly into and across the forest, and
- the increased likelihood that weeds do travel into or across the forest would find amenable disturbed habitat into which they may be introduced.

In summary, continued cross-country travel compounds the impacts of other forest projects upon soils and native plant communities; intensifies, prolongs, and augments the creation of noxious weed habitat; and provides more opportunities for noxious weeds to be introduced and take advantage of these disturbed habitats. Under this alternative, 5,219 high risk unauthorized routes would continue to be used by motor vehicles, in addition to seven medium-risk routes. This would be combined with the 5,188 already established NFTS roads and trails for a total of 10,407 roads open to motor vehicle use under alternative 1, combined with the high risk of continuing proliferation of new user created routes across the forest.

Action Alternatives

The following section presents an overview of the effects analysis for each action alternative. In general, the greater the number of motor vehicle trails and roads (and miles) and the less mitigation proposed, the higher the risk of noxious weed spread. Of the action alternatives, alternative 5 carries the highest risk

from noxious weeds, whereas alternative 3, which adds no unauthorized routes to the NFTS and prohibits cross-country motor vehicle travel across the landscape as well as the lake bottoms, has the lowest risk of weed introduction and spread.

Alternative 2 – Proposed Action

Alternative 2 would prohibit cross-country travel off NFTS roads and motorized trails; add 44.2 miles of existing unauthorized routes and Shasta Lake Area and Trinity Lake Area as open areas to the NFTS.

Direct/Indirect Effects of the Prohibition of Cross-Country Motor Vehicle Travel

This alternative carries a much lower risk of noxious weed introduction and spread than alternative 1. Prohibiting cross-country motor vehicle travel would minimize the risk of weed establishment and spread along unauthorized routes not proposed for designation. Additionally, the risk would be minimized for 773 known noxious weed sites (1,051 acres) throughout the forest.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Under alternative 2, nine proposed routes have weed occurrences documented within 100 feet of the route (Table 3.08-7). There are ten noxious weed occurrences documented within 100 feet of unauthorized routes (Table 3.08-7), with 6.0 miles of routes within 100 feet of a known weed occurrence.

Table 3.08-7. Summary of noxious weed indicator measures for alternative 2

Indicator Measure	Value
Miles of routes added for public motor vehicle use within or adjacent to noxious weed sites	6.0 miles
Number of routes added for public motor vehicle use within or adjacent to noxious weed sites	9 routes
Acres of noxious weed sites within 100 feet of a proposed route	51.01 acres
Total number of noxious weed occurrences within 100 feet of a proposed route	**10 occurrences**

Table 3.08-8. Alternative 2 known noxious weed species

Species [a]	Common Name	CDFA Rating	Cal-IPC Rating	Number of Locations	Total Acres
Carduus nutans	musk thistle	A	Moderate	1	**23.00**
Centaurea diffusa	diffuse knapweed	A	Moderate	2	**18.8**
Cirsium arvense	Canada thistle	B	Moderate	1	**5.5**
Cirsium vulgare	Bull thistle	NR	Moderate	1	**0.28**
Cytisus scoparius	Scotch broom	C	High	1	**0.30**
Isatis tinctoria	dyer's woad	B	Moderate	3	**2.8**
Spartium junceum	Spanish broom	NR	High	1	**0.02**
Total noxious weeds				**10**	**51.01**
Total high priority noxious weeds				**8**	**45.23**

a - species in bold are considered of the highest priority and are actively treated.

Alternative 2 has a much lower risk of weed infestation and spread than alternative 1. Under this alternative, 86 unauthorized routes considered at high risk for weed introduction and spread would be added to the NFTS, as well as two routes with medium risk. Seventy-eight routes are considered at high risk because they have not been previously surveyed. Table 3.08-9 summarizes the number of unauthorized routes considered at high risk of weed establishment and spread which are proposed for addition to the NFTS under alternative 2.

Table 3.08-9. Alternative 2 risk ratings for unauthorized routes proposed for addition to the NFTS

Indicator (Number of Unauthorized Routes)	Low Risk	Medium Risk	High Risk
A-Listed weed w/in 100 feet of route	0	0	8
No inventory or survey	0	0	78
B- or C-listed weed within 100 feet of route	0	2	0
Surveyed ≥ 2001; no weeds found	0	0	0
Total	**0**	**2**	**86**

The addition of 44.2 miles of unauthorized routes to the NFTS road system would allow continued motor vehicle traffic within 100 feet of 10 documented occurrences of noxious weeds. Most of these occurrences have not been treated. Mitigation to pull the weeds by hand would be implemented prior to adding the route to the NFTS. This may reduce the risk of spread of some species; however, because many species will leave seed banks these occurrences would continue to occur without continual monitoring and pulling. For some weed species such as rhizomatous species, pulling is not an effective treatment method as the weeds spread by their roots. Noxious weed occurrences in close proximity to proposed route additions would perpetuate the existing risk of vehicles spreading these weed species across the forest.

Areas below High-Water Mark: Public motor vehicle travel below the high-water mark on Shasta Lake and Trinity Lake would be restricted to highway-legal vehicles only with a maximum speed limit of 15 miles per hour. This would not result in a change from the no-action alternative because vehicle class has no effect on the spread of weeds. Similarly, the speed of vehicles has no effect on weed spread. Cultural resource protection measures include the potential for closing areas below the high water mark if needed to protect resources while mitigations measures are developed. Closing areas could decrease the risk of spread depending on the area and timing of the closure. Effects of motor vehicle travel below the high-water mark would be the same as for alternative 1. However, the overall risk of increased weed spread would be decreased from lake bottom use since Iron Canyon Reservoir would not be open to use. Under alternative 2 there would be 44 less high priority sites, but only 2.28 less acres being affected (see Tables 3.08-5 and 3.08-6). The lake bottom seasonal restrictions that were proposed in the FEIS to protect nesting and young northern spotted owls in habitat adjacent to Trinity Lake have been removed from this analysis. This change will have no measurable effect on the risk of NNIS spread.

Changes to the Existing NFTS [Changing the Vehicle Class or Season of Use]

There are no changes to the NFTS proposed in this alternative; therefore, there will be no direct, indirect, or cumulative effects to NNIS.

Cumulative Effects

The effects from forest management and use activities are the same as for alternative 1. For a complete discussion refer to the alternative 1 "Cumulative Effects" section. For a complete list of present and reasonably foreseeable forest management activities, refer to appendix B.

Travel off of designated NFTS roads would be prohibited in this alternative, which would greatly reduce the risk of noxious weed introduction and spread across the forest. In comparison to the no-action alternative, the proposed action has a greatly reduced risk of weed spread from any new infestations that might occur with timber harvest, grazing, prescribed burning, or wildfire activities, as well as other forest management and use activities impacting lands away from NFTS roads. Future ground-disturbing projects would also be less susceptible to the introduction of new weed propagules or to continued disturbance due to motor vehicle use. The prohibition of cross-country motor vehicle travel would eliminate disturbance off of NFTS roads and motorized trails. Motor vehicle disturbance favors such undesirable species as invasive exotic annual grasses, so the lack of it would favor native perennial grasses and forbs and generally later-seral (late-stage ecological succession) native vegetation, which is better able to resist weed invasion (Gelbard and Harrison 2005). Under alternative 2, 6.04 miles of routes infested with known noxious weed occurrences would be added to the NFTS. These 10 known occurrences cover 51.01 acres (Table 3.08-8). There are 334 NFTS roads that will be abandoned, closed, or decommissioned as a result of present and reasonably foreseeable actions. This will result in approximately 186 less miles of vector for NNIS. Under this alternative, 2,810 roads and motorized trails would be open for motor vehicle use.

Alternative 3 – Cross-County Travel Prohibition Only – No Additions to the Existing NFTS

Alternative 3 prohibits cross-country travel off NFTS roads and below the high-water marks of reservoirs, adds roads, trails, or areas to the NFTS, and does not change seasonal use restrictions or vehicle classes on existing NFTS roads.

Direct/Indirect Effects of the Prohibition of Cross-Country Motor Vehicle Travel

Alternative 3 prohibits cross-country travel on 1,599,471 acres of NFS lands and would amend the Forest Plan to prohibit cross-country travel. Under alternative 3, potential spread by motor vehicles from existing noxious weed occurrences within 100 feet of existing unauthorized routes (Table 3.08-10) would be eliminated. Prohibiting motor vehicle from traveling off designated routes would greatly reduce the potential for creating noxious weed habitat through ground disturbance. It would also greatly reduce the potential for spread of noxious weeds from existing occurrences.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

No roads, trails, or areas are proposed in this alternative; therefore, there will be no direct, indirect or cumulative effects to NNIS spread.

Table 3.08-10. Summary of noxious weed indicator measures for alternative 3

Indicator Measures	Values
Miles of routes added for public motor vehicle use within or adjacent to noxious weed sites	0
Number of routes added for public motor vehicle use within or adjacent to noxious weed sites	0
Acres of noxious weed sites within 100 feet of a proposed route	0
Total number of noxious weed sites within 100 feet of a proposed route	**0**

Changes to the Existing NFTS [Changing the Vehicle Class or Season of Use]

No changes to the existing NFTS are proposed in this alternative; therefore, there will be no direct, indirect, or cumulative effects to NNIS spread.

Cumulative Effects

The effects from forest management and use are the same for alternative 3 as for the no-action and proposed-action alternatives; a complete discussion can be found in the alternative 1 “Cumulative Effects” section. The additional effect from alternative 3 from the prohibition of cross-country travel would be the same as for alternative 2, described above. The difference in cumulative effects for alternative 3 is that there would be no unauthorized routes added to the NFTS. This would eliminate vehicle travel through the 273 known noxious weed occurrences located along unauthorized routes. This alternative would therefore have the lowest risk of noxious weed introduction and spread. There are 334 NFTS roads abandoned, closed, or decommissioned as a result of present and reasonably foreseeable actions. This will result in approximately 186 less miles of vector for NNIS. Under this alternative, a total of 2,388 roads and motorized trails would be open for motor vehicle use.

Alternative 4 – Minimize Impacts to Natural Resources and Roadless Areas

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

This alternative would prohibit cross-country travel on 1,599,277 acres of NFS lands and would amend the Forest Plan accordingly. Alternative 4 would prohibit cross-country travel off designated NFTS roads and motorized trails. Therefore, potential spread by motor vehicles from existing noxious weed occurrences within 100 feet of existing unauthorized routes (Table 3.08-10) would be eliminated. Under this alternative, motor vehicle traffic would be prohibited from traveling off designated routes, which would greatly reduce the potential for creating noxious weed habitat through ground disturbance. It would also reduce the potential for spread of noxious weeds from existing occurrences.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Alternative 4 would add 15.6 miles of unauthorized routes to the NFTS road and motorized trail system. There are no known weed sites along routes added in this alternative (Table 3.08-11); however, all 26 routes have not been surveyed so are considered a high risk. Additionally, the new routes do add to vehicle traffic and the increased possibility of future infestations. (Table 3.08-12).

Mitigation to pull the weeds by hand would be implemented prior to adding the route to the NFTS. This may reduce the risk of spread of some species; however, because many species will leave seed banks these occurrences would continue to occur without continual monitoring and pulling, Additionally, for some weed species such as rhizomatous species, pulling is not an effective treatment method as the weeds spread by their roots. Noxious weed occurrences in close proximity to proposed route additions would perpetuate the existing risk of vehicles spreading these weed species across the forest.

Table 3.08-11. Summary of noxious weed indicator measures for alternative 4

Indicator Measure	Value
Miles of routes added for public motor vehicle use within or adjacent to noxious weed sites	0
Number of routes added for public motor vehicle use within or adjacent to noxious weed sites	0
Acres of noxious weed sites within 100 feet of a proposed route	0
Total number of noxious weed sites within 100 feet of a proposed route	**0**

Table 3.08-12. Alternative 4 risk ratings for unauthorized routes

Indicator (Number of Unauthorized Routes)	Low Risk	Medium Risk	High Risk
A-Listed weed w/in 100 feet of route	0	0	0
No inventory or survey	0	0	26
B- or C-listed weed w/in 100 feet of route	0	0	0
Surveyed ≥ 2001; no weeds found	0	0	0
Total	**0**	**0**	**26**

Areas below High-Water Mark: Public motor vehicle travel below the high-water mark on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir would be open to highway-legal vehicles only, with a maximum speed limit of 10 miles per hour assigned to protect cultural resources. Cultural resource protection measures include the potential for closing areas below the high water mark if needed to protect resources while mitigations measures are developed. Closing areas could decrease the risk of spread depending on the area and timing of the closure. As stated previously, vehicle class and speed have no effect on noxious weed spread. The lake bottom seasonal restrictions that were proposed in the FEIS to protect nesting and young northern spotted owls in habitat adjacent to the reservoirs have been removed from this analysis. This change will have no measurable effect on the risk of NNIS spread. The addition of Iron Canyon Reservoir open area carries a higher risk for weed spread along lake bottoms and surrounding areas than for alternative 2 (see Tables 3.08-5 and 3.08-6). While there are more occurrences, the acres of infested lake bottoms differs very little. Due to the fluctuating reservoir levels, the amount of open area available for NNIS colonization and persistence varies through time. Existing NNIS on lake

bottoms is a less reliable predictor for overall risk of spread per alternative than weed infestations along routes.

Changes to the Existing NFTS [Changing the Vehicle Class or Season of Use]

Alternative 4 changes vehicle class on 30.41 miles of existing NFTS roads to allow highway-legal and non-highway-legal motor vehicle use on the same road segments. Vehicle class has no effect on impacts to NNIS so there would no effect from this action (see "Effects Common to All Alternatives").

Cumulative Effects

Alternative 4 adds 26 high risk routes (i.e., routes not surveyed for NNIS) to the 2,388 routes currently in the NFTS. This accounts for the 334 NFTS routes that will be closed, abandoned, or decommissioned. The effects from forest management and use are the same for alternative 4 as for the no-action and proposed-action alternatives, and a complete discussion can be found in the alternative 1 "Cumulative Effects" section. The additional effect from alternative 4 from the prohibition of cross-country travel would be the same as for alternative 2, described above. Under this alternative, a total of 2,414 roads would be open for motor vehicle use, and no routes with known weed occurrences would be added to the NFTS.

Alternative 5 – Improved Access and Motorized Recreation Opportunities

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

This alternative would prohibit cross-country travel on 1,599,062 acres of NFS lands and would amend the Forest Plan accordingly. This alternative carries a much lower risk of noxious weed introduction and spread than alternative 1. The prohibition of cross-country motor vehicle travel would minimize the risk of weed establishment and spread along unauthorized routes not proposed for designation. Additionally, the risk would be minimized for 41 known noxious weed sites (89 acres) throughout the forest.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Alternative 5 would add 106 miles of unauthorized routes. The direct, indirect, and cumulative effects of alternative 5 on noxious weeds are predicted to be slightly higher than those of alternative 2, due to the slightly higher numbers of known noxious weeds and infested routes (Table 3.08-13).

This alternative would add the same routes passing within 100 feet of the same noxious weed occurrences as would alternative 2 (Table 3.08-14). Direct and indirect effects from the addition of proposed routes in alternative 5 would therefore be similar to those of alternative 2.

Table 3.08-13. Summary of noxious weed indicator measures for alternative 5

Indicator Measure	Value
Miles of routes added for public motor vehicle use within or adjacent to noxious weed sites	7.8 miles
Number of routes added for public motor vehicle use within or adjacent to noxious weed sites	11 routes
Acres of noxious weed sites within 100 feet of a proposed route	58.86 acres
Total number of noxious weed sites within 100 feet of a proposed route	**11 locations**

Table 3.08-14. Alternative 5 known noxious weed species along proposed routes

Species	Common Name	CDFA Rating	Cal-IPC Rating	Number of Locations	Total Acres
Carduus nutans	musk thistle	A	Moderate	2	**30.85**
Centaurea diffusa	diffuse knapweed	A	Moderate	2	**18.90**
Cirsium arvense	Canada thistle	B	Moderate	1	**5.5**
Cirsium vulgare	Bull thistle	NR	Moderate	1	**0.28**
Cytisus scoparius	Scotch broom	C	High	1	**0.30**
Isatis tinctoria	dyer's woad	B	Moderate	3	**2.93**
Spartium junceum	Spanish broom	NR	High	1	**0.02**
Total noxious weeds				**11**	**58.86**
Total high priority noxious weeds				**8**	**53.08**

Alternative 5 has a much lower risk of weed infestation and spread than alternative 1. Under this alternative, 221 unauthorized routes considered at high risk for weed introduction and spread would be added to the NFTS, as well as 2 routes with medium risk. The vast majority of the routes considered at high risk are because they have not been surveyed for NNIS. Table 3.08-15 summarizes the number of unauthorized routes considered at high risk of weed establishment and spread under alternative 5.

Table 3.08-15. Alternative 5 risk ratings for unauthorized routes

Indicator (Number of Unauthorized Routes)	Low Risk	Medium Risk	High Risk
A-Listed weed w/in 100 feet of route	0	0	9
No inventory or survey	0	0	212
B- or C-listed weed w/in 100 feet of route	0	2	0
Surveyed ≥ 2001; no weeds found	0	0	0
Total	**0**	**2**	**221**

The addition of 106 miles of unauthorized routes to the NFTS road system would allow continued motor vehicle traffic within 100 feet of 11 documented occurrences of noxious weeds. Mitigation to pull the weeds by hand would be implemented prior to adding the route to the NFTS. This may reduce the risk of spread of some species; however because many species will leave seed banks these occurrences would continue to occur without continual monitoring and pulling, Additional, for some weed species such as rhizomatous species, pulling is not an effective treatment method as the weeds spread by their roots. The presence of noxious weed occurrences in proximity to proposed route additions would continue the currently present risk of vehicles spreading these weed species across the forest.

Areas below High-Water Mark: Public motor vehicle travel below the high-water mark on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir would be open all vehicle classes with a maximum speed limit of 10 miles per hour assigned to protect cultural resources. Cultural resource protection measures include the potential for closing areas below the high water mark if needed to protect resources while mitigations measures are developed. Closing areas could decrease the risk of spread depending on the area and timing of the closure. As stated previously, vehicle class and speed have no effect on noxious weed spread. The lake bottom seasonal restrictions that were proposed in the FEIS to protect nesting and young northern spotted owls in habitat adjacent to the reservoirs have been removed from this analysis. This change will have no measurable effect on the risk of NNIS spread.

The addition of Iron Canyon Reservoir open area carries a higher risk for weed spread along lake bottoms and surrounding areas than for alternative 2 (see Tables 3.08-5 and 3.08-6). While there are more occurrences, the number of acres infested on the lake bottoms differs very little. Due to the fluid nature of the amount of open area available for NNIS colonization and persistence, existing NNIS on lake bottoms is a less reliable predictor for overall risk of spread per alternative than weed infestations along routes.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Alternative 5 changes vehicle class on 30.41 miles of existing NFTS roads to allow highway-legal and nonhighway-legal motor vehicle use on the same road segments. Vehicle class has no effect on impacts to NNIS so there would no effect from this action (see “Effects Common to All Alternatives”).

Cumulative Effects

Alternative 5 adds 221 high risk routes and 2 medium risk routes to the 2,388 routes currently in the NFTS, with the reduction of routes from present and reasonably foreseeable actions. The effects from forest management and use are the same for Alternative 5 as for the no-action and proposed-action alternatives, and a complete discussion can be found in the alternative 1 “Cumulative Effects” section. The additional effect in alternative 5 from the prohibition of cross-country travel would be the same as for alternative 2, described above. Under this alternative, a total of 2,609 roads would be open for motor vehicle use, and 11 routes with known weed occurrences would be added to the NFTS. As a result, this alternative has the highest cumulative effect on risk of noxious weed spread of all the action alternatives.

Summary of Effects Analysis across All Alternatives

The risk of noxious weed introduction and spread varies among the proposed alternatives due to the number and mileage of routes within or adjacent to noxious weed infestations and the total number and acreage of weed infestations within 100 feet of a proposed route (see Table 3.08-16). Alternative 1 has the highest risk of noxious weed introduction and spread, primarily due to the allowance for cross-country travel, which provides potential access to all but the most inaccessible weed infestations and native plant habitats. Out of the action alternatives, alternative 3 poses the lowest risk from noxious weeds, because it adds no new routes. Alternative 4, designed for resource protection, has the second lowest risk of weed

introduction and spread due to the addition of new routes, but a lack of known weed sites. Alternative 2 and 5 pose a moderate risk in weed spread, primarily because they add new routes, but limit cross-country travel and have a moderate amount of known weed sites.

In the following table, rankings are scored on a scale of 1 to 5 from greatest (1) to least (5) impact. A score of 1 indicates the alternative has the most impact for spread of noxious weeds related to the indicator; 5 indicates the alternative has the least impact for spread of noxious weeds related to the indicator.

Table 3.08-16. Summary of noxious weed risk under each alternative

	Rankings of Alternatives for Each Indicator				
Indicators – Noxious Weeds	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**
Miles of unauthorized or proposed system routes open for public motor vehicle use within or adjacent to noxious weed sites	1	3	5	4	2
Number of unauthorized or proposed routes open for public motor vehicle use within or adjacent to noxious weed sites	1	3	5	4	2
Acres of noxious weed infestations within 100 feet of unauthorized or proposed routes	1	3	5	4	2
Total number of noxious weed sites within 100 feet of unauthorized or proposed routes	**1**	**3**	**5**	**4**	**2**
Overall risk of noxious weed spread	1	3	5	4	2

Compliance with the Forest Plan and Other Direction

The proposed action alternatives are consistent with the Forest Plan and other direction. A noxious weed risk assessment has been completed for each alternative (FSM 2081.03) and under alternatives 2, 4 and 5, which add routes to the NFTS, noxious weed control measures (i.e., hand pulling) have been identified in areas of (FSM 2081.03). See Botany BA/BE, appendix B: Route Risk Assessment for Botanical Species for individual mitigations by route.

3.09. Visual Resources

Introduction

This section examines the extent to which alternatives respond to visual resources management direction established in the Shasta-Trinity National Forest Land and Resource Management Plan (LRMP) and the Travel Management Rule. The LRMP visual resources direction was established under the implementing regulations of the National Forest Management Act (NFMA).

In the development of the Shasta-Trinity National Forest Land and Resource Management Plan (Forest Plan), the forest's visual resources were inventoried to determine the landscape's scenic attractiveness (variety class inventory) and the public's visual expectations (sensitivity level inventory). Based upon these inventories, visual quality objectives (VQOs) were established for all forest land areas. The VQOs establish minimum acceptable thresholds for landscape alterations from an otherwise natural-appearing forest landscape. For example, areas with a VQO of retention are expected to retain a natural appearance; areas with a partial retention VQO may have some alterations, but they remain subordinate to the characteristic landscape; areas with a modification VQO can have alterations that do not appear natural.

Roads and trails create linear alterations in landscapes that can be mitigated through sound design. Unmitigated, they present uncharacteristic line qualities in forest landscapes. Landscapes with a dense canopy cover and/or sloping terrain have the capability of masking these linear alterations; sparsely covered landscapes have less capability. The proliferation of unauthorized routes, particularly in sparsely covered landscapes, can adversely affect the forest's visual resources.

Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the proposed action as it affects visual resources includes the following.

National Forest Management Act (NFMA)

NFMA, and its implementing regulations, required the inventory and evaluation of the forest's visual resource, addressing the landscape's visual attractiveness and the public's visual expectations. Management prescriptions for definitive lands areas of the forest are to include visual quality objectives.

Travel Management Rule

The Travel Management Rule does not cite aesthetics specifically, but in the designation of roads, trails, or areas, the responsible official shall consider effects on forest resources, with the objective of minimizing effects of motor vehicle use.

Shasta-Trinity National Forest Land and Resource Management Plan (LRMP)

The LRMP contains forest-wide management direction in the form of visual quality objectives (VQO) and specific management area direction for visual resources. The visual standards and guidelines in the LRMP applicable to motorized travel management include the following:

Visual Quality (Chapter 4 – Standards and Guidelines, page 4-27 to 4-28)

B. In the following sensitive travel corridors, the foreground portions (areas located up to ¼ to ½ mile from the road viewer) will be managed primarily to meet the adopted VQO of retention (R):

1. Everett Memorial Highway
2. Interstate 5
3. State Highway 3
4. State Highway 36
5. State Highway 89
6. State Highway 299
7. U.S. Highway 97

C. In the following sensitive travel corridors, the middleground portions (areas between ¼ to ½ mile and 3 to 5 miles from the road viewer) will be managed primarily to meet the adopted VQO of partial retention:

1. Everett Memorial Highway
2. Interstate 5
3. South Fork – Sacramento River Rd (40N26)
4. State Highway 3
5. State Highway 36
6. State Highway 89
7. State Highway 299
8. U.S. Highway 97

D. In the following sensitive travel corridors, the foreground portions (areas located ¼ to ½ mile from the road viewer) will be managed primarily to meet the adopted VQO of partial retention:

1. Ah-Di-Na Rd (38N53)
2. Canyon Creek Rd (County 401 to Ripstein Campground)
3. Castle Lake Rd (County 2M020)
4. Coffee Creek Rd (County 104)
5. Eastside Road (County 106)
6. Everitt Hill Rd (Arterial Route 188)
7. Fowlers Rd (39N28.01)
8. Gilman Rd (35N60/County 7HO1 from I-5 East to McCloud River Bridge
9. Harris Spring Rd (43N15.1 from State Highway 89 to Powder Hill Rd 43N49)
10. Hobo Gulch Rd (34N07Y/County 421)
11. Hyampom Rd (County 301)
12. Mount Shasta Round the Mountain Rd.
13. New River Rd (County 402 to Denny)
14. Powder Hill Rd (43N49)
15. Rush Creek Rd (County 204)
16. South Fork Mountain Rd (6N12/6N01)
17. South Fork - Sacramento River Rd (40N26)
18. Trinity Dam Boulevard (County 105)
19. Wildwood Rd (County 302)

The sensitive travel corridors listed above were identified as key viewsheds for this analysis. (Forest Plan 4-27, 28).The number of key viewsheds impacted by proposed activities was used as an analysis indicator and is discussed further in the Effects Analysis Methodology section below. Generally, views from the Pacific Crest Trail are managed for partial retention VQO. Alterations may be noticeable, but must be subordinate to the characteristic landscape.

Management Prescriptions (Forest Plan Chapter 4 – Standards and Guidelines, page 4-31 to 4-91)

Some management prescriptions are assigned a VQO or a range of VQOs to guide decisions and resource management activities. Route additions are proposed in the following management prescription areas. Management prescription areas not listed below have no actions proposed in them or do not offer Standard and Guidelines direction for VQOs.

3. Administratively Withdrawn Areas

II. Limited Roaded Motorized Recreation

D. Standards and Guidelines

12. Adjacent management activities that are seen from within developed recreation sites will meet a VQO of retention in the foreground and partial retention in the middle ground. The area within the developed recreation site will meet a VQO of retention (LRMP 4-47).

5. Matrix Lands

III. Roaded Recreation

D. Standards and Guidelines

13. Manage to meet adopted Visual Quality Objectives of retention, partial retention or modification as indicated on the adopted VQO map. Unseen areas within any mapped VQO may be managed for modification except in recreation river corridors (LRMP 4-65).

VI. Wildlife Habitat Management

D. Standards and Guidelines

7. Manage to meet adopted Visual Quality Objectives of retention, partial retention, and modification as indicated on the adopted VQO map (LRMP 4-66).

VIII. Commercial Wood Products Emphasis

D. Standards and Guidelines

5. Manage to meet adopted Visual Quality Objectives of partial retention, modification and maximum modification as indicated on the adopted VQO map (LRMP 4-67).

The Shasta-Trinity National Forest also utilizes a map that displays the visual quality objectives on the Forest, and employs the visual management system (USDA Forest Service 1974) to evaluate effects on the visual resource.

Effects Analysis Methodology

This analysis was completed using the framework outlined in USDA Forest Service Handbook, The Visual Management System (USDA Forest Service 1974). This section describes the considerations, assumptions, methodologies, and indicators used to determine the visual effects of the proposed alternatives. The proposed alternatives have the potential to affect both the visual resource itself, as well as the forest visitor's opportunity to view the resource. Roads and trails are most often the platform for viewing the Forest's scenery. On the other hand, the road or trail itself can affect visual quality if seen from another vantage point. Non-characteristic line quality created by road or trail segments is the greatest impact to the visual resource from the proposed alternatives. Roads and trails can create changes to a naturally appearing landscape by introducing noticeable deviations to the characteristic form, line, color, or texture of a landscape. The location and design of these segments can significantly reduce their visual impact.

Visual experiences in outdoor recreation settings vary and depend on whether a scene is viewed from a motorized or nonmotorized mode of travel, from the speed at which the traveler is moving, the distance from the viewing area, and topography. For instance, alterations seen in the landscape on steep topography are more visually apparent than on flat topography due to the viewing angle. The ability to identify and discern individual objects, patterns, and their relationship to the whole landscape, become more difficult the faster one travels because the duration of the view is decreased. However, the chances for a hiker to notice deviations on a trail increase, because the viewing period increases dramatically. For the classification, analysis, and inventory of the visual resource, viewing is identified by the distance zones of foreground (0 to 0.5 mile), middleground (0.5 to 5 miles), and background (5 miles and greater) (USDA Forest Service 1995). Representative proposed route additions were field reviewed to determine effects of this type of activity on the visual resource. Additionally, ArcMap GIS was used to analyze the alternatives in regards to key viewshed locations, vegetative and topographic screening from the sensitive travel corridors, and VQOs assigned to the area. Aerial imagery was also used to determine vegetative cover around the proposed route additions.

VQOs provide direction for visual resources to determine the level of acceptable change for the landscape and are established in the Land and Resource Management Plan. This analysis uses VQOs to

determine if the alternatives meet Forest Plan standards and guidelines by comparing the degree of alterations from an otherwise natural-appearing forest landscape. The Shasta-Trinity National Forest LRMP and Agriculture Handbook Number 462 provide definitions for the visual quality objectives used for the visual management of lands administered by the STNF.

Preservation VQO – This VQO provides for ecological changes only (USDA Forest Service 1995). Management activities, except for very low visual impact recreation facilities, are prohibited (USDA Forest Service 1974).

Retention VQO – Activities are not evident to the casual forest visitor (USDA Forest Service 1995). This VQO provides for management activities that are not visually evident. Under retention, activities may only repeat form, line, color, and texture, which are frequently found in the characteristic landscape (USDA Forest Service 1974).

Partial Retention VQO – Activities may be evident, but must remain subordinate to the characteristic landscape (USDA Forest Service 1995). Activities may also introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape (USDA Forest Service 1974).

Modification VQO – Human activity may dominate the characteristic landscape, but must, at the same time, follow naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground (USDA Forest Service 1995).

Maximum Modification VQO – Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background (USDA Forest Service 1995).

The following describes in detail the general guidelines applied to the effects analysis for the scenery resource in regards to travel management effects.

Assumptions Specific to Visual Resources Analysis

- Based upon the review of the Forest Plan, the basic measurement indicator for the visual resources is compliance with the retention and partial retention VQOs.
- NFTS additions that contribute to the continuity of motor touring (loops and connections for extended rides) will have a beneficial effect on visual resources, since it is assumed that dead-end route situations will be reduced.
- NFTS additions are generally visually low impact roads or trails, which easily meet the modification and/or maximum modification VQO. These VQOs allow for designation of roads and trails, which may dominate the characteristic landscape but utilize naturally established form and texture.
- The prohibition of cross-country travel would have a beneficial effect on scenery.

- The proposed alternatives include actions below the high watermark of several reservoirs on the STNF. These reservoirs can have drastic changes in water levels. The water level drops an average of 70 vertical feet each summer. In drought years the water level can drop between 100 to 250 vertical feet. "The Visual Management System applies to all management activities on National Forest lands including, but not limited to, timber harvesting, road construction, fuel breaks, utility corridors, winter sports sites, and structures" (USDA Forest Service 1974). Based on the above, the Visual Management System was not designed to address temporary use that could constantly change due to water levels and use patterns, or that might not be visible due to water depth. Since the Visual Management System does not appear to be applicable to the proposed motorized activities below high water level on reservoirs, this activity will be discussed in the Affected Environment section, but the proposed activities in these areas will not be assessed for visual impacts.

- Proposals for season of use, vehicle class restrictions, and parking and camping off of designated routes do not cause physical impositions that are permanent on the landscape, and therefore, do not affect scenic quality in terms of VQOs. If site specific protection measures are implemented for heritage protection, such measures would propose using natural materials such as gravel, soil, rocks, and stumps to create barriers in order prevent vehicular access where needed. Since these physical measures borrow elements from the natural landscape, the visual scenes they create are expected to meet the definition of retention (i.e., activities will repeat the line, form, color, and texture frequently found in the characteristic landscape).

Data Sources

- The Shasta-Trinity National Forest LRMP for distribution of VQOs and identification of scenic viewsheds.

- The Shasta-Trinity National Forest VQO map: The VQO map was not included in the map package published with the 1995 final Forest Plan. A disclaimer is included on Page 1-2, "The maps which accompany this Plan are primarily illustrative in nature and must be used in conjunction with the written direction contained in this Plan." Thus, this analysis used the VQO map was used in conjunction with the LRMP and the Visual Management System concepts.

- The Shasta-Trinity National Forest national visitor use monitoring (NVUM) report to determine the popularity of viewing scenery or driving for pleasure.

Visual Resources Indicators

- The extent to which the proposed NFTS falls within the retention and partial retention VQOs (number routes traversing landscapes that are to remain natural to near-natural appearing in character).

- Number of key viewsheds that are or have the potential to be affected by motor vehicle travel.

Visual Resources Methodology by Action

For the purposes of analysis of visual resources, the methodology for direct and indirect effects is the same for all actions.

Direct/ indirect effects of the prohibition of cross-country motorized vehicle travel.

Short-term timeframe: 1 year

Long-term timeframe: 20 years.

Spatial boundary: The viewshed is the unit of spatial analysis when considering effects associated with changes in the NFTS or season of use. Viewsheds are considered areas seen from sensitive travel corridors.

Indicator(s): The extent to which the proposed changes to the NFTS falls within the retention and partial retention VQOs (number routes traversing landscapes that are to remain natural to near-natural appearing in character).

Methodology: Mix of field review and GIS analysis of proposed changes to the NFTS in relation to retention and partial retention VQOs.

Rationale: Compliance with the retention and partial retention VQOs.

Direct/ indirect effects of adding facilities (presently unauthorized roads and trails) to the NFTS, including identifying seasons of use and vehicle class.

Direct / indirect effects of changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use]

Cumulative Effects

Short-term timeframe: Not applicable. Cumulative effects analysis will be done only for the long-term time frame.

Long-term timeframe: 20 years.

Spatial boundary: The viewshed is the unit of spatial analysis for determining cumulative effects. Viewsheds pertains to the natural environment that is visible from one or more viewpoints. That is, visible landscape seen from the sensitive travel corridors outlined in Chapter 4 – Standards and Guidelines, page 4-27 to 4-28.

Indicator(s): Number and condition of routes as seen from key viewsheds that are or have the potential to be affected by motor vehicle travel.

Methodology: Identify key forest viewsheds (scenic byway corridors, etc). These viewsheds are identified in Chapter 4 – Standards and Guidelines (S&G's), page 4-27 to 4-28, management prescriptions, and the Shasta-Trinity National Forest VQO map. Identify whether any of these key viewsheds are or have the potential to be affected by motor vehicle travel.

Rationale: Compliance with the retention and partial retention VQOs. Retention and partial retention VQOs are generally assigned to key forest viewsheds.

Affected Environment/Environmental Consequences

Affected Environment

The Shasta-Trinity National Forest is the largest national forest in California with visually diverse landscapes ranging from 1,000 to 14,162 feet in elevation. The 2.1 million-acre forest encompasses five wilderness areas, hundreds of mountain lakes, and 6,278 miles of streams and rivers; and provides tourism and recreation vitally important to the economy of northern California. National visitor use monitoring (NVUM) data collected in 2002 revealed that 336,111 (11 percent) of visitors listed driving for pleasure driving as an activity they participate in on the STNF. Among the activities analyzed in the NVUM survey, driving for pleasure relates most directly to VQOs effects to the sensitive travel corridors outlined in the LRMP.

The Whiskeytown Shasta-Trinity National Recreation Area has three lakes within the Forest boundaries: Shasta, Trinity, and Lewiston Lakes. The many arms and inlets of these lakes make it a paradise for explorers and boaters alike, affording many opportunities to enjoy the scenic attractions of their surroundings. The four major arms of Shasta Lake: Sacramento, McCloud, Squaw Creek, and Pit offer spectacular scenery and unusual geologic and historic areas of interest. Trinity Lake is located on the west side of the Forest and offers a less-developed recreation experience than Shasta Lake. These reservoirs can fluctuate greatly; the water level drops an average of 70 feet each summer. In drought years the water level may drop between 100 to 250 vertical feet. Motor vehicle use is popular in these and other lake bottom areas. When the water level drops, recreationists drive to the water's edge creating unauthorized routes below the high water level. These routes are below water most of the year and are constantly changing. The effect these routes have on visual quality is difficult to analyze since these alterations change year to year. An area may have many noticeable unauthorized routes one year, and be under water the next year. Lewiston Lake, which has a constant level, lies just downstream from Trinity Dam and just north of the town of Lewiston.

The New River and the North Fork, South Fork, and main branch of the Trinity River are designated wild and scenic rivers which run through the forest. Motorized routes to access these rivers have been created over time, offering opportunities to view the scenery surrounding these wild and scenic rivers. Generally these motorized routes are not noticeable to the casual forest visitor.

A 154-mile section of the Pacific Crest Trail runs east and west across the forest. The trail is open to foot and horse (or other pack stock) travel only. Bicycles and motor vehicles are not permitted. Although some OHV use may be noticeable in the foreground viewing distance of the Pacific Crest Trail, this use does not dominate the landscape being viewed, and remains subordinate to the characteristic landscape. The Trinity Heritage, Volcanic Legacy, Modoc Volcanic, and the Trinity River Scenic Byways are scenic drives in the area. The highways or forest roads that comprise these highways are listed as sensitive travel corridors in the LRMP, Chapter 4 – Standards and Guidelines, page 4-27 to 4-28. These scenic byways have been identified as key viewsheds for this analysis.

Typical scenery scenarios can be described as exposed, granite-faced high alpine in the mountains, to cool, darker, lush, rapid flowing river valley bottoms. Vegetation varies from large specimen live oaks nearer to the valley, to dense pine varieties and hardwoods as the elevations, in both eastern and western directions from the valley, begin to increase.

The history of use on the Shasta-Trinity National Forest is visible in its landscape as well. Visual signs of past timber harvesting and forest fires in various stages of recovery can be seen throughout. Observing small dredge mining operations in the Trinity River is a common sight as well.

Because of past cross-country vehicle travel, evidence of such activity can be seen from roads on the Forest, including the sensitive travel corridors listed in the Forest Plan (Visual Quality Section, Chapter 4, Standards and Guidelines, page 4-27 to 4-28). OHV use, when viewed from another location, has the potential to create negative visual impacts by introducing non-characteristic linear features on a non-linear landscape with color contrasts from exposed soils on the routes and high use areas. Due to topographic and vegetative screening, these deviations are generally not noticeable in the key viewsheds. In most cases, the visual impact is that of an unimproved road, drive, or naturally-appearing trail intersecting the road or highway. These deviations are generally not noticeable in key viewsheds. Often, the trail or road is unnoticed due to topographic and vegetative screening (meeting retention VQO) or briefly seen for short durations, remaining subordinate to the characteristic landscape (meeting partial retention VQO).

Environmental Consequences

As mentioned in the Effects Analysis Methodology section, the basic measurement indicator for the visual resource is compliance with the retention and partial retention VQOs. For this analysis, retention and partial retention VQOs that exist in the foreground distance zone of 0 to 0.5 mile were considered. Routes beyond this foreground distance zone are expected to be unseen due to vegetation, distance, and topography, rendering no effect. This determination was made through field review and GIS analysis of the proposed route additions, sensitive travel corridors, topographic and vegetation data layers, and aerial imagery. No road or trail route additions are proposed within the foreground viewing distance of the Pacific Crest Trail under any action alternative. The action alternatives have no affect on the foreground viewshed of the Pacific Crest Trail.

The following table compares the number of routes per alternative that are within the 0 to 0.5 mile distance zone of the sensitive travel corridors (i.e., key forest viewsheds) identified in the forest plan Chapter 4 – Standards and Guidelines, page 4-27 to 4-28.

Table 3.09-1. Routes within foreground (0 to 0.5 mile) of key forest viewsheds

Number of Routes	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
No. of route additions per alternative	0	88	0	26	223
Cumulative no. of routes per alternative	10,407 a	5,276	5,188 b	5,214	5,411
No. of route additions within retention VQO	0	15	0	1	29
No. of route additions within partial retention VQO	0	0	0	0	16
Cumulative no. of routes within retention VQO	1,361 a	586	571	572	600
Cumulative no. of routes within partial retention VQO	1,036 a	543	543	543	559

a - The number of motorized routes (existing NFTS and inventoried unauthorized routes).
b - The number of motorized routes (existing NFTS).

Alternative 1 – No Action

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

No prohibition of cross-country motor vehicle travel is proposed under alternative 1. Cross-country motorized travel has led to 886 unauthorized routes within the foreground distance zone of the sensitive travel corridor's key viewsheds. Unauthorized routes would continue to be used and would not naturally rehabilitate over time. Unauthorized routes resulting from cross-country motorized travel may be noticeable in the foreground distance zone, but generally, these activities remain subordinate to the characteristic landscape due to vegetative and topographic screening. If and when seen, these routes typically appear as any other forest road or trail (such as unimproved, natural-surfaced temporary roads or trails that may resemble physically Forest Service ML 1 or 2 roads or motorized trails). When an unauthorized route intersects existing NFTS roads and trails, the unauthorized route would be seen briefly by the casual observer traveling the NFTS roads and trails at the posted speed limits. In most cases, the short duration for observation, in addition to the low development level and quality of the unauthorized routes, would allow these roadside scenes to meet their prescribed VQO of retention or partial retention. Some unauthorized routes are located within the foreground distance zone of the Pacific Crest Trail, but these routes do not dominate the view and remain subordinate to the characteristic landscape.

Attempting to quantify effects associated with potential future cross-country travel is speculative because it is impossible to predict exactly where, when, or how cross-country motorized use would occur. In the long-term, cross-country travel may lead to unauthorized routes which may not meet VQOs and can be characterized as random, blazed trails, projecting straight up or along highly visible hillsides and banks. This type of unauthorized route can create a scene depicting a level of development that dominates the viewshed and is incompatible with retention or partial retention VQOs. Authorized routes fitting this description are within the Chappie-Shasta OHV area which meets modification VQO, the allocated VQO for this area.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

No routes or areas are proposed for addition under this alternative, so no direct/indirect effects are expected for the visual resource in this regard.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

No changes to the existing NFTS are proposed under this alternative, so no direct/indirect effects are expected for the visual resource in this regard.

Cumulative Effects

The cumulative effects analysis for the visual resource considers the impact of the alternatives when combined with the following past, present, and foreseeable future actions and events: routes (both NFTS and unauthorized), any projects with decisions or proposals to close, abandon, add, or decommission NFTS or unauthorized roads, fuels and vegetation treatment, timber management and vegetation treatment, grazing management, minerals and geology, special uses and lands management, recreation, fish/wildlife/rare plant management and road/watershed management. See appendix B for a full list of the present and reasonably foreseeable future actions considered in this analysis. The viewshed is the unit of spatial analysis for determining cumulative effects. Viewsheds encompass lands generally seen from a sensitive travel corridor. Retention and partial retention VQOs are generally assigned to key viewsheds. The temporal scope is 20 years, because it is the approximate length of time for natural rehabilitation of unauthorized routes.

The past activities have formed the current landscape aesthetics and recreation opportunities. Recreation activities and developments and travel management activities, including the existing NFTS, most often form the viewing platform and opportunities for viewing scenery. Abandoning, closing or decommissioning roads generally results in a more naturally appearing landscape in the long-term. With continued cross-country motorized use, the unpredictable proliferation of unauthorized route segments can be expected to continue. Present and future environmental analyses for forest management projects are expected to propose and decide to either close some of these unauthorized routes, or add them to the NFTS. These management decisions would not likely balance out the effects of increasing numbers of unauthorized routes resulting from continued cross-country motorized travel. Other forest management activities that have the potential for affecting the visual resource, such as vegetation management projects, are expected to comply with the visual resources direction in the Forest Plan. Cumulatively the effects of continued cross-country motorized travel along with the past, present, and reasonably foreseeable future actions could result in more unnatural appearing landscape characteristics resulting in lower VQO ratings that do not meet the retention or partial retention VQO along the forest's key viewsheds. Although the majority of the forest would continue to have a natural appearance, it is anticipated that the no-action

alternative along with the past, present, and reasonably foreseeable future actions would result in an increase in forest lands which appear altered.

Alternative 2 – Proposed Action

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

In the short-term, visual effects of past cross-country travel may be noticeable in the retention and partial retention VQO areas and in the key viewsheds identified for this analysis, because rehabilitation of unauthorized routes would take longer than 1 year. Visual evidence of cross-country travel would be reduced in the long-term, allowing the viewshed scenes where impacts occurred to revegetate and take on characteristics associated with higher scenic integrity.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Alternative 2 proposes 15 additional route sections to NFTS routes located within the foreground distance zone of key viewsheds with retention VQO and no segments in partial retention VQO. Although located in the foreground distance zone, these routes would generally not be noticeable in the key viewsheds due to topographic and vegetative screening. Where proposed route additions intersect sensitive travel corridors, they may be seen very briefly by the casual observer traveling the sensitivity corridors at the posted speed limits. The short duration for observation, in addition to the low development level and quality of the routes, would allow the roadside scenes attributed to these proposed additions to meet the VQO of retention as directed in the LRMP.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Alternative 2 does not proposes any changes to the existing NFTS, so no direct/indirect effects associated with the visual resource are expected.

Cumulative Effects

See the cumulative effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered, and other information on how the cumulative effects analysis was conducted.

The past activities have formed the current landscape aesthetics and recreation opportunities. Recreation activities and developments and travel management activities, including the existing NFTS, most often form the viewing platform and opportunities for viewing scenery. Abandoning, closing or decommissioning roads generally results in a more naturally appearing landscape in the long-term. Other forest management activities that have the potential for affecting the visual resource, such as vegetation management projects, are expected to comply with the visual resources direction in the Forest Plan. The majority of the forest would continue to have a natural appearance, and visually impacted areas would continue to rehabilitate, resulting in a more natural-appearing landscape. It is anticipated that this

alternative along with the past, present, and reasonably foreseeable future actions would result in no cumulative effects to visual resources. With cross-country motorized travel prohibited, the unpredictable proliferation of unauthorized route segments would end, resulting in a more naturally appearing landscape along the forest's key viewsheds.

Alternative 3- Cross-country Travel Prohibition Only- No Additions to the Existing NFTS

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

In the short-term, visual effects would be similar to the effects described in alternative 2 for this action. Like alternative 2, visual evidence of cross-country motorized travel would be reduced in the long-term, allowing the viewshed scenes where impacts occurred to re-vegetate and take on characteristics associated with higher scenic integrity.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Alternative 3 does not propose any additional routes, so no direct/indirect effects associated with the visual resource are expected.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

Alternative 3 does not proposes any changes to the existing NFTS, so no direct/indirect effects associated with the visual resource are expected.

Cumulative Effects

See the cumulative effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered and other information on how the cumulative effects analysis was conducted. The cumulative effects of alternative 3 would be the same as described for alternative 2.

Alternative 4

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

In the short-term, visual effects would be similar to the effects described in alternative 2. Like alternatives 2 and 3, visual evidence of cross-country travel would be reduced in the long-term, allowing the viewshed scenes where impacts occurred to re-vegetate and take on characteristics associated with higher scenic integrity.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

The addition of unauthorized roads, trails, and areas under this alternative would have similar effects as those described under alternative 2, but to a lesser degree. Alternative 4 proposes 14.68 miles of

additional routes with one route section (0.75 miles) located within the foreground distance zone of key viewsheds in retention VQO. This proposed route section does not intersect with a sensitive travel corridor and would be screened from view by topography and vegetation. This proposed route addition meets retention VQO as it would not be noticeable to the casual forest visitor. No proposed route additions would be located in partial retention VQO.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

The proposed change of vehicle class to allow motorized mixed-use on 23 segments of existing NFTS ML 3 roads would cause no change in effects for visual resources; this assumes existing NFTS roads, with template, are already in place. Changing the road use or vehicle class allowed to access the route would have no effect on the visual resource.

Cumulative Effects

See the cumulative effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered and other information on how the cumulative effects analysis was conducted. The cumulative effects of alternative 4 would be the same as those described for alternative 2.

Alternative 5- Improved Access and Motorized Recreation Opportunities

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

In the short-term, visual effects would be similar to the effects described in alternative 2. Like alternatives 2, 3, and 4, visual evidence of cross-country travel would be reduced in the long-term, allowing the viewshed scenes where impacts occurred to re-vegetate and take on characteristics associated with higher scenic integrity.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

The addition of unauthorized roads, trails, and areas under this alternative would have similar effects as those described under alternative 2, but to a greater degree. Alternative 5 proposes 29 additional route sections within the foreground distance zone of key viewsheds within retention VQO, and 16 additional route sections within the foreground distance zone of key viewsheds with partial retention VQO. These routes, if noticed, would be seen very briefly by the casual observer traveling the sensitivity corridors at the posted speed limits. In most cases, the short duration for observation, in addition to the low development levels and quality of the routes, would allow the roadside scenes attributed to these proposed additions to meet the VQO of retention.

Direct/Indirect Effects of Changes to the Existing NFTS (Vehicle Class)

The effects on visual resources from this action would be the same as those described for alternative 4.

Cumulative Effects

See the cumulative effects section under alternative 1 for the past, present, and reasonably foreseeable future actions considered and other information on how the cumulative effects analysis was conducted. The cumulative effects of alternative 5 would be the same as those described for alternative 2.

Summary of Effects Analysis across All Alternatives

The following table summarizes the effects analysis by ranking each alternative regarding how well it addresses the visual quality objective along key viewsheds. Rankings are scored on a scale of 1 to 5 from greatest (1) to least (5) impact.

Table 3.09-2. Comparison of effects to visual resources

Indicators – Visual Resources	Rankings of Alternatives for Each Indicator				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Disturbance/Integrity: Compliance with the retention and partial retention VQOs	1	5	5	5	5
Key viewsheds affected by proposed NFTS	1	3	5	4	2
Average for visual resource	**1**	**4**	**5**	**4.5**	**3.5**

Compliance with the Forest Plan and Other Direction

Alternative 1 allows cross-country motorized travel and use of unauthorized routes, which could result in long-term changes to the visual resource along key viewsheds. A route would meet retention if not evident to the casual forest visitor. Determining if a person would notice a particular intersecting route or not, when traveling by motor vehicle at speeds up to 55 miles per hour, is difficult, if not speculative. In the long-term, alternative 1 would have the most impacts to the visual resource; eventually, it is anticipated that the visual effects of cross-country motorized travel would not meet LRMP direction for the retention and partial retention VQOs.

Visual Quality (Chapter 4 – Standards and Guidelines, page 4-27 to 4-28)

All motorized route additions proposed in alternatives 2, 4, and 5 were determined through a mix of field verification and GIS analysis to meet the foreground and middle ground VQOs prescribed for the sensitive travel routes under chapter 4 of the LRMP, Standards and Guidelines for Visual Quality. Alternatives 1 and 3 do not propose any additions and will not affect VQOs. Of alternatives 2, 4, and 5, no proposed motorized routes are seen from the Pacific Crest Trail. The closest proposed addition is PC025 in alternative 5 at 3.7 miles away, so there would be no effect to VQOs along the Pacific Crest Trail. Routes proposed in wild and scenic river corridors meet the VQOs directed in the Forest Plan (page L-4). See the recreation section for more information on routes in wild and scenic river corridors.

Management Prescriptions (Chapter 4 – Standards and Guidelines, page 4-31 to 4-91)

The locations of the proposed routes are consistent with the VQOs identified for prescriptions in the Forest Plan. Management prescriptions in areas with proposed routes include VQOs of retention, partial

retention, and modification, with specific direction for management within river corridors and developed recreation sites. Motorized route additions are not proposed in locations in or seen from developed recreation sites. The closest proposed addition is RM1206 under alternative 5, at 0.11 mile from Basin Gulch Campground. Routes proposed along recreation river corridors of the Trinity River in alternatives 2 and 5 will meet VQOs of retention, and as stated above, no proposed routes are seen from developed recreation sites. Protective measures for sensitive heritage sites will be designed using natural materials and will meet VQOs as directed in the Forest Plan.

3.10. Inventoried Roadless Areas

Introduction

The rugged topography of the STNF and the relatively limited opportunities for resource extraction has contributed to the classification of approximately 22 percent of the forest as inventoried roadless areas (IRAs). Classification of IRAs began with the RARE II (Roadless Area Review and Evaluation) study in 1978, which identified 48 areas as roadless study areas subject to evaluation for potential wilderness designation. Of these, all or parts of four study areas were designated wilderness by the California Wilderness Act of 1984. All or parts of 29 other study areas were made available for non-wilderness uses.

In 2001, the California Wilderness Coalition (CWC) completed its own inventory of potential wilderness areas on California public lands. For the purpose of this analysis, these areas will be referred to as Citizen-Inventoried Roadless Areas (CIRAs).

Effects Analysis Methodology

This analysis focuses on how each alternative would affect IRAs and CIRAs and their characteristics on the STNF. Roadless characteristics were defined in the 2001 Roadless Area Conservation Rule (66 FR 3272, Jan. 12,2001) and include: (1) high quality or undisturbed soil, water, and air; (2) sources of public drinking water; (3) diversity of plant and animal communities; (4) habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land; (5) primitive (P), semi-primitive nonmotorized (SPNM) and semi-primitive motorized (SPM) classes of dispersed recreation; (6) reference landscapes; (7) natural appearing landscapes with high scenic quality; (8) traditional cultural properties and sacred sites and, (9) other locally identified unique characteristics (66 FR 3245, Jan. 12, 2001).

Table 3.10-1. Roadless and wilderness characteristics and descriptions

Characteristics	Description
Roadless	
Soil, water and air resources	These three key resources are the foundation upon which other resource values and outputs depend. Healthy watersheds provide clean water for domestic, agricultural, and industrial uses; help maintain abundant and healthy fish and wildlife populations; and are the basis for many forms of outdoor recreation.
Sources of public drinking water	NFS lands contain watersheds that are important sources of public drinking water. Careful management of these watersheds is crucial in maintaining the flow of clean water to a growing population.
Diversity of plant and animal communities	Undeveloped areas are more likely than roaded areas to support greater ecosystem health, including the diversity of native and desired nonnative plant and animal communities, due to the absence of disturbances caused by roads and accompanying activities. Inventoried roadless areas also conserve native biodiversity, by providing areas where nonnative invasive species are rare, uncommon, or absent.
Habitat for TES and species dependent on large undisturbed areas of land	Inventoried roadless areas function as biological strongholds and refuges for many species. Of the Nation's species currently listed as threatened, endangered, or proposed for listing under the Endangered Species Act, approximately 25% of animal species and 15% of plant species are likely to have habitat within inventoried roadless areas on NFS lands.

Characteristics	Description
Primitive, semi-primitive nonmotorized, and semi-primitive motorized classes of recreation	These areas often provide outstanding recreation opportunities such as hiking, camping, picnicking, wildlife viewing, hunting, fishing, cross-country skiing, and canoeing. While they may have many wilderness-like attributes, unlike wilderness, the use of mountain bikes and motorized means of travel is allowed.
Reference landscapes	The body of knowledge about the effects of management activities over long periods of time and on large landscapes is very limited. Reference landscapes can provide comparison areas for evaluation and monitoring. These areas provide a natural setting that may be useful as a comparison to study the effects of more intensely managed areas. They serve as a barometer to measure the effects of development on other parts of the landscape.
Landscape character and integrity	High quality scenery, especially scenery with natural-appearing landscapes, is a primary reason that people choose to recreate. In addition, quality scenery contributes directly to real estate values in neighboring communities and residential areas.
Traditional cultural properties and sacred sites	Traditional cultural properties are places, sites, structures, art, or objects that have played an important role in the cultural history of a group. Sacred sites are places that have special religious significance to a group. Traditional cultural properties and sacred sites may be eligible for protection under the National Historic Preservation Act.
Wilderness	
Untrammeled	This quality monitors human activities that directly control or manipulate the components or processes of ecological systems.
Natural	This quality monitors both intended and unintended effects of modern people on ecological systems.
Undeveloped	This quality monitors the presence of permanent improvements such as structures, construction, habitations, and other evidence of modern human presence or occupation.
Outstanding opportunities for solitude or a primitive and unconfined type of recreation	This quality monitors conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation in a wilderness setting, rather than monitoring visitor experiences per se.

Measurement Indicators

Because of the relationship between motorized use and the natural resource and recreation conditions called for in the roadless characteristics, the following measurement indicators will be used in the analysis:

- Miles of routes available for public motorized use within IRAs and CIRAs
- Density (miles per square mile) of routes available for motorized use within IRAS and CIRAs
- Number of perennial stream crossings in IRAs and CIRAs
- Miles of routes within 0.5 mile of IRAs and CIRAs

Roadless Methodology by Action

Direct and Indirect Effects of Prohibition of Cross-Country Motor Vehicle Travel

Short-term timeframe: 1 year

Long-term timeframe: 20 years

Spatial boundary: IRAs and CIRAs

Indicators: Miles of routes available, density of routes, number of stream crossings, and miles of routes within 0.5 mile of a roadless area.

Rationale: Prohibition of cross-country travel will reduce route miles within and outside the roadless areas; reduce stream crossings and density of routes, positively benefiting soil productivity and hydrologic function in the long-term, reducing disturbance to animal communities, and enhancing qualities of solitude in the short-term.

Direct and Indirect effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, including identifying Seasons of Use and Vehicle Class

Short-term timeframe: 1 year

Long-term timeframe: 20 years

Spatial boundary: IRAs and CIRAs

Indicators: Miles of routes available, density of routes, number of stream crossings, and miles of routes within 0.5 mile of a roadless area.

Rationale: Added routes within and outside the roadless areas, increased stream crossings and overall density of authorized routes, will have long-term effects to soil productivity and hydrologic function, animal community diversity, and short-term effects to wilderness qualities of solitude and primitiveness.

Direct and Indirect Effects of Changes to the Existing NFTS (this includes changes to the Vehicle Class and Season of Use)

Short-term timeframe: 1 year

Long-term timeframe: 20 years

Spatial boundary: 0.5 mile around IRAs and CIRAs

Indicators: Miles of routes within 0.5 mile of IRAs and CIRAs

Rationale: Motor vehicle use adjacent to IRAs and CIRAs can affect solitude and nonmotorized recreation. A change in vehicle types could affect traffic volume and type.

Cumulative Effects

Short-term timeframe: 1 year

Long-term timeframe: 20 years

Spatial boundary: 0.5 mile around IRAs and CIRAs

Indicators: Miles of routes available, density of routes, number of stream crossings, and miles of routes within 0.5 mile of a roadless area.

Rationale: Adding roads and trails will increase authorized route miles within and outside the roadless areas, increase stream crossings and overall density of authorized routes, with short- and/or long-term effects to soil productivity and hydrologic function, animal community diversity, and wilderness qualities of solitude and primitiveness.

Data Sources

Query of GIS databases using layers provided by the STNF and the California Wilderness Coalition for CIRAs.

Assumptions

The following assumptions are central to the analysis of the effects on IRAs:

- The unauthorized routes considered in the alternatives are part of the current condition of the IRAs. Motor vehicle use is currently taking place within IRAs.
- Public motor vehicle use of the 52.33 miles of existing unauthorized routes in IRAs and 475 miles of NFTS roads in IRAs would continue under the no-action alternative. No permanent prohibition on cross-country travel would be in place.
- Motor vehicle use of unauthorized routes in IRAs would result in human presence and noise in close proximity to these routes. The effect will be localized and temporary and the opportunity to experience primitive and semi-primitive recreation may be affected.
- Routes in IRAs being proposed as motorized trails, in many cases, have been and continue to be used by forest visitors who seek or engage in primitive, semi-primitive nonmotorized, and semi-primitive motorized recreation opportunities.
- No further analysis or decision is necessary to continue public motorized use of the existing NFTS roads within IRAs. These decisions were made previously.
- For the purposes of this analysis, unauthorized routes not added to the NFTS are assumed to naturally decompact and revegetate. Converting routes to nonmotorized uses is not reasonably foreseeable at this time as site-specific proposals must first be developed and analyzed.

Affected Environment/Environmental Consequences

Affected Environment

On the STNF, 38 percent of non-wilderness lands are within IRAs. There are 29 IRAs consisting of 306,060 acres. IRAs offer a unique landscape with few developed roads where recreationists may experience technical trail driving and access to remote dispersed recreation opportunities. Recreation in IRAs and surrounding areas includes hunting, fishing, hiking, backpacking, camping, nature viewing and OHV use. Motorized routes, both NFTS roads and unauthorized routes, in IRAs comprise 11 percent of all routes on the STNF. Unauthorized routes in IRAs make up 4.1 percent (52.33 miles) of all unauthorized routes on the forest. NFTS routes in IRAs make up 5.7 percent (475 miles) of all routes located on the forest. Total route density within IRAs is 1.2 miles per square mile for both unauthorized routes and existing NFTS roads. Comparatively, route density for areas outside of IRAs where unauthorized routes can be added to the NFTS is 1.61 miles per square mile.

The California Wilderness Coalition inventory of CIRAs identified 369,787 acres in 136 areas on the forest as potential wilderness areas, approximately 67 percent of which is within agency-identified IRAs. The 121,742 acres of the CIRAs outside of IRAs include key trailhead and access roads. In many cases, the CIRAs include roads that were cherry-stemmed out when IRA boundaries were established (i.e., boundaries were drawn to exclude existing roads when the area was designated as an IRA).

There are currently 59.9 miles of NFTS routes and 221.6 miles of unauthorized routes in CIRAs, including 212.8 miles of trails. Considering all routes, existing route density within CIRAs is 0.73 miles per square mile.

There are no perennial stream crossings by unauthorized routes in IRAs or CIRAs that are also being proposed for addition to NFTS. Therefore this measurement indicator will not be further discussed in this report.

All IRAs and CIRAs would be affected in alternatives 2, 3, 4, and 5 by the cross-country travel prohibition. In alternative 2, two IRAs (Backbone, and Devil's Rock) and four CIRAs (Devil's Rock, East Fork, South Fork, and Trinity Alps) are affected by proposed additions. Additionally, five IRAs (East Gerard, Little French Creek, Panther, Pattison, and South Fork) are affected by additions to the NFTS totaling more than 0.25 mile in length within 0.5 mile of their boundaries, and four CIRAs (Backbone, Chinquapin, Panther, and Yolla Bolly-Middle Eel) are similarly affected. In alternative 5, seven IRAs (Backbone, Devil's Rock, East Girard, Little French, South Fork, Wells Mountain, and West Beegum) and two CIRAs (Devil's Rock, and Beegum PW) include additions to the NFTS. Additionally, five IRAs (Chanchellula, East Fork, Mount Shasta, Panther, and Salt) and six CIRAs (Backbone, Chanchellula, Chinquapin, Mount Shasta, South Fork, and Yolla Bolly-Middle Eel) are affected by proposed additions to the NFTS within 0.5 mile of their boundaries with lengths of greater than 0.01 mile. There are no additions in alternative 4 that affect IRAs or CIRAs, or constitute more than 0.01 mile of total length

within 0.5 mile of an IRA or CIRA boundary. Descriptions of IRAs, below, are drawn from Appendix C of the LRMP EIS. There are no specific descriptions for CIRAs, but these areas do overlap IRAs.

Table 3.10-2. Inventoried roadless areas on the STNF

Inventoried Roadless Area (IRAs)	Total Area (square miles)	Existing NFTS Roads or Motorized Trails (miles)	Unauthorized Routes (miles)	Road Density (miles/ square mile)	Perennial Stream Crossings (no.)	Existing NFTS roads or motorized trails within 0.5 mile (miles)
Mt. Eddy	15.38	15.28	2.75	1.18	8	25.62
Backbone	15.49	6.22	3.12	0.60	1	19.65
Bell-Quinby	18.29	2.80	0.96	1.11	0	35.41
Bonanza King	25.48	5.81	1.99	0.31	6	40.73
Castle Crags	2.71	3.48	0.11	1.35	0	32.69
Chanchellula	6.04	18.02	0.21	3.05	0	24.64
China Springs	1.10	3.20	0.00	2.91	2	17.32
Chinquapin	33.65	28.02	4.29	0.96	10	74.33
Cow Creek	36.18	1.56	0.07	0.05	0	38.30
Devil's Rock	21.71	29.19	0.19	1.35	4	33.46
Dog Creek	8.66	8.02	0.00	1.08	2	28.03
Eagle	10.62	14.56	1.62	1.52	7	32.84
East Beegum	3.07	8.64	2.70	3.69	3	33.92
East Fork	8.12	2.41	0.65	0.38	1	80.28
East Girard	34.24	116.85	2.55	3.49	22	53.58
Fisher Gulch	6.89	0.00	0.00	0.00	0	4.26
Kettle Mountain	7.60	16.71	0.12	2.21	6	14.93
Little French Creek	17.54	43.48	0.00	2.48	0	69.72
Mayfield	0.00	0.00	0.00	0.00	0	0.00
Mount Shasta	4.62	15.26	7.09	4.84	0	55.30
Murphy Glade	1.59	2.5	0.00	1.57	2	16.32
Panther	18.32	1.04	0.00	0.06	0	29.22
Pattison	36.45	35.42	11.85	1.30	5	61.58
Penney Ridge	7.57	8.02	0.75	1.16	2	34.09
Salt Gulch	10.40	11.04	2.60	1.31	0	13.34
Slate Creek	10.34	13.64	0.85	1.40	1	43.77
South Fork	26.97	6.91	0.49	0.27	2	47.83
Underwood	5.03	0.55	0.00	0.11	0	9.74
Wells Mountain	9.60	16.17	5.61	2.27	11	5.55
West Beegum	8.56	6.11	1.72	0.91	2	48.13
West Girard	54.52	34.37	0.04	0.63	4	77.97

Table 3.10-3. Citizen inventoried roadless areas on the STNF that have proposed additions to NFTS in alternative 2, 4 or 5

Citizen's Inventoried Roadless Area (CIRAs)	Total Area (square miles)	Existing NFTS Roads or Motorized Trails (miles)	Unauthorized Routes (miles)	Road Density (miles per square mile)	Perennial Stream Crossings (no.)	Existing NFTS Roads or Motorized Trails within 0.5 Mile (miles)
Backbone	37.04	11.39	1.18	0.34	7	43.57
Beegum	30.20	32.67	7.17	1.32	2	14.48
Chanchellula	12.24	8.98	1.48	0.86	1	46.13
Chinquapin	40.86	31.48	5.99	0.92	9	90.56
Devil's Rock	36.92	37.85	3.20	4.23	8	32.87
East Fork	15.74	19.28	0.23	1.24	4	26.25
Mount Shasta	9.61	9.69	6.92	1.73	2	30.39
South Fork	13.90	21.20	5.67	1.93	3	71.52
Trinity Alps	288.54	40.76	0.27	0.14	2	130.38
Yolla Bolly Middle Eel	249.85	25.53	2.86	0.11	3	74.80

Backbone IRA

This area is adjacent to Shasta Lake. Over 25 percent of the area is private land. One developed recreation site (Gooseneck Cove) receives light- to moderate-level use. There is very little dispersed recreation use in the rest of the area (mostly fishing). A small portion of the Shasta Unit of the Whiskeytown-Shasta-Trinity National Recreation Area is within this area.

Chanchellula IRA

Significant commercial timber stands are found in the area. There are some trails in the IRA. At the present dispersed recreation use is very low and occurs primarily as fishing access.

Chinquapin IRA

Older Douglas-fir forest blanket rugged steep slopes in this area. Specimen-sized chinquapins grow throughout the area. Seventy percent slopes and unstable soils are common. Major tributaries to the South Fork Trinity River are in this area, and water quality is high. Present recreation use is moderate and confined mostly to the South Fork Trinity River.

Devil's Rock IRA and CIRA

Devil's Rock IRA is near the Pit River Arm of Shasta Lake. Limestone outcropping are visually pleasing. The Shasta salamander which inhabits the limestone formations and the sensitive plants within the area are its prime ecological features. Recreation use is light, consisting mostly of hunting. Trails lead up three of the perennial creeks of the area. The IRA borders on a portion of the Shasta Lake.

East Girard IRA

This area has been substantially roaded since the RARE II roadless inventory. Over 30 percent of the area is private land. Six tributaries to the McCloud River and Squaw Creek originate within the area, and the north and northwest portions of the area are adjacent to the McCloud River. Recreation use is mostly fishing and hunting.

East Fork IRA

This area borders the Yolla Bolly-Middle Eel Wilderness, and the East Fork of the South Fork of the Trinity River runs through it. Primitive recreation is limited by lack of diversified terrain.

East Fork Mountain CIRA

This IRA is in between the Kettle IRA and the East Girard IRA, which is entirely a checkerboard of forest and private land of approximately similar terrain north of and adjacent to Shasta Lake and containing major tributaries of the Pit River.

Kettle IRA

Minor roading has occurred in this area since the RARE II roadless inventory. Over 50 percent of the area is private land. Moderately steep slopes and very irregular, dissected hills characterize the area. A peregrine falcon territory has been identified north of the Pit No. 6 Reservoir. The naturalness of the area is impacted most by road construction, logging, and the presence of the reservoir and its facilities. Dispersed recreation use is currently light, mostly in the form of hunting in the fall.

Little French Creek IRA

Little French Creek is adjacent to the Trinity Alps Wilderness, and is characterized by rugged and steep terrain. Several major trails for OHVs traverse the area. These are primitive jeep trails confined to the tops of north and south trending ridges. The use, though light, is well established. The area is used as an entrance to the southern portion of the Trinity Wilderness Area.

Mayfield CIRA

The area covered by the Mayfield CIRA is almost entirely managed by the Lassen National Forest. Just over 1 mile of unauthorized routes within 0.5 mile of the boundary is proposed under alternative 5 for addition to the NFTS. The Mayfield CIRA is flat terrain covered by young lava flow rock. There is very low density of routes, and no perennial streams in the area.

Mount Shasta IRA

The IRA is in several portions adjacent to Mount Shasta Wilderness. The entire area is characterized by rugged terrain of old lava flows. The area receives a high amount of dispersed camping and hiking use.

Recreation is concentrated in the Bunny Flat-Sand Flat area, as a take-off point for hikers who climb Mount Shasta. Nordic skiing and snowmobiling is popular during the winter at Mount Shasta Snow Play.

Panther CIRA

This CIRA overlaps the Panther IRA, for which the following description applies. Minor road building has occurred since the RARE II roadless inventory. Six perennial streams flow through the area. Most of the recreation use occurs along the Trinity River in the form fishing and rafting, and some hunting on the southern edge of the area.

Pattison IRA

There is at least one known cultural site (an Indian village) in this area. Recreation is comprised mostly of OHV use on numerous jeep trails, and includes some hunting and fishing.

South Fork IRA

Special features include Marble Caves, located about 1 mile north of Forest Glen near the southern end of the area, and an old Indian village. Approximately 10.5 miles of the South Fork of the Trinity River, located in the area, are designated wild and scenic. The South Fork supports a valuable anadromous fishery and spawning habitat. Recreation use is moderate to heavy in the river corridor. Hiking, camping, rafting, and prospecting all take place, but fishing is the primary activity.

Trinity Alps IRA

This is a very large, diverse area. The CIRA by the same name is partially on the Klamath National Forest; 83,305 acres are on the Shasta-Trinity National Forest and mostly overlap the Bell Quinby, Cow Creek, Little French and Fisher Gulch IRAs, for which the following description will apply.

Bell-Quinby is bounded on the north by the Trinity Alps Wilderness. The area is extremely rugged, and present recreation use centers on hiking along a jeep and foot trail that runs through the unit. Rock bluffs and steep talus slopes predominant throughout the Cow Creek area. Presently, dispersed recreation use is confined along the Trinity River and New River, where there is fishing, rafting, hiking and hunting. Recreation use is hampered in the Fisher Gulch area by dense brush and rugged terrain. Moderate recreation use is concentrated around roads, trails, and trailheads leading into the Trinity Alps Wilderness. The Little French IRA was described previously.

Wells Mountain IRA

This area has been substantially roaded since the RARE II roadless inventory. Over 35 percent of the area is private land. Ten tributaries feed into Carr Creek to the north and Hayfork Creek to the south and west. Recreation use is extremely light; mostly hunting and fishing.

West Beegum IRA and Beegum

Beegum gorge is the outstanding feature in the area. A foot and horse trail follows main Beegum Creek and the North Fork and Middle Fork of Beegum Creek. Opportunities for primitive recreation, including hunting and fishing, are low.

Yolla Bolly Middle Eel CIRA

This CIRA is very large and in several portions, mostly on the Six Rivers National Forest. The Shasta-Trinity portion (8,451 acres) overlaps and is mostly within the East Fork and Murphy Glade IRAs, for which the following description applies.

The East Fork IRA borders on the north side of the Yolla Bolly-Middle Eel Wilderness. The East Fork of the Trinity River runs through the area. Primitive recreation is limited by lack of diversified vegetation and terrain. Murphy Glade is also adjacent to the northern boundary of the Yolla Bolly-Middle Eel Wilderness, and the area is used primarily as access to that wilderness. Current recreation within the area is extremely light.

Environmental Consequences

This section discloses the environmental effects of each of the alternatives on IRAs and CIRAs. This analysis is focused on the effects of three actions proposed by the alternatives: (1) prohibition of cross-country travel, (2) additions of currently unauthorized routes to the NFTS, and (3) changes to the use of the existing NFTS.

Direct and Indirect Effects of the Alternatives on IRAs

Alternatives 2 and 5 propose adding certain unauthorized routes in IRAs to the NFTS as motorized trails (Table 3.10-4). Alternative 1 would not add any of the existing unauthorized routes within IRAs and CIRAs; however, cross-country travel would not be prohibited, so it is likely these routes would continue to be used. General effects of those actions include:

- Routes added to the NFTS as motorized trails would be dedicated to use for transportation and would not support native vegetation within the road prism or wheel treads. Recovery of natural vegetation would occur if unauthorized routes are not added to the NFTS because motor vehicle use would be prohibited. This would benefit the natural condition of the landscape, the health of soil and water resources, and plant and animal communities.
- The total number of perennial stream crossings in IRAs would remain the same. Some minor improvements in overall water quality may be expected with reduction in route miles, since routes tend to produce fine sediment that can be transported by running water to flowing channels.

- Opportunities for primitive and semi-primitive nonmotorized recreational experiences would increase, as would opportunities to experience solitude, or the isolation from the sights, sounds, and presence of others.
- Opportunities for semi-primitive motorized experiences would decrease compared to the existing condition. Fewer routes would be available for exploration in remote, low density areas.
- This analysis does not address use below the high-water mark on Shasta Lake, Trinity Lake, or Iron Canyon Reservoir because none of these areas are within IRAs or CIRAs.
- Approximately 8 feet of SE194 (0.0015 miles) is within Devil's Rock IRA, according to Forest GIS database. Since this is well within the error margins of GIS location and a very minor portion, this section will not be considered further in this analysis.

Table 3.10-4. Details of routes added to IRAs and CIRAs by alternative

Route #	Area (IRA=I CIRA=C)	Alternative(s)	Length (miles)
RM1206	Beegum-C	5	0.006
RM1210	Beegum-C	5	0.067
RM1211	Beegum-C, W. Beegum-I	5	0.119
RM1213	Beegum-C, W. Beegum-I	5	0.0.61
RM1216	Beegum-C, W. Beegum-I	5	0.390
SE416	Devil's Rock-C	2, 5	2.045
SE476	East Fork Mountain-C	2, 5	0.007
SE477	East Fork Mountain-C	2, 5	0.002
SE512	East Girard-I	5	0.520
TC319	South Fork Trinity-C	5	0.107
TC1427	Wells Mountain-I	5	1.040
TRMU3	Trinity Alps-C	2	0.012
U4N12D	Trinity Alps-C	2, 5	0.087
U35N05A	Backbone-I	2, 5	0.230
U42N15M	Mount Shasta-C	5	0.095

Table 3.10-5 details the potential effects of the alternatives on roadless characteristics of IRAs and CIRAs. Effects for all action alternatives are compared to the existing condition as represented by alternative 1. Please see the resource sections in chapter 3 for more information about effects of the alternatives on natural and cultural resources forest-wide.

Table 3.10-5. Direct and indirect effects of project activities on roadless area characteristics of IRAs and CIRAs, and on wilderness (please see the resource sections in chapter 3 for more information about effects of the alternatives on natural and cultural resources)

Characteristics	Description of Effect
Roadless	
Soil, water and air resources	Short-term effects of cross-country prohibition will be reduction in fine sediment (<0.5 mm diameter particle size) from running surfaces that reach channels. The most significant factor in production of sediment from transportation routes is traffic and degree of traffic (Bilby et al. 1989; Sheridan et al. 2006). Addition of some unauthorized routes to the NTS may encourage more traffic on those routes, because of the loss of other routes. Change of classification of routes to allow mixed use may also increase traffic on those routes. Increased traffic will increase sediment production from the running surfaces. No maintenance level changes are proposed within IRAs or CIRAs. All routes not designated to be added to NTS will over the long-term (>30 years) revegetate, de-compact, and regain a degree of soil productivity, assuming some remnant soil cover.
Sources of public drinking water	There are no direct sources of public drinking water in either the IRAs or CIRAs affected by either of the action alternatives to add routes to the system, or alter maintenance level on system roads adjacent to the roadless areas.
Diversity of plant and animal communities	Where diversity of a plant or animal community is dependent on undisturbed areas, the cross-county prohibition or addition of routes to the NFTS may be significant.
Habitat for TES and species dependent on large undisturbed areas of land	Under all action alternatives there would be a substantial degree of improvement because of prohibition of cross-country travel. Travel would be prohibited on a minimum of 106 miles of unauthorized routes in IRAs and CIRAs. Under Alternatives 2 or 5, between 2.71 and 4.7 miles, respectively, would be added to the system in IRAs and CIRAs. No alternative would change vehicle class to mixed-use within an IRA or CIRA. Alternative 3 and 4 would not add any routes in an IRA or CIRA, or change vehicle class use, so likewise there would be no impact from route additions or change in vehicle class under these alternatives.
Primitive and semi-primitive classes of recreation	Recreation activities such as hiking, backpacking, fishing, and wildlife viewing would be enhanced by reduction in noise, dust, and simple intrusion of motor vehicles through prohibition of cross-country travel in all action alternatives. Relatively, additions to the NFTS from action Alternatives 2 and 5 would be minor and not detract from overall sense of greater isolation.
Reference landscapes	Prohibiting motor vehicle use on the unauthorized routes will result in gradual revegetation of route prisms and would reduce the number of routes on the landscape. There will be a decreased potential for spread of noxious weeds from motor vehicles. There would be fewer road-stream crossings, so local sediment input would be closer to natural levels. The maximum addition of about 2 miles of unauthorized routes (Alternative 5) is very small in comparison to the roadless acreage (306,000) acres and added routes would not include any perennial stream crossings. As a result, all of the action alternatives would increase the value of the IRAs and CIRAs as reference landscapes.
Landscape character and integrity	The proposed maximum addition (Alternative 5) of approximately 2 miles of existing but unauthorized or inventoried routes to approximately 306,000 acres of inventoried roadless area will not change or reduce the overall existing landscape character or scenic integrity experienced now. Prohibiting cross-country travel will help maintain landscape character and increase visual integrity by eliminating the appearance of roads where they are not expected to be seen.
Traditional cultural properties and sacred sites	There are currently no known traditional cultural properties (TCPs) affected by these routes. Several routes pass through areas identified by Native American use and several routes are very close to these locations. The importance of these areas to contemporary tribes/individuals, and the determination of the location's status as a TCP or sacred area will be ascertained through interviews and tribal consultation.

Characteristics	Description of Effect
Wilderness	
Untrammeled	Trammeling of natural systems is a deliberate and conspicuous manipulation or control. Proposed additions and changes to the NFTS do not meet this definition because they do not involve new construction and would maintain existing use patterns and levels.
Natural	There would be intended control of vegetative re-growth on unauthorized routes added to the NFTS. There would be un-intentioned risk for spread of noxious weeds from continued wheeled motor vehicle use of routes. Sediment input and removal of riparian vegetation would continue at stream crossings. Prohibiting motorized use on all unauthorized routes will result in gradual revegetation of route prism and would reduce the visual presence of routes on the landscape. There will be a decreased potential for spread of noxious weeds from motor vehicles. There would be fewer road-stream crossings, so local sediment input would decrease.
Undeveloped	Adding unauthorized routes to the NFTS would not increase the level of development within IRAs since the routes under consideration are part of the existing condition and do not represent a new development of the landscape. The majority of unauthorized routes are primitive wheel tracks which follow natural terrain. They have native surfacing and lack constructed structures such as culverts, water bars, and bridges. If motorized use were to be eliminated, the surface would be expected to revegetate and return to natural soil function within 20 to 40 years. Active restoration would decrease the recovery time. Vegetation on all unauthorized routes not added to the NFTS in each alternative would gradually recover to a natural state, causing minor improvements to the undeveloped character
Outstanding opportunities for solitude or a primitive and unconfined type of recreation	With Alternative 1 there will be no changes to the opportunity to experience solitude because use will remain consistent to existing levels. Route density within IRAs is lower than the general forest area. With action alternatives a reduction in the miles of motorized routes in IRAs will decrease the likelihood of encountering other recreationists and increase the sense of isolation from sights, sounds, and the presence of others compared to the existing condition.

Alternative 1 – No Action

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

There would be no prohibition to cross-country travel under this alternative. Present miles of routes, both within the NFTS and unauthorized, as well as density of routes within the roadless areas are shown in Table 3.10-2 for the short-term. Current conditions in sediment production and delivery to channels will probably continue in the short-term. Non-vegetative areas, due to cross-country travel routes, would continue to be non-productive because of compaction and/or soil loss. Further routes may be created and the overall condition in roadless areas may deteriorate. At the same time, routes may become disused and in the long-term, overall condition may improve as ground revegetates and de-compacts. Hydrologic function would generally recover in the long-term, with the recovery of ground cover to at least 50 percent in any route fallen into disuse.

The diversity of plant and animal species and habitat for threatened and endangered species (TES) dependant on undisturbed areas will continue in the present condition or, with the possibility of new routes being pioneered, will continue to degrade.

Recreational activities, such as hiking, backpacking, and wildlife viewing that benefit from a degree of isolation, could be further degraded by creation of new routes. Other pursuits, such as fishing and hunting would continue to be better served by continuation of present access routes, and the ability to create new ones.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

There would no unauthorized routes or areas added into the NFTS under this alternative. Miles of available NFTS routes within the roadless areas and density of routes would be unchanged from values shown in Table 3.10-2 for the short-term. Present extent of access for recreation, and conversely disturbance, or intrusiveness, of motor vehicles on some stated qualities of roadless areas (Table 3.10-1) would continue. Present seasons of use and vehicle class on NFTS routes would continue.

Direct/Indirect Effects of Changes to the Existing NFTS (Changes in Vehicle Class)

There would be no changes in vehicle class for any route currently in the NFTS under this alternative.

Alternative 2- Proposed Action

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

There would be a long-term reduction of fine sediment production that could be transported by surface flow into channels from unauthorized routes. There would also be immediate benefits with reduction of noise, dust, and intrusiveness of motor vehicles. Hydrologic function would probably return in the long-term with re-establishment of ground cover to at least 50 percent on unauthorized routes. Over the long-term, soil productivity would improve because of natural re-vegetation and de-compaction of unauthorized routes.

Plant and animal diversity or TES habitat, when dependant on undisturbed areas, should improve for some species and some areas in the short-term. Some degree of intrusiveness might continue because of nonmotorized passage by bike riders, backpackers, and hikers, depending on cover type or terrain (for example, dense brush is less likely to be crossed than forest), as well as pioneering by these visitors.

Some recreational access would decrease, especially for fishing and hunting. However, the isolation incurred by the travel prohibition is generally beneficial to backpackers, picnickers, wildlife viewers and other pedestrian pursuits. There would be a marked decrease in trammeling of natural areas, and unintentional impacts such as spread of noxious weeds along roads or trails. There would be a concomitant recovery of natural vegetation with the reduction in motor vehicle activities. Because no roads would be built there would no addition or improvement in structures construed with roadways, such as drainage features.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

One route of 0.23 miles will be added to the NFTS within Backbone IRA, and five routes, 2.38 miles total, in 3 CIRAs (Table 3.10-6). Increase to road density available for motor vehicle travel in Backbone IRA is only 0.015 miles/square mile. Changes in road density in NFTS for the three CIRAs, Devil's Rock, South Fork Trinity and Trinity Alps, are 0.06, 0.20, and < 0.001 miles/square mile, respectively. These slight increases would result in minor to immeasurable change overall to soil and water resources of the affected areas, as well as minimal changes in animal and plant diversity, or TES habitat dependant on undisturbed areas.

Table 3.10-6. Alternative 2 changes to CIRAs and IRAs and adjacent 0.5-mile area

	# of Routes	Miles
Additions to the NFTS with CIRAs		
CIRAs		
Devil's Rock	2	2.08
South Fork Trinity	2	0.20
Trinity Alps	1	0.10
Additions to the NFTS within 0.5 mile of CIRA		
Backbone CIRA	1	1.44
Beegum CIRA	2	0.16
Chinquapin	1	0.45
Devil's Rock	2	0.08
East Fork Mountain	2	0.31
Panther	2	0.68
Pattison	1	0.14
South Fork Trinity	3	3.32
Trinity Alps	3	0.32
Yolla Bolly-Middle Eel	2	0.36
Additions to the NFTS with IRAs		
IRAs		
Backbone	1	0.23
Additions to the NFTS within 0.5 mile of IRA		
Backbone	1	1.52
Devil's Rock	2	0.11
East Beegum	1	0.10
East Girard	2	0.32
East Fork	1	0.32
Little French C.	3	0.53
Panther	2	0.69
Pattison	1	0.14
Penney Ridge	1	0.32
South Fork	1	0.12

CIRAs overlap and extend out beyond the boundaries of IRAs, therefore the routes are shared between them, with longer segments counted in a given CIRA because of its greater extent. Also, added routes within a CIRA may not be counted as added to the IRA because the segments are outside the IRA.

Within 0.5 mile of 10 IRAs and 12 CIRAs, routes will be added that, combined, add 1.3 percent to the available routes adjacent to the CIRAs listed, and 0.9 percent to the available routes adjacent to the listed IRAs (Table 3.10-6). Again, most of these routes are shared between the CIRAs and IRAs, with the typically larger CIRAs containing the longer segments of the added route.

This portion of the analysis, of the adjacent area to the roadless, is concerned primarily with the intrusiveness of motor vehicle travel, noise, and dust; on primitive and semi-primitive qualities; and on animal habitat that depends on a degree of non-disturbance. The added routes are mostly small segments that connect an access point on an IRA boundary, and are perpendicular to the boundary. An exception is the Backbone IRA and CIRA addition, which is a loop route within the 0.5 mile area outside the roadless boundaries. Therefore, the disturbance these additional routes cause to primitive qualities and animal habitat are considered minor or insignificant. Vehicle class and season of use for added routes would be the same as connecting system roads, and continuation of current condition.

Table 3.10-7. Alternative 2 percent change in available NFTS routes

Areas	Increase in Available Routes (%)
IRAs	
Backbone	0.50
CIRAs	
Devil's Rock	5.50
South Fork Trinity	0.94
Trinity Alps	0.25

In addition to added routes within at least 0.5 mile of IRAs is the addition of an open area on Shasta Lake adjacent to a portion of Backbone and Devil's Rock IRA. A total of 1169 acres of this open area are next to Backbone IRA and 725 acres are next to Devil's Rock. Some of the restrictions on this use are 15 mph speed limit and highway-legal vehicles only. Existing season of use restrictions for protection of nesting bald eagles would be applied. Within this area, about 420 acres within 0.5 mile of Backbone, Devil's Rock IRAs and CIRAs and Horsemouth CIRA currently has frequent motor vehicle use. Expected effects will be similar to the intrusive character of motor vehicle routes, yet this expectation should be tempered by the obvious likelihood of motorboat travel occurring in the same locale when lake levels allow–a use that is also ongoing and without restriction except for bald eagle season of use restrictions with similar effect to those roadless and wilderness characteristics of solitude in primitive or semi-primitive setting.

Proposals to leave felled hazard trees along routes in late successional reserves do not apply to any added routes in an IRA or CIRA or within 0.5 mile of same.

Parking would be allowed within one vehicle length of a designated route. In regards to characteristics of solitude or primitiveness in roadless or wilderness areas, or wildlife habitat (Table 3.10-1), the effect is probably minimal, because parking would not be over 30 feet from the edge of a travel route. There could be some resource damage to soil, trammeling of vegetation, and increased erosion from ground disturbance. The scope of damage is uncertain and would depend largely on hill slope gradient conducive to parking. Hence, damage is likely minimal because the most erodible and thinnest soils are on steep slopes that would be largely unaffected by the proposal.

Direct/Indirect Effects of Changes to the Existing NFTS (Changes in Vehicle Class)

The proposal to allow motorized mixed use on some existing NFTS roads affects portions of those routes shown below in Table 3.10-8. None of the routes are within either an IRA or CIRA, but are within 0.5 mile of one or the other. Change in vehicle class may or may not induce a change in traffic volume. No significant effect is therefore expected to those characteristics previously identified (Table 3.10-1) for roadless or wilderness areas.

Table 3.10-8. Miles of routes within 0.5 mile of IRA or CIRA with proposed mixed-use changes

	# of Routes	Miles
IRA		
Cow Creek	1	0.72
Devil's Rock	1	0.71
Mt. Eddy	1	0.28
Pattison	2	1.26
CIRA		
Devil's Rock	1	1.28
Mt. Eddy	1	0.99
Pattison	2	1.36
South Fork Trinity	1	0.31
Trinity Alps	2	1.41

Alternative 3- Cross-Country Travel Prohibition Only - No Additions to the Existing NFTS

Direct/Indirect Effects of the Prohibition of Cross-County Motor Vehicle Travel

Cross-country travel would be prohibited under this alternative. This would affect 52.33 miles of unauthorized routes in IRAs and the 51.1 miles within CIRAs. Within the long-term there would be reduction of fine sediment production that could be transported by surface flow into channels. There would also be immediate benefits with reduction of noise, dust, and intrusiveness of motor vehicles. Hydrologic function would probably return with reestablishment of ground cover in the long-term. Over the long-term, soil productivity would improve because of natural re-vegetation and de-compaction of routes.

Plant and animal diversity or TES habitat, when dependant on undisturbed areas, should improve, for some species and some areas in the short-term. Some degree of intrusiveness might continue because of

nonmotorized passage by bike riders, backpackers and hikers, probably depending on cover type or terrain (for example, dense brush is less likely to be crossed than forest), as well as pioneering by these visitors.

Recreational access would decrease, especially for fishing and hunting. However, the isolation incurred by the travel prohibition is generally beneficial to backpackers, picnickers, wildlife viewers, and other pedestrian pursuits. There would be a marked decrease in trammeling of natural areas, and unintentional impacts such as spread of noxious weeds along travel routes, resulting in a proportional potential recovery of natural vegetation.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

There would no unauthorized routes or areas added to the NFTS under this alternative.

Direct/Indirect Effects of Changes to the Existing NFTS (Changes in Vehicle Class)

There would no change in vehicle class under this alternative.

Alternative 4- Minimize Impacts to Natural Resources and Roadless Areas

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

The prohibition would be in effect for the 52.33 miles of unauthorized routes in IRAs and the 51.1 miles within CIRAs. Within the short-term there would be reduction of fine sediment production that could be transported by surface flow into channels. There would also be short-term benefits with reduction of noise, dust, and intrusiveness of motor vehicles. Hydrologic function would probably return, in the long-term, with reestablishment of ground cover of at least 50 percent on disused routes. Over the long-term, soil productivity would improve because of re-vegetation and de-compaction of routes.

Plant and animal diversity or TES habitat, when dependant on undisturbed areas, should improve for some species and some areas in the short-term. Some degree of intrusiveness might continue because of nonmotorized passage by bike riders, backpackers, and hikers, probably depending on cover type or terrain (for example, dense brush is less likely to be crossed than forest), as well as pioneering by these visitors.

Recreational access would decrease, especially for fishing and hunting. However, the isolation incurred by the travel prohibition is generally beneficial to backpackers, picnickers, wildlife viewers, and other pedestrian pursuits. There would be a marked decrease in trammeling of natural areas, and unintentional impacts such as spread of noxious weeds along roads and trails. A concomitant and proportional potential recovery of natural vegetation would occur on un-used roads and trails. Because no new roads would be built, there would be no improvement or addition of structures, such as roadway drainage features.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

No routes will be added to any IRA or CIRA with this alternative. Two routes totaling 0.21 mile will be added to the NFTS within 0.5 mile of the Beegum CIRA. A single route of 0.14 mile will be added within 0.5 mile of the West Beegum IRA (Table 3.10-9). These additions do not constitute significant change to total miles in the area adjacent to either roadless area. West Beegum IRA has currently 48.13 miles of NFTS routes within 0.5 mile of its boundary and the Beegum CIRA currently has 14.48 miles of available routes within 0.5 mile of its boundary. The proposed changes will increase available NFTS routes by 0.4 percent and 1.0 percent in West Beegum and IRA and Beegum CIRA, respectively.

In addition to added routes within at least 0.5 mile of IRAs is the addition of an open area on Shasta Lake adjacent to a portion of Backbone and Devil's Rock IRA. A total of 1,169 acres of open area are next to Backbone IRA and 725 acres are next to Devil's Rock. Some of the restrictions on motor vehicle use in this area are 10 mph speed limit and highway-legal vehicles only. Existing season of use restrictions for bald eagle would apply. With this area, about 420 acres within 0.5 mile of Backbone, Devil's Rock IRAs and CIRAs and Horsemouth CIRA, currently has frequent motor vehicle use. Expected effects will be similar to the intrusive character of motor vehicle routes, yet this expectation should be tempered by the obvious likelihood of motorboat travel occurring in the same locale when lake levels allow–a use that is also ongoing and without restriction with similar effect to those roadless and wilderness characteristics of solitude in primitive or semi-primitive setting.

Table 3.10-9. Alternative 4 changes to CIRAs and IRAs within 0.5 mile of area boundary

	# of Routes	Miles
Additions to the NFTS within 0.5 mile of CIRAs		
Beegum	2	0.21
Additions to the NFTS within 0.5 mile of IRAs		
West Beegum	1	0.14

Proposals to leave felled hazard trees along routes in late successional reserves do not apply to any added routes in an IRA or CIRA or within 0.5 mile of same.

Parking would be allowed within one vehicle length of a designated route. In regards to characteristics of solitude or primitiveness in roadless or wilderness areas, or wildlife habitat (Table 3.10-1), the effect is probably minimal, because parking would not be over 30 feet from the edge of a travel route. There might be some resource damage to soil, trammeling of vegetation, and increased erosion from ground disturbance. The scope of damage is uncertain and would depend largely on hill slope gradient conducive to parking. Hence, damage would likely be minimal because the most erodible and thinnest soils are on steep slopes that would be largely unaffected by the proposal.

Direct/Indirect Effects of Changes to the Existing NFTS (Changes in Vehicle Class)

Under this alternative, there would be no changes to vehicle class on any routes within an IRA; however, there would be changes in motorized mixed-use on portions of 4 routes in CIRAs (Table 3.10-10). Also there would be changes within 0.5 mile of several or the same IRAs and CIRAs (Table 3.10-10).

The routes shown in Table 3.10-10 are currently existing NFTS level 3 roads and are proposed to allow motorized mixed-use. This may promote added traffic to these routes. Disturbance to primitive qualities and animal diversity or habitat which are dependent on undisturbed areas is unlikely to be greatly affected as these are already in use. Soil productivity would remain the same, because the routes are likely to have a similar degree of disturbance. Erosion of fine sediment from running surfaces may increase, because traffic is a primary factor in sediment production from forest roads (Bilby et al. 1989; Sheridan et al. 2006). However the routes proposed for vehicle class change are largely paved or gravel surfaced. Two routes, one within 0.5 mile of the Chinquapin CIRA and the other within 0.5 mile of Devil's Rock IRA cross perennial streams, but both are paved. Therefore, no change in effects to water quality is expected.

Table 3.10-10. Changes in vehicle class for NFTS routes in alternative 5

Area	Miles of Route
CIRA	
Devil's Rock	0.11
Mount Eddy	0.09
Pattison	0.03
Trinity Alps	0.70
Yolla Bolly	0.46
Within 0.5 mile of CIRA	
Chinquapin	1.63
Devil's Rock	1.69
Mount Eddy	0.90
Pattison	1.23
South Fork	0.31
Trinity Alps	0.71
Yolla Bolly	3.27
Within 0.5 mile of IRA	
Cow	0.72
Devil's Rock	0.71
East Fork	2.86
Mount Eddy	0.28
Pattison	1.26

Existing seasonal restrictions on unauthorized routes does not affect any routes within an IRA or CIRA or within 0.5 mile of either.

The proposal to allow motorized mix use on certain level 3 routes affects portions of those routes shown above in Table 3.10-8. None of the routes are within either an IRA or CIRA, but are within 0.5

mile of one or the other. Change in vehicle class may or may not induce a change in traffic volume. No significant effect is therefore expected to those characteristics previously identified (Table 3.10-1) with roadless or wilderness areas.

Alternative 5- Improved Access and Motorized Recreation Opportunities

Direct/ Indirect Effects of the Prohibition of Cross-County Motor Vehicle Travel

The prohibition would be in effect for the 52.33 miles of unauthorized routes in IRAs and the 51.1 miles within CIRAs. Within the short-term there would be reduction of fine sediment production that could be transported by surface flow into channels. There would also be short-term benefits with reduction of noise, dust, and intrusiveness of motor vehicles. Hydrologic function would probably return over the long-term with reestablishment of ground cover of at least 50 percent on unused routes. Over the long-term, soil productivity would improve because of re-vegetation and de-compaction of routes.

Plant and animal diversity, or TES habitat, when dependant on undisturbed areas, should improve for some species and some areas in the short-term. Some degree of intrusiveness might continue because of nonmotorized passage, by bike riders, backpackers and hikers, probably depending on cover type or terrain (for example, dense brush is less likely to be crossed than forest), as well as pioneering by these visitors.

Recreational access would decrease, especially for fishing and hunting. However, the isolation incurred by the travel prohibition is generally beneficial to backpackers, picnickers, wildlife viewers and other pedestrian pursuits. There would be a marked decrease in trammeling of natural areas, and unintentional impacts such as spread of noxious weeds along transportation routes. Concomitant with reduction of intrusive motor vehicle activities would be a recovery of natural vegetation. As no new roads would be built there would be no improvement or addition of structures, such as roadway drainage features.

Direct/Indirect Effects of Adding Facilities (Presently Unauthorized Roads, Trails, and/or Areas) to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Six routes totaling 1.93 miles will be added to the NFTS within four IRAs (Table 3.10-11), and five routes, totaling 2.81 miles, will be added to three CIRAs. These additions will add about 1.3 percent of available routes to the IRAs and 3.5 percent to the combined CIRAs. Increases to individual IRAs and CIRAs are shown in Table 3.10-11. Increase to road density is the same proportion as increase to route lengths. Vehicle class and season of use for added routes would be same as connecting system roads, and continuation of current condition.

Table 3.10-11. Alternative 5 changes to CIRAs and IRAs and adjacent 0.5-mile area

Area	# Route	Miles
Additions to the NFTS with CIRAs		
Beegum CIRA	5	0.64
Devil's Rock	2	2.08
Mount Shasta	1	0.09
Additions to the NFTS within 0.5 mile of CIRA		
Backbone CIRA	1	1.44
Beegum CIRA	5	0.80
Chanchellula	3	1.37
Chinquapin	1	0.45
Devil's Rock	2	0.08
Chinquapin	2	0.55
East Fork Mountain	2	0.31
Mayfield	2	1.01
Mount Shasta	4	2.66
Panther	2	0.68
Pattison	1	0.14
South Fork Trinity	3	3.32
Trinity Alps	3	0.32
Yolla Bolly-Middle Eel	4	1.08
Additions to the NFTS with IRAs		
IRAs		
Backbone	1	0.23
East Girard	1	0.52
Wells Mountain	1	1.04
West Beegum	3	0.14
Additions to the NFTS within 0.5 mile of IRA		
Backbone	1	1.52
Chanchellula	4	1.22
Devil's Rock	2	0.11
East Beegum	1	0.10
East Girard	2	0.32
East Fork	1	0.73
Little French C.	3	0.53
Mount Shasta	2	0.78
Panther	2	0.69
Pattison	1	0.14
Penney Ridge	1	0.32
South Fork	1	0.12
Wells Mountain	4	1.87
West Beegum	5	0.43

These values, miles of added roads, and total road densities, would result in minor to immeasurable change overall to soil and water resources of the affected areas. As well, changes in animal and plant diversity, or TES habitat dependant on undisturbed areas is expected to be insignificant or minor.

CIRAs overlap and extend out beyond the boundaries of IRAs, therefore the routes are shared between them with longer segments counted in a given CIRA. Also, added routes within a CIRA may not be added to the IRA because the segments are outside the IRA.

Within 0.5 mile of 10 IRAs and 12 CIRAs routes will be added that, combined, add 2.23 percent to the available routes adjacent to the CIRAs listed, and 1.47 percent to the available routes adjacent to the listed IRAs. Again, most of these routes are shared between the CIRAs and IRAs, with the typically larger CIRAs containing the longer segments of the added route.

Table 3.10-12. Alternative 5 percent change in available NFTS routes

Area	Increase in Available Routes (%)
IRAs	
Backbone	3.70
East Girard	0.45
Wells Mountain	6.43
West Beegum	2.29
CIRAs	
Beegum	1.96
Devil's Rock	5.50
Mount Shasta	0.93

This portion of analysis, of the adjacent area to the roadless, is concerned with the intrusiveness of motor vehicle travel, noise, and dust, on primitive and semi-primitive qualities, and on animal habitat that depends on a degree of non-disturbance. The added routes are mostly small segments that connect an access point on an IRA boundary, and are perpendicular to the boundary. Exceptions are lengths of 1 to 3 miles in Backbone, Mount Shasta, and South Fork Trinity CIRAs, and lengths of between 1 and 1.5 miles in Backbone, Chanchellula and Wells Mountain IRAs. These routes are either loops or parallel to boundaries, but contained within the adjacent 0.5-mile width to the roadless area. Insofar as these routes are not within the roadless areas themselves, and the total increase is minor, the effects are not expected to be significant.

In addition to added routes within at least 0.5 mile of IRAs is the addition of an open area on Shasta Lake adjacent to a portion of Backbone and Devil's Rock IRA. A total of 1,169 acres of open area are next to Backbone IRA and 725 acres are next to Devil's Rock. Some of the restrictions on motor vehicle use in this area are 10 mph speed limit with both highway-legal vehicles and non-highway legal vehicles allowed. Exiting season of use restrictions for bald eagle would apply. Within this area about 420 acres within 0.5 mile of Backbone, Devil's Rock IRAs and CIRAs, and Horsemouth CIRA currently has frequent motor vehicle use. Expected effects will be similar to the intrusive character of motor vehicle routes, yet this expectation should be tempered by the obvious likelihood of motorboat travel occurring in the same locale when lake levels allow–a use that is also ongoing and without restriction with similar effect to those roadless and wilderness characteristics of solitude in primitive or semi-primitive setting.

Proposals to leave felled hazard trees along routes in late successional reserves does not apply to any added routes in an IRA or CIRA or within 0.5 mile of same.

Parking would be allowed within one vehicle length of a designated route. In regards to characteristics of solitude or primitiveness in roadless or wilderness areas, or wildlife habitat (Table 3.10-1) the effect is most probably minimal, given parking would not be over 30 feet from the edge of a travel route. There might be some resource damage to soil, trammeling of vegetation, and increased erosion from ground disturbance. The scope of damage is uncertain and would depend largely on hill slope gradient conducive to parking. In this regard there would likely be minimal damage because the most erodible and thinnest soils are on steep slopes that would be largely unaffected by the proposal.

Direct/Indirect Effects of Changes to the Existing NFTS (Changes in Vehicle Class)

Changes in vehicle class (mixed-use) in this alternative are identical to alternative 4. Refer to the same titled section above in alternative 4.

The proposal to allow motorized mixed-use on some NFTS roads affects portions of those routes shown above in Table 3.10-8. None of the routes are within either an IRA or CIRA, but are within 0.5 mile of one or the other. Change in vehicle class may or may not induce a change in traffic volume. No significant effect is therefore expected to those characteristics previously identified (Table 3.10-1) with roadless or wilderness areas.

Cumulative Effects for All Alternatives

Table 3.10-4 displays the miles of existing NFTS roads and NFTS additions within IRAs for each alternative. None of the alternatives propose new road construction in IRAs. Alternative 5 would add existing unauthorized routes to the NFTS as motorized trails.

Motor vehicle use has historically taken place in IRAs, resulting in the existing network of 922 miles of NFTS roads and unauthorized routes. Records indicate that motor vehicle use (of NFTS roads and unauthorized routes) was occurring at the time IRA boundaries were established during the RARE II evaluations in 1978. Therefore, adding existing unauthorized routes to the NFTS as motorized trails would have no cumulative effect on the level of development within IRAs.

The greatest potential threats to maintaining roadless characteristics are road construction, reconstruction, timber harvesting, mining, utility lines, or other new developments. These activities pose disproportionately greater risks of altering and fragmenting natural landscapes at regional and national scales. Therefore, consideration of cumulative effects resulting from present and foreseeable future activities (see Appendix B) was limited to proposals to construct or reconstruct roads or harvest timber within IRAs. There are proposals by Sierra Pacific Industries (SPI) to construct two roads through portions of two IRAs to provide access to SPI land. The longer route (0.4 miles) is proposed in the East Girard Roadless Area. The second route is 300 feet (0.06 mile) in the Kettle Mountain IRA. Neither

crosses a stream. Both connect to current NFTS routes, and constitute a 0.34 percent and 0.36 percent increase in NFTS routes for East Girard and Kettle Mountain IRAs, respectively. These amounts do not elicit concern for significant effect, and the proposed route placements are not near ridgelines.

For CIRAs, the action alternatives are expected to result in minor adverse direct and indirect effects to semi-primitive motorized recreation experiences. Semi-primitive motorized experiences are characterized by the presence and use of primitive roads and trails. Primitive roads are not constructed, and are used by vehicles not primarily intended for highway use (ROS Users' Guide, p. 16). All unauthorized routes in CIRAs (and forest-wide) are considered to be primitive roads or trails.

No present or reasonably foreseeable future actions are known that would increase semi-primitive motorized experiences by constructing new primitive roads within CIRAs. As a result, the action alternatives would have the cumulative effect of reducing semi-primitive motorized experiences in CIRAs by decreasing the miles of primitive roads and trails available for motor vehicle use from existing conditions. This effect is expected to be most pronounced in alternative 3, which would not add any unauthorized routes to the NFTS, followed by alternatives 4, 2, and 5. For all other characteristics, direct and indirect effects are either not expected or are expected to be beneficial overall. Therefore, adverse cumulative effects to these characteristics are not expected.

A number of NFTS roads are to be closed or decommissioned in foreseeable forest actions undertaken by other projects (Table 3.10-13) that are proximate (within 0.5 mile) to IRAs and CIRAs though none are within roadless areas themselves. These changes would be expected to enhance characteristics of roadless and wilderness areas, although such effects may not be measurable, as for instance, no more than four percent of routes are affected for any of the areas adjacent to IRAs.

Table 3.10-13. Closed routes in foreseeable actions by Forest, within 0.5 mile of IRAs or CIRAs

Area	# of Routes	Miles
IRAs		
Chanchellula	7	1.88
Chinquapin	2	0.40
Salt Gulch	3	0.67
Weaver Bally	3	1.57
CIRAs		
Beegum	1	0.75
Chanchellula	6	3.54
Chinquapin	3	1.44
Eagle	1	0.25
South Fork Trinity	1	0.93

Summary of Effects Analysis across All Alternatives

Direct and indirect effects of the alternatives on roadless characteristics as measured by the indicators and discussed above are summarized below. The alternatives result in varying degrees of minor effects to

roadless characteristics. All action alternatives would result in minor beneficial effects to the overall character of IRAs on the Forest compared to existing conditions.

Effects are ranked by alternative on a scale of 1 to 5 from greatest (1), to least (5) impact.

The overall effects of the alternatives from greatest impact to IRAs and CIRAs to least impact would be:

Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
1	3	5	4	2

The differences from the current condition are largely the prohibition of cross-country travel in alternatives 2 through 5. Considering only the addition of present unauthorized routes to the NFTS, the order of alternatives from greatest to least effects is 5 and 2, with alternatives 4 and 3 essentially of equal weight.

Compliance with the Forest Plan and Other Direction

Proposed activities within IRAs and CIRAs are consistent with applicable management direction from the 1995 LRMP.

3.11. Socio-Economic Resources

Introduction

The STNF is located within a dominantly rural part of northern California, and serves a variety of functions for residents. The primary role of the forest for local residents is as a recreation destination; forest amenities attract visitors from all over the western United States. A variety of lakes, rivers, and streams provide abundant water recreation opportunities. Popular bodies of water in the area are Shasta and Trinity Lakes, as well as the Trinity River, which flows through a large portion of the forest. A complex system of public roads, highways, and interstates provides easy access to many STNF inlets.

Activities supported by the STNF affect social and economic conditions in a variety of ways. Local residents associate forest recreation and natural amenities with their quality of life, and subsistence uses such as firewood are valued by local residents. Therefore, the management of resources on the STNF may affect the lifestyles, attitudes, beliefs, and values of many individuals. In addition to the social implications, spending by non-resident visitors generates economic activity in nearby communities. Ultimately, expenditures related to the use of the forest can impact the overall level of jobs and income.

While the STNF receives visitors from throughout the western United States; the vast majority of visitors are residents of Shasta County, where Redding is the largest community within close proximity to the forest (see the socioeconomic specialist's report in the project record for additional detail regarding the data and methods in this report). The STNF provides a variety of recreational opportunities such as hiking, backpacking, mountain climbing, horseback riding, camping, boating, fishing, sightseeing, downhill skiing, snowboarding, cross-country skiing, and snowmobiling (http://fs.usda.gov/goto/stnf/aboutforest).

Both motorized and nonmotorized activities are popular on the STNF. One objective of this project is the development of a sound travel management plan protecting a variety of amenity values for the well-being of participants of all activities. Although recreational activities are available on lands under a variety of ownerships in the region, the STNF is a primary location for motorized travel. Motorized use provides a means of getting to various locations, including access to a variety of recreational pursuits, and it serves as a recreational activity itself. Both motorized and nonmotorized activities attract visitors to the forest; and those visitors have implications for economic and social conditions.

This report summarizes and incorporates by reference the socioeconomic analysis documented in "Shasta-Trinity National Forest Travel Management EIS: Society, Culture, and the Economy," hereafter referred to as the "socioeconomics report," located in the project record. The socioeconomics report contains supporting data, details, and analysis used in reaching the effects determinations in this section.

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Multiple statutes, regulations, and Executive orders identify the requirements for the application of economic and social evaluation in support of Forest Service planning and decision-making. These include, but are not limited to, the Multiple-Use Sustained Yield Act of 1960 (74 Stat. 215: 16 USC 528-531), National Environmental Policy Act of 1969 (83 Stat. 852; 42 USC 4321, 4331-4335, 4341-4347), and the Planning Act of 1974. In addition, the following guidance also applies:

- Executive Order 12898, issued in 1994, orders Federal agencies to identify and address any adverse human health and environmental effects of agency programs that disproportionately impact minority and low-income populations. The Order also directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife.
- The Civil Rights Act of 1964 provides for nondiscrimination in voting, public accommodations, public facilities, public education, federally assisted programs, and equal employment opportunity. Title VI of the Act, Nondiscrimination in Federally Assisted Programs, as amended (42 U.S. C. 2000d through 2000d-6), prohibits discrimination based on race, color, or national origin.

Impacts Relevant to the Socioeconomic Environment

Impacts to the socioeconomic environment include changes in employment and income, altered recreational habits by local residents, and variations in the distribution of social welfare experienced by user groups. Jobs and personal income are the primary variables used to determine economic effects. Social effects are less quantifiable by nature and are determined through a qualitative assessment of potential changes to the existing conditions as a result of actions specific to the various alternatives.

Assumptions Specific to the Socio-economic Analysis

- Prohibition of cross-country motor vehicle travel will result in less motorized recreation and travel.
- Nonmotorized activities are enhanced by improvements in ecological conditions.
- Effects from use below high-water mark would be intermittent due to changing lake levels.
- Restrictions in use below the high-water mark on Shasta and Trinity Lakes, and Iron Canyon Reservoir, would reduce motor vehicle use in those areas.

Data Sources

- U.S. Census Bureau
- Bureau of Labor Statistics (BLS)
- Minnesota IMPLAN Group

- Headwaters Economics: Economic Profile System (EPS)
- National Visitor Use Monitoring (NVUM)

Affected Environment/Environmental Consequences

Affected Environment

Study Area

The STNF study area is defined as five northern California counties: Humboldt, Shasta, Siskiyou, Tehama, and Trinity.

Population and Demographics

The reason for defining the relationship between the travel management planning and the economic and social environments is two-fold. First, individuals with different backgrounds are likely to be affected by STNF management differently. Secondly, social and economic well-being may affect tastes, preferences, and demand for recreational opportunities. An important goal of this analysis is to inform decision makers of the social and economic conditions evident in the study area. A large portion of forest visits are from local residents. Therefore, the local social and economic conditions may affect the rate and types of activities residents participate in, which in turn can affect individual livelihoods. Recreational, subsistence, and cultural activities serve a primary function in defining the social and economic dynamic of the five counties. Forest visitors generate important economic stimulus for many businesses, which impacts employment and income levels.

This section highlights demographic trends in each of the five counties in the study area. Current population levels influence the use of natural resources. Forecasts of future population levels indicate the potential for increased demand for recreational opportunities and resultant pressure on resources. Age distributions provide insight into the proportion of individuals in the working age group versus retirees and minors; groups who typically use the forest differently and use local services in different ways. Similarly, the racial composition of the population may affect cultural and heritage uses. Employment and income statistics describe economic conditions as well as aid in the identification of important sectors of the economy and the different ways travel management policies could affect them. For example, the impact of restrictions on motorized travel would affect businesses in the oil and gas industry differently than manufacturing firms. Additionally, household income could affect participation rates in natural resource recreation; the greater the income of local residents, the greater their ability to participate in various recreational activities.

Table 3.11-1. Population and growth rates by county and State, 2001-2008

	Humboldt		Shasta		Siskiyou		Tehama		Trinity		California	
	Pop	% Change	Pop	% Change	Pop	% Change	Pop	% Change	Pop	% Change	Pop	% Change
2001	127,123	0.5%	166,435	2.2%	44,490	0.5%	56,221	0.6%	12,986	-0.3%	34,430,970	2.1%
2002	128,055	0.7%	169,869	2.1%	44,597	0.2%	56,915	1.2%	13,097	0.9%	35,063,959	1.8%
2003	129,335	1.0%	172,987	1.8%	44,835	0.5%	57,835	1.6%	13,319	1.7%	35,652,700	1.7%
2004	130,452	0.9%	175,686	1.6%	45,141	0.7%	58,797	1.7%	13,506	1.4%	36,199,342	1.5%
2005	131,191	0.6%	177,717	1.2%	45,459	0.7%	59,698	1.5%	13,773	2.0%	36,675,346	1.3%
2006	131,575	0.3%	179,259	0.9%	45,615	0.3%	60,790	1.8%	13,966	1.4%	37,114,598	1.2%
2007	131,977	0.3%	180,666	0.8%	45,667	0.1%	61,709	1.5%	13,970	0.0%	37,559,440	1.2%
2008	132,821	0.6%	182,236	0.9%	45,971	0.7%	62,419	1.2%	13,966	0.0%	38,049,462	1.3%

Source: www.dof.ca.gov.

Population is an important consideration in managing forest resources. In particular, population structure (size, composition, density, etc.) and population dynamics (how the structure changes over time) are "essential to describing the effects and consequences of forest management and planning on a social environment" (Seesholtz et al. 2004). This section highlights population trends in the study area. Population increases may lead to conflicts over forest uses, travel management, recreation activities, and values.

Table 3.11-1 reports the population for each of the five counties from 2001 to 2008. In recent years, populations have remained relatively stable; Trinity and Siskiyou Counties have experienced minimal population growth, while Tehama and Humboldt Counties have had slow, but steady growth. Shasta County has experienced the most growth in recent years; the county seat, Redding, is the largest town in the immediate vicinity, and provides more advanced medical facilities and retail outlets. The goods and services offered in Redding and nearby communities have likely contributed to the higher rate of growth. The amenities of the STNF also draw people to the area due to the outdoor activities it supports.

There have been no sharp increases or decreases in population to suggest significant changes in the economic and/or social structure of the counties. Growth rates in each county have remained slow in recent years. The State of California also experienced slow growth during this time period; however, it outpaced the majority of counties.

According to the California Department of Finance (www.dof.ca.gov/), populations are expected to continue to rise in the future. Figure 3.11-1 reports the projected population by decade until 2050. Shasta and Tehama Counties are expected to experience the greatest growth. Tehama County is located to the south of Shasta County, and contains communities along the Interstate 5 highway corridor. These towns may serve as bedroom communities for commuters to Redding, as well as allow for easy access into parts of the STNF. The natural amenities of northern California and goods and services offered in Redding make Shasta and Tehama Counties desirable retirement places. As populations continue to age, it is likely that these counties will experience a greater immigration of retirees. Other counties in the study area are more remote, and are not expected to experience as rapid a rate of growth. However, as other areas of northern California become increasingly populated, it is likely that some people will look to these counties for a place of residence.

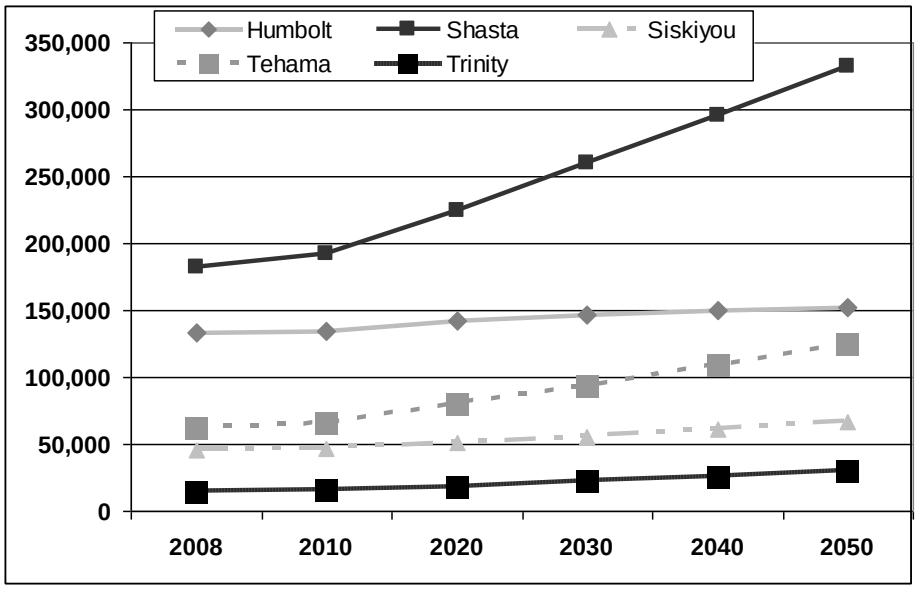


Figure 3.11-1. Population forecasts by county (Source: www.dof.ca.gov)

In recent years, the natural amenities of national forests have attracted people to live near forest boundaries to have easy access for recreational purposes. Such changes in population are referred to as amenity-led growth, and have been common in communities located near National Forest System lands in recent years. A portion of the growth in Shasta County may be characterized as amenity led. Many retirees have left more congested areas to be closer to the visual and recreational amenities offered by forested lands. Similarly, working-age individuals have been increasing commute times to live in more affordable, family-friendly environments with nearby natural resource recreational opportunities. However, some of the nearby counties have been experiencing slow growth. This is likely due to the remoteness of the area and immense distance from metropolitan centers. Retirees often demand medical services not readily available in these counties. In contrast, Shasta County has more advanced retail outlets and medical facilities, and provides easy access to the Sacramento Valley via Interstate 5. Thus, Shasta County has experienced steady growth in recent years, and is projected to have accelerated growth

in the future. Infrastructure in Redding provides the basic services required by retirees and young families, while maintaining a close proximity to the forest. It is likely that Shasta County will continue to experience an increase of households into the future.

The median age in each county is higher than the median age for the state (Table 3.11-2). This suggests that residents of the study area are older than residents in more metropolitan areas of California. This could be due to the lack of adequate higher educational and job opportunities to draw and retain a younger population. Likewise, there may be a greater influence from retirees.

Table 3.11-2. Median age of residents by County and State

Humboldt County[a]	**35.9 years**
Shasta County[a]	38.8 years
Siskiyou County[b]	43.0 years
Tehama County[b]	37.8 years
Trinity County[b]	44.6 years
California[a]	34.4 years

a - Source: American Community Survey 2006
b - Source: U.S. Census 2000

Regarding the distribution of age groups, all counties in the study area consist dominantly of middle-aged people (Figure 3.11-2). Trinity County tends toward an older age group, which is reflected in its median age of 44.6 years (Table 3.11-2). Humboldt County has a larger proportion of residents in the 20 to 24 and 24- to 34-year-old age groups; this is likely due to the presence of Humboldt State University (HSU) in the town of Arcata. HSU is part of the California State University (CSU) system, and draws students of college age to the area. The remaining counties follow a relatively normal age distribution, with the majority of residents in the working age group.

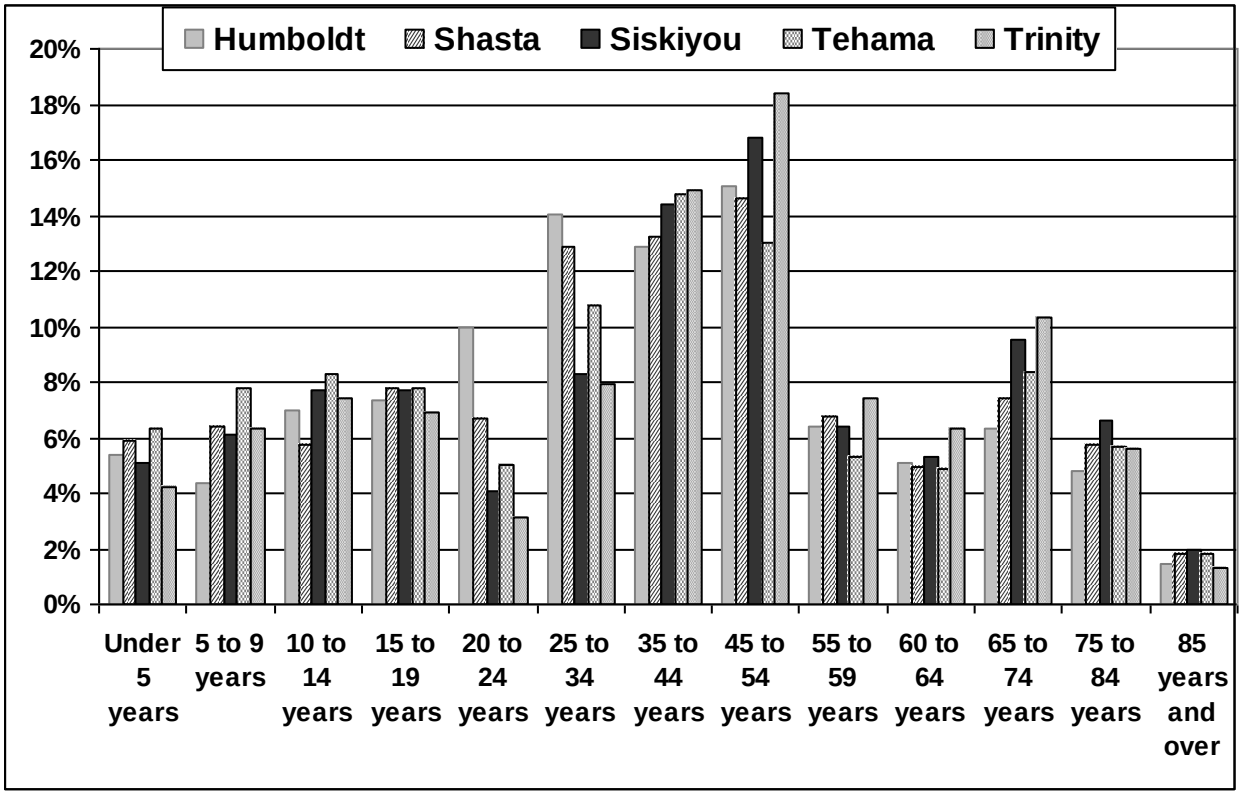


Figure 3.11-2. Age distribution by county (*Sources*: American Community Survey 2006, U.S. Census 2000)

Table 3.11-3 reports the racial distribution for each county in the study area. As defined by the U.S. Census Bureau, race and Hispanic origin are two different concepts; thus, people of Hispanic origin may identify with any race (http://www.census.gov/population/www/ socdemo/compraceho.html). The vast majority of residents around the STNF are Caucasian. This is a very different ethnic composition than the State average. As a whole, California is much more ethnically diverse than the study area. California's population is 59.8 percent Caucasian, where the distribution of Caucasian people for the counties ranges from 82.8 percent in Humboldt County to 88.9 percent in Shasta and Trinity Counties. Nearly 36 percent of California's population comes from a Hispanic origin; whereas counties in the study area range from 4 percent to 15.8 percent. Of the five counties, Humboldt is the most ethnically diverse with more than 18 percent of the population being something other than Caucasian. The Native American population has a much higher presence around the STNF than in the State as a whole. Native Americans/Pacific Islanders are the second most populous race in all counties except Tehama. At the individual county level, Humboldt and Trinity Counties have the highest proportions of Native Americans, 5.7 percent and 4.8 percent, respectively.

Table 3.11-3. Racial percentages of the total population by county and State

	Caucasian	African American	American Indian & Alaska Native	Asian/ Pacific Islander	Other Race	Two or More Races	Hispanic Origin (of any race)
California[a]	59.8%	6.2%	0.7%	12.7%	17.3%	3.3%	35.9%
Humboldt[a]	82.8%	1.2%	5.7%	1.8%	3.6%	4.8%	7.7%
Shasta[a]	88.9%	0.7%	2.7%	2.3%	1.6%	3.7%	7.2%
Siskiyou[b]	87.1%	1.3%	3.9%	1.3%	2.8%	3.6%	7.6%
Tehama[b]	84.8%	0.6%	2.1%	0.9%	8.3%	3.4%	15.8%
Trinity[b]	88.9%	0.4%	4.8%	0.6%	0.9%	4.4%	4.0%

a - Source: American Community Survey 2006
b - Source: U.S. Decennial Census 2000

Employment and Income Conditions

Employment and income statistics are important indicators of economic health. In recent years, the study area has not received any substantial positive or negative changes in employment, which is similar to recent population trends. Total employment has remained steady for each county over the specified time period. Given the relative remoteness of many parts of the study area, jobs may not be as vulnerable to swings in market structure and labor demand as total employment at the State level. Table 3.11-4 reports the percent change in employment levels from the previous year for the five counties and the State of California. During the specified time period, each county experienced modest changes in employment numbers. In counties with low population levels and volume of jobs, a relatively small change in employment could show up as a relatively large impact.

Table 3.11-4. Change in employment from previous year, 2002-2006

	2002	2003	2004	2005	2006	2007
California	-1.0%	-0.2%	1.0%	1.9%	1.8%	0.9%
Humboldt County	0.1%	-0.9%	0.3%	-1.0%	1.8%	-1.2%
Shasta County	3.3%	1.0%	-0.2%	-0.2%	2.5%	1.1%
Siskiyou County	-0.8%	-0.1%	-0.5%	-2.1%	2.0%	-0.6%
Tehama County	2.7%	-1.2%	-0.4%	0.6%	2.4%	-2.7%
Trinity County	3.4%	-4.0%	-3.6%	-1.4%	-2.5%	0.5%
Five-County Total	**1.7%**	**-0.1%**	**-0.1%**	**-0.6%**	**2.1%**	**-0.3%**

Source: www.bls.gov

To assess the relative size of sectors in the local economy, data reported by the Minnesota IMPLAN Group (MIG) is used. MIG reports annual economic data for all counties in the United States. The most current IMPLAN data available is 2006. MIG uses national, State, and local data sources to report county-level employment, and includes full time, part time, seasonal, and self-employment. Because IMPLAN employment data is reported simply as jobs, not full-time equivalents (FTEs), one person with multiple jobs will show up more than once in the data. This prohibits the comparison to local population data provided by the U.S. Census Bureau.

IMPLAN employment data is reported by economic sector, which is a set of local businesses by industry, grouped together according to similarities in the goods and services offered. Table 3.11-5 lists

the proportion of total jobs in the study area. Government supports the largest percentage of jobs, followed by retail trade, health and social services, and other services.

Table 3.11-5. Total jobs by county and economic sector

Sectors by 2 Digit NAICS Code	Humboldt	Shasta	Siskiyou	Tehama	Trinity	Total
Ag, Forestry, Fish and Hunting	2,059	1,585	1,213	2,184	147	**7,189**
Mining	10	190	15	129	14	**358**
Utilities	293	195	53	39	7	**588**
Construction	3,962	8,011	1,147	1,174	208	**14,502**
Manufacturing	3,868	3,095	739	2,561	259	**10,522**
Wholesale Trade	1,256	2,112	267	311	6	**3,951**
Transportation and Warehousing	2,003	3,470	665	1,371	58	**7,567**
Retail Trade	8,763	12,827	1,998	2,501	380	**26,470**
Information	770	988	270	128	32	**2,188**
Finance and Insurance	2,293	2,843	373	430	65	**6,004**
Real Estate and Rental	2,096	3,694	675	413	109	**6,985**
Professional-Scientific and Technical Services	3,021	4,857	672	565	122	**9,236**
Management of Companies	343	458	76	73	0	**951**
Administrative and Waste Services	2,143	3,969	525	761	25	**7,424**
Educational Services	658	1,481	105	112	36	**2,392**
Health and Social Services	6,953	11,666	1,868	2,068	425	**22,980**
Arts-Entertainment and Recreation	1,183	1,448	396	312	104	**3,443**
Accommodation and Food Services	5,101	7,261	1,861	1,266	351	**15,840**
Other Services	4,545	5,895	1,297	1,564	394	**13,695**
Government	13,097	13,052	4,214	3,932	1,148	**35,443**
Total	**64,418**	**89,096**	**18,429**	**21,896**	**3,889**	**197,727**

Source: MIG 2006

Travel management decisions as they pertain to recreation may affect the condition and relative importance of tourism-based sectors in the local economy. The natural resources sector (including grazing, wood products and processing, mining, and agriculture, forestry, fishing, and hunting) makes up less than 5 percent of total employment in the area. Thus, natural resource-based industries are not a major contributor to employment in the five counties overall; however, that sector could be of greater importance to individual counties.

According to the 2006 IMPLAN data, total employment in the study area is 197,727 jobs; 45 percent of those jobs are in Shasta County, and 33 percent are in Humboldt County. Tehama, Siskiyou, and Trinity Counties account for 11 percent, 9 percent, and 2 percent of total employment, respectively (Table 3.11-5). The government sector is the largest employer in all counties. Proportionally, the agriculture, forestry, fishing and hunting sector is an important employer in Siskiyou and Tehama Counties. Many of the activities on the STNF support jobs in this sector, making it a valuable source of economic stimulus. Retail trade and accommodation and food services are also important sources of employment. Businesses in these sectors generate economic stimulus from activities on the STNF due to travelers purchasing goods and services while on their way to visit the forest. The importance of such activities varies by

county. The more resilient economies of the larger counties are not as reliant on forest activities for economic stimulus.

Another indicator of economic health is the level of unemployment. All five counties have consistently maintained an unemployment rate higher than the State in recent years. Table 3.11-6 reports the annual unemployment rate for the counties and the State from 2000 through 2007. Humboldt County has maintained the lowest unemployment rate, while Shasta and Tehama Counties have experienced similar rates, fluctuating between 6 and 8 percent. Trinity County has had the highest presence of unemployment, consistently experiencing rates above 10 percent since 2002. As jobs are created in a region, labor comes from two primary sources: local unemployment and in-migration of households. With the higher unemployment rates in the study area, it is likely that any new demands for labor would be supplied from the local labor market. Thus, any additional jobs created by activities on the STNF would likely not affect household migration patterns, and may serve to reduce unemployment rates.

Table 3.11-6. Annual unemployment rates (percent) by counties and State, 2000–2007

	Humboldt	Shasta	Siskiyou	Tehama	Trinity	CA
2000	5.8	6.1	7.5	6.5	9.8	4.9
2001	6.0	6.3	8.1	6.5	9.3	5.4
2002	6.7	7.2	8.9	7.2	10.1	6.7
2003	6.9	7.6	9.5	7.7	10.5	6.8
2004	6.5	7.6	9.5	7.4	11.0	6.2
2005	6.2	7.3	9.1	6.9	10.3	5.4
2006	5.5	6.6	8.0	6.5	9.9	4.9
2007	6.0	7.5	8.6	7.4	10.4	5.4

Source: Bureau of Labor Statistics 2008

Income available to local residents directly impacts their ability to purchase goods and services. A total of 11.7 billion dollars of personal income was earned by local residents in 2005. This accounts for just 0.9 percent of the total personal income earned in California. Income is generated from the following sources and proportions: payments for labor (57 percent), transfer payments (24 percent) and dividends, interest and rent (18 percent). Dividends, interest, and rent are forms of investment earnings, which along with transfer payments are considered non-labor forms of income. Transfer payments consist of a variety of government and non-government non-labor income payments, including: retirement and disability, medical assistance, social security, unemployment benefits, welfare and veterans' benefits. Earnings from dividends, interest, and rent are sources of investment income generated through financial investments or other property income. Both sources of income contribute to economic resiliency because they are not directly tied to an individual's employment status. Labor income is further broken down by wage and salary income, and farm and non-farm proprietor's income. Proprietor's income is earnings from self-employment. The majority of income for local residents is generated by wages and salaries (42 percent).

Table 3.11-7. Total personal income by source, all counties, 2005

Total Personal Income ($ Millions)	11,696
Income Source (Percent of Total Income)	
Labor	57%
Non-Labor	43%
Dividends, Interest and Rent	18%
Transfer Payments	24%

Source: EPS 2007

Table 3.11-8 reports the personal income and source of income as a percent of total. Per capita personal income ranges from $23,377 in Trinity County to $29,104 in Shasta County. Labor income remains the primary source of earnings for residents of Shasta, Humboldt, and Tehama Counties. Non-labor sources account for roughly half of total income in Siskiyou and Trinity Counties.

Table 3.11-8. Personal income by source, 2005[a]

	Humboldt	Shasta	Siskiyou	Tehama	Trinity
Per Capita Personal Income ($)	27,932	29,104	26,874	22,420	23,377
Total Personal Income ($ Millions)	3,585	5,209	1,211	1,366	325
Income Source (Percent of Total Income)					
Labor	58%	60%	50%	56%	47%
Wage and Salary	43%	43%	35%	40%	27%
Non-farm Proprietors Income	11%	12%	11%	8%	8%
Farm Proprietors Income	1%	0%	1%	1%	0%
Non-Labor	42%	40%	50%	44%	53%
Dividends, Interest and Rent	20%	16%	22%	17%	20%
Transfer Payments	22%	24%	28%	27%	33%

a -Does not sum to 100 percent because of adjustments made by the Bureau of Economic Analysis.
Source: EPS 2007

Visitor Use

According to Executive Order 12862 (1993) information about the quality and quantity of recreation on National Forest System lands is required for national forest planning and implementation of the national recreation agenda. The National Visitor Use Monitoring (NVUM) program serves as the primary means of monitoring recreational activity at the national, regional, and forest level, directing each forest to be surveyed once every 5 years, yielding consistent data regarding visitor use. The primary purpose of the collection of NVUM data is to provide reliable estimates of recreational visits to national forests. A detailed explanation of the methods used for estimating annual recreation use on NFS lands is provided in English et al. (2001).

NVUM data available for the STNF is from round one of the surveying process conducted during fiscal year 2002. During that year, the STNF received 2,763,289 national forest visits, which is defined as the entry of one person into the Forest to participate in recreation activities for an unspecified period of time (NRIS HD-NVUM 1.2.2.33). During those visits, individuals participated in a variety of recreational

activities. Table 3.11-9 reports the participation rates by activity, as well as designates the activities as motorized, nonmotorized, or other. The "total activity participation" column represents total participation in all activities and exceeds 100 percent since visitors are likely to participate in multiple activities during their time spent on the Forest. Of the activities chosen as the main reason for visiting the forest, 2 percent fall into the motorized category and 16.5 percent fall into the nonmotorized. Of the motorized activities, driving for pleasure was the most popular, accounting for 1.6 percent of main activities and 11.1 percent of total activity participation.

Table 3.11-9. Activity participation on the STNF

Activity	Activity Emphasis for Road & Trail Use	Total Activity Participation (%)[a/b]	Percent as Main Activity (%)[c/d]
Snowmobiling	Motorized	0.3	0.0
Driving for Pleasure	Motorized	11.1	1.6
OHV Use	Motorized	4.9	0.4
Other Motorized Activity	Motorized	0.7	0.0
Motorized Subtotal			**2.0**
Hiking/Walking	Nonmotorized	27.6	6.4
Bicycling	Nonmotorized	4.9	2.0
Other Nonmotorized	Nonmotorized	20.2	4.0
Cross-country skiing	Nonmotorized	3.5	2.3
Backpacking	Nonmotorized	5.9	1.8
Horseback Riding	Nonmotorized	0.3	0.0
Nonmotorized Subtotal			**16.5**

Activity	Activity Emphasis for Road & Trail Use	Total Activity Participation (%)[a/b]	Percent as Main Activity (%)[c/d]
Downhill Skiing	Other	3.5	2.3
Fishing	Other	26.9	15.7
Viewing Natural Features	Other	44.2	17.8
Relaxing	Other	40.7	11.3
Motorized Water Activities	Other	22.3	8.9
Hunting	Other	9.1	7.8
Nonmotorized Water	Other	6.4	2.8
Developed Camping	Other	19.1	5.4
Primitive Camping	Other	5.0	0.4
Picnicking	Other	14.0	2.4
Viewing Wildlife	Other	31.7	2.3
Sightseeing	Other	0.0	0.0
Resort Use	Other	4.8	1.0
Visiting Historic Sites	Other	4.9	0.7
Nature Study	Other	5.0	0.5
Gathering Forest Products	Other	7.6	1.0
Nature Center Activities	Other	7.7	2.0
No Activity Reported	Other	18.9	20.3
Other Subtotal			**102.6**
Total			**121.1**

a - Survey respondents could select multiple activities so this column may total to more than 100%.
b - This column represents the percent of survey respondents who indicated participation in this activity.
c - Survey respondents were asked to select just one activity as their main reason for visiting the forest. However, some respondents selected more than one, so this column may total to more than 100%.
d - This column represents the percent of survey respondents who indicated this activity as their main activity.
Source: NRIS HD-NVUM 1.2.2.33

When assessing recreational use of the STNF, it is important to distinguish between local and non-local visitors. Non-local visitors are those who reside more than 30 straight-line miles from the forest boundary (Stynes and White 2005). This distinction allows for spending related to the forest visit to be differentiated between locals and non-locals. It is impossible to determine what would happen to local forest-related spending if the STNF were no longer available. However, it is likely that local residents would substitute other activities in the area if recreation on the STNF were no longer available and would still make expenditures at local businesses and firms. Expenditures by non-locals on the other hand, generates additional economic stimulus, as new money to the local economy. Non-local visitors account for 58 percent of the total annual visits; this suggests that a large portion of expenditures contributed to forest visits represents new money to the local economy. Non-primary visits are cases where recreation on the STNF was not the primary purpose for the trip, and account for 7 percent of total visits.

Table 3.11-10. Distribution of national forest visits by market segment

	Non-local Segments			Local Segments			Non-Primary	Total
	Day	Overnight on STNF	Overnight off STNF	Day	Overnight on STNF	Overnight off STNF		
Number of STNF Visits	110,532	386,860	469,759	911,885	248,696	442,126	193,430	**2,763,289**
Percent of STNF Visits	4	14	17	33	9	16	7	**100**

Source: NRIS HD-NVUM 1.2.2.33

Money spent by forest visitors helps support jobs and income in the local economy. Table 3.11-11 reports the annual total spending associated with national forest visits. Overall, 69 percent of total spending is by non-locals. Visitors purchase a variety of goods and services during their trip. Lodging, food, and fuel account for the majority of spending. Table 3.11-12 reports average expenditures per party per trip by category. Non-locals staying outside of the forest spend the most among all market segments due in large part to the additional expense of lodging at non-STNF facilities.

According to the data in Table 3.11-9, motorized activities are not a substantial proportion of recreation use on the STNF. However, according to Cordell et al. (2008), participation in OHV activities has experienced an increasing trend in recent years; participants in the U.S. increased from 37.6 million in 1999 to 51.6 million in 2003. More recent estimates of OHV participants show a decrease to 44.4 million in 2005 through 2007. Nonetheless, OHV use remains a major source of recreation in the U.S. as estimates for 2005 through 2007 report that 19.2 percent of Americans age 16 and older have participated in OHV recreation at least once within the last year. California is the highest ranked state amongst OHV users with 4.99 million participants or 11.6 percent of the U.S. total (Cordell et al. 2008).

Table 3.11-11. Annual total spending associated with national forest visits by market segment

National Forest Visits Excluding Downhill Skiing	Non-local Segments			Local Segments			Total
	Day	Overnight on STNF	Overnight off STNF	Day	Overnight on STNF	Overnight off STNF	
Total Spending ($1,000s)	**3,156**	**37,708**	**61,477**	**12,542**	**11,236**	**21,775**	**147,894**
National Forest Visits Downhill Skiing Only	**Non-local Segments**			**Local Segments**			**Total**
	Day	**Overnight**		**Day**	**Overnight**		
Total Spending ($1,000s)	**128**	**3,360**		**688**	**1,995**		**6,172**

Source: NRIS HD-NVUM 1.2.2.33

Table 3.11-12. Average spending of national forest visitor groups by market segment, dollars per group per trip

	Non-local Segments			Local Segments			Non-Primary
	Day	Overnight on STNF	Overnight off STNF	Day	Overnight on STNF	Overnight off STNF	
Lodging	0.00	35.56	80.95	0.00	24.62	28.11	64.62
Restaurant	16.96	35.41	73.07	6.43	14.28	32.07	64.30
Groceries	9.08	47.36	38.30	7.50	42.40	28.15	23.51
Gas and Oil	21.62	47.16	37.92	10.58	28.79	29.76	35.18
Other Transportation	1.36	4.61	10.38	0.33	0.00	4.32	6.06
Activities	4.97	13.51	23.54	1.96	3.47	6.89	23.39
Admissions/ fees	7.60	14.01	10.51	2.69	9.21	8.56	9.79
Souvenirs/other	6.47	19.74	29.30	7.63	12.32	18.18	26.87
Total	**68.06**	**217.36**	**303.97**	**37.12**	**135.09**	**156.04**	**253.72**

Source: NRIS HD-NVUM 1.2.2.33

From 1999 to 2007, the average annual growth rate of OHV registration in California was 12.8 percent. OHV registration in the study area followed a similar trend with an average annual growth rate of 12.5 percent during the same period. Growth in OHV ownership has exceeded population growth in both the study area and the state. This suggests that OHV use as an outdoor activity is gaining popularity among California residents; which is likely to result in an increased demand for OHV activities on the STNF.

Lands under other Federal ownership also offer opportunities for motorized recreation in the study area. Currently, the BLM oversees a large land base that supports a variety of motorized recreational opportunities. The Redding Field Office manages much of the BLM lands in the study area. The Chappie-Shasta OHV Area offers opportunities for motorized recreation and is co-managed by the BLM Redding Field Office and the STNF. Furthermore, the Arcata Field Office manages the Samoa Dunes Recreation Area, which allows year-round OHV use on 220 acres. One other area open to OHV use is the waveslope at South Spit; however, a 15 mph speed limit is imposed, and no play activities are allowed. Currently, no projects are planned that would substantially influence motorized recreation on these lands (Zaffarano 2009; Cann 2009).

Lifestyles, Attitudes, Beliefs and Values

The study area is largely dominated by natural-resource-based activities that support a rural lifestyle. A rural lifestyle is one that relies on agricultural opportunities and outdoor recreation supported by natural resources to maintain a sense of self-sufficiency and self-worth. Natural amenities are an important factor for many residents while deciding to reside in the study area. In addition to impacting lifestyles, natural amenities affect attitudes, beliefs, and values. This notion varies by individual, and affects their use and ties to the STNF. This section provides an assessment of the influence of forest management on the lifestyles, attitudes, beliefs, and values of residents of the study area.

Activities occurring on the STNF have many different influences on the lifestyles of local residents. Foremost, the forest supports employment opportunities through the extractive capacity of natural resources as well as the economic activity generated by forest visitors. Extractive capacity means the levels of forest product removal sustainable by the forest for activities such as timber harvesting, mining, grazing, mushroom picking, etc. In turn, a person's employment status affects his or her lifestyle. The economic contribution of forest activities specific to this travel management planning is addressed in much greater detail below; however, it is important to note that such issues also affect lifestyles. Natural-resource-based activities play an integral role in the lifestyle of many residents in the study area. From employment status to leisure activities, natural resources on the STNF impact both social and economic conditions.

The general composition of economic sectors has implications for the lifestyles of residents. Much of the economy in the study area is service-based, which is likely to affect lifestyles differently than areas that are dominated with employment in manufacturing and management. Service-based industries tend to be lower paying than other sectors of the economy. Economies dominated by service-based industries are typical of areas with abundant travel and tourism opportunities, as well as areas with large proportions of retirees. The natural resources of the STNF provide recreational opportunities that support jobs and income in service-based industries. Furthermore, counties in the study area tend to have an older population than the State average (Table 3.11-2). Research by Cordell and Overdevest (2001) indicates that important factors for popular retirement areas include a rich natural amenity base, including areas with abundant recreational opportunities and scenic qualities, and can often be in close proximity to national forests and national parks. In the study area, lifestyles of many residents are influenced by the availability of natural-resource- based activities. Outdoor recreation and natural amenities plays an important role in both professional and personal livelihoods. For many, the rural lifestyle remains a motivating factor in their decision to continue to reside in the study area because it supports a lower cost of living, more recreational opportunities, and a slower pace of life (USDA Forest Service 1995).

Management of STNF resources affects the livelihoods of individuals and groups in many ways. Many residents of the study area associate their attitudes, beliefs, and values with outdoor recreational opportunities and natural amenities. The effects of resource management are different for each person due to disparities in their ties to the forest. Four social categories have been identified by the STNF to capture the range of attitudes, beliefs, and values of those influenced by forest management decisions; they are resource utilization, resource amenities, recreation, and traditional cultural use (USDA Forest Service 1995).

Resource Utilization

Those involved with resource utilization base their attitudes, beliefs, and values on the opportunities to make direct use of forest resources. People whose livelihoods revolve around the wood products industry fall into this category. The 1995 STNF Forest Plan highlights the towns of Weaverville and Hayfork in

Trinity County and Weed in Siskiyou County as timber-dependent communities. Many people in these communities base their attitudes, values, and beliefs on the opportunity to harvest forest products. This part of the population base is likely to be more concerned with policies regarding timber management than they would with recreation and travel.

Resource Amenities

Another group of individuals identified in the study area is concerned about resource amenities; they typically value natural resources more for their amenity and symbolic values rather than economic conversion values (USDA Forest Service 1995). Concerns exhibited by the resource amenities group include the nonextractive use of natural resources. They value forests for their recreation and natural amenity qualities rather than extractive capacity. These individuals may be long-time residents or newly relocated residents to the study area, and are generally not identified with occupational communities (USDA Forest Service 1995). Therefore, their employment status is not dependent on the management of forest resources.

The 1995 STNF Forest Plan also identifies retirees and second homeowners as a growing population in the study area. The attitudes, values, and beliefs of these individuals tend towards the noncommercial use of natural resources and focus on the importance of recreation in their lives.

Recreation

Recreationists are another social category identified in the 1995 STNF Forest Plan. This large, diverse group includes local residents and visitors from outside the study area. This group values the opportunity to escape from urban environments through outdoor recreation. The availability of recreational opportunities directly affects their attitudes, beliefs, and values. Travel management planning is likely to be of more importance to recreationists than the other social categories. Attitudes, beliefs, and values may differ among individuals in this group, as some may be advocates of motorized recreation and others may not. The overall social well-being of this group is closely related to the management of recreational opportunities.

Traditional Cultural Use

The final social category identified in the 1995 STNF Forest Plan is Native Americans. Their attitudes, beliefs, and values go way beyond the management of recreational opportunities and forest products. Many traditions and their cultural heritage stem from the use of forest resources. Federally recognized tribes in the area include the Pit River, Quartz Valley, Hoopa Valley, Redding Rancheria, Colusa Indian Community, and the Klamath. Additionally, several unrecognized tribes maintain traditional values and practices. A list of these tribes is provided in chapter 4. The forest provides sources of native foods and medicines as well as serves as a venue for traditional activities. In addition to providing subsistence and cultural amenities, the forest also serves spiritual functions for Native Americans. Their attitudes, beliefs, and values depend heavily on the use of forest resources. Maintaining access to cultural sites is important;

however, travel across such sites may degrade the cultural environment. In many cases, maintaining and restoring the forest to its native state enhances the cultural values experienced by Native Americans.

Public Concerns and Issues

Parties with a wide variety of interests have a stake in this travel management plan. There are many cases of conflicting interests. Just as attitudes, beliefs, and values differ across stakeholders, so do their uses of the forest and their desired direction for travel management. Based on the public comments received during the scoping period, four important issues regarding motorized travel were identified. These issues arose among public stakeholders as a result of their attitudes, beliefs, and values towards the use of the forest. The first issue of concern is the availability of motorized recreation. The concern is that the reduction in miles of routes and prohibition of cross-country travel would adversely affect the quality of motorized recreation experiences. This is a shared concern among many OHV enthusiasts valuing the motorized recreational opportunities on the STNF. Another issue of concern is motorized access to forest sites. The concern is that restrictions in travel would also limit access for activities such as dispersed camping, hunting, fishing, sightseeing, and other recreational opportunities. It could also limit access to the lakeshore and place added burdens on elderly and disabled citizens requiring motorized access to certain sites. Effects to elderly and disabled citizens are discussed in Appendix H (Civil Rights Impact Analysis). Under the proposed action, motorized access below high-water line would be limited to highway-legal vehicles. Thus, an avenue for access would still exist, but there is a concern that people who cannot afford recreational highway-legal vehicles would be unduly harmed.

The remaining issues involve consideration for nonmotorized recreation and environmental impacts. This includes concerns regarding the adverse effects of motorized activities on nonmotorized recreation. Noise pollution, resource damage, and insufficient enforcement are all concerns of stakeholders valuing the nonmotorized recreation opportunities and natural amenities on the Forest. Such occurrences could adversely affect the recreational experiences and aesthetic values observed by nature-oriented visitors. Along the same lines, the final issue concerns the environmental impacts of motorized travel. The concern is that public motorized travel would create natural resource damage such as sedimentation, erosion, spread of noxious weeds, and decreased wildlife habitat and populations. The proposed action would limit such motorized travel to system roads and designated trails, prohibiting cross-country travel. This could serve to reduce environmental impacts, but motorized use of roads and trails may still contribute to resource degradation to some degree. These concerns reflect differences in the attitudes, beliefs, and values among interested parties. Those characteristics shared among advocates of motorized recreation differ from those common to supporters of natural resource and environmental issues. Balancing the concerns of all parties is a difficult task faced by forest managers. Differences in the attitudes, values, and belief systems of stakeholders complicate the social dynamic under which they must operate. However, understanding the realities of such dissimilarities in the social environment is crucial to developing a comprehensive travel management plan.

Summary

The relationship between the STNF and the lifestyles, attitudes, beliefs, and values of its constituents has many components. Effects vary by communities of interest according to their uses of the forest. Communities of interest bring together stakeholders with shared interests in the framing and resolution of a problem (Fischer 2001). Recreational and environmental interest groups are becoming increasingly involved in the forest management process. Their lifestyles, attitudes, beliefs, and values also depend on the use and management of natural resources. The Native American community will continue to use the forest for cultural and traditional activities. Their way of life depends on the management of natural resources. With such a variety of communities of interest, the STNF influences livelihoods in many ways. Balancing the interests of each group is an issue that must be taken into account during the travel management process. Ultimately, the decision will affect the lifestyles, attitudes, beliefs, and values of individuals in many different ways, some positively and others negatively.

Environmental Justice

As stated in Executive Order 12898, it is required that all Federal actions consider the potential of disproportionate high and adverse human health or environmental effects on minority and low-income populations in the local region ("environmental justice"). The principals of environmental justice require agencies to address the equity and fairness implications associated with Federal land management actions.

According to the American Community Survey and U.S. Census data reported in Table 3.11-3, it is suggested that the Native American population meets the environmental justice criterion as a minority population meaningfully greater than the general population of the state. Table 3.11-13 reports the number of individuals below the poverty level and poverty rates for the five counties in the study area and California in 2000 and 2005. All counties have poverty rates higher than that of the state. Poverty rates in Humboldt, Siskiyou, and Tehama counties increased from 2000 to 2005. As of 2005, Siskiyou and Tehama Counties have the highest poverty rates in the study area at 17.5 percent and 17.8 percent, respectively (Table 3.11-13). Such poverty rates suggest that a substantial proportion of the existing population should be considered as a low-income group.

In cases where the management decisions of the STNF are expected to create jobs and income in the local economy, it is unlikely that there would be a disproportionate adverse effect on minority and low-income populations. Individuals in that population may benefit from any increase in jobs and income. Alternatively, future management decisions that may negatively impact local employment and income conditions should carefully assess the distribution of effects across population demographics, paying careful attention to Native American and low-income populations.

Table 3.11-13. Poverty status by state and county, 2000 and 2005

	2005		2000	
	Number of people	Percent	Number of people	Percent
California	4,669,056	13.3%	4,304,909	12.7%
Humboldt County	20,367	16.5%	19,614	15.9%
Shasta County	24,200	13.8%	24,195	14.7%
Siskiyou County	7,771	17.5%	7,235	16.7%
Tehama County	10,643	17.8%	9,605	17.2%
Trinity County	2,139	16.0%	2,138	16.8%

Source: U.S. Census Bureau, small area income and poverty estimates.

While Native American and low-income populations may exist in greater presence in the study area than the general population of the State of California, none of the alternatives is expected to have disproportionately high and adverse human health or environmental effects. Impacts to local communities are expected to be negligible, and there is no reason to suspect that any impacts would disproportionately affect minority and low-income populations.

Environmental Consequences

Principles of economic impact analysis are relied upon to estimate the effects of travel management alternatives on the economic environment. “Economic impact analyses seek to determine short-term effects that Forest Service programs have on economic conditions in defined impact areas in which the planning area occurs” (FSM 1900). As prescribed by FSM 1900, short-term effects are those that occur during the first 10 years of a longer planning cycle. Economic impact analyses investigate the effects of the alternative-development scenarios on employment and income. The relative size of the local communities plays an important role in the assessment of job and income impacts to the economy. Broader, more diverse, economies will likely be more resilient to changes in jobs and income than smaller, more rural, communities. For example, a loss of 10 jobs in a large metropolitan area will likely have very little impact on the overall health of the economy. However, the same loss in jobs in a small rural community may severely affect local economic conditions. Thus, when assessing the magnitude of impacts to employment and income across alternatives, it is important to keep in mind the relative importance of those economic factors to the specified study area.

Models of the local economy were built using IMPLAN Professional 2.0 software and 2006 data. For the purposes of this report, the local economy is defined the same as the study area. Changes in activity on the STNF may have several different consequences for the condition of the economic environment. Ultimately, a change in the activities occurring on the STNF would change the local economic stimulus. A change in economic stimulus (e.g., increased recreational visits) would likely change the total level of jobs and income. In order to estimate the level of change, IMPLAN is used to develop response coefficients that estimate the level of jobs and income generated per thousand visits by activity type. The response coefficients are then input into the Travel Management Economic Contribution Application (TMECA). TMECA is a spreadsheet that the uses these response coefficients along with data collected

from the NVUM survey to estimate the local economic contribution of different types of recreational activities based on whether the recreationists stayed only for a day or overnight (USDA Forest Service, 2009 Inventory and Monitoring Institute. "Instructions for using the Travel Management Economic Contribution Applications (TMECA)" May 12, 2009).

NVUM reports estimates of current visitor use by activity type based on interviews of forest visitors as they leave the forest. Thus, the data available represents the conditions under the no-action alternative. There is no means of predicting the change in visitor use across management alternatives. Due to these limitations, an economic impact analysis cannot be conducted for the various alternatives. Economic contributions calculated in TMECA are reported for the no-action alternative. Response coefficients for each activity are also reported, which allows for inferences to be made regarding the economic implications of changes in visitor use under the action alternatives. Any change in visitor use that would occur as a result of implementation of an action alternative would impact the economy according to the response coefficients. Thus, the discussion of the economic consequences of the action alternatives is based on the response coefficients reported in TMECA.

Response coefficients estimate impacts in three parts. Direct impacts are the response of an industry to demand for the goods or services it produces. The employment and labor income that result from the production of output to meet demand are direct effects. However, direct effects are only a part of the picture. There are many interdependencies between businesses, consumers, and the natural resources on which economic activity depends. IMPLAN modeling allows a more complete examination of these complex linkages. In addition to direct effects, each sector also has indirect and induced effects. Indirect effects are produced when a sector must purchase supplies and services from other industries in order to produce output sufficient to meet demand. The employment and labor income generated in other industries as a result are referred to as indirect effects. Induced effects represent the employment and labor income stimulated throughout the local economy as a result of the expenditure of new household income generated by direct and indirect employment.

In addition to impacts on the local economy, there would also be changes to the current condition of the social environment under the action alternatives. As reported in the lifestyles, attitudes, beliefs, and values section above, individuals are affected differently due to their unique ties to the forest. Thus, increases in the social welfare of one group may be offset by decreases to another group. Estimation of net social welfare across alternatives is outside the scope of this analysis. Thus, the effects analysis reported below relies on a qualitative assessment of changes in social conditions stemming from the specifications of the action alternatives.

Incomplete and Insufficient Information

Insufficient information exists to accurately estimate changes in recreation use that would occur under implementation of the action alternatives analyzed in this report. Although certain trends in visitor use may be predicted from the guidelines set forth under each alternative, there is no method and/or data

available to estimate actual changes in motorized and nonmotorized recreation. The lack of this information prohibits the ability to conduct an economic impact analysis to estimate differences in economic conditions across alternatives. Current visitation data represents use under no action and is used to conduct an economic-contribution analysis based on existing conditions. Those contributions serve as a baseline for comparison to the effects of action alternatives (discussion of those effects is based on the response coefficients by activity and visit type and includes a qualitative assessment of potential economic implications). As more data becomes available regarding recreation use in the future, the response coefficients may be used to estimate specific economic impacts at that time. This may include future rounds of NVUM data or other sources reporting recreational visits by activity type.

Response Coefficients by Activity Type

Table 3.11-14 reports the estimated employment and labor income response coefficients by activity type for local and non-local recreation. Both day and overnight (OVN) trips are accounted for. Non-primary (NP) visits are cases where recreation on the STNF was not the primary purpose for the trip. Local visitors are defined as those visitors whose primary residence is within 30 straight-line miles of the forest visited (Stynes and White 2005). Non-local visitors are all those who are not considered local. The response coefficients indicate the jobs and labor income supported per thousand visits by activity type. Table 3.11-14 indicates that non-local visitation generates larger economic impacts than local recreation because of differences in expenditure habits (Table 3.11-12). Therefore, increasing visitation by non-local forest users will result in the creation of more jobs and income in the study area than the same increase in visitation by local forest users. The total economic effects vary widely by activity type. Non-local overnight snowmobiling and cross-country skiing visits generate the most jobs and income in the study area. Per every thousand visits, cross-country skiing supports 5.3 direct jobs and 1.8 indirect and induced jobs, as well as $110,085 in direct labor income and $62,151 in indirect and induced labor income. Non-local overnight snowmobiling is a close second, supporting 5.0 direct jobs and 1.7 indirect and induced jobs, as well as $101,795 in direct labor income and $57,055 in indirect and induced labor income per thousand visits.

Snowmobiling and cross-country skiing (Table 3.11-9) account for a very small percentage of recreation on the STNF. Two of the most common activities are fishing and viewing natural features. Those activities are combined in the all other activities group. Non-local overnight visits for those activities support, on average, 2.991 direct jobs and 1.201 indirect and induced jobs, as well as $85,705 in direct labor income and $36,426 in indirect and induced labor income per thousand visits.

Table 3.11-14. Employment and labor income response coefficients by activity type

		Employment (Jobs per 1,000 Party-Trips)		Labor Income (2006 dollars) ($ per 1,000 Party-Trips)	
		Direct Effects	Indirect & Induced Effects	Direct Effects	Indirect & Induced Effects
Nonmotorized Use					
Hiking/Walking, Bicycling, Horseback Riding, Other Nonmotorized	Local Day	0.163	0.061	$4,002	$1,988
	Local OVN	1.039	0.397	$24,056	$13,424
	Non-local Day	0.518	0.179	$12,028	$5,698
	Non-local OVN	3.702	1.298	$79,104	$43,922
	NP	0.163	0.061	$4,002	$1,988
Backpacking	Local Day	-	-	$0	$0
	Local OVN	0.918	0.397	$23,359	$13,603
	Non-local Day	-	-	$0	$0
	Non-local OVN	1.175	0.480	$31,302	$15,770
	NP	0.918	0.397	$23,359	$13,603
Cross-country Ski	Local Day	0.396	0.144	$8,699	$4,801
	Local OVN	3.190	1.098	$66,051	$37,291
	Non-local Day	0.698	0.253	$15,316	$8,453
	Non-local OVN	5.317	1.830	$110,085	$62,151
	NP	0.396	0.144	$8,699	$4,801
Motorized Use					
OHV Use	Local Day	0.351	0.140	$8,899	$4,617
	Local OVN	1.138	0.446	$26,910	$15,131
	Non-local Day	0.617	0.246	$15,669	$8,129
	Non-local OVN	1.896	0.743	$44,845	$25,214
	NP	0.351	0.140	$8,899	$4,617
Driving	Local Day	0.233	0.086	$5,625	$2,793
	Local OVN	1.658	0.548	$33,517	$18,465
	Non-local Day	0.411	0.151	$9,906	$4,919
	Non-local OVN	2.764	0.913	$55,868	$30,778
	NP	0.233	0.086	$5,625	$2,793
Snowmobile	Local Day	0.620	0.246	$16,013	$8,065
	Local OVN	3.032	1.014	$61,076	$34,231
	Non-local Day	1.197	0.461	$29,619	$15,056
	Non-local OVN	5.054	1.689	$101,795	$57,055
	NP	0.620	0.246	$16,013	$8,065
All Other Use					
All Other Activities[a]	Local Day	0.339	0.149	$9,031	$4,945
	Local OVN	1.382	0.608	$42,119	$18,844
	Non-local Day	0.684	0.262	$17,802	$8,186
	Non-local OVN	2.991	1.201	$85,705	$36,426
	NP	0.339	0.149	$9,031	$4,945

a - All Other Activities includes developed camping, primitive camping, resort use, picnicking, viewing natural features, visiting historic sites, nature center activities, nature study, relaxing, fishing, hunting, motorized water activities, nonmotorized water, downhill skiing, gathering forest products, viewing wildlife, sightseeing, and no activity reported.
Source: TMECA, 2008 and IMPLAN, 2006.

OHV use represents 0.4 percent of main activities occurring on the STNF, and 4.9 percent of total activity participation (Table 3.11-9). For every thousand non-local overnight visits, OHV use supports 1.896 direct jobs and 0.743 indirect and induced jobs, as well as $44,845 in direct labor income and $25,214 in indirect and induced labor income.

Economic effects vary by the amount of spending and by the type of activity. It is important to remember that these numbers reflect an economic structure that is a snapshot in time. The data used for this analysis reflects the economic conditions of the study area as they were in 2006. Therefore, the results may not be applicable to visitation numbers that are dramatically different from current recreation levels. If visitation were to change substantially, there could be a structural shift in the economy as spending patterns changed and these results would not reflect the changed composition of the local economy.

Actions with No Effects

Several aspects of the action alternatives are not expected to have measurable effects on the socioeconomic environment. Specific actions identified in the alternatives with no effects include the heritage resource protection measures of reroutes, placing barriers and covering sites with materials, ands the forest plan amendments for routes affecting heritage resource sites. These specifications are not expected to affect visitation rates and will therefore have no bearing on employment and income, as well as no measurable impact on social conditions. Additionally, direction for parking and dispersed camping off proposed routes, as well as the mitigation measure of leaving felled trees along proposed routes in late successional reserves (LSRs), would have no measurable effects beyond those estimated for the prohibition of cross-country travel.

Alternative 1 – No Action

Under the no-action alternative, no changes would be made to the current National Forest Transportation System (NFTS) and no cross-country travel prohibition would be put into place. The Travel Management Rule would not be implemented and no motor vehicle use map (MVUM) would be produced. Unauthorized routes would continue to have no status or authorization as NFTS facilities, and motor vehicle travel by the public would not be limited to designated routes.

Direct and Indirect Effects

Since the Travel Management Rule would not be implemented, there is no anticipated change in motorized or nonmotorized use. Therefore, it is assumed that current levels of recreation provide an accurate representation of the effects of visitation on the local economy. There are no predictions of changes to current economic conditions. The effects reported below are simply the total economic contribution of current recreation levels on the forest.

The only change in recreation on the forest would be that occurring as a natural progression from changes in population and tastes and preferences for recreational activities. Contributions to employment and labor income are estimated with the most current use data reported by NVUM. Table 3.11-15 reports employment and labor income by activity type. The contributions of local and non-local residents are reported separately because spending by local residents for recreation on the forest does not represent new money to the economy. If local residents could not recreate on the STNF, they could find other forms of

recreation in the study area and maintain local recreational expenditures. Therefore, employment and labor income supported by this type of spending are not necessarily dependent on the opportunities provided by the forest.

Table 3.11-15. Employment and labor income contribution by activity type

	Employment (# of jobs)		Labor Income (2008 dollars)	
	Direct	Indirect & Induced	Direct	Indirect & Induced
Nonmotorized Use				
Backpacking - Local	5	2	129,240	75,262
Non-local	4	2	113,170	57,016
Hiking/Walking - Local	13	5	312,564	161,405
Non-local	43	15	958,244	526,382
Horseback Riding - Local	0	0	486	251
Non-local	0	0	1,490	819
Bicycling - Local	4	1	97,707	50,455
Non-local	13	5	299,544	164,545
Cross-country Skiing - Local	8	3	174,980	97,374
Non-local	33	11	698,331	393,883
Other Nonmotorized - Local	8	3	195,413	100,910
Non-local	27	9	599,089	329,091
Total Nonmotorized	**157**	**56**	**$3,580,260**	**$1,957,392**
Subtotal: Nonmotorized	**213**		**$5,537,652**	
Motorized Use				
OHV Use - Local	1.5	0.6	38,951.9	21,002
Non-local	1.9	0.8	47,935.3	26,606
Driving for Pleasure - Local	4.1	1.5	99,928	50,544
Non-local	3.9	1.3	82,790	45,035
Snowmobiling - Local	0.1	0.0	1,454	761
Non-local	0.1	0.0	1,569	863
Other Motorized Activity - Local	0.0	0.0	950	512
Non-local	0.0	0.0	1,169	649
Total Motorized	**12**	**4**	**$274,748**	**$145,973**
Subtotal: Motorized	**16**		**$420,720**	
All Other Use				
All Other Activities - Local	374	164.46	11,166,387	5,435,580
Non-local	671	269	19,763,301	8,451,762
Total Other	**1,045**	**433**	**$30,929,689**	**13,887,343**
Subtotal: All Other	**1,478**		**$44,817,031**	
Grand Total	**1,214**	**493**	**34,784,696**	**15,990,707**
Grand Subtotal	**1,708**		**50,775,403**	

Source: TMECA 2008 and IMPLAN 2006.

Under current recreation use on the STNF, a total of 213 jobs and $5,537,652 in labor income are supported by nonmotorized activities. This includes direct, indirect, and induced activity resulting from the expenditures of forest visitors. Non-local visitors hiking or walking on the forest support the most jobs and labor income among nonmotorized activities with 58 jobs and $1,484,626 in labor income. Total motorized activities support 16 jobs and $420,720 in labor income in the study area. Driving for pleasure supports the most economic activity among motorized recreation; 5.6 jobs and $150,472 in labor income by locals and 5.2 jobs and $127,825 in labor income by non-locals. Even though average expenditures by non-locals are greater than those of local visitors (Table 3.11-12), there are more total visits by locals driving for pleasure, which results in a greater economic contribution than that of non-locals. The majority of economic stimulus supported by recreation on the forest is from “all other” activities. Those

activities include: developed camping, primitive camping, resort use, picnicking, viewing natural features, visiting historic sites, nature center activities, nature study, relaxing, fishing, hunting, motorized water activities, nonmotorized water, downhill skiing, gathering forest products, viewing wildlife, sightseeing, and no activity reported. Visitor use in these activities combined support 1,478 jobs and $44,817,031 in labor income.

Table 3.11-16 reports the percent of total employment and labor income supported by each activity type. Direct jobs supported by all other activities accounts for 61.2 percent of all jobs contributed to the local economy from recreation on the STNF, and indirect and induced jobs account for another 25.4 percent. Total motorized activities accounts for just 0.9 percent of jobs and 0.8 percent of labor income contributed. In terms of total employment and income in the study area, recreation on the STNF accounts for 0.88 percent of jobs and 0.67 percent of labor income (Table 3.11-17). Non-local motorized use on the forest supports just 0.004 percent and 0.003 percent of jobs and labor income in the study area respectively.

Table 3.11-16. Percent of total employment and labor income contributed by activity type

	Employment (% of Full & Part-time Jobs)		Labor Income(2008 dollars) % of Total Income	
	Direct	Indirect & Induced	Direct	Indirect & Induced
Nonmotorized Use				
Backpacking - Local	0.3%	0.1%	0.3%	0.1%
Non-local	0.2%	0.1%	0.2%	0.1%
Hiking/Walking - Local	0.7%	0.3%	0.6%	0.3%
Non-local	2.5%	0.9%	1.9%	1.0%
Horseback Riding - Local	0.0%	0.0%	0.0%	0.0%
Non-local	0.0%	0.0%	0.0%	0.0%
Bicycling - Local	0.2%	0.1%	0.2%	0.1%
Non-local	0.8%	0.3%	0.6%	0.3%
Cross-country Skiing - Local	0.5%	0.2%	0.3%	0.2%
Non-local	1.9%	0.7%	1.4%	0.8%
Other Nonmotorized - Local	0.5%	0.2%	0.4%	0.2%
Non-local	1.6%	0.6%	1.2%	0.6%
Total Nonmotorized	**9.2%**	**3.3%**	**7.1%**	**3.9%**

	Employment (% of Full & Part-time Jobs)		Labor Income(2008 dollars) % of Total Income	
	Direct	Indirect & Induced	Direct	Indirect & Induced
Motorized Use				
OHV Use - Local	0.1%	0.0%	0.1%	0.0%
Non-local	0.1%	0.0%	0.1%	0.1%
Driving for Pleasure - Local	0.2%	0.1%	0.2%	0.1%
Non-local	0.2%	0.1%	0.2%	0.1%
Snowmobiling - Local	0.0%	0.0%	0.0%	0.0%
Non-local	0.0%	0.0%	0.0%	0.0%
Other Motorized Activity - Local	0.0%	0.0%	0.0%	0.0%
Non-local	0.0%	0.0%	0.0%	0.0%
Total Motorized	**0.7%**	**0.2%**	**0.5%**	**0.3%**
All Other Use				
All Other Activities - Local	21.9%	9.6%	22.0%	10.7%
Non-local	39.3%	15.7%	38.9%	16.6%
Total Other	**61.2%**	**25.4%**	**60.9%**	**27.4%**
Totals	**71.1%**	**28.9%**	**68.5%**	**31.5%**
	100.0%		**100.0%**	

Source: TMECA 2008 and IMPLAN 2006

Table 3.11-17. Percent of total study area employment and total area labor income

		Employment Effects (full and part time jobs)	Labor Income (2008 dollars)
Total Nonmotorized Use	**Local**	**0.026%**	**0.018%**
	Non-local	**0.082%**	**0.053%**
Total Motorized Use	**Local**	**0.004%**	**0.003%**
	Non-local l	**0.004%**	**0.003%**
Total All Other Use	**Local**	**0.272%**	**0.215%**
	Non-local	**0.475%**	**0.370%**
	Total Use	**0.876%**	**0.670%**
Total for Study Area		**197,727**	**7,835,311,000**

Source: TMECA 2008 and IMPLAN 2006

Under the no-action alternative there would be no change occurring to the activities taking place on the forest. Thus, the employment and income figures reported above represent the contribution of current activities to the local economy. There would be no change in employment and income as a result of implementation of this alternative; therefore, there are no specific direct and indirect effects that would occur. The information reported represents the status quo, and does not imply changes in economic activity resulting from this alternative.

Cumulative Effects

Given that there are no measurable direct and indirect effects that would occur under the no-action alternative, there would also be no measurable cumulative effects.

Alternative 2 – Proposed Action

The proposed action is comprised of the prohibition of cross-country travel and includes changes to the existing NFTS and additions to the NFTS as described in chapter 2. Cross-country travel is defined as motor vehicle travel off designated NFTS roads, NFTS trails, and areas by the public except as allowed

by permit or other authorization. Cross-country travel by snowmobiles is not included in the exclusion. Travel on some routes would be subject to seasonal closures and vehicle class restrictions as reported in chapter 2. Additionally, areas below high-water mark on Shasta and Trinity Lakes are proposed for addition to the NFTS. Travel below the high-water marks would be restricted to highway-legal vehicles only with a speed limit of 15 miles per hour (mph). Existing season of use restrictions to protect nesting bald eagles from August 16-December 31 would apply to Shasta Lake.

Direct and Indirect Effects

Under this alternative, prohibitions in cross-country travel would result in fewer visitor days for motorized recreation. Motorized recreation accounts for only 2 percent of main activities (Table 3.11-9); thus, it is likely that restrictions in cross-country travel would not substantially reduce visits. Seasonal restrictions proposed for routes and areas could further reduce visitation during certain parts of the year. However, economic models are static and do not account for seasonal usage; jobs and income reported under the no-action alternative are based solely on annual visitation estimates. The addition of 36.51 miles of NFTS roads open to all vehicle classes and 7.69 miles of NFTS trails allowing for a variety of vehicle classes could serve to mitigate some of the loss in motorized recreation, as visitors would have the opportunity to use the added roads and trails. Overall, total employment supported by non-local motorized recreation on the STNF accounts for only 0.004 percent of total jobs in the study area; motorized recreation by local residents supports another 0.004 percent (Table 3.11-17). Therefore, the total economic effects of changes in motorized recreation would be minimal compared to the overall economic activity in the study area. The effects, however, may not be evenly distributed across communities in the five counties. For example, businesses in close proximity to popular motorized recreation spots that would no longer be accessible under this alternative are likely to be more affected than similar businesses in other parts of the study area. Due to limitations in the data, estimating the effects at such a small scale is outside the scope of this analysis.

The proposed motorized use areas below the high-water marks would change the existing use. It could inconvenience homeowners accessing the lakeshore with non-highway-legal vehicles. Private vendors along the lake may yield some benefits from decreased OHV activity due to less noise pollution and traffic on resources and infrastructure; however, they may also experience problems with customer access and demand for services. Water levels on both lakes are intermittent, thus the true effects from this restriction would vary from year to year.

The proposed actions under this alternative may also have implications for activities other than motorized recreation. It is likely that a reduction in motorized recreation would increase recreational visits for nonmotorized and other activities. This may serve to mitigate adverse economic impacts resulting from fewer motorized recreation visits. Nonmotorized and other recreational activities account for a large portion of visits to the STNF. Less motorized recreation may increase the quality of the experience for these visitors. Currently, data does not exist to estimate changes in jobs and income resulting from the

substitution effect between motorized and other recreational activities. Response coefficients reported in Table 3.11-14 indicate the levels of jobs and income supported per 1,000 visits across a variety of activities. Economic impacts vary widely across activity types, thus the direct and indirect effects depend heavily on changes in recreation use that would result from implementation of this alternative.

Analysis of the social environment indicates that motorized and nonmotorized forms of recreation are important to a variety of user groups. Advocates of motorized recreation would have less access to areas where they could legally recreate. This would adversely impact the value they experience from use of the forest. Additional roads and trails that would be included in the NFTS suggest that some new motorized recreational opportunities would exist despite restrictions in cross-country travel. However, there would likely be a net loss in motorized recreational visits. The total value experienced by these stakeholders would decline as opportunities to participate in such forms of recreation decline.

The prohibition of cross-country travel would improve conditions of natural resources on the forest, which could also increase opportunities for nonmotorized recreation. Advocates of nonmotorized recreation and user groups concerned with environmental degradation are also active in the study area. Such stakeholders would likely experience an increase in total benefits. There is a tradeoff between opportunities provided for different user groups. As opportunities for one group increase, it is possible that opportunities for other user groups could decrease. Under the proposed action, it is likely that opportunities for nonmotorized recreation would increase, while opportunities for motorized recreation decrease, relative to that under alternative 1. In terms of economic impacts, it is likely that changes in use by one group would mitigate impacts resulting from changes in use by other groups. In terms of net social welfare, a decrease in social benefits for one group may be offset by an increase for another. There may be individual user groups that are adversely impacted and those that benefit.

Cumulative Effects

Cumulative effects include the total change in social and economic conditions that would result from the specifications under this alternative in conjunction with the direct and indirect effects of other present and reasonably foreseeable activities being conducted in the study area. For example, any environmental change caused by the proposed action would be in addition to other travel management activities occurring simultaneously in the region on both public and private lands. On the margin, other projects affecting cross-country travel and motorized recreation are likely to have similar effects on the social and economic environment as reported above. Individually, such projects may not have much bearing on local communities; however, cumulatively, they may impact social and economic conditions.

Table 3.11-18 reports present and reasonably foreseeable actions that could contribute to cumulative effects. The estimated direct and indirect effects of each project are unknown. Individually, each project would likely have a minimal impact on social and economic conditions; however, cumulatively they may affect forest visits, and thus change employment and income conditions in the study area, as well as influence the lifestyles, attitudes, beliefs, and values of residents.

In addition to travel management planning on the STNF, other national forests are undergoing similar efforts; hence, travel on nearby NFS lands will likely be changing. This may affect the availability of substitute activities. Other forests are in various stages of travel management planning, so there is no information available that addresses the aggregate social and economic implications of all plans being developed in the study area.

Lands under private ownership offer additional opportunities for motorized recreation. Both authorized and unauthorized travel across private lands occurs in the study area. Some projects to prohibit or improve motorized recreation by large-scale landowners could impact social and economic conditions. However, the majority of projects would likely be small scale, and would not dramatically alter recreational habits. There is no information available regarding the social and economic effects that would be generated from activity occurring on private land.

Table 3.11-18. Present and reasonably foreseeable projects conducted by the STNF that could add to cumulative effects

Project Name	Purpose	Effects on Transportation System
9862-Restoration of Fish Passage	Wildlife, fish, rare plants	Road maintenance at stream crossings
9269-Hazel "D" Lode Mine Reauthorization	Minerals and geology	Use and maintenance of access road
1814-Trout Creek Restoration	Wildlife, fish, rare plants - watershed management	Obliterate stream crossings
1542-Mt. Thin and Fuels Management	Fuels management and forest products	Road reconstruction, closure and decommissioning
4153-Scott Camp Ridge Proposed Road Closures	Road management	Road closure
26245-Moosehead Vegetation and Road Management Project	Road and fuels management, and forest products	Road reconstruction, closure and decommissioning
26691-Trinity Roadside Hazard	Road and fuels management	Road maintenance for public safety
14268-Enterprise Lode Mine	Minerals and geology	Use and maintenance of access road
25318-West Side Watershed Restoration	Watershed management	Road-related watershed improvements
14323-Pettijohn LSR Project	Fuels management and wildlife, fish and rare plants management	Road decommissioning
25444-Road Rights-of-Way Requests from Sierra Pacific Industries	Road management	Provide road access to private lands
10009-Upper Dubakella Vegetation Management	Road and watershed management, and forest products	Road construction and decommissioning

Source: Schedule of proposed actions (SOPA), USDA Forest Service, Shasta-Trinity National Forest 2009

Alternative 3 –Cross-country Travel Prohibition Only – No Additions to the Existing NFTS

Under this alternative cross-country travel would be prohibited without adding any new facilities to the NFTS. No currently unauthorized trails, roads, or areas would be added. Additionally, motor vehicle travel would be prohibited below high-water marks on all lakes except to access permitted uses.

Direct and Indirect Effects

This alternative addresses concerns for impacts to natural resources and nonmotorized recreation. It is assumed that nonmotorized activities are often enhanced with improved ecological conditions. The principles reported under the proposed action that describe the effects to different interest groups apply to this alternative as well. There would be additional opportunities for nonmotorized recreation compared to those that would occur under the proposed action, thus benefits experienced by these user groups would increase. Conversely, there would be fewer opportunities for motorized recreation. This would result in decreased social benefits experienced by these user groups. The change in recreational opportunities would create unevenly distributed effects across interest groups; however, the degree to which individual lifestyles are affected is unpredictable.

Under this alternative there would be fewer routes open to motorized travel than there would be under the proposed action. Therefore, interest groups wanting more motorized access and recreation would experience less social benefits. Alternatively, it is likely that a decrease in motorized travel would improve opportunities for resource conservation and nonmotorized recreation; thus, interest groups that favor such experiences would have a net increase in benefits. No motorized recreation areas would be proposed below the high-water marks on any lakes; therefore, access to the lakeshore would be limited. However, other recreational experiences and opportunities for resource protection could be enhanced. It is impossible to predict with certainty whether or not net social welfare is better or worse under this alternative compared to any of the others.

In addition to changes in social indicators discussed in the “Affected Environment” section above, there would continue to be a trade-off in the economic effects associated with changes in recreational opportunities. Economic activity lost due to decreased motorized visits may be offset by additional stimulus generated by an increase in visits for nonmotorized recreation. Recreation on the STNF accounts for a small portion of economic activity and would yield negligible impacts. The social effects, however, are likely to be more realized by local residents. There would be a decrease in opportunities and social values for individuals passionate about motorized recreation. Conversely, advocates of nonmotorized recreation and conservation of natural resources would experience improvements in lifestyle and social values.

Cumulative Effects

Other projects in the study area that may contribute to cumulative effects are described under the proposed action. Under alternative 3 there would be a greater displacement of motorized recreationists. However, substitute activities would exist within the study area. Cumulative effects would be similar to those reported under the proposed action paired with any changes in the levels and distribution of direct and indirect effects on the social environment that would result from this alternative.

Alternative 4: Minimize Impact to Natural Resources and Roadless Areas

Alternative 4 responds to issues of inventoried roadless areas (IRAs), citizen inventoried roadless areas (CIRAs), and natural resource impacts. This alternative adds no motorized routes to IRAs and CIRAs, and does not add routes where resource concerns were raised internally and externally. Cross-country travel would be prohibited on the forest. Motorized recreation areas are proposed below the high-water mark on Shasta and Trinity Lakes, and Iron Canyon Reservoir, with vehicle classes restricted to highway-legal vehicles with a 10 mph speed limit. Existing season of use restrictions to prevent disturbance to nesting bald eagles would apply on Shasta Lake from August 16-December 31.

Direct and Indirect Effects

In alternative 4 there would be additional opportunities for nonmotorized recreation compared to those that would occur under the proposed action, and designation of routes would be restricted to minimize impacts to natural resources. Therefore, social benefits to nonmotorized and environmental interest groups would increase. Alternatively, there would be fewer opportunities for motorized recreation. Restrictions below high-water mark would include Iron Canyon Reservoir, which would impose additional limitations for lake access. Effects would be similar to those described under alternative 2. Vehicle class and seasonal restrictions, as well as a 10 mph speed limit, would deter recreational OHV use.

Activities on the forest in which people participate vary by individual. Thus, the substitution of recreational activities would continue to create unevenly distributed effects across interest groups; however, the degree to which individual lifestyles are affected is unknown. There would be a greater decrease in opportunities and social values for individuals passionate about motorized recreation compared to the proposed action. Conversely, advocates of nonmotorized recreation and conservation of natural resources would experience greater social benefits.

Direct and indirect effects on the social environment would likely be realized by local residents more than the economic effects. Net changes in economic activity would be negligible. Therefore, levels of employment and income would not be substantially different than under the no-action alternative.

Cumulative Effects

The cumulative effects would be similar to those reported under the proposed action in conjunction with any changes in the levels and distribution of direct and indirect effects resulting from this alternative.

Alternative 5- Improved Access and Motorized Recreation Opportunities

Alternative 5 responds to the issue of access and the availability of motorized recreation. Public scoping resulted in many suggestions for additional routes that would enhance the quality of the motorized recreation experience by creating loops and providing connections for longer and more diverse rides for a variety of vehicle types and skill levels. Routes would be authorized in IRAs. This alternative is also

intended to address the desire for access for the pursuit of an array of recreational activities such as camping, hunting, fishing, and sightseeing. Cross-country travel would be prohibited on the forest. Proposed motorized recreation areas below high-water mark on Shasta and Trinity Lakes, and Iron Canyon Reservoir, would allow all vehicle classes with a 10 mph speed limit. Existing season of use restrictions to protect nesting bald eagles from August 16-December 31 would apply to Shasta Lake.

Direct and Indirect Effects

This alternative would yield the greatest opportunity for motorized access and recreation among action alternatives. Cross-country travel would still be prohibited, which would result in motorized recreation levels being less than under the no-action alternative; but there would be an increase in NFTS roads and trails. This would provide additional opportunities for motorized recreation, and provide access to various sites on the forest for activities such as fishing, hunting, dispersed camping, and wildlife viewing. There would be the least displacement of visitors participating in motorized travel among the action alternatives; thus, there would also be the smallest decrease in social benefits experienced by those user groups. Restrictions below the high-water mark on Shasta and Trinity Lakes, and Iron Canyon Reservoir, would deter OHV use. There would be no restrictions on vehicle class, but the 10 mph speed limit would reduce motorized use in those areas. Residents accessing the lakeshore would be less affected because they would still be able to use non-highway-legal vehicles. Such restrictions would further decrease motorized recreation visits below that of the no-action alternative, but could serve to reduce resource damage as described in other sections of chapter 3. Opportunities for travel and potential resource damage are greater than under alternative 4.

Prohibition of cross-country travel would improve opportunities for resource conservation and nonmotorized recreation relative to the no-action alternative; however, authorization of routes in IRAs would limit increases in social benefits below that of the other action alternatives (see “Inventoried Roadless Areas” section). Implementation of alternative 5 would still enrich the lifestyles of individuals concerned with environmental protection and nonmotorized activities, because there would be greater restrictions in motorized travel compared to that under the no-action alternative.

The economic stimulus derived by forest use represents a small portion of total activity in the area. Thus, direct and indirect effects on the economy would remain negligible. Social indicators would be affected, yet there remains a tradeoff among the values experienced by visitors participating in different activities. For example, losses in social benefits by one group may be offset by gains in another. This could yield little or no change in net social welfare. It is apparent, however, that this alternative would yield the greatest benefit to advocates of motorized recreation of the action alternatives, and the least benefit to advocates of nonmotorized recreation.

Cumulative Effects

Under alternative 5, there would be less displacement of motorized recreationists than would occur under any other action alternative. However, there would also be less increase in the quality of nonmotorized activities (see "Recreation" section). The cumulative effects would be similar to those reported under the proposed action paired with any changes in the levels and distribution of direct and indirect effects on the social environment that would result from this alternative.

Monitoring and Mitigation

There are no specific monitoring and mitigation procedures in place for the social and economic environments. Annual recreation use by activity type would likely differ across alternatives. Changes in recreation use should be measured during future rounds of NVUM surveying. In order to monitor effects on the economic environment, visitation estimates from future NVUM rounds may be used in conjunction with the response coefficients reported above. The estimated effects may then be compared to the baseline reported under the no-action alternative in order to determine changes resulting from implementation of the travel management plan. The negative relationship between recreational activities may serve to mitigate some of the economic impacts over time. For example, a change in employment and income resulting from a loss in recreational visits for one activity may be offset by an increase in visits for other activities. NVUM data should provide an avenue for estimating changes in visitation rates by activity type in the future. Monitoring the conditions of the social environment is less tangible by nature. Currently, the methods available for this analysis do not allow for a quantitative estimate of changes in social welfare across time. As opportunities for recreational activities change, so do the lifestyles, attitudes, values, and beliefs of user groups. Forest visitors gain utility from the recreational activities they pursue. A decrease in visits for one activity type would result in a decrease in social benefits for that user group.

Alternatively, it is assumed that an increase in visitation rates would yield an increase in benefits. The sum of changes in social benefits across stakeholders yields a net change in social welfare; however, no appropriate methods are available that would allow for the monitoring of social welfare over time. Maintaining working relationships with user groups and following public involvement procedures should provide an appropriate means of understanding changes in the social environment in the future.

3.12. Transportation Management

Introduction

This section of the environmental analysis examines the extent to which alternatives respond to transportation facilities direction established in the Shasta-Trinity National Forest Land and Resource Management Plan (LRMP or Forest Plan). The Forest Plan transportation facilities direction was established under the implementing regulations of the National Forest Management Act (NFMA) and the National Forest Roads and Trails Act (FRTA). The National Forest Transportation System (NFTS) consists of roads, trails, and airfields. The NFTS provides for protection, development, management, and utilization of resources on the national forests. There are other roads and trails existing on the Forest that are not currently part of the NFTS. Transportation facilities considered in this analysis include roads and trails that are suitable for motor vehicle use. This analysis considers changes needed to the NFTS to meet the purpose and need of this analysis. Decisions regarding changes in the transportation facilities must consider: 1) providing for adequate public safety, and 2) providing adequate maintenance of the roads and trails that will be designated for public use. The analysis in this section focuses primarily on these two aspects of the NFTS.

Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Direction relevant to the proposed action as it affects transportation facilities includes:

Title 36, Code of Federal Regulations, Part 212 (36 CFR 212) is the implementing regulation for the FRTA and includes portions of the Travel Management Rule published in the Federal Register on November 9, 2005. Part 212 provides criteria for designation of roads and trails. Providing safe transportation facilities and considering the affordability of maintaining the transportation facilities are two of the criteria.

Forest Service Manual Sections 2350 and 7700 contain agency policy for management of the National Forest Transportation System. The policy requires the development of trail management objectives (TMOs) and road management objectives (RMOs). The TMOs and RMOs document the purpose of each trail or road. The purpose for the trail or road sets the parameters for maintenance standards needed to meet user needs, resource protection and public safety. Forest Service Handbook 7709.59 describes the maintenance management system the Forest Service uses and the maintenance standards needed to meet road management objectives (RMOs) for the road system and including considerations for public safety.

Regional Forester's letters, file code 7700/2350, dated 08/21/06, 06/20/07, 3/27/08, 09/08/08, 01/13/09, and 2/13/09 contain procedures national forests in the Pacific Southwest Region will use to evaluate safety aspects of public travel on roads when proposed changes to the NFTS will allow both highway-legal and non-highway-legal traffic on a road (motorized mixed-use).

The California Vehicle Code (CVC) regulates the use of motor vehicles in California, including motor vehicles used on the national forests. The CVC sets safety standards for motor vehicles and vehicle operators. It defines a highway as "…a way or place of whatever nature, publicly maintained and open to the use of the public for purposes of vehicular travel. Highway includes street." Operational Level 3-5 roads meet this definition. The CVC also defines the safety equipment needed for highway-legal and off-highway vehicles, and it defines the types of roads and trails where off-highway motor vehicles may be operated.

Shasta-Trinity National Forest Land and Resource Management Plan (Forest Plan)

The Shasta-Trinity National Forest Land Management Plan (1995, chapter 4.B.8) states the forest- wide goals for facilities, including the NFTS, as follows:

> Manage the Forests transportation system to facilitate resource management activities, protect wildlife, meet water quality objectives, and provide recreational access.

Forest-wide goals are met by applying standards and guidelines for management of resources. The Standards and Guidelines for facilities (chapter 4.E.7) include the following, which are pertinent to travel management planning:

a. Perform road maintenance activities to meet a variety of management objectives. Not all roads will be maintained every year due to the maintenance level assigned by management, use, and other factors. Schedule road maintenance activities according to the following priorities: (1) to provide for user safety: (2) to meet contractual and legal obligations; (3) to protect natural resources; and (4) to provide an efficient transportation system.

b. Assign road maintenance levels to each system road or road segment based on traffic management and use objectives. Maintain all roads to at least Maintenance Level 1.

e. Closures of roads and/or selected areas, to assist in management of the Forests' resources, may be made by regulatory and/or physical devices on the road, for the following purposes:

- to protect the road surface during the wet season so that maintenance and erosion are reduced ;
- to protect wildlife and/or help meet wildlife management objectives;
- for safety, fire, and general administrative purposes;
- and for special closures per Code of Federal Regulations (CFR).

f. A public information/education program will accompany any new road closure program. Closure areas will be signed for the seasons and periods of closure. The reason for closure, the regulations providing for closure, and the responsible agencies will also be indicated.

g. Retain roads on the Forest transportation system that will be needed for future activities (beyond one season) such as forest health, timber management, fire protection, recreation management, mining, wildlife, and range. Analyze non-inventoried roads to determine whether they should be added to the transportation system or obliterated as time and funding allow.

j. Trails will be maintained as needed for specific management objectives. Erosion control and primary access will receive priority.

Effects Analysis Methodology

Transportation Specific Assumptions:

1) Any motor vehicle use authorized by state law is occurring on the NFTS unless there are Forest specific prohibitions.
2) Motor vehicle use by special use permit or other permitted activities are outside the scope of this proposal (e.g., fuelwood gathering, motorized special use permit event, recreation residences, mining activities).
3) Motorized trails are used by high-clearance vehicles such as four wheel drives, all terrain vehicles, and motorcycles.
4) There is some cost for maintenance that will have to borne by the Forest Service for any route open to motor vehicle use by the public.
5) State law regulating motor vehicle drivers sets the standard of care for the safety of themselves and other users for the NFTS.

Transportation Sources of Information

Information on individual roads and trails can be found in appendix A, “Route Specific Data”; and appendix C, “Motorized Mixed-use.” Additional information is part of the project record. All sources used for this report are referenced, and included in the project record.

Public Safety – 36 CFR 212.55 requires public safety be considered when designating roads, trails and areas for motor vehicle use. The proposed additions and changes to the NFTS have been evaluated for the effects on public safety. Refer to appendix A and appendix C for specific information on each road or trail.

Affordability – 36 CFR 212.55 requires consideration of the need for maintenance and administration of the designated NFTS. Costs for the NFTS include costs for needed maintenance work that has not been completed for various reasons (deferred maintenance) and costs of maintenance that should be performed routinely to maintain the facility to its current standard (annual maintenance). There may be additional costs associated with proposed changes to the NFTS (implementation costs). These costs may be for improving unauthorized routes that will be added to the NFTS, costs for proposed safety and resource improvements and costs for closing routes to use by motor vehicles.

An estimate of the deferred maintenance for roads on the Shasta-Trinity National Forest is $216,885,117[82]. This number is based on a national random sample of deferred maintenance needs completed in 2007. It is not statistically valid at the national forest level however it can be used as an indicator of maintenance needs for the existing road system.

Estimates of the annual maintenance costs for the road system for each alternative are included in appendix F. Regional average costs per mile to maintain each operational maintenance level (ML) were developed and applied to the road system to calculate the estimated total cost. The average road maintenance costs per mile are shown in Table 3.12-1 below. The average costs per mile were derived from regional average unit costs for maintenance items and frequency of maintenance appropriate for each operational maintenance level. There are no regional or local estimates for motorized trail maintenance. The estimate for motorized trail maintenance came from Tahoe National Forest data, and has been reviewed and determined to be a reasonable estimate by Shasta-Trinity National Forest engineering and recreation staff.

Table 3.12-1. Annual maintenance cost per mile by operational maintenance level[83]

Operational Maintenance Level	Annual Maintenance Cost $/Mile
1	$225.00
2	$543.33
3	$10,870.00
4	$14,106.67
5	$14,106.67
Motorized Trail	$1,350

Implementation costs for proposed changes to the NFTS are shown for each road or trail in appendix A, where applicable. The costs shown are based on estimates for the types of work needed to complete the changes. Costs may include safety or resource improvements on the NFTS and work needed to bring unauthorized routes to acceptable standards for use by motor vehicles.

Transportation Management Indicators

Measurement Indicator 1: Public Safety

1A. Miles of Unauthorized Roads/Trails added to the NFTS:

Adding unauthorized roads and trails to the NTFS as ML 2 roads or motorized use trails will decrease the likelihood of accidents by improving and maintaining these roads and trails to standards designed to address safety concerns. Displaying these routes on the motor vehicle use map (MVUM) and signing them on the ground will decrease the response time for emergency services.

[82] Region 5 Engineering: R5 calculated DM.xls
[83] Road Annual Maintenance Cost: R5 Regional Office: Rd maint costing spd_041608.xls; Motorized Trail Annual Maintenance Cost: Local data not available, used information from Tahoe National Forest; Tahoe Engineering Chapter 3deis_vol_3e.pdf

This indicator will be measured by the number of miles of roads or trails added to the NFTS. The direct, indirect, and cumulative effects are limited to one year due to the requirement to re-visit the Travel Management Plan on an annual basis. The specific indicators for this management indicator are as follows:

- 1A1. Miles of roads added to the NFTS
- 1A2. Miles of motorized use trails added to the NFTS

1B. Miles of Motorized Mixed-use:

The CVC has exceptions to requirements for off-highway vehicles on "Combined Use Highways." The CVC allows the operation of non-highway-legal vehicles operated by unlicensed drivers on roughly graded and/or logging roads. The Shasta-Trinity National Forest considers roads maintained for high-clearance vehicles (maintenance level 2) as roughly graded or logging roads and considers operation of OHVs on these roads to be consistent with State law. Roads maintained for passenger cars (maintenance levels 3-5) are considered highways, and therefore operation of non-street legal vehicles on those roads is not consistent with State law.

A decision to designate a section of ML 3-5 NFTS road for motorized mixed-use requires that the decision be informed by an engineering analysis conducted by a qualified engineer. Based on the analysis conducted, the qualified engineer will identify risks and prepare documentation for the appropriate responsible official. The analysis may include mitigation measures that would reduce the risk associated with designating the road for motorized mixed-use. The results are included in appendix C- Motorized Mix Use.

The specific indicators for this management indicator are as follows:

- 1B1. Miles of Motorized mixed-use (MMU) on high clearance roads (ML 2) on the NFTS
- 1B2. Miles of Motorized mixed-use (MMU) on passenger car roads (ML 3-5) on the NFTS
- 1B3. Miles of Motorized mixed-use (MMU) consistent with the CVC on the NFTS
- 1B4. Miles of Motorized mixed-use (MMU) not consistent with the CVC on the NFTS

The timeframe for analyzing direct and indirect effects is one year due to the Travel Management Rule requirement to review and publish the MVUM on an annual basis.

The timeframe for analyzing cumulative effects is 10 years to encompass the time needed to implement and realize the effects of the present and reasonably future roads projects listed in appendix B.

1C. Acres of Cross-Country Travel Allowed:

Permitting cross-country travel in areas presents a public safety concern. Unregulated motorized vehicle use has an inherent risk of single and multiple vehicle accidents. The emergency response time increases with the size of the area where cross-country travel is allowed. The measurement of this indicator is the number of acres where cross-country travel will be allowed.

The timeframe for analyzing direct and indirect effects is one year due to the Travel Management Rule requirement to review and publish the MVUM on an annual basis.

The timeframe for analyzing cumulative effects is 10 years to encompass the time needed to implement and realize the effects of the present and reasonably foreseeable future roads projects listed in appendix B.

Measurement Indicator 2: Transportation System Affordability

2A. Annual Maintenance Costs

Changes to the NFTS will result in increases or decreases in the total mileage of roads and trails to be maintained on an annual basis. The costs are calculated by applying the regional average road maintenance costs to the miles of roads in each maintenance level. While the direct and indirect effects are limited to one year due to the Travel Management Rule requirement to review and publish the MVUM on an annual basis, the cumulative effects occur over a 10-year period to encompass the time needed to implement and realize the effects of the present and reasonably future roads projects listed in appendix B

2B. Implementation Costs

Unauthorized routes added to the NFTS will be managed to forest service standards. Cost estimates for common road and trail work are used to estimate the costs by alternative and the differences between them.

The costs associated with upgrading unauthorized routes to a operational maintenance level 2 road include signing, grading, culvert installation as needed, removal of fallen trees/logs, and clearing brush for sight distance. The estimated cost used was the regional average cost of $4,543 per mile.

The costs associated with upgrading unauthorized routes to motorized use trails include signing and brushing out. The cost estimate used was the regional average costs for these tasks of $1,593 per mile.

The costs associated with producing the motor vehicle use map (MVUM) are primarily labor, including updating the INFRA database, and producing and editing draft maps.

Affected Environment/Environmental Consequences

Affected Environment

A majority of national forest visitors travel on National Forest System roads. Roads have opened the Shasta-Trinity National Forest to millions of national and international visitors. Forest roads are also an integral part of the transportation system for rural counties. They provide access for research, fish and wildlife habitat management, grazing, timber harvesting, fire protection, mining, insect and disease control, and private land use.

Roads in the National Forest Transportation System are not public roads in the same sense as roads that are under the jurisdiction of State and county road agencies. National Forest System roads are not intended to meet the transportation needs of the public at large. Instead, they are managed only for the use and administration of National Forest System lands. Although generally open and available for public use, that use is at the discretion of the Secretary of Agriculture. Through authorities delegated by the Secretary, the Forest Service may restrict or control traffic to meet specific management direction (USDA Forest Service, Forest Service Manual 7731).

The Shasta-Trinity National Forest has approximately 5,332 miles of NFTS roads open to motor vehicle use by the public (see Table 3.11-2) and 1,431 miles of NFTS trails, which includes 87 miles of motorized trails. Roads are defined as motor vehicle travel ways over 50 inches wide, except those designated and managed as a trail. NFTS trails are managed for user type such as ATV, motorcycle, and hiking trails. Motorized trails are covered further in the recreation section of this chapter.

The National Forest System roads are designed, constructed, and maintained to provide access for the utilization and management of the national forest. The design and maintenance standards for these roads were developed to provide for public safety. The predominant reason for constructing these roads was to support timber harvest. As timber harvest has declined in the past two decades, the predominant use of the roads has changed to a combination of uses: management access for resource protection, timber harvest activities, and public uses. NFTS roads are each managed in one of three ways: as closed long-term to motor vehicles (closed roads), roads maintained for high-clearance vehicles only (high-clearance roads), and roads maintained for passenger car vehicles.

Table 3.12-2. Existing Shasta-Trinity NFTS roads by operational maintenance level [a]

Operational Maintenance Level	Miles
1 - Basic Custodial Care (Closed)	1457.8
2 - High Clearance Vehicles	4216.6
3 - Suitable for Passenger Cars	785.3
4 - Moderate Degree of User Comfort	327.6
Total Miles	**6787.3**

[a] Source: INFRA, GIS, roads_NFTS_021209.xls

Maintenance of the NFTS roads is performed and funded from three sources. First, the Shasta-Trinity National Forest receives an annual appropriation for road maintenance. Secondly, cooperators such as special use permittees and private landowners are given written authorization to use NFTS roads. These cooperators contribute funds and/or perform maintenance on the roads they use commensurate with their level of use. Last of all, timber sale purchasers perform maintenance on the roads they use to remove the timber from the sales. The maintenance goal is for every road to receive routine maintenance every five years, or 20% of the roads being maintained each year. If funding is insufficient to meet this goal, the unfunded maintenance is added to the deferred maintenance. Table 3.12-3 shows the past four years of funding and miles of maintenance accomplished by the Shasta-Trinity National Forest.

Table 3.12-3. Funds spent in the last four years on road maintenance

Year	Miles of Road Maintained	Percent of Road System Maintained	Road Maintenance Cost - All Sources
2005	816.9	12%	$552,449
2006	864.7	12%	$563,239
2007	882.8	13%	$625,795
2008	994.7	14%	$1,069,582

The Forest has implemented season of use restrictions on 528 miles of NFTS roads (the reason for the seasonal restrictions are listed below) and 2,854 acres of lake bottom to protect nesting and young bald eagles. Table 3.12-4 summarizes the miles of roads and acres of closures by reason. Generally, the season of use for these roads is in the summer months when the road surfaces are dry, reducing erosion from rutting and damage to the drainage systems. This reduces the maintenance needs for these roads.

Table 3.12-4. Existing season of use restrictions

Resource Protection Reason	Miles of Road Seasonally Closed	Acres of Lake Bottom
Erosion Concerns	73.0	0
Watershed Concerns	168.3	0
Wildlife Concerns	84.8	2,854
Maintenance Concerns	183.2	0
Facility Protection	4.29	0

Unauthorized routes were typically created as temporary roads for timber harvest purposes or by users to access areas for dispersed uses such as recreation, hunting, and fishing. These routes are not part of the NFTS and are not currently managed for motor vehicle use. These routes were not designed, and are not maintained, to address public safety concerns. These routes will continue to be used in the no-action alternative, while some will be added to the NFTS in the action alternatives as motorized NFTS trails or operational maintenance level 2 NFTS roads. There are 1,252 miles of unauthorized routes on the STNF.

There are approximately 2,290 miles of roads and 88 miles of trails within the administrative boundaries of the Shasta-Trinity National Forest, which are under the jurisdiction of other federal agencies, state, county, local governments, or are owned by private individuals (Table 3.12-5). These roads provide travel routes through the national forest, and also provide local access.

Table 3.12-5. Roads and trails under other jurisdiction within Shasta-Trinity National Forest boundaries

Jurisdiction	Miles
Roads [a]	
Bureau of Land Management	5.5
Bureau of Reclamation	3.2
County	794.2
Local	26.2
National Park Service	29.5
Private	186.4
State Highway	1242.5
California State Lands	6.9
Unknown	0.1
Total Miles	**2294.6**
Trails [b]	
Bureau of Land Management	73.9
Bureau of Reclamation	0.5
Private	1.5
California State Lands	12.8
Total Miles	**88.8**

a - Source: INFRA, GIS, roads_other_021209.xls
b - Source: INFRA, GIS, trails_other_021209.xls

Connected Actions, Past, Present, and Foreseeable Activities Relevant to Cumulative Effects Analysis

The Shasta-Trinity National Forest has eighteen projects, either in the planning phase or with a final decision, which could affect the NTFS. A Roads Analysis Process (RAP) was completed for each of these projects, and many of the recommendations from these RAPs were carried into the NEPA process for the projects. These recommendations include adding unauthorized routes to the NTFS, putting seasonal restrictions on NFTS roads, and closing or decommissioning NTFS roads. If all of these proposals and decisions are implemented the net effect on the NFTS is a reduction of 180 miles of open roads. Table 3.12-6 summarizes the effects of these recommendations on the NTFS, and listing of the recommendations is located in appendix B.

Table 3.12-6. Present and reasonably foreseeable actions affecting the NFTS

NFTS Status	Miles	Proposed Action/ Decision
NFTS System Road	5.15	Abandon
	101.65	Close
	75.80	Decommission
	3.50	Seasonal Closure
Subtotal	**186.1**	
Unauthorized	5.60	Add to NFTS
Subtotal	**5.60**	
New Road	0.46	Add to NFTS
Grand Total	**192.2**	

Environmental Consequences

Measurement Indicator 1 - Public Safety

The indicators for public safety are summarized by alternative in Table 3.12-7.

Table 3.12-7. Public safety measurement indicators by alternative

Public Safety Measurement Indicator (Miles)	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
1A1: Unauthorized routes added to the NFTS as roads	0.0	36.51	0.0	0.88	43.49
1A2: Unauthorized routes added to the NFTS as trails	0.0	7.69	0.0	14.68	62.62
1B1: MMU, High-clearance roads	4216.6	4253.0	4216.6	4216.7	4259.9
1B2: MMU, Passenger Car roads[a]	0.0	0.0	0.0	30.4	30.4
1B3: MMU, Consistent with CVC	4216.6	4253.0	4216.6	4247.1	4290.3
1B4: MMU, Not consistent with CVC	0	0	0	0	0
1C: Acres of cross-country travel allowed	1,632,316	44,047	0	44,476	44,476

a - Proposed motorized mixed-use segments on passenger car roads are pending an engineering analysis.
Acres of cross-country travel allowed: For alternative 1, this is the total acreage of the STNF outside of designated Wilderness. For alternatives 2, 4, and 5, this is the total acreage of the open areas proposed.
Alternative 2 = Shasta Lake Area and Trinity Lake Area.
Alternatives 4 and 5 = Shasta Lake Area, Trinity Lake Area, and iron Canyon Reservoir Area.

Alternative 1 - No Action

Under alternative 1, there would be no change to the NFTS. Use of unauthorized roads and trails, and cross-country travel would be allowed on 1,632,316 acres. Public safety will not be improved under this alternative. The direct effect of this alternative is no change in the risk of single or multiple vehicle accidents. All roads with motorized mixed-use are consistent with the CVC.

The indirect effect is a continued high emergency response time because this alternative has the most area where cross-country travel (including the unauthorized routes) is allowed. Emergency personnel will have the most difficult time locating accident scenes under this alternative.

The cumulative effect of past, present, and reasonably foreseeable proposed changes to the NTFS will reduce the NFTS roads by 176.5 miles, or 2.5 percent of the existing open roads. This will result in a slight increase in the risk of multiple vehicle accidents by concentrating the use on the remaining system roads.

Alternative 2 - Proposed Action

Under alternative 2, the NFTS will be increased by 36.5 miles of ML 2 roads, and 7.7 miles of motorized trails. Acres of cross-country travel will be reduced to 44,047. All use of unauthorized roads and trails would be prohibited. Public safety will be improved under this alternative. The direct effect of this alternative is a reduced risk of single vehicle accidents due to restricting vehicle use to system roads, motorized use trails, and areas designated for cross-country travel. While these roads and trails have safety features in their design and maintenance standards, there are no such standards for cross-country

travel areas. Motorized mixed-use increases by 36.5 miles. If the current level of use remains constant, this 0.8 percent increase in roads available for motorized mixed-use should slightly reduce the risk of multiple vehicle accidents. All roads with motorized mixed-use are consistent with the CVC.

The indirect effect is a reduced emergency response time because this alternative restricts vehicle travel to designated routes and areas. Emergency personnel will be able to quickly locate the scene of an accident using the MVUM.

The cumulative effect of past and proposed changes to the NTFS will reduce the NFTS roads by 180 miles, or 2.5 percent of the open roads proposed under this alternative. This will result in a slight increase in the risk of multiple vehicle accidents by concentrating the use on the remaining system roads.

Alternative 3 – Cross-Country Travel Prohibition Only – No Additions to the Existing NFTS

Under alternative 3, there will be no change to the NFTS. Cross-country travel and use of unauthorized roads and trails would be prohibited. Public safety will be improved under this alternative. The direct effect of this alternative is a reduced risk of single vehicle accidents due to restricting vehicle use to system roads. These roads have safety features in their design and maintenance standards. Motorized mixed-use does not change under this alternative, so the risk of multiple vehicle accidents does not change. All roads with motorized mixed-use are consistent with the CVC.

The indirect effect is a reduced emergency response time because this alternative restricts vehicle travel to designated routes and areas. Emergency personnel will be able to quickly locate the scene of an accident using the MVUM.

The effect of past and proposed changes to the NTFS will reduce the NFTS roads by 180 miles, or 2.5 percent of the open roads proposed under this alternative. This will result in a slight increase in the risk of multiple vehicle accidents by concentrating the use on the remaining system roads.

Alternative 4 – Minimize Impacts to Natural Resources and Roadless Areas

Under alternative 4, the NFTS will be increased by 0.9 miles of ML 2 roads, and 14.7 miles of motorized trails. Acres of cross-country travel will be reduced to 44,476. Use of unauthorized roads and trails would be prohibited. Public safety will be improved under this alternative. The direct effect of this alternative is a reduction in the risk of single vehicle accidents by restricting vehicle use to system roads, motorized use trails, and areas designated for cross-country travel. While these roads and trails have safety features in their design and maintenance standards, there are no such standards for cross-country travel areas. Motorized mixed-use increases by 0.9 miles from the addition of ML 2 roads. If the current level of use remains constant, this increase in roads available for motorized mixed-use should have no effect on the risk of multiple vehicle accidents. Motorized mixed-use would be allowed on 30.4 miles of ML 3 roads. The engineering analysis identified any risk associated with this use, and appropriate mitigation measures.

The risk analysis is included in appendix C. All roads with motorized mixed-use are consistent with the CVC.

The indirect effect is a reduced emergency response time because this alternative restricts vehicle travel to designated routes and areas. Emergency personnel will be able to quickly locate the scene of an accident using the MVUM.

The effect of past and proposed changes to the NTFS will reduce the NFTS roads by 176.85 miles, or 2.5 percent of the open roads proposed under this alternative. This will result in a slight increase in the risk of multiple vehicle accidents by concentrating the use on the remaining system roads.

Alternative 5 – Improved Access and Motorized Recreation Opportunities

Under alternative 5, the NFTS will be increased by 43.5 miles of ML 2 roads, and 62.6 miles of motorized trails. Acres of cross-country travel will be reduced to 43,701. Use of unauthorized roads and trails would be prohibited. Public safety will be improved under this alternative. The direct effect of this alternative is a reduced risk of single vehicle accidents due to restricting vehicle use to system roads, motorized use trails, and areas designated for cross-country travel. While these roads and trails have safety features in their design and maintenance standards, there are no such standards for cross-country travel areas. Motorized mixed-use increases by 43.5 miles from the addition of ML 2 roads. If the current level of use remains constant, this 1.0 percent increase in roads available for motorized mixed-use should have a corresponding decrease on the risk of multiple vehicle accidents. Motorized mixed-use would be allowed on 30.4 miles of ML 3 roads. The engineering analysis identified any risk associated with this use, and appropriate mitigation measures. The risk analysis is included in appendix C. All roads with motorized mixed-use are consistent with the CVC.

The indirect effect is a reduced emergency response time because this alternative restricts vehicle travel to designated routes and areas. Emergency personnel will be able to quickly locate the scene of an accident using the MVUM.

The effect of past and proposed changes to the NTFS will reduce the NFTS roads by 176.5 miles, or 2.5 percent of the open roads proposed under this alternative. This will result in a slight increase in the risk of multiple vehicle accidents by concentrating the use on the remaining system roads.

Measurement Indicator 2- Affordability

Table 3.12-8 displays the NFTS and estimated costs for each alternative. The total cost shown at the bottom of the table includes the estimated annual maintenance costs for roads and trails as well as implementation costs from appendix A.

Table 3.12-8. Estimated travel management costs by alternative

Item/Cost Center	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
NFTS Roads (miles)	6,961	6,998	6,961	6,962	7,005
NFTS Trails* (miles)	1,430	1,438	1,430	1,445	1,493
2a: Annual Maintenance Costs($)					
Roads	$15,776,566	$15,796,321	$15,776,566	$15,780,745	$15,800,115
Trails	$1,930,500	$1,941,090	$1,930,500	$1,951,413	$2,015,246
Subtotal	**$17,707,066**	**$17,737,411**	**$17,707,066**	**$17,732,158**	**$17,815,361**
2b: Implementation Costs:					
Unauthorized Route Upgraded to High-clearance Road	$0	$165,840	$0	$3,975	$197,567
Unauthorized Route Upgraded to Motorized Trail	$0	$12,254	$0	$23,391	$99,775
Cost of implementing MVUM	$0	$100,000	$100,000	$100,000	$100,000
Subtotal	**$0**	**$278,094**	**$100,000**	**$127,366**	**$397,342**
Total Estimated cost for Alternative	**$17,707,066**	**$18,015,505**	**$17,807,066**	**$17,859,524**	**$18,212,703**

* Includes non motorized and motorized trail mileages.

Alternative 1 - No Action

Alternative 1 results in no change to the current situation on the forest. No roads or trails are added to the NFTS, and unauthorized roads and trails will continue to be used. There would be no cost of implementation for this alternative.

The indirect effect is based on the assumption that if maintenance funding remains constant and use of NFTS roads and trails continues at current level, it is likely that the backlog of maintenance needs will continue to increase. This is a negative feedback cycle. If funding is available to maintain 14 percent (Table 3.12-3) of the NFTS roads and trails, then the unmaintained roads and trails have a higher probability of drainage or surface failures. Because these roads and trails were not maintained, the damage to roads and trails is more destructive. This type of damage is more expensive to repair than preventive maintenance, and will result in reducing the funds available for preventive maintenance.

At current funding levels, 14.3 percent of NFTS roads will receive annual maintenance. This situation is compounded by the continued use of the unauthorized roads and trails. These roads and trails often have serious drainage problems which directly impact and can cause additional damage to adjacent NFTS roads, resulting in additional repairs to shoulders, intersections, and drainage which reduce the funds available for preventive maintenance.

The cumulative effects of the past and foreseeable changes to the NFTS are similar for all alternatives. As roads are closed or decommissioned, fewer miles of roads will need preventive maintenance, and so the yearly percentage receiving maintenance will increase to 14.6 percent. Refer to appendix J for more information about maintenance strategies implemented on the Shasta-Trinity National Forest.

Alternative 2 - Proposed Action

Alternative 2 will add 36.5 miles of unauthorized routes as NFTS roads, and 7.7 miles as NFTS trails. It also limits cross-country travel to the proposed two areas encompassing 44,047 acres of lake bottoms. There is no maintenance cost associated with cross-country travel. The cost of implementation is approximately $278,094, which makes it the second most expensive alternative to implement.

The indirect effect is based on the assumption that if maintenance funding remains constant and use of NFTS roads and trails continues at current level, it is likely that the backlog of maintenance needs will continue to increase. This is a negative feedback cycle. If funding is available to maintain 14 percent (Table 3.12-3) of the NFTS roads and trail, then the unmaintained roads and trails have a higher probability of drainage or surface failures. Because these roads and trails were not maintained, the damage to roads and trails is more destructive. This type of damage is more expensive to repair than preventive maintenance, and will result in reducing the funds available for preventive maintenance.

The additional roads and trail will require preventive maintenance. At current funding levels, 14.2 percent of NFTS roads will receive annual maintenance.

Prohibiting use of the existing unauthorized roads and trails will over time reduce the impacts on the NFTS. In the short-term, while these roads and trails stabilize and revegetate, drainage from these roads and trails impact and can cause additional damage to adjacent NFTS roads, resulting in additional repairs to shoulders, intersections, and drainage which reduce the funds available for preventive maintenance. However, over time the damage to the NFTS will decrease, allowing more funds to be spent on preventive maintenance.

The cumulative effects of the past and foreseeable changes to the NTFS are similar for all alternatives. As roads are closed or decommissioned, fewer miles of roads will need preventive maintenance, and so the yearly percentage receiving maintenance will increase to 14.6 percent. . Refer to appendix J for more information about maintenance strategies implemented on the Shasta-Trinity National Forest.

Alternative 3 – Cross-Country Travel Prohibition Only – No Additions to the Existing NFTS

Alternative 3 does not add roads or trails to the NFTS; it simply prohibits cross-country travel and the use of unauthorized roads and trails. There would still be an MVUM production cost of $100,000 to implement this alternative, which makes it the least expensive of the action alternatives.

The indirect effect is based on the assumption that if maintenance funding remains constant and use of NFTS roads and trails continues at current level, it is likely that the backlog of maintenance needs will continue to increase. This is a negative feedback cycle. If funding is available to maintain 14 percent (Table 3.12-3) of the NFTS roads and trail, then the unmaintained roads and trails have a higher probability of drainage or surface failures. Because these roads and trails were not maintained, the

damage to roads and trails is more destructive. This type of damage is more expensive to repair than preventive maintenance, and will result in reducing the funds available for preventive maintenance.

There are no additional roads which will require preventive maintenance. At current funding levels, 14.3 percent of NFTS roads will receive annual maintenance.

Prohibiting use of the existing unauthorized roads and trails will over time reduce the impacts on the NFTS. In the short-term, while these roads and trails stabilize and revegetate, drainage from these roads and trails impact and can cause additional damage to adjacent NFTS roads, resulting in additional repairs to shoulders, intersections, and drainage which reduce the funds available for preventive maintenance. However, over time the damage to the NFTS will decrease, allowing more funds to be spent on preventive maintenance.

The cumulative effects of the past and foreseeable changes to the NTFS are similar for all alternatives. As roads are closed or decommissioned, fewer miles of roads will need preventive maintenance, and so the yearly percentage of roads receiving maintenance will increase to 14.6 percent.

Alternative 4 – Minimize Impacts to Natural Resources and Roadless Areas

Alternative 4 will add 0.88 miles of unauthorized routes as NFTS roads, and 14.68 miles as NFTS trails. It also limits cross-country travel to the proposed three open areas encompassing 44,476 acres of lake bottoms. There is no maintenance cost associated with cross-country travel. The cost of implementation is approximately $127,365, which makes it the third most expensive alternative to implement.

The indirect effect is based on the assumption that if maintenance funding remains constant and use of NFTS roads and trails continues at current level, it is likely that the backlog of maintenance needs will continue to increase. This is a negative feedback cycle. If funding is available to maintain 14 percent (Table 3.12-3) of the NFTS roads and trail, then the unmaintained roads and trails have a higher probability of drainage or surface failures. Because these roads and trails were not maintained, the damage to roads and trails is more destructive. This type of damage is more expensive to repair than preventive maintenance, and will result in reducing the funds available for preventive maintenance.

The additional roads and trail will require preventive maintenance. At current funding levels, 14.2 percent of NFTS roads will receive annual maintenance.

Prohibiting use of the existing unauthorized roads and trails will over time reduce the impacts on the NFTS. In the short-term, while these roads and trails stabilize and revegetate, drainage from these roads and trails impact and can cause additional damage to adjacent NFTS roads, resulting in additional repairs to shoulders, intersections, and drainage which reduce the funds available for preventive maintenance. However, over time the damage to the NFTS will decrease, allowing more funds to be spent on preventive maintenance.

The cumulative effects of the past and foreseeable changes to the NTFS are similar for all alternatives. As roads are closed or decommissioned, fewer miles of roads will need preventive maintenance, and so the yearly percentage of roads receiving maintenance will increase to 14.6 percent. . Refer to appendix J for more information about maintenance strategies implemented on the Shasta-Trinity National Forest.

Alternative 5 – Improved Access and Motorized Recreation Opportunities

Alternative 5 will add 43.5 miles of unauthorized routes as NFTS roads, and 62.6 miles as NFTS trails. It also limits cross-country travel to the proposed three open areas encompassing 44,476 acres of lake bottoms. There is no maintenance cost associated with cross-country travel. The cost of implementation is approximately $379,342, which makes it the most expensive alternative to implement.

The indirect effect is based on the assumption that if maintenance funding remains constant and use of NFTS roads and trails continues at current level, it is likely that the backlog of maintenance needs will continue to increase. This is a negative feedback cycle. If funding is available to maintain 14 percent (Table 3.12-3) of the NFTS roads and trail, then the unmaintained roads and trails have a higher probability of drainage or surface failures. Because these roads and trails were not maintained, the damage to roads and trails is more destructive. This type of damage is more expensive to repair than preventive maintenance, and will result in reducing the funds available for preventive maintenance.

The additional roads will require preventive maintenance. At current funding levels, 14.2 percent of NFTS roads will receive annual maintenance.

Prohibiting use of the existing unauthorized roads and trails will over time reduce the impacts on the NFTS. In the short-term, while these roads and trails stabilize and revegetate, drainage from these roads and trails impact and can cause additional damage to adjacent NFTS roads, resulting in additional repairs to shoulders, intersections, and drainage which reduce the funds available for preventive maintenance. However, over time the damage to the NFTS will decrease, allowing more funds to be spent on preventive maintenance.

The cumulative effects of the past and foreseeable changes to the NTFS are similar for all alternatives. As roads are closed or decommissioned, fewer miles of roads will need preventive maintenance, and so the yearly percentage of roads receiving maintenance will increase to 14.5 percent. . Refer to appendix J for more information about maintenance strategies implemented on the Shasta-Trinity National Forest.

Compliance with the Forest Plan and Other Direction

All the action alternatives comply with the Forest Plan and the Transportation Rule. Additionally, roads analyzed for motorized mixed-use were assessed for compliance with the California Vehicle Code (see appendix C– Motorized Mixed-use).

Transportation Rule (36 CFR 212, 251, 261 and 295): The alternatives in this EIS are designed specifically to implement the requirements of the November 5, 2005, rule for travel management; Designated Routes and Areas for Motor Vehicle Use. In particular, it addresses the requirements of 36 CFR § 212 Designation of roads, motorized trails, and motorized areas which states in part "Motor vehicle use on National Forest System roads, on National Forest System trails, and in areas on National Forest System lands shall be designated by vehicle class and, if appropriate, by time of year by the responsible official on administrative units or Ranger Districts of the National Forest System."

3.13. Geology

Introduction

Geology affects all aspects of National Forest System lands. Geology determines watershed morphology, soil types, and other essential ecosystem functions. Geological resources can include caves, lava tubes, geological special interest areas and paleontological resources. Geological hazards can affect public safety on National Forest System lands. Hazards can include mass wasting (downslope movement of soil and rock), caves, tube collapse, and the potential for asbestos exposure from serpentinite rock formations. The principal concerns to be assessed for the geologic resource is the potential for mass wasting and subsequent effects on water quality, site productivity, and infrastructure; detrimental effects to geologic resources such as geologic special interest areas (GSIAs), caves, and lava tubes; public safety concerns from routes that traverse serpentinite rock formations, which potentially could contain naturally occurring asbestos and detrimental effects to paleontological resources.

Analysis Framework: Statute, Regulation, Forest Plan and Other Direction

Regulatory direction directly relevant to the proposed action as it affects geologic resources includes the following.

The Northwest Forest Plan, Section C – Riparian Reserves (USDA and USDI 1994). The direction in the Northwest Forest Plan is incorporated into the Forest Plan and is discussed below.

Shasta-Trinity National Forest Land and Resource Management Plan, Chapter 4, Management Direction. The following LRMP direction is applicable to geologic resources:

> **Subsection 3X, Special Area Management (page 4-49).** The Special Area Management prescription provides for protection and management of associated amenity values within SIAs to be consistent with special area objectives. Management direction allows OHV use on existing, designated roads only, and prohibits use where no existing roads occur or closes them if necessary to maintain SIA values.
>
> **Subsection 4, Riparian Reserves (page 4-53 to 4-60).** The Riparian Reserves Management prescription requires action to meet Aquatic Conservation Strategy objectives including (as numbered therein): (1) maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features; (4) maintain and restore water quality necessary to support healthy riparian, aquatic and wetland ecosystems; (5) maintain and restore the sediment regime under which aquatic ecosystems evolved; and (6) maintain and restore in-stream flows sufficient to create and sustain riparian habitats. For each existing or planned road, ACS objectives must be met by: (1) minimizing road locations in riparian reserves; (5) minimizing disruption of natural hydrologic flow paths, including diversion of stream flow and interception

of surface and subsurface flow; (7) avoiding wetlands entirely; (c-3) closing and stabilizing, or obliterating and stabilizing roads based on the on-going and potential effects to ACS objectives and considering short-term and long-term transportation needs. This section also includes direction regarding mass wasting areas (2-e, page 4-55).

Subsection 2, Biological Diversity (page 4-14). This section provides direction for managing caves to protect their existing microenvironments.

Subsection 18, Soils and Water (page 4-25). This section directs the Agency to: "Give full recognition to the tendency of erosion, mass land movement, and severe watershed damage potential when implementing vegetation management and related land management activities." It also provides direction to: "Assess the potential impacts of vegetation management, road construction, and related activities on slope stability and watershed condition for areas identified as moderately or highly unstable."

Forest Service Manual (FSM) 2800-Minerals and Geology, Chapter 2880 - Geologic Resources, Hazards, and Services. This manual provides Agency-wide direction for the gathering, inventory, and research of geologic information and report writing. It provides definitions for geologic SIAs, geologic hazards, and cave resources.

FSM 2370 - Special Recreation Designations. This manual provides Agency-wide direction regarding the management of SIAs including keeping roads and trails to a minimum and prohibiting building roads through geological formations unless it is the only alternative to meet management objectives.

Federal Cave Resources Protection Act of 1988 (102 Stat. 4546; 16 U.S.C. 4301 et. seq). This act provides that Federal lands be managed to protect and maintain significant caves, to the extent practical.

Omnibus Public Land Management Act of 2009 Subtitle D: Paleontological Resources Preservation (Sec. 6302). This act directs the Secretary of Interior or the Secretary of Agriculture, as appropriate, to (1) manage and protect paleontological resources on Federal land, and (2) develop plans for inventorying, monitoring, and deriving the scientific and educational use of such resources.

Region 5 Regional Office Direction on Naturally Occurring Asbestos (Letter to Forest Supervisors and Directors dated February 11, 2009). The Regional Forester has provided direction on addressing naturally occurring asbestos on national forest lands in California. "Any land management decisions regarding NOA must be based on sound data and analysis. According to EAP, the scientific assessment and identification of actual public health risks associated with NOA is a complex and time intensive process. Until such studies are performed, the Region will not have definitive information regarding actual employee and public health risks posed by NOA on NFS lands. Therefore, no decisions are being made or direction issued at this point in time to restrict or alter public access to and/or recreational use of the national forests." The letter further directs forests to make the public aware of the potential risk of

NOA and its presence on national forest lands, as well as guidance on how forest visitors can reduce their exposure to the substance.

Effects Analysis Methodology

Geology Indicators

The environmental indicators used for this analysis are:

- Miles of routes/areas open for motor vehicle use within either active mass wasting zones, debris slides, avalanches, torrents or inner gorges
- Miles of routes/areas open for motor vehicle use within 100 feet of caves or lava tubes
- Miles of routes/areas open for motor vehicle use within geological SIAs
- Miles of routes/areas open for motor vehicle use traversing areas underlain by serpentinite rock formations
- Miles of routes/areas open for motor vehicle use within the McCloud and Hosselkus limestone formations

Geology Methodology by Action

1. Direct and indirect effects of the prohibition of cross-country motorized vehicle travel

Considerations: Whether the prohibition of motor vehicle use away from designated NFTS and other areas would have a beneficial effect on mass wasting occurrence, caves or lava tube integrity, geological SIAs, and serpentinite rock formations.

2. Direct and indirect effects of adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS, including identifying seasons of use and vehicle class

Short-term timeframe: 1 year

Long-term timeframe: 20 years

Spatial boundary: Forest

Indicator(s): (1) Miles of routes/areas open for motor vehicle use within either active mass wasting zones, debris slides, avalanches, torrents and inner gorges; (2) miles of routes/areas open for motor vehicle use within 100 feet of caves or lava tubes; (3) miles of routes/areas open for motor vehicle use within geological SIAs; (4) miles of routes/areas open for motor vehicle use traversing areas underlain by serpentinite rock formations; and (5) miles of routes/areas open for motor vehicle use within the McCloud and Hosselkus limestone formations.

Data Sources: (1) Forest Geomorphology Data Base (original interpretation on a 1:24,000 scale) and field surveys; (2) forest cave inventory; (3) forest SIAs management area layer; (4) forest Bedrock Data Base, 3rd order Soils Survey and the Trinity Serpentine Soil Survey of Earl Alexander. Data sources used to identify NOA in this analysis are of different vintages, occur at different scales, and represent different levels of precision and accuracy. For the purposes of analysis, if any of the 3 data sources indicated serpentine bedrock or soils, NOA is presumed to be present. In some cases, locations showed serpentine soils and thus NOA in one mapping system, but not in another. By considering NOA to be present if a given location appeared as serpentine soils in any of the 3 GIS layers used, the approach taken in this analysis is the most conservative. Any routes proposed for additions to the NFTS that may have NOA but do not appear in all 3 data sources should be further surveyed and/or tested before adding to the NFTS.

Methodology: (1) Initially, the Forest Geomorphology Data Base was used to help identify and prioritize where active mass wasting locations intersect routes proposed for addition to the system. All routes considered in the alternatives that were located within active mass wasting zones, debris slides, avalanches, torrents, and inner gorges were field-evaluated by the forest geologist to verify mapped features and gain a specific understanding and knowledge of on-the-ground erosion and mass wasting conditions, and to identify potential geologic resources or hazards. (2) The forest cave inventory was used to identify routes considered in the alternatives within 100 feet of caves and lava tubes. (3) The Forest SIAs were used to identify routes considered in the alternatives within geological SIAs. (4) The Forest bedrock layer, the 3rd order Soil Survey and the Trinity Serpentine Soils Survey of Earl Alexander were used to identify routes within 30 feet of areas of serpentinite rock formations or sediments. (5) The forest bedrock layer was used to identify routes within the McCloud and Hosselkus limestone formations. This constitutes best available and most timely science sources for these factors. Additionally all routes located on potential mass wasting terrain were *walked* and checked by a geologist for evidence of active mass wasting.

Rationale: (1) Any routes located within active mass wasting zones, debris slides, avalanches, torrents and inner gorges can potentially affect mass wasting. (2) Routes within 100 feet of caves or lava tubes can potentially affect unique geological features within such features. Additionally, there is the potential for caves or lava tubes to collapse if driven over in a motor vehicle. (3) Direction regarding geological SIAs requires protection and management of associated amenity values, including keeping roads and trails to a minimum and prohibiting the building of roads through geological formations unless it is the only alternative to meet management objectives. (4) There is a risk of serpentine derived soils containing naturally occurring asbestos which can be harmful to human health. Routes within 30 feet of serpentinite rock formations or sediments were identified. (5) The McCloud and Hosselkus limestone formations have the largest deposits of fossils, including caves with vertebrate fossils.

3. Changes to the Existing NFTS

Considerations: Change in vehicles class on the existing NFTS will have no effect on geological resources. The changes proposed involve allowing street-legal and non-street-legal vehicles on the same roads. The roads on which these changes would occur are ML 3 roads, which are maintained for passenger cars. The additional use by non-street-legal vehicles will have no added effect on the risk of mass wasting, caves or lava tubes, geological SIAs, serpentinite rock formations, or paleontological resources; therefore, no indicators or methodology was used.

Affected Environment/Environmental Consequences

Affected Environment

The STNF is geologically quite diverse and complex. It contains portions of five geomorphic provinces into which the State of California is divided. These include the Coast Ranges, Klamath Mountains, Cascades, Modoc Plateau and Great Valley provinces.

There are two major drainages within the forest: the Trinity and the Upper Sacramento Rivers. Subdrainages within the Trinity River include the North Fork, East Fork, and South Fork. Major tributaries to the upper Sacramento River include the Pit River and McCloud River, both of which flow into Shasta Lake.

Prominent mountain ranges include the Trinity Alps, Eddies, Yolla Bolly, South Fork Mountain and the Scott Mountains. At 14,161 feet above sea level, Mount Shasta is the highest point on the forest; the lowest point is along the Trinity River near Burnt Ranch at 670 feet.

The Coast Range Province is located along the western edge of the Trinity Forest. It is composed of faulted blocks of Cretaceous sediments (63 to 135 million years before present [mybp]) and is bounded by the South Fork Mountain Schist of the Klamath Province along its eastern limit. Slopes are generally steeply dissected, and mass wasting has dominated the geomorphic development of these landscapes.

The Klamath Mountains lie east of the Coast Ranges and are the largest of the provinces in areal extent within the forest. The Klamath is the most diverse province within the forest, being composed of six major belts of rock which range in age from Ordovician (500 mybp) to Jurassic (135 mybp). Major lithologies include shale, chert, limestone, phyllites, greenstone, peridotite, serpentinite, diorite, gabbro, and granodiorite. Major intrusions within the Klamath include the Ironside Mountain and Hayfork Bally Batholiths.

Geomorphic development of this province is as complex as the geology. Slopes are generally steep and highly dissected with a few flat upland areas. As in the Coast Range, mass wasting has played a dominant role in the development of the landscape. Glaciation is also evident in the Trinity Alps along the Trinity-Sacramento divide, and in the Yolla Bolly, Eddies, and Scott Mountains.

A minor portion of the Great Valley Province is located in the southeast corner of the Trinity Forest. It is composed of a homoclinal sequence of interbedded Tertiary (2 to 65 mybp) sediments, striking northwest and dipping eastward.

The Cascade Province is located within the STNF and prominently includes the active Mount Shasta stratovolcano and the Medicine shield volcano. The province is characterized by a broad undulating volcanic plateau broken by cinder cones, and small stratovolcanoes. Andesite lava flows are the dominant rock type in this province. Other major lithologies include basalt, volcanic mudflows, tuffaceous sediments, pyroclastics, ash, and pumice deposits. These rocks vary in age from Pliocene (13 mybp) to Holocene (500 ybp). Debris flows, torrents and avalanches, rockfalls, and topples are the predominant mass wasting processes within this province.

The Modoc Plateau is located within the STNF. It also is characterized as an undulating gently sloping volcanic plateau broken by scattered volcanic cones. Extensional north-south trending block faulting has resulted in local basins which in the Pleistocene (2.5 mybp) were occupied by large freshwater lakes. Fissure type basaltic lava flows are the dominant lithology. Pumice, ash and mudflow deposits also occur. These rocks vary in age from Miocene (25 mybp) to Holocene.

Active mass wasting has the potential to impact downslope and downstream resources. As mentioned, mass wasting is the dominant erosional process within four of the five provinces, the Coast Range, Klamath Mountain, and portions of the Cascade and Great Valley provinces. This can take the form of translational, rotational, and debris slides, debris avalanches and torrents, and earthflows. Size of features can range from several cubic yards to millions of cubic yards. Slope movement activity can range from active, to dormant (last movement occurred within the last 100 years) to relict (inactive to the point where large portions of the landslide have eroded away by surface erosion). The largest proportions of mass wasting features are relict. Inner gorges which are a product of mass wasting tend to form along the highly incised fluvial channels common within this topography.

About 200 caves or lava tubes are to be found within the forest. Caves are located within limestone lithologies of the Klamath Mountain Province, while lava tubes are found throughout the Cascade and Basin Range Provinces.

Geologic special interest areas are areas designated for their outstanding geologic value. The Forest Service management objective for these areas is to protect their outstanding values and to encourage public use and enjoyment, as long as such use is not detrimental to the values being protected.[84] Seven geologic SIAs are found within the forest. These are: Deep Crater, Giant Crater, Natural Bridges, Pumice Stone, Samwel Cave, Black Butte, and Triad.

Some serpentinite rock formations, and the soils where these rock types are located, have the potential to contain naturally occurring asbestos. Naturally occurring asbestos (NOA) is the term applied to the

[84] FSM 2880

natural geologic occurrence of any of the types of asbestos, and has been found to be present in the majority of counties in California. The California Air Resources Board has identified asbestos as a toxic air contaminant and has concluded there is not sufficient scientific evidence available to identify a threshold exposure level for asbestos below which no significant health effects are anticipated (Title 17, California Code of Regulations, Section 93000). The U. S. Environmental Protection Agency (EPA) has also listed asbestos, in all its forms, as a hazardous air pollutant pursuant to Section 112 of the Clean Air Act. For more information on naturally occurring asbestos, see the Air Quality section. Not all serpentinite soils contain NOA; the Weitchpec and Neuns soil families are not likely to contain NOA, while the Beaughton and Dubakella soils have a higher probability of occurrence.

Serpentinite rock formations and soils are found throughout the forest, except for the McCloud and Shasta Lake Ranger Districts. Serpentinite rock formations (approximately 600 acres) have also been found below the high watermark in two arms of Trinity Lake (main stem of the Trinity River near Carville and Stuarts Fork). Testing of sediments from these areas has been performed by an approved laboratory and found that NOA was not present.

On the STNF, fossils are found primarily in limestone, particularly the Hosselkus Limestone and McCloud Limestone formations. Fossils representing the Devonian, Mississippian, Pennsylvanian, Permian, Triassic, and Pleistocene periods are found on the forest. There has never been an inventory of the fossils on the STNF, so the degree of the existing impacts occurring to fossils is unknown.

Devonian Fauna: Fossils occur in two distinct depositional facies within the Kennett formation. Limestones represented on Backbone Creek yield a poorly preserved coral fauna assigned to the Devonian. Shales representing the second facies, contain *Atrypa* and the coral *Cladopora*.

Mississippian and Pennsylvanian Fauna: The Bragdon and Baird formations have produced several large Mississippian and Pennsylvanian invertebrate faunas. Fossils come from both shales and limestones, but the fossiliferous shale exposures are very limited due to their rapid differential weathering. Since this interval is poorly represented elsewhere on the West Coast, these faunas become all the more important to understanding the late Paleozoic evolution of this part of the country.

Permian Fauna: The coral fauna of the McCloud Limestone is very rich and contains mostly genera characteristic of the Durhaminidae Seas. Sixteen genera and thirty-six species of rugose and tabulate corals have been found.

Triassic Fauna: The Hosselkus Limestone contains the largest and most diverse invertebrate fossil faunas in California (including ammonites, corals, brachiopods, and other mollusks). A total of 210 invertebrate species are represented, including terebratulid, rynchonellid, and spiriferid brachiopods. These species serve as a reference worldwide for comparative identification and cataloguing of rock units.

A diverse assemblage of marine reptiles is also found in this formation including: Icthyosaurs (five species of *Shastasaurus pacificus*) and *Leptocheirus*, *Toretocnemus*, and *Delphinosaurus*. In addition to

the Icthyosaurs the Hosselkus Limestone has preserved the only known remains of the order *Thallatosauria* in the Western Hemisphere.

Pleistocene Fauna: Caves within the McCloud and Hosselkus Limestones have produced a diverse assemblage of fossil vertebrates. In one cave in the McCloud Limestones, vertebrates representing 65 species (13 extinct) have been found including extinct ground sloth, short-faced bear, camel, peccary, scrub ox, mammoth, mastodon, and giant jaguar. In another cave, 50 vertebrate fauna have been identified (8 extinct).

Caves within the Hosselkus Limestone have yielded representatives of all vertebrate classes including: fish, salamanders, snakes, and many birds (including *Gymnogyps*, the California condor). Among the mammals are *Sorex*, shrew; *Scapanus*, mole; *Sylvilagus*, cottontail; *Aplodontia*, mountain beaver; *Scuirus*, tree-squirrel; *Thomomys*, pocket gopher; *Neotoma*, woodrat; *Peromyscus*, deer mouse; *Martes*, marten; *Odocoileus*, deer; *Euceratherium*, scrub ox; and at least one each of Microtine mice, ground squirrels, and Vespertilionid bats.

Environmental Consequences

The analysis addresses cross-country travel, adding roads, motorized trails and open areas to the NFTS, parking and camping within one vehicle length, and changes in vehicle class. There are no effects on geology resources on designating season of use and resource protection measures for cultural resources, so these will not be addressed for the alternatives below.

Direct and Indirect Effects of the Prohibition of Cross-country Motorized Vehicle Travel

Alternative 1–No Action

Cross-country motorized vehicle travel would continue to occur, including travel on the areas below the high watermark on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir.

Active Mass Wasting Zones: Continued cross-country motor vehicle travel over active mass wasting zones, debris slides, avalanches, torrents and inner gorges could contribute to slope failure. Slope failure and falling debris that could result from driving over these areas, could also be a hazard to the vehicle occupants.

Caves and Lava Tubes: There is the potential for impacts to caves and lava tubes, and their associated resources, from motorized vehicle use under this alternative. Included are impacts to unique geological features. Additionally, there is a continued risk to humans from the risk of the cave or lava tube collapsing if driven over.

Geological Special Interest Areas: Motor vehicles are currently impacting geological features in these areas. Under this alternative, these impacts would continue to occur and likely increase. The access in some of these areas is such that cross-country travel is relatively easy and therefore expected.

Serpentinite Rock Formations: There may continue to be potential human health hazards from continued motorized vehicle use in areas within serpentinite rock formations. Field testing has confirmed the presence of NOA on proposed routes in the Beaughton and Dubakella soil families. NOA is not likely to occur in the Neuns and Weitchpec soil families. Additional information on the health effects of serpentine are further described in the Air Quality section.

Paleontological Resources: There would be continued vehicle traffic over areas potentially containing fossils. This vehicle use could potentially impact fossils.

Alternatives 2, 3, 4, and 5

Direct and Indirect Effects of the Prohibition of Cross-country Motorized Vehicle Travel

Under these alternatives, cross-country travel would be prohibited. The analysis demonstrated that there are no negative impacts expected to mass wasting areas, caves and lava tubes, geological SIAs and paleontological resources from motor vehicle cross-country travel. A positive impact is expected since access to these sensitive areas would be prohibited and motor vehicle use would not result in impacts. Since there would be no direct effects, there would be no indirect or cumulative effects.

Direct and indirect effects of adding facilities to the NFTS

Alternative 1–No Action

There would be no additions to the NFTS under this alternative, thus there would be no effects from additions. Since there would be no direct effects, there would be no indirect and cumulative effects.

Alternative 3- Cross-Country Travel Prohibition Only- No Additions to the Existing NFTS

This alternative prohibits cross-country travel only and makes no additions to the NFTS, thus there would be no effects from additions. Motor vehicle use below the high watermark would be prohibited. Since there would be no direct effects, there would be no indirect and cumulative effects.

Alternatives 2, 4, and 5

These alternatives include both additions of routes to the NFTS and additions of open areas on the lake bottoms. Alternative 2 includes open areas on Shasta Lake and Trinity Lake. Alternatives 4 and 5 include open areas on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir.

Active Mass Wasting Zones: Routes within active mass wasting zones, debris slides, avalanches, torrents and inner gorges were screened out beforehand from inclusion in the alternatives because of potential resource impacts. Any route that the GIS database indicated was in one of these features was field surveyed. In some cases, this field survey subsequently found that these features were not present, but rather were a mapping inconsistency. Since there are no routes within these areas, there would be no direct effects. Parking and dispersed camping one car length from these routes would also not have an

effect on these areas because the analysis does not indicate any of these areas within the vicinity of the route. Additionally, motor vehicle use below the high-water mark on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir will not have an effect on mass wasting. Without direct and indirect effects there would be no cumulative effects.

Caves and Lava Tubes: There were no routes proposed in any alternative within 100 feet of caves and lava tubes. Because there are no routes within 100 feet of caves and lava tubes, there would be no effect from parking and dispersed camping within one car length from these routes. There are no caves or lava tubes in the areas below the high-water mark. Since there would be no direct effects, there would be no indirect and cumulative effects.

Geological Special Interest Areas: Routes within geological SIAs were screened out from inclusion in the alternatives to be consistent with LRMP and FSM 2370 direction. Because there are no routes to be added in these areas, there will be no effects from parking and dispersed camping within one car length on geological SIAs. There are no geological SIAs in the areas below the high watermark. Since there are no routes within there would be no direct effects. Without direct effects there would be no indirect and cumulative effects.

Serpentinite Rock Formations: Three soil and bedrock data layers were used to locate routes within 30 feet of serpentine soils. These data layers include: Forest Bedrock Data Base, 3rd order Soils Survey, and the Trinity Serpentine Soil Survey of Earl Alexander. The routes found within serpentine soils are shown in Table 3.13-1. Field testing confirmed the presence of NOA on routes in Beaughton and Dubakella soil families. The Weitchpec and Neuns soil families are not likely to have NOA.

Table 3.13-1. Proposed route additions within 30 feet of serpentine soils

Alternative	Route	Length of Route in Miles	Miles within Serpentinic Soils	Soil Family	Probability of NOA Presence[85]
5	PM047	0.14	0.14	Beaughton	Likely
5	PM048	0.17	0.16	Beaughton	Likely
5	PM211	1.43	0.32	Beaughton	Likely
5	PM216	0.34	0.03	Weitchpec	Not Likely
5	U30N36B	0.86	0.19	Dubakella	Possible
5	U29N73G	0.98	0.05	Neuns	Not Likely
5	RM1603	0.29	0.29	Dubakella	Possible
5	RM737	0.23	0.13	Dubakella	Possible
5	RM1101	0.29	0.23	Weitchpec	Not Likely
5	RM145	0.37	0.37	Weitchpec	Not Likely
5	RM146	0.56	0.56	Weitchpec	Not Likely
5	U29N33B	0.91	0.03	Beaughton	Likely
4, 5	U33N51F	0.32	0.32	Weitchpec	Not Likely

[85] Probability represents the professional opinion of the Forest Soil Scientist.

Under alternatives 2, 4, and 5, areas below the high watermark on Trinity Lake would be open to motor vehicle use. The area underlain by serpentinite rock formations was tested for NOA. The test results were negative for NOA.

No routes proposed in alternative 2 are within 30 feet of serpentinite rock formations. There would be no impacts from parking and dispersed camping because no routes would be added within 30 feet of serpentinite rock formations. There would be no potential effects in this alternative.

Under alternative 4, one route was identified to be within 30 feet of serpentine soils. Under alternative 5, 13 thirteen routes were identified to be within 30 feet of serpentine derived soils, however NOA is not likely to be occur in the Weitchpec or Neuns soil families. There would be potential human health hazards from motorized vehicle use on these routes, and parking and dispersed camping one car length in the areas containing serpentinite. Further information is in the Air Quality section.

Paleontological Resources: Under all the action alternatives, no routes would be added within the Hosselkus and McCloud limestone formations (the fossiliferous formations). There would be no impacts on vertebrate fossils found in these areas.

Direct and Indirect Effects of Changes to the existing NFTS

Mixed-use is proposed under alternatives 4 and 5. As noted above, changes in vehicle type will have no impacts to active mass wasting zones, caves and lava tube, geological SIAs, and paleontological resources under any of the action alternatives. There are 8.8 miles of the 30.41 miles proposed for mixed-use that are underlain by serpentine bedrock or derived soils. Further discussion is in the Air Quality section.

Summary of Effects

Direct and indirect effects of the alternative on areas underlain by serpentinite rock formations are summarized in the table below. The following have no direct and indirect effects; therefore, they are not included in the summary.

- Active mass wasting zones, debris slides, avalanches, torrents or inner gorges
- Caves or lava tubes
- Geological SIAs
- Paleontological resources

In the following table, rankings are scored on a scale of 1 to 5 from the greatest (1) to least (5) impact.

Table 3.13-2. Summary of direct and indirect effects on potential serpentinite rock formations

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Serpentinite Rock Formations	1	3	5	4	2

Compliance with the Forest Plan and Other Direction

Active Mass Wasting Zones: All routes within active mass wasting zones, debris slides, avalanches, torrents and inner gorges were screened out of the alternatives. This complies with direction in the LRMP on riparian reserves.

Geological Special Interest Areas: All routes within geological SIAs were screened out of the alternatives to comply with direction in the LRMP (page 4-49), FSM 2889, and FSM 2370 to protect and manage associated amenity values, including keeping roads and trails to a minimum within SIAs.

Caves and Lava Tubes: There were no routes proposed for any alternative within 100 feet of caves and lava tubes; therefore, the Federal Cave Resources Protection Act and direction in the LRMP (page 4-14) and FSM 2889 regarding protecting and maintaining caves has been met.

Serpentinite Rock Formations: One route in alternative 4 and 13 in alternative 5 have potential serpentinite rock formations and/or sediments, however not all Serpentinite solid formations are likely to include NOA. The analysis for this project meets the requirements of the regional office direction to consider NOA in land management decisions. Further information on compliance with Federal and State air quality laws is in the Air Quality section.

Paleontological Resources: None of the alternatives add routes within the fossiliferous formations (McCloud and Hosselkus limestones), meeting the Paleontological Resources Preservation (Sec. 6302) requirements in the Omnibus Public Land Management Act of 2009.

3.14. Air Quality

Introduction

Air quality is managed in California at three levels of governments, the Federal EPA, the State of California Air Resource Board, and local air pollution control districts as follows.

The EPA has the primary Federal role of ensuing compliance with the requirements of the Clean Air Act. The EPA issues national air quality regulations, approves and oversees State implementation plans, and conducts major enforcement actions. In California, the California Air Resource Board (CARB) is responsible for meeting the Clean Air Act requirements. The CARB has further delegated the authorities to local air pollution control districts (APCDs) or air quality management district's (AQMDs) for stationary sources, while retaining the authority for mobile sources. The districts have the primary responsibility for meeting the requirements of the Clean Air Act. This responsibility is carried out through the development and execution of implementation plans, which must provide for the attainment and maintenance of air quality standards (Ahuja 2009).

Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction

Air quality is managed through a series of Federal, State, and local laws and regulations designed to assure compliance with the Clean Air Act. A summary of how the regulations apply to this project is provided here.

Federal Clean Air Act

The Federal Clean Air Act (CAA), passed in 1970, and last amended in 1990 (42 U.S.C. §7401 et seq.), is the basis for national control of air pollution. The 1990 amendments to the Clean Air Act include a list of 189 pollutants identified as hazardous to human health. These pollutants are known to or have the potential to cause cancer, cause mutation, be toxic to nervous tissue, or cause reproductive dysfunction. Asbestos was one of the pollutants included on the list.

Regional Haze Rule (1990 Clean Air Act Amendments), 40 CFR Part 51

Under the Regional Haze Rule, released by the EPA in 1999, each State was required to develop a visibility state implementation plan (SIP) for Class I areas by December 31, 2007. The CARB board approved the visibility attainment plan on January 22, 2009. It will become a SIP as soon as the EPA approves it. Class I areas include wilderness areas or national parks greater than 5,000 acres which existed on August 7, 1977.

General Conformity Rule (1990 Clean Air Act Amendments) (Section 176 (c) of the Clean Air Act (part 51, subpart W, and part 93, subpart B)

The EPA passed the final General Conformity Rule in 1993. Under this rule, Federal agencies must work with State and local governments in a non-attainment or maintenance area to ensure that federal actions conform to the initiatives established in the applicable state implementation plan (EPA 2008).

California Clean Air Act (H&S §§ 39660 et seq.)

California adopted the California Clean Air Act (CCAA) in 1988. The act provides the basis for air quality planning and regulation in California, independent of Federal regulations, and establishes ambient air quality standards for the same criteria pollutants as the Federal clean air legislation.

According to the technical advisory issued in July, 2008 by the Office of Planning and Research for the State of California, all agencies should identify the nature and extent of exposure to naturally occurring asbestos (NOA) based on the project location and type of project being proposed. Even if the presence of NOA is not indicated or suggested by available State maps, it should still be considered within the environmental document if NOA is otherwise known to occur in the area.

Asbestos Airborne Toxic Control Measure (ATCM) for Surface Application

The ATCM rule was adopted by the CARB in 1990 and amended in 2000. The amendment lowered the asbestos content to 0.25 percent for asbestos-bearing ultramafic rock materials used for surfacing applications subjected to vehicular, pedestrian, or non-pedestrian use, such as cycling and horseback riding.

Shasta-Trinity National Forest Land and Resource Management Plan

The LRMP includes the following applicable direction related to air quality management.

Goals:

1) Maintain air quality to meet or exceed applicable standards and regulations (page 4-4).

Standards and Guidelines:

a. Protect air quality while achieving land and resource management goals and objectives. Baseline levels will be established, and available technology will be used to predict and monitor changes. Activities such as burning, which are under the Forests' control, will be coordinated with affected landowners and control agencies.

b. Identify, assess, and monitor significant air quality related values and sensitive indicators of those values in the Yolla Bolly-Middle Eel Wilderness in cooperation with the Mendocino National Forest (page 4-13).

Region 5 Regional Office Direction on Naturally Occurring Asbestos

The regional forester has provided direction on addressing NOA on national forest lands in California. "Any land management decisions regarding NOA must be based on sound data and analysis. According to EPA, the scientific assessment and identification of actual public health risks associated with NOA is a complex and time intensive process. Until such studies are performed, the Region will not have definitive information regarding actual employee and public health risks posed by NOA on national forest lands. Therefore, no decisions are being made or direction issued at this point in time to restrict or alter public access to and/or recreational use of the national forests." The letter further directs forests to make the public aware of the potential risk of NOA and its presence on national forest lands as well as guidance on how forest visitors can reduce their exposure to the substance. (Letter to forest supervisors and directors dated February 11, 2009.)

Effects Analysis Methodology

Assumption Specific to the Air Quality Analysis

Not all serpentinite soils contain NOA; the Weitchpec and Neuns soil families are not likely to contain NOA, while the Beaughton and Dubakella soils have a higher probability of occurrence. Field testing has confirmed presence of NOA that exceeds California Air Resources Board thresholds in the Beuaghton and Dubakella soil families, so routes proposed for addition to the NFTS in those soil families are assumed to have NOA present.

Data Sources

- Forest bedrock data base: This is the newest and most precise mapping of serpentine bedrock for the purposes of GIS analysis.
- Forest 3rd order soils survey: This is an older survey, and was digitized by hand into the Forest GIS system. As a result, it may not be as precise as the Forest bedrock database for GIS analysis. This layer differs slightly from the Forest bedrock data base.
- Trinity serpentine soil survey of Earl Alexander: This is a watershed level survey that was undertaken for other project level planning to refine the Forest 3rd order soils survey. As a result, it does not cover the entire forest, but provides accurate mapping of serpentine soils in the area of the survey. It was digitized by hand into the Forest GIS database and as a result, may not be as precise as the Forest bedrock database for GIS analysis.

Air Quality Indicators

1. Miles of roads and motorized trails crossing areas underlain by serpentinite bedrock and soils.

Rationale: There is a risk of serpentine-derived soils containing NOA which can be harmful to human health. Routes within 30 feet of serpentinite rock formations or sediments were identified. By using 30 feet, the analysis takes into account the data accuracy and parking and dispersed camping within one-car-length off from designated routes in the analysis.

2. Acres of open areas underlain by serpentinite bedrock and derived soils.

Rationale: There is a risk of serpentine derived soils contain NOA which can be harmful to human health. Areas underlain by serpentinite and alluvial fans of serpentinite derived soils were identified by the forest geologist.

3. Miles of roads and motorized trails crossing serpentinite available to non-highway-legal vehicles.

Rationale: Open motor vehicles, such as motorcycles and all-terrain vehicles, expose people to more dust than motor vehicles with a closed cab, such as cars and pickups. Non-highway-legal vehicles tend to be open vehicles while highway-legal vehicles tend to have closed cabs. Exposure to dust from NOA can put people at risk to asbestos-related disease.

4. Miles of roads and motorized trails available for public motorized use within one mile of Yolla Bolly-Middle Eel Wilderness Class I Airsheds.

Rationale: The Regional Haze Rule requires States to demonstrate "reasonable progress" toward improving visibility in each Class I area over a 60-year period.

Affected Environment/Environmental Consequences

Affected Environment

The STNF lies within three air basins, the Northeast Plateau and Upper Sacramento Valley and North Coast Air Basin. The three air basins within the forest are in attainment for all criteria air pollutants as of December 2008. (See EPAs Green Book at http://www.epa.gov/air/oaqps/greenbk/.)

Naturally Occurring Asbestos (NOA)

Asbestos is a term used for several types of fibrous minerals that occur naturally in the environment. Asbestos fibers are too small to be seen by the naked eye. The two general types of asbestos are amphibole and chrysoltile (fiberous serpentine). Chysotile (also known as serpentine asbestos) has long, flexible fibers. This type of asbestos is most commonly used in commercial products. Amphilbole fibers are brittle, have a rod or needle shape, and are less common in commercial products. Although exposure to both types of asbestos increases the likelihood of developing asbestos-related diseases, amphibole

fibers tend to stay in the lungs longer. They are also thought to increase the likelihood of illness, especially mesothelioma, to a greater extent than chrysotile asbestos (Agency for Toxic Substances and Disease Registry 2005).

Not all serpentinite soils contain NOA; the Weitchpec and Neuns soil families are not likely to contain NOA, while the Beaughton and Dubakella soils have a much higher probability of occurrence. NOA is commonly found in ultramafic rock, including serpentinite rock. Not all serpentinite rock is the highly fibrous, silky variety that contains asbestos; it only has the potential to contain asbestos. Environmental testing determines if a rock contains asbestos. According to the EPA, asbestos-bearing rocks are found in 44 counties out of the 58 counties in California. Humboldt, Trinity, Shasta, and Siskiyou counties are listed as having ultramafic rock that may contain NOA (State of California 2000).

Natural weathering and human activities may disturb NOA-bearing rock or soil and release mineral fibers into the air, which pose the potential for human exposure by inhalation. Activities, such as driving over unpaved surfaces, crushing NOA-bearing rock and stirring up dust, can expose people to NOA. Little, if any, health risk is posed by NOA that is not disturbed. When asbestos containing rocks are crushed or broken through weathering and ground-disturbing activities such as vehicle travel on and/or maintenance of roads in NOA areas, asbestos-containing dust can be generated. Asbestos fibers do not dissolve or evaporate, are resistant to heat, fire, chemicals and biological degradation (Agency for Toxic Substances and Disease Registry 2005). Once asbestos fibers are released into the air, they may remain airborne or in the soil for a long time.

Airborne asbestos fibers may pose a health hazard because of the potential risks associated with inhalation of fibers over time. Being exposed to asbestos does not necessarily mean a person will develop health problems. Other factors such as type and quantity of asbestos and duration and frequency of exposures are all important considerations. Health risks of inhaling NOA are not yet fully understood. Scientists do not yet know with certainty how much exposure to asbestos can result in a person developing asbestos-related disease, but they do know that long-term exposure to relatively high concentrations of airborne asbestos is a potent cause of disease. Exposure to asbestos can cause an illness known as asbestosis, as well as lung cancer and a rare cancer of the lining of the lungs called methothelioma (Agency for Toxic Substances and Disease Registry 2001a,b). People with asbestosis have difficulty breathing, often a cough, and in severe cases heart enlargement. Asbestosis is a serious disease and can eventually lead to disability and death. Mesothelioma is a cancer of the thin lining surrounding the lung (pleural membrane) or abdominal cavity (the peritoneum) (Agency for Toxic Substances and Disease Registry 2001a,b). Exposure occurs when asbestos fibers are inhaled, but the effects from exposure may not be seen for 3 to 40 years (National Institute of Standards and Technology 2007).

Breathing lower levels of asbestos may result in changes called plaques in the pleural membranes. Pleural plaques can occur in workers and sometimes in people living in areas with environmental levels of asbestos. Effects of breathing NOA on pleural plaques alone are not usually serious, but higher exposure

can lead to thickening of the pleural membrane that may restrict breathing (Agency for Toxic Substances and Disease Registry 2001a).

Initial concern over the health effects of asbestos arose from studies of workers in the asbestos industries. Since the initial studies of occupational asbestos exposure, other studies have investigated non-occupational exposures to asbestos minerals and the potential health effects. Specific information on the health effects of asbestos can be found in the Toxicological Profile for Asbestos by the Agency for Toxic Substances and Disease Registry (2001b).

On the STNF there are 348,000 acres of serpentinite bedrock and soils with 274,000 acres outside of wilderness areas. Approximately 793 miles of NFTS roads and motorized trails cross serpentine-bearing rock and soils. Table 3.14-1 displays the miles of current NFTS roads and motorized trails on serpentinite by surface type. Approximately 54 miles of roads that cross serpentinite have sealed surfaces (paved and bituminous surface treatments) minimizing dust and potential NOA exposure.

Aggregate roads have rock aggregate (gravel) surfaces. The risk of NOA on these roads primarily depends on the source material of the rock aggregate. Serpentinite is generally not used for aggregate because it breaks up easily; however, it could have been used on some roads prior to the 1990s. If the rock aggregate contained NOA, then the dust from these roads could contain NOA. There are 1,107 miles of aggregate roads on the STNF that could potentially contain NOA. However, it is very probable that only roads within 40 miles from a serpentinite quarry source would potentially be affected because of the high costs of transporting aggregate greater than 40 miles. Because of these reasons, the risk of NOA on aggregate roads is low except for the approximately 119 miles of aggregate roads that cross serpentinite.

Native surface roads and trails generally have no additional aggregates added. Some limited use of aggregates has occurred on native surface roads and trails such as spot rocking areas to reduce erosion. However, these roads and trails would be primarily influenced by their underlying bedrock and soils. The majority (78 percent) of the current NFTS roads and motorized trails on the STNF that cross serpentinite bedrock and derived soils are native surface roads.

Table 3.14-1. Current miles of NFTS roads and motorized trails on potential serpentinite by surface type

Surface Type	Miles
Asphalt	9
Bituminous surface treatment	45
Aggregate	119
Native	620
Total	**793**

Open motor vehicles, such as motorcycles and all-terrain vehicles, expose people to more dust than motor vehicles with a closed cab, such as cars and pickups. Non-highway-legal vehicles tend to be open vehicles while highway-legal vehicles tend to have closed cabs. Motor vehicle users of highway-legal vehicles can better limit their exposure to NOA dust through closing windows and circulating air. Roads

and motorized trails which allow non-highway legal vehicles would generally put motor vehicle users at greater risk of potentially inhaling NOA. Of the 793 miles of current NFTS roads and motorized trails on serpentine, 585 miles are open to both highway legal and non-highway-legal vehicles.

There are approximately 600 acres of serpentinite rock formations under Trinity Lake. Samples of sediments were taken from these areas and sent to a qualified laboratory for testing using the CARB Method 435 testing protocol. Test results indicate that the sediments do not contain NOA (Rust 2009).

Class I Wilderness Area

The Yolla Bolly-Middle Eel Wilderness was designated as a Class I air quality area by the Clean Air Act amendments of 1977. Air quality related values for the Yolla Bolly-Middle Eel Wilderness are visibility, flora and fauna, and water.

To monitor air quality in the Yolla Bolly-Middle Eel Wilderness and Marble Mountain Wilderness (located on the Klamath National Forest), the EPA and CARB approved an IMPROVE (Interagency Monitoring of Protected Visual Environment) site managed by the Forest Service located near Trinity helipad base. The Trinity monitoring station is located on a clear-cut area on a ridgeline at 1,014 meters (approximate top of Central Valley inversion layer). The area is forested with no significant anthropogenic sources nearby, except the helipad base used only during northern California fires.

Air samples are analyzed for PM_{10}, $PM_{2.5}$, SO_4, NO_3, organic carbon, elemental carbon, dust, and soot. The data will help identify sources that generate pollutants for visibility degradation. The data was used during the development of the visibility SIP by the State and will also be used for showing progress towards achieving visibility goals.

Data from the IMPROVE site indicates that visibility impairment rises slightly in warmer months, but the worst days occur as spikes throughout the year. Organic matter carbon (OMC) is the overwhelming cause of the worst haze days followed by sulfate and nitrate. Average sulfate concentration on the worst days is twice the amount of the best days. The ammonium sulfate particles are very efficient at scattering light and visibility impairment. Nitrate is occasional cause of a winter haze day. Coarse mass and fine soils contribute extremely small amounts to impaired visibility (Ahuja 2009).

Environmental Consequences

Naturally Occurring Asbestos (NOA)

Motorized activities in areas with NOA can stir up dust containing asbestos fibers, putting people at risk for inhaling the fibers. Table 3.14-2 lists specific routes associated with NOA that are proposed to be added to the NFTS. These routes that would be added are native surface that would be open to both highway-legal and non-highway-legal vehicles. As noted above, native surface roads and trails have a

greater potential for dust generation, increasing the risk of inhaling NOA. Field sampling showed NOA in routes in the Beaughton and Dubakella soil families.

Table 3.14-2. Proposed additions to the NFTS associated with NOA [86]

Alternative	Route	Length of Route in Miles	Miles within Serpentinitic Soils	Soil Family	Probability of NOA Presence[87]
5	Pm047	0.14	0.14	Beaughton	Likely
5	Pm048	0.17	0.16	Beaughton	Likely
5	Pm211	1.43	0.32	Beaughton	Likely
5	U30N36B	0.86	0.19	Dubakella	Possible
5	Rm1603	0.29	0.29	Dubakella	Possible
5	Rm737	0.23	0.13	Dubakella	Possible
5	U29N33B	0.91	0.03	Beaughton	Likely

Parking and dispersed camping could occur along these routes in areas with serpentinite. Parking and dispersed camping in an area with potential NOA could increase risk of exposure.

Cultural resource protection measures proposed under alternatives 2, 4, and 5 would have no effect on the potential risk of exposure to NOA.

Shasta Lake, Trinity Lake and Iron Canyon Reservoir are proposed as open areas under alternatives 2, 4, and 5 (Iron Canyon Reservoir is not included in alternative 2). Testing of areas underlain by serpentinite rock formations on Trinity Lake indicate that NOA does not occur in these areas.

Yolla Bolly-Middle Eel Wilderness Class I Area

Currently there are approximately 54 miles of roads open for public travel within one mile of the Yolla Bolly-Middle Eel Wilderness on the STNF. Monitoring indicates that dust from roads is a minor contributor to impaired visibility to this area. Motor vehicle use within one mile of this Class I area is not expected to have a measurable effect on visibility. Two alternatives, alternative 2 and 5, add approximately 0.33 mile of road within one mile of the wilderness border. Motor vehicle travel may increase on this road as it is designated and identified on the MVUM. Parking and dispersed camping within one vehicle length of this route will not have an effect on air quality in the Class I area.

[86] These routes show as possible serpentine soils with NOA in the Forest 3rd Order Soil Survey, or the Trinity serpentine soil survey of Earl Alexander, but not in the Forest bedrock database.
[87] Probability represents the professional opinion of the Forest Soils Scientist.

Alternative 1 – No Action

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Cross-country motor vehicle travel would not be prohibited under this alternative and would continue to occur, including travel in the areas below the high-water mark on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir.

Naturally Occurring Asbestos

Motor vehicle uses would continue on unauthorized routes and areas with serpentinite soils and bedrock. Driving over these unauthorized routes and areas would continue to break up serpentinite rocks and potentially release NOA. When conditions are dry and dust is generated from motorized activities on routes and areas with serpentine, people could be exposed to NOA.

Yolla Bolly-Middle Eel Wilderness Class I Area

Cross-country motor vehicle travel would continue in the areas around the Yolla Bolly-Middle Eel Wilderness. This continued traffic is not expected to measurably affect visibility.

Direct/ Indirect Effects of Adding Facilities to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Under alternative 1 there would be no additions to the NFTS, therefore there would be no direct and indirect effects to the Yolla Bolly-Middle Eel Wilderness Class I Air or to air quality from NOA from adding facilities in this alternative.

Direct/ Indirect Effects of Changes to the Existing NFTS

Under alternative 1 there would be no changes to the existing NFTS, therefore there would be no direct and indirect effects.

Alternative 2 – Proposed Action

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Naturally Occurring Asbestos

Motor vehicle travel over areas with potential serpentinite would be prohibited, reducing continued break up of serpentinite rocks that release NOA and reducing the risk of inhalation. Revegetation of areas with serpentinite that are now disturbed from cross-country travel depends on soil productivity. Serpentinite areas with shallow soils may not recover and, if they did recover, it would be slow. Vegetation can reduce air-born dust containing serpentine minerals.

Yolla Bolly-Middle Eel Wilderness Class I Area

Cross-country travel would be prohibited under alternative 2 including areas next to the Yolla Bolly-Middle Eel Wilderness. Since motor vehicle use contributes very little to visibility in the area, it is unlikely there will be a noticeable difference in visibility.

Direct/ Indirect Effects of Adding Facilities to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Naturally Occurring Asbestos

Under alternative 2, there would be no unauthorized routes that cross serpentine-bearing rock and soils added to the NFTS; therefore, there would be no changes in exposure to NOA.

Yolla Bolly-Middle Eel Wilderness Class I Area

One-third of a mile of one route (pm2004) would be added as a road to the NFTS within one mile of the Yolla Bolly-Middle Eel Wilderness, a Class I wilderness area. As mentioned above, the effects on visibility from the addition of this road would be undetectable.

Direct/ Indirect Effects of Changes to the Existing NFTS

There would be no changes to the NFTS under this alternative; therefore, there would be no effects.

Alternative 3 – Cross-country Travel Prohibition Only – No Additions to the Existing NFTS

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

This alternative is similar to alternative 2 in prohibiting cross-country travel.

Direct/ Indirect Effects of Adding Facilities to the NFTS, Including Identifying Seasons of Use and Vehicle Class

No routes would be added to the NFTS under this alternative; therefore, there would be no effects. Areas below high water on Shasta Lake, Trinity Lake, and Iron Canyon Reservoir would be closed to motor vehicle use. There are no changes to the existing NFTS under this alternative. Therefore, there would be no changes to exposure to potential NOA and to motor vehicle use within one mile of the Yolla Bolly-Middle Eel Wilderness.

Direct/ Indirect Effects of Changes to the Existing NFTS

There would be no changes to the NFTS under this alternative; therefore, there would be no effects.

Alternative 4 – Minimize Impacts to Natural Resources and Roadless Areas

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

This alternative is similar to alternative 2 in prohibiting cross-country travel.

Direct/ Indirect Effects of Adding Facilities to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Naturally Occurring Asbestos

One unauthorized route that crosses 0.32 mile of potential NOA would be added to the NFTS.

Yolla Bolly-Middle Eel Wilderness Class I Area

There would be no unauthorized routes added within one mile of the Yolla Bolly-Middle Eel Wilderness under alternative 4.

Direct/ Indirect Effects of Changes to the Existing NFTS

Naturally Occurring Asbestos

Of the 30.41 miles of ML 3 roads where highway-legal and non-highway-legal motor vehicles can operate, there are 8.8 miles crossing potential serpentinite bedrock and soils. Non-highway legal vehicles tend to be open, such as motorcycles and all-terrain vehicles, and riders have more exposure to dust.

Alternative 5 – Improved Access and Motorized Recreation Opportunities

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

This alternative is similar to alternative 2 in prohibiting cross-country travel.

Direct/ Indirect Effects of Adding Facilities to the NFTS, Including Identifying Seasons of Use and Vehicle Class

Naturally Occurring Asbestos

Under alternative 5, thirteen unauthorized routes that cross 2.29 miles of potential NOA would be added to the NFTS.

Yolla Bolly-Middle Eel Wilderness Class I Area

One-third of a mile of one route (pm2004) would be added to the NFTS within one mile of the Yolla Bolly-Middle Eel Wilderness, a Class I wilderness area. As mentioned above, the effects on visibility from the addition of this road would be undetectable.

Direct/ Indirect Effects of Changes to the Existing NFTS

Naturally Occurring Asbestos

Of the 30.41 miles of ML 3 roads where highway-legal and non-highway-legal motor vehicles can operate, there are 8.8 miles that may cross serpentinite bedrock and soils. Non-highway legal vehicles tend to be open, such as motorcycles and all-terrain vehicles, and riders have more exposure to dust.

Cumulative Effects

Naturally Occurring Asbestos

Except for alternative 1, the no-action alternative, all alternatives would prohibit cross-country travel. Prohibiting cross-country travel would reduce the risk of additional exposure from motor vehicle travel over areas with serpentine.

Present and reasonably foreseeable road management actions include closing, decommissioning, and abandoning NFTS roads and adding unauthorized routes to the NFTS (see Appendix B for details). There are approximately 8.3 miles of NFTS roads that cross potential serpentinite that would be closed, decommissioned, or abandoned. These roads would not be available for public use in the future, reducing the risk of potential exposure to NOA. There are no reasonably foreseeable road management actions that add routes to the NFTS that are on serpentine. The result of present and reasonably foreseeable actions would be 784.7 miles of NFTS roads and motorized trails crossing serpentine with the potential to contain NOA. Alternative 2 would add .32 miles of route on serpentine resulting in 785 miles of NFTS roads and motorized trails crossing serpentine. Alternative 5 would add 2.29 miles on serpentine resulting in 787 miles of NFTS roads and motorized trails crossing serpentine. There would be no unauthorized routes that cross areas with potential NOA added under alternatives 1, 2, and 3.

Alternatives 4 and 5 would change the vehicle class from highway-legal only to allowing both highway-legal and non-highway-legal vehicles on 8.8 miles of roads crossing potential NOA. These changes in addition to the routes added on serpentine would result in 594 miles of roads and motorized trails that cross serpentine open to non-highway-legal vehicles in alternative 4 and 596 miles in alternative 5.

Table 3.14-3 summarizes the forest-wide potential for exposure to NOA by alternative. Other than alternative 1 which continues cross-country travel, alternatives 4 and 5 present the most risk for exposure to NOA. The degree that these additions and vehicle class changes would add to health risks is unknown as most of these roads and motorized trails have not been tested for extent of NOA. Additionally, the risk can be reduced by actions individuals take to reduce exposure to NOA (see the Agency for Toxic Substances and Disease Registry's Limiting Environmental Exposure to Asbestos in Areas with Naturally Occurring Asbestos and US EPAs "Naturally Occurring Asbestos: Approaches for Reducing Exposure," 2008).

Table 3.14-3. Miles of roads and motorized trails crossing serpentine

	Alt 1 - Current NFTS	Alt 2	Alt 3	Alt 4	Alt 5
Total miles of roads and motorized trails crossing serpentine	**785**	**785**	**785**	**785**	**787**
Total miles of roads and motorized trails crossing serpentinite available to non-highway-legal vehicles	**585**	**585**	**585**	**594**	**596**

Yolla Bolly-Middle Eel Wilderness Class I Area

Data from the IMPROVE site indicates that dust from motor vehicle use makes minor contributions to impaired visibility. Cross-country travel would be prohibited under the action alternatives. Under alternatives 2 and 5, 0.33 mile of road added to the NFTS within one mile of the boundary of this Class I area brings the total of roads and motorized trails within one mile of the boundary from approximately 54 miles to 54.3. There are no present and reasonably foreseeable road management actions within one mile of the Class I area. Prohibiting cross-country travel and adding 0.33 mile of road is not expected to make a discernable difference to visibility in the Yolla Bolly-Middle Eel Wilderness.

Summary of Effects Analysis across All Alternatives

The following table summarizes the effects analysis by ranking each alternative regarding how well it addresses naturally occurring asbestos and Class I wilderness area. Rankings are scores on a scale of 1 to 5 from the greatest (1) to least (5) impact.

Table 3.14-4. Comparison of effects to air quality

Indicators	Rankings of Alternatives for Each Indicator				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Naturally Occurring Asbestos	1	4	5	3	2
Class I Wilderness Area	1	3	5	5	3
Average for air quality	1	4	5	4	2.5

Climate Change

The Environmental Protection Agency (EPA, 2007) developed a State of Knowledge paper that outlines what is known and what is uncertain about global climate change. The following elements of climate change are known with near certainty:

1) Human activities are changing the composition of Earth's atmosphere. Increasing levels of greenhouse gases like carbon dioxide (CO_2) in the atmosphere since pre-industrial times are well-documented and understood.
2) The atmospheric buildup of CO_2 and other greenhouse gases is largely the result of human activities such as the burning of fossil fuels.
3) An unequivocal warming trend of about 1.0 to 1.7 F occurred from 1906-2005. Warming occurred in both the Northern and Southern Hemispheres and over the oceans (IPCC, 2007).
4) The major greenhouse gases emitted by human activities remain in the atmosphere for periods ranging from decades to centuries. It is therefore virtually certain that atmospheric concentrations of greenhouse gases will continue to rise over the next few decades.
5) Increasing greenhouse gas concentrations tend to warm the planet.

According to EPA (2007), however, it is uncertain how much warming will occur, how fast that warming will occur, and how the warming will affect the rest of the climate system including precipitation patterns.

Given what is and is not known about global climate change, the following discussion outlines the cumulative effects of this project on greenhouse gas emissions and effects of climate change on forest resources.

Carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxide (N_20) emissions generated by public motorized vehicle travel on NFTS facilities are expected to contribute to the global concentration of greenhouse gases that affect climate change. Projected climate change impacts include air temperature increases, sea level rise, changes in the timing, location, and quantity of precipitation, and increased frequency of extreme weather events such as heat waves, droughts, and floods. The intensity and severity of these effects are expected to vary regionally and even locally, making any discussion of potential site-specific effects of global climate change on forest resources speculative.

Because greenhouse gases from vehicle emissions mix readily into the global pool of greenhouse gases, it is not currently possible to discern the effects of this project from the effects of all other greenhouse gas sources worldwide, nor is it expected that attempting to do so would provide a practical or meaningful analysis of project effects. Potential regional and local variability in climate change effects add to the uncertainty regarding the actual intensity of this project's effects on global climate change. Further, emissions associated with this project are extremely small in the global atmospheric CO_2 context, making it impossible to measure the incremental cumulative impact on global climate from emission associated with this project. In summary, the potential for cumulative effects is considered negligible for all alternatives because none of the alternatives would result in measurable direct and indirect effects on air quality or global climatic patterns.

Compliance with the Forest Plan and Other Direction

The STNF air basins are in attainment for all criteria air pollutants as noted above. Therefore, the forest is exempt from the General Conformity determination requirement. The Clean Air Act requires coordination (under Interim Air Quality Policy) with the state and local governments in areas that are in attainment.

The analysis performed for this project assures we are following the LRMP goal to "Maintain air quality to meet or exceed applicable standards and regulations (page 4-4)." and standards and guideline to "Protect air quality while achieving land and resource management goals and objectives (page 4 -13)."

Yolla Bolly-Middle Eel Wilderness Class I Area

Monitoring indicates that motor vehicle use contributes little to visibility in this Class I area. This project assessed the effects of travel management on air quality related values of visibility meeting LRMP direction to assess air quality-related values in the Yolla Bolly-Middle Eel Wilderness (page 4-14). The

analysis indicates that the actions proposed under any alternative will have no discernable effect on the visibility in the Yolla Bolly-Middle Eel Wilderness Class I Area. This project is in compliance with the Regional Haze Rule of the Clean Air Act.

Naturally Occurring Asbestos

NOA is a pollutant identified by Federal and State Clean Air Acts. This analysis discloses potential effects to NOA per State of California Office of Planning and Research. If any routes that have the potential to contain NOA are added to the NFTS, they would be posted to notify the public of the potential risks per regional office direction. Serpentinite is not used for surface application on the forest which complies with the state's Asbestos Airborne Toxic Control Measure (ATCM) for Surface Application.

3.15. Modified Alternative 2

Introduction

Modified Alternative 2 is a blend of Alternative 2 (the Proposed Action) and Alternative 5. Modified Alternative 2 was developed after the publication of the Draft Environmental Impact Statement in response to new analysis and public comments. Modified Alternative 2 maintains the core elements of Alternative 2, the original Proposed Action but adds selected routes and makes provisions for motorized mixed use with routes that were considered in Alternative 5. Modified Alternative 2 is intended to provide more diverse motorized recreation opportunities while also protecting cultural and natural resources. For clarity, Alternative 2 will be described as the Proposed Action in the remainder of this section. See Chapter 2 for a complete description of Modified Alternative 2.

Effects Analysis Methodology

Environmental consequences of this alternative were analyzed by comparing measurement indicator values as calculated for the Proposed Action with those same measurement indicator values as calculated for Modified Alternative 2. This comparison of measurement indicators by resource is documented in Appendix M. The analysis of measurement indicators for Modified Alternative 2 used the same data sources, assumptions, and methods as was done in the analysis of the Proposed Action. This provides a comparison of the Proposed Action and Modified Alternative 2 by resource. For simplicity, additions to the NFTS and changes to the NFTS are considered together. Once the comparison to the original Proposed Action was completed, Modified Alternative 2 was then compared to other Alternatives by relative ranking by resource. Refer to the individual resource sections in chapter 3 for documentation of assumptions and methods for each resource.

Affected Environment

The affected environment is as described in each of the resource sections in chapter 3.

Environmental Consequences

This section describes the direct, indirect, and cumulative effects for each of the 3 actions:

- The prohibition on motorized cross country travel
- Additions to the NFTS
- Changes in the NFTS

Direct / Indirect and Cumulative Effects of the Prohibition of Motorized Cross Country Travel

Modified Alternative 2 increases the area where motorized cross country travel is prohibited from 1,599,062 acres to 1,599,122 – about 60 acres - as a result of slight changes in route configuration (i.e., a

slight reduction in miles added to the NFTS) when compared to the Proposed Action. This increase is so small when compared to the size of the Forest that there is no discernible change beyond local site scales in direct or indirect effects from those already described for the Proposed Action with respect to the prohibition of cross county travel.

There is no discernable change in cumulative effects from those displayed in the Proposed Action since the differences in direct and indirect effects are so small. Cumulative effects are discussed by resource in the discussions below.

Direct / Indirect and Cumulative Effects of Route and Area Additions and Changes to the NFTS

Modified Alternative 2 adds 35.69 miles of routes to the NFTS and authorizes motorized mixed use on 21.31 miles of existing Maintenance Level 3 roads. Changes proposed in Modified Alternative 2 in comparison to the Proposed Action are described in Table 3.15-1.

There would be no change in effects as a result of the proposed open areas below the high water marks in Shasta Lake and Trinity Lake because the proposals in the two alternatives are identical.

Most resource areas have no change in effects as a result of changes in proposed vehicle classes between the two alternatives. Any direct, indirect, or cumulative effects resulting from changes in vehicle class are noted in the relevant resource discussions below.

Most resource areas have no change in effects as a result of the proposed motorized mixed-use on existing NFTS maintenance level 3 routes. Any direct, indirect, or cumulative effects resulting from allowing motorized mixed use on existing NFTS roads are noted in the relevant resource discussions below.

There are no differences between the Proposed Action and Modified Alternative 2 with respect to seasons of use, mitigation measures, or protection measures required for specific routes or cultural resources.

Vehicle classes and total route mileages vary somewhat as noted in Table 3.15-1.

Table 3.15-1. Changes proposed in Modified Alternative 2 compared to the Proposed Action

Action	Alternative 2 (Proposed Action)	Modified Alternative 2	Change
Roads Open to all Vehicle Classes	71 routes 36.51 miles	48 routes 21.34 miles	-23 routes -15.17 miles
Trails Open to all Trail Class Vehicles	7 routes 0.85 miles	17 routes[88] 5.88 miles	+10 routes +5.03 miles
Trails Open to Vehicles 50" and less in Width	6 routes 5.4 miles	19 routes 7.21 miles	+13 routes +1.81 miles
Trails Open to Motorcycles Only	4 routes 1.44 miles	4 routes 1.25 miles	No change in number of routes -0.19 miles

[88] 10 of these routes were shown as roads in Alternative 2.

Action	Alternative 2 (Proposed Action)	Modified Alternative 2	Change
Total Additions to the NFTS	**88 Routes 44.2 miles**	**88 Routes 35.69 Miles**	**No change in # of Routes -8.51 Miles**
Changes to the NFTS to Make Provisions for Mixed Use	0	16 Routes[89] 21.31	16 Routes 21.31 miles
Total Route Additions and Changes to the NFTS	**88 routes 44.2 miles**	**104 routes 56.99 miles**	**+ 16 Routes +12.79 Miles**

Recreation

When compared to the Proposed Action direct and indirect effects of Modified Alternative 2 results in:

- No change in either the semi-primitive motorized or roaded natural ROS classes.
- A decrease of approximately 9,500 acres in areas where noise can be anticipated. In other words, less area is potentially affected by OHV noise because of the 8.51 mile reduction in the added miles of routes open to OHV use. Motorized mixed use is presumed not to increase overall noise levels since Maintenance Level 3 routes are open and already have traffic on them.
- A slight decrease of routes within 0.5 miles of neighboring federal and private lands from 23 miles in the Proposed Action to 14.15 miles in Modified Alternative 2. The effect of this reduction is less potential noise, dust, and conflict with uses on neighboring lands.
- An increase in connectivity of routes open to all vehicles by authorizing motorized mixed use on 21.31 miles of Maintenance Level 3 roads. This connects 35 Maintenance Level 2 roads providing 128 miles of connecting rides. This increases opportunities for loop rides, longer rides, and reduces trailering between routes.
- An additional 23 motorized trails that result in a net increase of 6.65 miles of motorized trails when compared the Proposed Action. This increases motorized access for high clearance 4wd vehicles and provides more diversity and opportunity for motorized trail use.
- A very slight reduction in motorized access on NFTS roads open to all motorized vehicles. Modified Alternative 2 proposes a reduction of 23 routes totaling 15.17 miles of roads open to all vehicles when compared to the Proposed Action. These are Maintenance Level 2 roads. The effect of this change is to reduce NFTS roads open to all motorized vehicles from approximately 4,253 miles (4216 miles existing NFTS + 36.51 miles additions) to 4,237 miles (4,216 miles existing NFTS + 21.34 miles additions). Although not directly comparable, this decrease is likely offset by the addition of 21.31 miles of motorized mixed use that connects 35 Maintenance Level 2 routes creating 128 miles connected rides.

[89] Includes some discrete segments that are separated but on the same route and have the same road number.

- There is no overall change in motorized access to dispersed recreation because the number of routes added to the system remains the same. The character of access to dispersed recreation may change somewhat by the addition of 6.65 miles of motorized trails.

Modified Alternative 2 provides an overall increase in diversity and opportunity for motorized recreation when compared to the Proposed Action. Although 8.51 fewer miles of roads and motorized trails are added to the NFTS than in the Proposed Action, the vehicle class assignments and addition of mixed use on 21.31 miles of existing roads provide more overall opportunity and diversity for all vehicle classes. The increased trail miles results in increased quality and presumed degree of difficulty provided by more trail miles. There is also a slight reduction in potential conflicts adjacent to neighboring lands. Use below the high water marks of Shasta and Trinity Lakes remain unchanged as do Season of Use restrictions.

The cumulative effects of adding present and reasonably foreseeable actions defined in Appendix B to the direct and indirect effects on recreation resources of Modified Alternative 2 are as follows:

- No change with respect to ROS consistency with the LRMP assuming future actions in Appendix B are consistent with the ROS as is Modified Alternative 2.
- A slight increase (less than 5%)[90] in non-motorized recreation opportunity as an estimated 180 miles of existing NFTS routes are decommissioned or obliterated by reasonably foreseeable project-level NEPA decisions. Otherwise, the activities described in Appendix B are typical management activities that occur on the forest with the potential to produce temporary noise, dust, and use conflicts when in operation and do not cumulatively affect non-motorized recreation.
- A slight decrease (less than 5%) in motorized recreation opportunity and access to dispersed motorized recreation provided by the NFTS as an estimated 180 miles of existing NFTS routes are decommissioned or obliterated as a result of reasonably foreseeable future actions.
- A slight decrease in impacts on neighboring federal and private lands as routes in Appendix B within 0.5 miles the Forest boundary are decommissioned or obliterated in reasonably foreseeable future actions. Otherwise, the activities described in Appendix B are typical management activities that occur on the forest with the potential to produce temporary noise, dust and use conflicts when in operation and do not cumulatively affect non-motorized recreation.

Summary of Effects Analysis for Recreation

In the following tables, relative rankings are scored on a scale of greatest (1) to least (6) impact.

[90] 180 miles is approximately 4.1% of the 4,237 miles of the NFTS open to motorized travel in Modified Alternative 2.

Table 3.15-2. Relative Effects Ranking

Indicator	Alt 1	Alt 2	Modified Alt 2	Alt 3	Alt 4	Alt 5
Nonmotorized Recreation Indicators						
Nonmotorized recreation opportunity	1	3	4	6	5	2
Impact of proposed changes to the NFTS on neighboring private and Federal lands (dust, noise, use conflicts)	1	3	4	6	5	2
Average ranking for nonmotorized values	1	3	4	6	5	2
Motorized Recreation Indicators						
Motorized recreation opportunity	6	4	3	1	2	5
Type of motorized access to dispersed recreation	6	4	3	1	2	5
Average ranking for motorized values	6	4	3	1	2	5

Watersheds

When compared to the Proposed Action, direct and indirect effects of Modified Alternative 2 results in:

- A very slight increase (0.05 miles) of routes in riparian reserves.
- An offsetting very slight decrease (0.35 miles) in riparian reserves in high or very highly erosive soils.
- No change in the number of stream crossings with high or very high erosion potential.
- A slight increase in routes with high runoff potential but overall, both the Proposed Action and Modified Alternative 2 are a 99% reduction from the current condition.
- No change in the recovery potential of unauthorized routes.
- No change in the density of route miles in HUC 7 watersheds.
- An increase from 6.45 miles to 13.8 miles of routes proposed in key watersheds with established TMDL; however compared to the current condition, the percent decline from the current condition is essentially equal.

Overall, there is very little difference in direct and indirect effects between the Proposed Action and Modified Alternative 2 when compared to the current condition. The number of routes proposed for addition to the NFTS is the same under both alternatives; Modified Alternative 2 proposes 8.61 fewer miles of routes than the Proposed Action. While some of those routes in Modified Alternative 2 are in more hydrologically sensitive areas, the overall effect of the two alternatives is essentially the same when compared to the current condition. Modified Alternative 2 prohibits motorized cross country travel on 1,599,122 acres. While there is an increase of 60 acres over the Proposed Action, the effect is essentially the same as the Proposed Action at the watershed scale. Of the 5,216 inventoried unauthorized routes totaling 1,252 miles on the Forest, motorized travel on 5,131 routes totaling 1,216 miles will be prohibited by implementation of the Travel Management Rule with Modified Alternative 2, compared to

1,208 miles in the Proposed Action. The small number of routes proposed for addition under either the Proposed Action or Modified Alternative 2 has a minor watershed impact compared to beneficial effect of the prohibition on cross country travel. Adding motorized mixed use to existing Level 3 routes as proposed in Modified Alternative 2 will have no watershed effect compared to the current condition because those routes are surfaced and maintained thus limiting the impact of OHV use.

The cumulative effects of adding present and reasonably foreseeable actions defined in Appendix B to the direct and indirect effects on watershed resources of Modified Alternative 2 are essentially the same as described in the Proposed Action because there is very little difference in the alternatives beyond the site scale. When combined with the prohibition of cross country travel on 1,216 miles of unauthorized routes in Modified Alternative 2, the decommissioning of approximately 180 miles of NFTS routes (less than 5% of the NFTS in Modified Alternative 2) in present and future NEPA decisions would benefit the watersheds where the action occurs, but would likely have no cumulative effect beyond the local watershed because these routes are widely spread across the Forest. When added to the direct and indirect effects of prohibiting cross country motorized travel, an additional 47 miles of road-related watershed improvement on the Yolla Bolly Ranger District would benefit the watersheds where that work occurred.

Summary of Effects Analysis for Watersheds

In the following table, relative rankings are scored on a scale of greatest (1) to least (6) impact.

Table 3.15-3. Relative Effects Ranking for Watershed Resources

Indicators – Watershed Resources	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod. Alt 2	Alt 3	Alt 4	Alt 5
Miles of unauthorized routes in hydrologically sensitive areas	1	3	4	6	5	2
Sum of the erosion potential in cubic yards or tons or route miles with existing erosional features on unauthorized routes and areas proposed for addition to the NFTS in hydrologically sensitive areas on the forest	1	3	4	6	5	2
Numbers of locations where routes divert or have potential to divert streamflow	1	3	4	6	5	2
Sum of route miles with documented erosional features	1	3.5	3.5	6	5	2
Change in road density	1	4	3	6	5	2
Average for Watershed Resources	**1**	**3**	4	6	**5**	**2**

Aquatic Resources

When compared to the Proposed Action, direct and indirect effects of Modified Alternative 2 results in:

- A very slight reduction (0.1 miles) of additions to the NFTS within or adjacent to riparian reserves of fish-bearing streams.

- No change in additions to the NFTS with documented damage from motor vehicles to aquatic resources. No routes are proposed in either the Proposed Action or Modified Alternative 2 that have documented damage from motor vehicles to aquatic resources.
- No change in miles of roads per square mile that potentially affect TES 7th field watersheds.
- A slight reduction of miles within riparian habitat including meadows and stream banks.
- A reduction of six (0.96 mile) routes within riparian reserves of SONCC designated critical habitat.

Overall, aquatic resources under either the Proposed Action or Modified Alternative 2 benefit from the prohibition of cross country travel by implementation of Subpart B of the Travel Management Rule. Modified Alternative 2 reduces impacts to aquatic resources primarily because it adds 8.61 fewer miles of roads to the NFTS than the Proposed Action. There are slight reductions in miles of road in the riparian reserves of fish-bearing streams and meadows, but the change is not significant beyond the site scale. The most significant change with respect to additions to the NFTS is the change from 15 routes in the Proposed Action to 9 routes in Modified Alternative 2 in riparian reserves that are within SONCC coho designated critical habitat. Route miles in SONCC coho critical habitat are reduced from 2.68 to 1.72.

The cumulative effects of adding present and reasonably foreseeable actions defined in Appendix B to the direct and indirect effects on aquatic resources of Modified Alternative 2 are essentially the same as described in Alternative 2.

Endangered Species Act and Sensitive Species Findings

The Biological Evaluation (BE) (Briggs, 2009) for Sensitive aquatic species on the Regional Foresters Sensitive Species list documents a finding of **no effect** for all aquatic invertebrate species. A finding of **no effect** is documented in the Supplemental Biological Assessment (BA) and BE (Brock, 2010) for Central Valley spring-run Chinook and Central Valley steelhead, and a finding of **may affect, not likely to adversely affect** is documented in the BA/BE and supplement (Briggs, 2009; Meese, 2010) for Southern Oregon/Northern California Coast coho salmon. See Chapter 3.03 – Aquatic Resources for additional information on Threatened, Endangered and Sensitive species.

Summary of Effects Analysis for Aquatics

In the following table, relative rankings are scored from greatest (1), to least (6) impact.

Table 3.15-4. Relative Effects Ranking for Aquatic Biota

Indicators – Aquatic Biota	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
Miles of unauthorized routes open for motor vehicle use within or adjacent to aquatics resources – Forest-wide.	1	3.5	3.5	6	5	2
Number of routes open for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources – Forest-wide	1	3.5	3.5	6	5	2
Density of routes open for motor vehicle use potentially affecting aquatic TES - 7th field watershed	1	3.5	3.5	6	5	2

Indicators – Aquatic Biota	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
Miles of routes open for motor vehicle use within riparian habitat including meadows, and stream banks - Forest-wide	1	3	4	6	5	2
Routes open for motor vehicle use within habitats of TES aquatic biota, based on SONCC coho salmon critical habitat	1	3	4	6	5	2
Miles of Routes open for motor vehicle use within habitats of known or historically occupied TES aquatic biota. (SONCC)	1	3	4	6	5	2
Average for aquatic biota	1	3	4	6	5	2

Herpetological Resources

When compared to the Proposed Action, the direct and indirect effects of Modified Alternative 2 results in:

- A decrease in miles of NFTS routes located within occupied or suitable habitat for all species evaluated.
- A decrease in the number of stream crossings for all species evaluated.
- A decrease in the number of acres impacted from routes added to the NFTS within occupied or suitable habitat for all species evaluated.
- No change in added acres open to motor vehicle use below the high water mark or with occupied or suitable habitat.
- A reduction in the number of stream crossings on routes added to the NFTS within occupied or suitable habitat for all species evaluated.

Overall, Modified Alternative 2 benefits herpetological species when compared to the Proposed Action because it has fewer stream crossings and affects less suitable habitat than the Proposed Action. The prohibition of cross country travel on unauthorized routes has by far the most benefit for herpetological species when compared to the effect of adding routes to the NFTS. There is very little difference in the Proposed Action and a Modified Alternative 2 in this respect. Motorized mixed use in Modified Alternative 2 will not affect herpetological species when compared to the current condition because the roads involved are surfaced and maintained and already have traffic on them.

Direct and indirect effects for all species evaluated are reduced in Modified Alternative 2 when compared to the Proposed Action. When present and reasonably foreseeable actions as defined in Appendix B are added to the direct and indirect effects of Modified Alternative 2, the cumulative effect will be slightly less than that described for the Proposed Action, Alternative 2 because Modified Alternative 2 has 8.6 fewer miles of routes added to the NFTS.

Endangered Species Act and Sensitive Species Findings

The Biological Evaluation for Herpetological Resources (Moser, 2009) documents a finding of either **no effect**, or **may impact individuals, but is not likely to lead to a trend in federal listing** for all wildlife species Regional Forester's Sensitive Species List. There are no ESA listed herpetological species found on the Shasta-Trinity National Forest. See Chapter 3.04 – Herpetological Resources for additional information.

Summary of Effect Analysis for Herpetological Resources

In the following table, relative rankings are scored from greatest (1), to least (6) impact.

Table 3.15-5. Relative Effects Ranking for Herpetofauna

Indicators – Herpetofauna	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
1– Miles of all NFTS routes within occupied or suitable habitat.	1	3	4	6	5	2
2 – Miles of added routes within occupied or suitable habitat.	1	3	4	6	5	2
3 – Number of acres impacted from added routes within occupied or suitable habitat.	1	3	4	6	5	2
4 – Acres open to motor vehicle use below the high water mark within occupied or suitable habitat.	1	3.5	3.5	6	5	2
5 – Number of stream crossings (perennial and intermittent) on added routes within occupied or suitable habitat.	1	3	4	6	5	2
6 – Percent of occupied or suitable habitat impacted by added routes.	1	3	4	6	5	2
Average for Herpetofauna	1	3	4	6	5	2

Wildlife

When compared to the Proposed Action, direct and indirect effects of Modified Alternative 2 results in:

- A decrease in of 8.6 miles of unauthorized routes within terrestrial wildlife habitat.
- A decrease or no change in density of added routes, motorized trails, and open routes for habitat effectiveness for all species evaluated except hairy woodpeckers, which showed a slight increase. (See Table 3.05-41)
- A reduction in miles of motor vehicle routes added within habitat for all species evaluated except hairy woodpeckers which showed a slight increase. (See Table 3.05-41)
- A decrease in the number of sensitive sites within ½ mile of added routes for threatened, endangered, and sensitive species. (See Table 3.05-41)
- A decrease in the acres of habitat in the zone of influence for all species evaluated except hairy woodpeckers which showed a slight increase. (See Table 3.05-41)

This modification of Alternative 2 was developed to address new information and respond to concerns raised in public comments on the Draft Environmental Impact Statement. Alternative 2, the Proposed Action described in the DEIS, provides the core of this Alternative. Motorized cross country travel is prohibited on approximately 1,599,122 acres – approximately 60 acres more than the Proposed Action. The number of routes added to the NFTS, acres of designated Open Areas and changes to the existing NFTS remain the same as in Alternative 2.

This modification of Alternative 2 includes dropping routes that would have caused resource conflicts, adding selected routes considered in Alternative 5 and requested by the public and minor changes in route classification to make provisions for mixed use. Open Areas below the high water mark of Shasta Lake and Trinity Lakes remain as described in Alternative 2 with a restriction for street legal vehicles with a 15 mph speed limit. One minor Forest Plan Amendment of the Standards and Guidelines for Recreation in the Shasta-Trinity Land and Resource Management Plan would be required for this Alternative. See page Chapter 2 for a description of this proposed amendment.

Environmental Consequences

Direct/Indirect Effects of the Prohibition of Cross-country Motor Vehicle Travel

Under Modified Alternative 2, the prohibition of motorized cross-country travel affects approximately 1,599,122 acres. The Proposed Action prohibits motorized cross-country travel on approximately 1,599,062 acres. There is no discernable difference between the Proposed Action and Modified Alternative 2 beyond the site scale.

There are no changes in the analysis of the effects of lake bottom use between the original Alternative 2 and Modified Alternative 2.

Table 3.15-6. Modified Alternative 2: Direct/indirect effects of prohibition of cross country travel measurement indicator 1 and 5 for all focal species groups

Indicator		1	5
Species Group	**Species**	**Total Acres of Habitat available to motor vehicle cross-country travel**	**Acres of Habitat within 60 meter Influence Zone (Bald Eagle has 300 meter zone) of Lake Bottom Areas (Shasta and Trinity Lakes) Added as Open Areas -**
Late-successional Forest	**Northern Goshawk**	0	5,219
	Northern Spotted Owl	0	1,307
	Pacific Fisher	0	5,174
	American Marten	0	1,670
Wide-Ranging	**Black Bear**	0	465
Ungulate	**Mule Deer**	0	1,460
	Elk	0	1,165
Riparian	**Bald Eagle**	0	8,275
Cavity-dependent	**Hairy Woodpecker**	0	796
	Pileated Woodpecker	0	2,937

Relative to the Indicator 2, the density of added routes within habitat, the change makes no discernable difference at the Forest scale. The reduction of overall road miles by 15 miles is very small at the larger, Forest scale.

Indicator 3 (see Table 3.15-8), miles of added routes, provides some small differences between the original and modified alternative 2. Miles of added routes drops for each species except the black bear, where the rise is small and within the margin of error (2 miles in the original Alternative 2 and 2.04 miles in the modified).

Indicator 5, the proportion of species habitat affected by added routes, changed in minor ways as shown below.

Table 3.15-7. Modified Alternative 2: Differences between Alternative 2 and Modified Alternative 2 relative to Indicator 5, the proportion of species habitat affected by the added routes

Indicator		5	5	5
Species Group	**Species**	**Alternative 2: Proportion of species habitat affected by added routes**	**Modified Alternative 2: Proportion of species habitat affected by added routes**	**Differences between Alternative 2 and Modified Alternative 2**
Late-successional Forest	**Northern Goshawk**	0.07%	0.06%	-0.01%
	Northern Spotted Owl	0.06%	0.05%	-0.01%
	Pacific Fisher	0.05%	0.03%	-0.02%
	American Marten	0.05%	0.01%	-0.04%
Wide-Ranging	**Black Bear**	0.32%	0.22%	-0.1%
Ungulate	**Mule Deer**	0.36%	0.30%	-0.06%
	Elk	0.53%	0.50%	-0.03%
Riparian	**Bald Eagle**	0.47%	0.42%	-0.05%
Cavity-dependent	**Hairy Woodpecker**	0.15%	0.19%	0.04%
	Pileated Woodpecker	0.05%	0.04%	-0.01%

These differences at the forest scale expressed as a percentage of habitats are minor and within the margin of error for measuring these things.

Indicator 4, the number of threatened, endangered or sensitive sites for the species within ½ mile of added routes was variable, going from 2 to 0 for the goshawk, increasing from 2 to 4 for the NSO, increasing from 0 to 6 for the fisher, increasing from 0 to 3 for the marten and staying the same, 1, for the bald eagle.

Direct/ Indirect Effects of Adding Facilities to the NFTS, including Identifying Seasons of Use and Vehicle Class

Table 3.15-8. Modified Alternative 2: Direct/Indirect effects of adding facilities to measurement indicators 3, 4, and 5 for all focal species groups

Indicators		3	4	5		5
Species Group	**Species**	**Miles of Routes Proposed for Addition to the NFTS Within Habitat**	**# of TES sites within ½ mile of added routes**	**Acres of Habitat Affected by Added Routes (Habitat Influence Zone) (Acres/Square Miles)[1]**		**Percent of Habitat Affected By Added Routes (Habitat Influence Zone)[1]**
Late-successional Forest	**Northern Goshawk**	9.6	0	502	0.78	0.06%
	Northern Spotted Owl	5.5	3	301	0.47	0.05%
	Pacific Fisher	3.7	0	243	0.38	0.03%
	American Marten	0.6	0	40	0.06	0.01%
Wide-ranging	**Black Bear**	5.6	N/A	329	0.51	0.22%
Ungulate	**Mule Deer**	12.7	N/A	660	1.03	0.30%
	Elk	10.9	N/A	511	0.80	0.50%
Riparian	**Bald Eagle**	1.5	1	925	1.45	0.42%
Cavity-dependent	**Hairy Woodpecker**	9.9	N/A	467	0.73	0.19%
	Pileated Woodpecker	2.8	N/A	190	0.30	0.04%

[1] Habitat influence zone is 300 meters for bald eagle, and 60 meters for all other species. The percent is calculated on all habitat found in the Cross-Country Access zone

Table 3.15-9. Comparison of Alternative 2 with Modified Alternative 2 for Indicator 3

Indicators		3	3	3
Species Group	**Species**	**Alt 2: Miles of Routes Proposed for Addition to the NFTS Within Habitat**	**Modified Alt 2: Miles of Routes Proposed for Addition to the NFTS Within Habitat**	**Difference between Alt 2 and Mod Alt 2**
Late-Successional Forest	**Northern Goshawk**	13.3	9.6	-3.8
	Northern Spotted Owl	7.5	5.5	-1.9
	Pacific Fisher	7.2	3.7	-3.5
	American Marten	3.0	0.6	-2.4
Wide-ranging	**Black Bear**	9.6	5.6	-4.0
Ungulate	**Mule Deer**	16.0	12.7	-3.3
	Elk	11.8	10.9	-0.9
Riparian	**Bald Eagle**	2.2	1.5	-0.6
Cavity-dependent	**Hairy Woodpecker**	7.8	9.9	2.1
	Pileated Woodpecker	4.5	2.8	-1.7

[1] Habitat influence zone is 300 meters for bald eagle, and 60 meters for all other species.

Indicator 3, miles of routes proposed for addition to the NFTS within species habitat, has been reduced in modified alternative 2 for all species except the black bear. The very small range of this increase, 0.04 miles or (4/100s of a mile or about 211 feet) is within the level of error of our habitat mapping and measuring systems and not significant for the species. Although reduced overall, keep in mind that 37 routes were dropped from Alternative 2 for reasons mentioned above and 37 routes were added from Alternative 5. Those routes are given site specific analysis under Alternative 5 and do not

need to be separately considered here. These additions to the systems are all very small, each less than 0.01% of the habitat available overall on the Forest, and are within margins of error of measurements on large Forests.

Table 3.15 -10. Comparison of Alternative 2 with Modified Alternative 2 for Indicator 4

Indicators		4	4	4
Species Group	**Species**	**Alt 2: # of TES sites within ½ mile of added route**	**Mod Alt 2: # of TES sites within ½ mile of added routes**	**Difference between Alt 2 and Mod Alt 2**
Late-successional Forest	**Northern Goshawk**	2	0	-2
	Northern Spotted Owl	2	3	1
	Pacific Fisher	0	0	0
	American Marten	0	0	0
Wide-ranging	**Black Bear**	N/A	N/A	N/A
Ungulate	**Mule Deer**	N/A	N/A	N/A
	Elk	N/A	N/A	N/A
Riparian	**Bald Eagle**	1	1	0
Cavity-dependent	**Hairy Woodpecker**	N/A	N/A	N/A
	Pileated Woodpecker	N/A	N/A	N/A

[1] Habitat influence zone is 300 meters for bald eagle, and 60 meters for all other species.

Indicator 4, the number of TES sites within a half mile of added routes changed modestly for most species. Northern goshawk sites reduced from 1 to 0, northern spotted owl sites increased from 2 to 3, pacific fisher and American marten sites remained at 0 and bald eagle sites remained at 1. The increase of northern spotted owl sites from two to three is relatively meaningless on a larger database of over 4000 owl locations on the Forest. In this case, these are historical owl locations that may or may not be occupied at any given time. As seen in the previous discussion, at this point we believe that owls are relatively insensitive to these kinds of intermittent disturbances and continued traffic on these routes is not likely to cause significant changes in the owl's behavior or demographics.

Table 3.15-11. Comparision of Alternative 2 with Modified Alternative 2 for Indicator 5 - Acres

Indicators		5	5	5
Species Group	**Species**	**Alt 2: Acres of Habitat Affected by Added Routes (Habitat Influence Zone)[1]**	**Mod Alt 2: Acres of Habitat Affected by Added Routes (Habitat Influence Zone)[1]**	**Difference between Alt 2 and Mod Alt 2**
Late-successional Forest	**Northern Goshawk**	634	502	-132
	Northern Spotted Owl	387	301	-86
	Pacific Fisher	401	243	-159
	American Marten	154	40	-113
Wide-ranging	**Black Bear**	474	329	-145
Ungulate	**Mule Deer**	791	660	-131
	Elk	545	511	-33
Riparian	**Bald Eagle**	1,027	925	-102
Cavity-dependent	**Hairy Woodpecker**	354	467	113
	Pileated Woodpecker	244	190	-55

[1] Habitat influence zone is 300 meters for bald eagle, and 60 meters for all other species.

Table 3.15-12. Comparison of Alternative 2 with Modified Alternative 2 for Indicator 5 - Percent

Indicators		5	5	5
Species Group	**Species**	**Alt 2: Percent of Habitat Affected By Added Routes (Habitat Influence Zone)[1]**	**Mod Alt 2: Percent of Habitat Affected By Added Routes (Habitat Influence Zone)[1]**	**Percent of Habitat Affected By Added Routes (Habitat Influence Zone)[1]**
Late-Successional Forest	**Northern Goshawk**	0.07%	0.06%	-0.01%
	Northern Spotted Owl	0.06%	0.05%	-0.01%
	Pacific Fisher	0.05%	0.03%	-0.02%
	American Marten	0.05%	0.01%	-0.04%
Wide-ranging	**Black Bear**	0.32%	0.22%	-0.1%
Ungulate	**Mule Deer**	0.36%	0.30%	-0.06%
	Elk	0.53%	0.50%	-0.03%
Riparian	**Bald Eagle**	0.47%	0.42%	-0.05%
Cavity-dependent	**Hairy Woodpecker**	0.15%	0.19%	0.04%
	Pileated Woodpecker	0.05%	0.04%	-0.01%

[1] Habitat influence zone is 300 meters for bald eagle, and 60 meters for all other species.

Indicator 5 measures the amount and proportion of species habitat affected by the added routes. Although the absolute difference between the alternatives can be significant, relative to the larger landscape of habitat availability, these difference are small. All but one (the bald eagle) of the percentages of habitat affected by added routes was below 1.0%. Relative to the larger landscape, these figures are probably below the limits of the database to accurately measure and evaluate the distribution and quantity of habitat for any given species. None of the changes in percentage of habitat affected are greater than -0.1%.

Table 3.15-13. Modified Alternative 2: Totals NFTS with Modified Alt 2 proposed routes, measurement indicators 2, 3, and 5

Indicators		2	3	4	5		5
Species Group	**Species**	**Density of Routes Within Habitat[1]**	**Combined Miles of NFTS and Added Routes within Habitat on NF**	**# of TES sites within ½ mile of all routes**	**Acres of Habitat Affected by Combined Routes (Habitat Influence Zone) (Square Miles)[1]**		**Percent of Habitat Affected By Route (Habitat Influence Zone)[1]**
Late-Successional Forest	**Northern Goshawk**	2.29	3,217	88	149,168	233	16.60% Low
	Northern Spotted Owl	2.84	2,659	4828	118,580	185	19.80% Low
	Pacific Fisher	2.23	2,731	224	131,856	206	16.85% Low
	American Marten	2.29	1,151	137	55,801	87	17.34% Low
Wide-ranging	**Black Bear**	3.22	751	N/A	32,848	51	21.97% Low
Ungulate	**Mule Deer**	3.59	1,234	N/A	54,391	85	24.75% Low
	Elk	3.87	616	N/A	26,961	42	26.46% Low
Riparian	**Bald Eagle**	2.96	1,010	54	149,975	234	68.75% High
Cavity-dependent	**Hairy Woodpecker**	3.85	1,440	N/A	59,867	94	24.99% Low
	Pileated Woodpecker	2.23	1,804	N/A	84,459	132	16.31% Low

[1] Habitat influence zone is 300 meters for bald eagle, and 60 meters for all other species.

Direct/ Indirect Effects of Changes to the Existing NFTS

There would be no changes to the NFTS under this alternative because the maintenance level 3 routes selected for motorized mixed use already have traffic on them, and the intermittent use by OHVs would not significantly change effects.

Cumulative Effects

Reasonably foreseeable actions are described in Appendix B of the FEIS. When added to the direct and indirect effects of Modified Alternative 2 these actions will result in approximately 180 fewer miles – about a 5% reduction - in the NFTS. Otherwise, cumulative are the same as described in Alternative 2. The reduction in mileage in the NFTS from reasonably foreseeable actions in Appendix B would generally benefit wildlife habitat, individual animals and populations at the site scale. It is unlikely the effect of these future actions would be discernable at the landscape or forest scale with respect to wildlife populations. Reasonably foreseeable future actions will require a Biological Evaluation for sensitive species, and compliance with the Endangered Species Act (ESA) for listed species. Therefore, future actions are not likely to cause a trend toward listing for sensitive species or jeopardize populations of species listed under the ESA.

Endangered Species Act and Sensitive Species Findings

The Biological Evaluation for Wildlife (Moser, 2009) documents a finding of either **no effect**, or **may impact individuals, but is not likely to lead to a trend in federal listing** for all wildlife species on the 2007 Regional Forester's Sensitive Species List. The Biological Assessment (Wolcott, 2010) documents a finding of **may affect, not likely to adversely affect** for the northern spotted owl, and **no effect on principle component elements** of designated critical habitat. Modified Alternative 2 has no routes that affect critical habitat. See Chapter 3.05 – Wildlife for additional information on Threatened, Endangered and Sensitive Species.

Summary of Effect Analysis for Wildlife Resources

Overall, differences between the Proposed Action and modified Alternative 2 resulting from additions and changes to the NFTS are relatively minor when compared to the prohibition of motor vehicle cross country travel on approximately 1,599,122 acres, which includes 1,216 miles of unauthorized routes. Modified Alternative 2 benefits wildlife when compared to the Proposed Action primarily because it avoids critical habitat for northern spotted owls, and adds 8.6 fewer miles to the NFTS than the Proposed Action.

In the following table, relative rankings are scored from greatest (1), to least (6) impact.

Table 3.15-14. Relative Effects Ranking for Terrestrial Wildlife

Indicators: Terrestrial Wildlife	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod. Alt 2	Alt 3	Alt 4	Alt 5
Density of motor vehicle routes at the forest level	1	3	4	6	5	2
Acres open to motor vehicle use and miles of routes added to the NFTS within terrestrial wildlife habitat	1	3	4	6	5	2
Miles of motor vehicle routes at forest-wide scale and within the habitat for each species group	1	3	4	6	5	2
Number of sensitive sites for TES species within ½ mile of an added route or area	1	4	5	6	3	2
The proportion of a species (or species group's) habitat that is affected by motor vehicle routes	1	3	4	6	5	2
Average for terrestrial wildlife	1	3	4	6	5	2

Cultural Resources

When compared to the Proposed Action, Modified Alternative 2 results in:

- A very slight increase in the acres prohibiting cross-country motor vehicle travel. This provides a minor additional benefit in the overall greatly increased protection of cultural resources resulting from the prohibition of cross-country travel proposed in all action alternatives. Elimination of cross-country travel greatly reduces the risk to cultural resources located off of designated roads and trails across the Shasta-Trinity National Forest.
- Seven fewer routes proposed in Modified Alternative 2 that would potentially affect cultural resources; therefore the potential for diminished integrity of cultural resources is reduced.
- Sixteen fewer routes proposed in Modified Alternative 2 that would require cultural resources protection measures applied along the routes.
- Fewer at-risk historic properties affected per acre than the Proposed Action. Modified Alternative 2 has a slightly lower site density when considering the area of surveyed routes.
- No routes proposed in the vicinity of LRMP Prescription XI cultural resources.

Modified Alternative 2 provides a benefit over the Proposed Action due to the slight reduction in cultural resource sites within the area of potential effect established for proposed routes, and the elimination of the proposed routes in the LRMP Prescription XI management area. In particular, the potential adverse effects and irreversible commitment of resources predicted for one Prescription XI cultural resource site would be avoided in Modified Alternative 2.

Since all present and future planning projects with potential to impact cultural resources, including future NFTS additions will be subject to National Historic Preservation Act section 106 compliance, the potential effects to Historic Properties would be identified and mitigated. No cumulative effects are expected, nor will the integrity of cultural resources be diminished as a result of present and reasonably foreseeable future projects as described in appendix B

Summary of Effect Analysis for Cultural Resources

In the following table, relative rankings are scored from greatest (1), to least (6) impact.

Table 3.15-15. Relative Effects Ranking for Cultural Resources

Indicators – Cultural Resources	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
Degree to which the integrity of historic property values are diminished	1	3	4	6	5	2
Number of Historic Properties within unauthorized routes at risk from ongoing use	1	3	4	6	5	2
Average number of Historic Properties protected per acre	1	3	4	6	5	2
Average for cultural resources	1	3	4	6	5	2

Botanical Resources

When compared to the Proposed Action, the direct and indirect effects of Modified Alternative 2 result in:

- A very slight increase in the acres prohibiting cross-country motor vehicle travel. This provides a minor additional benefit in the overall greatly increased protection of TES plants realized as a result of the prohibition of cross-country travel proposed in all action alternatives. Elimination of cross-country travel greatly reduces the risk to TES plants located off of designated roads and trails across the Shasta-Trinity National Forest.
- The addition of three proposed routes totaling 3.04 miles proposed within 100 feet of species identified as sensitive by the Forest Service. These additions add three additional sensitive species occurrences within 100 feet of the proposed routes, resulting in an additional 7.93 acres of TES species habitat affected. There is no change in the determination in the Biological Evaluation for these routes.

In general, the greater the number of motor vehicle routes (and miles) proposed, the higher the risk and severity of negative impacts to rare species and their associated habitats. Modified Alternative 2 proposes the same number of routes but fewer miles than the Proposed Action, however the particular routes proposed in Modified Alternative 2 result in a slightly higher risk to rare species and habitats than the Proposed Action due to the presence of more known sites and higher number of acres of rare plant species within 100 feet of proposed routes. Additionally, there is an increase of the number of routes and mileage of routes with known rare plant sites within 100 feet of Modified Alternative 2 compared to the Proposed Action. The additional proposed routes in the vicinity of TES plant species are routes requested by the public (RM720, TC1489, and U29N73G) that primarily provide loop rides or access for dispersed recreation opportunities. If selected for addition to the NFTS, these routes would be monitored and mitigations such as barriers or treatment of noxious weeds will be implemented as necessary. Monitoring and mitigation will provide protection for TES plants to ensure the required protections and viability for

these plants as discussed in the Botanical Resources Biological Evaluation and Biological Assessment (BE / BA) found in the project record.

Species determinations as required by the Endangered Species Act are the same as those for alternatives 2 and 5 as described in Table 24 in the Botanical Resources BA / BE.

Cumulative effects of present and reasonably foreseeable actions described in Appendix B, when added to the direct and indirect effects of Modified Alternative 2 are essentially the same as described for the Proposed Action. Modified Alternative 2 has a slightly higher risk of impacting TES plant species; however plants are surveyed and managed for during present and future project analysis. The implementation of planning and design features greatly reduces the impacts from current and foreseeable projects.

Endangered Species Act and Sensitive Species Findings

The Biological Evaluation (BE) (Miller, 2009) for Sensitive plants, lichens and fungi species on the Regional Forester's Sensitive Species list documents a finding of either **no effect** or **may affect individuals but is not likely to cause a trend toward federal listing** for all species. There are no known Threatened or Endangered plants, lichens or fungi on the Shasta-Trinity National Forest, however the Forest is within the range of two ESA listed species -*Arabis macdonaldiana* (McDonald's rock-cress) and *Orcuttia tenuis* (Slender Orcutt grass). The BA / BE (Miller, 2009) determined that proposed routes would not affect these species or their designated critical habitat. See Chapter 3.07 – Botanical Resources for additional information Threatened and Endangered Species.

Summary of Effect Analysis for Botanical Resources

In the following table, relative rankings are scored from greatest (1), to least (6) impact.

Table 3.15-16. Relative Effects Ranking for Botanical Resources

Indicators – Botanical Resources	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
Miles of unauthorized or proposed system trails open for public motorized vehicle use within or adjacent to Sensitive rare species sites.	1	4	3	6	5	2
Number of unauthorized or proposed routes open for public motorized vehicle use within or adjacent to Sensitive rare species sites.	1	4	3	6	5	2
Acres of rare plant sites or suitable habitat within 100 feet of unauthorized or proposed system routes.	1	4	3	6	5	2
Total number of rare plant sites within 100 feet of unauthorized or proposed routes.	1	4	3	6	5	2
Average for botanical resources	1	4	3	6	5	2

Non-native Invasive Species (NNIS)

When compared to the Proposed Action, the direct and indirect effects of Modified Alternative 2 result in:

- A very slight increase in the acres prohibiting cross-country motor vehicle travel. This provides a minor additional benefit in the overall greatly reduced risk of spread of non-native invasive species spread as a result of the prohibition of cross-country travel. Elimination of cross-country travel greatly reduces the risk of spread to uninfested areas located off of designated roads and trails across the Shasta-Trinity National Forest.
- Three fewer routes (resulting in 3.6 fewer miles) proposed within or adjacent to non-native invasive species sites.
- A reduction of 18.69 acres of non-native invasive species sites within 100 feet of a proposed route.
- Three fewer non-native invasive species occurrences within 100 feet of a proposed route.
- The routes proposed in Modified Alternative 2 eliminated some Proposed Action routes that provide significant vectors for non-native invasive species. There is less risk of noxious weed spread in Modified Alternative 2 as compared to the Proposed Action due to a reduction in infested mileage, number of infested routes, acres of noxious weed sites within 100 feet of a proposed route, and a reduction of the total number of occurrences within 100 feet of a proposed route. Overall, Modified Alternative 2 poses a moderate risk in weed spread, primarily because of the addition of new routes. This overall risk is reduced by the prohibition of cross-country travel and the moderate amount of known weed sites.

Cumulative effects of present and reasonably foreseeable actions described in Appendix B when added to the direct and indirect effects of Modified Alternative 2 would have less effect than the Proposed Action because Modified Alternative 2 eliminates several vectors for NNIS. Since NNIS are surveyed, managed, and monitored, the present and reasonably foreseeable actions in Appendix B should not significantly contribute to the spread of NNIS.

Summary of Effect Analysis for Non-native Invasive Species

In the following table, relative rankings are scored from greatest (1), to least (6) impact.

Table 3.15-17. Relative Effects Ranking for Noxious Weeds

Indicators – Noxious Weeds	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
Miles of proposed system routes open for public motor vehicle use within or adjacent to noxious weed sites	1	3	4	6	5	2
Number of proposed routes open for public motor vehicle use within or adjacent to noxious weed sites	1	3	4	6	5	2
Acres of noxious weed infestations within 100 feet of proposed routes	1	3	4	6	5	2
Total number of noxious weed sites within 100 feet of unauthorized or proposed routes	1	3	4	6	5	2
Overall risk of noxious weed spread	1	3	4	6	5	2

Visual Resources

When compared to the Proposed Action, the direct and indirect effects of Modified Alternative 2 result in:

- A very slight increase in the acres prohibiting cross-country motor vehicle travel. There would be no discernable change in the effects predicted from the prohibition of cross country motor vehicle travel from the Proposed Action. Overall, visual evidence of cross-country travel would be reduced in all action alternatives over the long-term, allowing the viewshed scenes where impacts occurred to revegetate and take on characteristics associated with higher scenic integrity.
- Overall, one less route proposed in the foreground of key viewsheds. Fewer routes are proposed in the retention visual quality objective (VQO) areas and more routes proposed in the partial retention VQO areas.

The mix of routes varies from the Proposed Action in that there are fewer routes in the retention VQO and more in the partial retention VQO. The adopted visual quality objectives will be met under both alternatives. No key viewsheds are adversely affected by the additions under either alternative.

Since visual quality standards are used in project planning, the effect of present and reasonably foreseeable actions in Appendix B when combined with the direct and indirect effects of Modified Alternative 2 would not result in a cumulative impact on visual resources.

Summary of Effect Analysis for Visual Resources

In the following table, relative rankings are scored from greatest (1), to least (6) impact.

Table 3.15-18. Relative Effects Ranking for Visual Resources

Indicators – Visual Resources	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
Disturbance/Integrity: Compliance with the retention and partial retention VQOs	1	5	5	6	5	2
Key viewsheds affected by proposed NFTS	1	3	4	6	5	2
Average for visual resource	**1**	**3**	**4**	**6**	**5**	**2**

Inventoried Roadless Areas

When compared to the Proposed Action, direct and indirect effects of Modified Alternative 2 result in:

- A very slight increase in the acres prohibiting cross-country motor vehicle travel. Modified Alternative 2 results in no discernable change in the overall reduced risk to resources and wilderness characteristics as a result of the prohibition of cross-country travel. Elimination of unmanaged cross-country motor vehicle travel will have positive effects under all action alternatives.
- Elimination of all proposed additions in agency-inventoried roadless areas.

- Fewer miles of routes added within 0.5 miles of IRAs and CIRAs.

The proposed Action increases road densities in IRAs and CIRAs slightly, by 0.015 and an average of 0.09 mile/square mile, respectively. Modified Alternative 2 eliminates the increase in road density in IRAs altogether, and reduces it in CIRAs to an average of less than 0.07 mile/square mile. Overall, the elimination of added routes in IRAs in Modified Alternative 2 provides for a slightly higher benefit in protecting resources and wilderness characteristics than the Proposed Action. The most notable net positive benefit would be to non-motorized recreation as there would be a reduction in potential noise, dust and use conflicts with motorized recreation.

Cumulative effects on IRAs from present and reasonably foreseeable actions in Appendix B are the same as disclosed in Chapter 3.10, Inventoried Roadless Areas.

Summary of Effect Analysis for Inventoried Roadless Areas

The overall effects of the alternatives to IRAs and CIRAs are measured by miles of routes added for public motorized use, changes in route density, number of perennial stream crossings, and miles added within 0.5 miles of CIRAs and IRAs.

In the following table, relative rankings are scored from greatest (1), to least (6) impact.

Table 3.15-19. Relative Effects Ranking for Inventoried Roadless Areas

Alternative 1	Alternative 2	Mod Alt 2	Alternative 3	Alternative 4	Alternative 5
1	3	4	6	5	2

Socio-Economics

When compared to the Proposed Action, Modified Alternative 2 results in:

- A very slight increase in the acres prohibiting cross-country motor vehicle travel. There is no discernable change in the social or economic values associated with the prohibition of cross-country motor vehicle travel between the Proposed Action and Modified Alternative 2.
- Fewer miles of motorized routes proposed may result in a slight increase in non-motorized recreation.
- Minor benefits for recreationists seeking motorized trail opportunities when compared to the Proposed Action, resulting in increased social value among this group.
- Fewer new roads designated for all vehicle classes could affect social values for this user group, however the net increase in miles open to all vehicle classes (due to the proposal to allow motorized mixed-use on specific existing maintenance level 3 roads) would expand riding opportunities for OHVs and therefore likely improve motorized recreation experiences and access as compared to the Proposed Action.

In general, the differences between the Proposed Action and Modified Alternative 2 do not represent a major deviation from the original Proposed Action in terms of socioeconomic effects. Although there are some clear differences between the two alternatives that could result in a change in the effects for certain users, the changes would occur at a small scale. Effects at this scale may not be estimated at the county or forest-wide level. On average the effects from Modified Alternative 2 would remain within the bounds of those described under the original Proposed Action with no clearly measurable differences.

Cumulative effects from present and reasonably foreseeable actions in Appendix B added to direct and indirect effects of Modified Alternative 2 on social and economic resources are the same as disclosed in Chapter 3.11 – Socio-Economic Resources.

Summary of Effect Analysis for Socio Economic Resources

Ranking the socio-economic effects among alternatives is impossible. The social effects are very subjective because they relate to values, and we could not assume one form of recreation such as motorized recreation has more or less value than another form such as non-motorized recreation. The quantitative indicators (jobs and income) cannot be ranked because of the lack of data on how recreation use would change across the alternatives.

Transportation

When compared to the Proposed Action, the direct and indirect effects of Modified Alternative 2 result in:

- No discernable change to the effects on public safety as described in the Proposed Action. The prohibition of cross country motor vehicle travel would reduce the risk of single vehicle accidents overall due to restricting vehicle use to system roads, motorized use trails, and areas designated for cross-country travel. NFTS roads and trails have safety features in their design and maintenance standards intended to improve public safety, whereas there are no such standards for the unmanaged cross-country motor vehicle travel areas that currently exist. Emergency response time would be reduced due to the vehicle use restricted to designated roads and trails.
- Fewer miles proposed as new roads open to all vehicle classes. This could result in a slight increase in the risk of multiple vehicle accidents due to the decrease in the number of miles of roads available for use, however there is no discernable change in the effects to public safety as a result of the miles proposed.
- More miles added as motorized use trails, resulting in a slight decrease in the risk of multiple vehicle accidents due to the increase in the number of miles of trails.
- No discernable difference in the costs of adding routes to the NFTS or in the annual maintenance costs associated with the proposed route additions.

- Addition of 21.31 miles of motorized mixed-use on 16 segments of existing NFTS maintenance level 3 routes.
- Costs for implementing motorized mixed use designations on these 16 segments are estimated at approximately $3,000 per segment, or $48,000 total. This would cover work including: brushing for additional sight distance, warning and other traffic control signing, route identification signing, and implementing traffic management strategies on adjacent routes.

Overall, the primary differences between the Proposed Action and Modified Alternative 2 are related to the differing vehicle class assignments for the proposed routes as noted above, and the addition of motorized mixed-use on existing NFTS maintenance level 3 roads.

The public safety risk associated with the motorized mixed-use roads proposed in Modified Alternative 2 is considered to be moderate. These roads are proposed after field studies by a qualified engineer to determine public safety risks and potential mitigations, as described in Appendix C. The roads selected for Modified Alternative 2 are a subset of the roads proposed and studied under alternatives 4 and 5. They facilitate extended rides and loops to enhance motorized recreation experiences and access while providing for public safety. They intersect approximately 35 maintenance level 2 roads and extend OHV riding opportunities a minimum of 128 miles.

Cumulative effects from present and reasonably foreseeable actions in Appendix B added to direct and indirect effects of Modified Alternative 2 on transportation management are the same as disclosed in Chapter 3.12 – Transportation Management.

Summary of Effect Analysis for Transportation Management

In the following table, relative rankings are scored from greatest (1), to least (6) impact

Table 3.15-20. Relative Effects Ranking for Transportation Management

Indicators – Transportation Management	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
Unauthorized routes added to the NFTS as roads	1	3	4	6	5	2
Unauthorized routes added to the NFTS as trails	1	5	4	6	3	2
Public Safety measured by miles of mixed use on ML 2 Roads	1	3	4	6	5	2
Public Safety measured by miles of mixed use on ML 3-5 Roads	1	5.5	4	5.5	2.5	2.5
Average Rating for public safety	1	4	4	6	4	2
Transportation System Affordability - Annual Maintenance	5.5	2	4	5.5	3	1
Transportation System Affordability - Implementation Costs	**6**	**2**	**3**	**5**	**4**	**1**
Average Rating for Affordability	**6**	**2**	**4**	**5**	**3**	**1**

Geology

When compared to the Proposed Action, Modified Alternative 2 results in:

- A very slight increase in the acres prohibiting cross-country motor vehicle travel. This provides a minor additional benefit in the overall net positive benefit to geological resources in all action alternatives. Motorized access to sensitive areas such as geological special interest areas, mass wasting areas, caves and lava tubes, and paleontological resources would be restricted.
- No change in effects as a result of added roads and trails in sensitive areas such as geological areas such as geological special interest areas, mass wasting areas, caves and lava tubes, and paleontological resources. Neither alternative proposes routes in these sensitive areas.
- Four routes proposed on or near serpentine bedrock where field testing has confirmed the presence of NOA. Field testing found NOA in the Beaughton and Dubakella soil families. These routes will be capped with rock prior to inclusion in the MVUM.
- No change in effects as a result of the proposed motorized mixed-use on existing NFTS maintenance level 3 routes. Changing vehicle types on existing roads will have no effect on geological resources. However, the existing roads proposed for motorized mixed-use in Modified Alternative 2 include 1.12 miles crossing serpentine soils. These routes will be tested for NOA before adding them to the MVUM. Any inclusions of NOA will be capped to protect public health.

Overall, there are no differences between the alternatives that result in a discernable change in environmental effects. The potential for routes located in serpentine soils is increased in Modified Alternative 2; however inclusions will be capped with crushed rock prior to designation on the motor vehicle use map.

Due to the lack of direct or indirect effects in Modified Alternative 2, and project planning standards that include protection for Special Interest Areas, soils, inner gorges, lava tubes, caves and paleontological resources, no cumulative effects as related to the geology resource have been identified from implementation of present and reasonably foreseeable actions in Appendix B.

Summary of Effect Analysis for Geology

In the following table, relative rankings are scored from greatest (1), to least (6) impact.

Table 3.15-21. Relative Effects Ranking for Geology

Indicators - Geology	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
Serpentinite Rock Formations	1	4	3	6	5	2

Air Quality

When compared to the Proposed Action, Modified Alternative 2 results in:

- A very slight increase in the acres prohibiting cross-country motor vehicle travel. This provides a minor additional reduction in the potential release and inhalation of naturally occurring asbestos as vehicle travel on serpentine soils will be greatly reduced. In addition, there would be change in effects to visibility in the Yolla Bolly-Middle Eel Wilderness Class I airshed.
- Four routes proposed on or near serpentine bedrock where field testing has confirmed the presence of NOA. Field testing found NOA in the Beaughton and Dubakella soil families. These routes will be capped with rock prior to inclusion in the MVUM.
- Elimination of the 0.3 to miles of added routes within one mile of Yolla Bolly-Middle Eel Wilderness Class I airshed. This will have no discernable change in effects on visibility.
- No change in effects with respect to air quality as a result of changing vehicle class since these are existing maintenance level 3 routes that are already in use as part of the existing NFTS.

Overall, there is no discernible difference in the direct and indirect effect of Modified Alternative 2 and the Proposed Action with respect to air quality. Routes with inclusions of NOA will be capped, so there will be no increase in public exposure or degradation of air quality from NOA.

Present and reasonably foreseeable actions described in Appendix B, when added to the direct and indirect effects of Modified Alternative 2 are not expected to cumulatively impact air quality because project planning standards are designed to protect and maintain air quality.

Summary of Effect Analysis for Air Quality

In the following table, relative rankings are scored from greatest (1), to least (6) impact.

Table 3.15-22. Relative Effects Ranking for Air Quality

Indicators – Air Quality	Rankings of Alternatives for Each Indicator					
	Alt 1	Alt 2	Mod Alt 2	Alt 3	Alt 4	Alt 5
Naturally Occurring Asbestos	1	5	4	6	3	2
Class I Wilderness Area	1	3	4	6	5	2
Average for air quality	1	4	4	6	4	2

Compliance with the Forest Plan and Other Direction

Modified Alternative 2 complies with Forest Plan standards and guidelines and other State or Federal regulatory direction listed under the Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction section for each resource area.

Unavoidable adverse impacts

There is no change in unavoidable adverse impacts from those already described in Chapter 3.00 with the exception of impacts to cultural resources. Modified Alternative 2 eliminates SE 476 and SE477, two routes that would have unavoidable adverse impacts on cultural resources. These routes are not included in Modified Alternative 2, thus avoiding this impact. See Chapter 3.00 – Introduction

Irretrievable and irreversible commitments of resources

There is no change in irretrievable and irreversible commitments of resources from those already described in Chapter 3.00 with the exception of irreversible commitments associated with routes SE476 and SE477. Those routes are not included in Modified Alternative 2, avoiding this commitment of resources. See Chapter 3.00 – Introduction.

Chapter 4: Preparers, Consultation, Distribution, Glossary, References and Index

List of Preparers

Abel Jasso

Position: Geologist, STNF

Education: Master of Science and Bachelor of Arts, California State University-Fullerton

Experience: Currently the forest geologist for the STNF, he has 30 years with the Forest Service and has worked in both domestic and international assignments in the Caribbean and Central America. Prior to the Forest Service, he worked as Professor of Geology in the Dominican Republic.

Janet S Moser

Position: Wildlife Biologist, TEAMS

Education: Bachelor of Science, Wildlife Resources, University of Idaho

Experience: Served 6 years in the U.S. Air Force, and has worked for the Forest Service since 1989 as a wildlife biologist for the Mendocino and Klamath National Forests in Region 5, the Arapaho/Roosevelt National Forest in Region 2, and the Malheur and the Siuslaw National Forests in Region 6. Janet has also worked as a habitat biologist for Alaska Department of Fish and Game, and as a fire crew leader for the National Park Service. Janet has worked with TEAMS since 2007.

Joshua B Wilson

Position: Economist, TEAMS

Education: B.S., Managerial Economics, University of California-Davis; M.S., Agricultural Economics, Colorado State University; [currently working toward a Ph.D. in Forestry Economics at Colorado State University]

Experience: Contract economist for TEAMS Enterprise since October 2007. He began working for the Forest Service as an economist for Ecosystems Management Coordination (EMC) as a student in March of 2006.

Patricia Nasta

Position: ID Team Leader, TEAMS

Education: B.S., Forest Technology, State University of New York College of Environmental Science and Forestry; B.S., Forest Management, Oregon State University

Experience: Currently environmental coordinator with the TEAMS Enterprise unit (since 2008). Pat has 25 years experience with the Forest Service working as a silviculture forester, recreation planner, public affairs specialist, and environmental coordinator. She has served on interdisciplinary teams for 22 years with varying roles as a resource specialist, writer-editor, and team leader. She is a member of the US Forest Service's NEPA teaching cadre with a focus on public involvement.

Bill Overland

Position: GIS Specialist, TEAMS

Education: B.S.; Forestry and Natural Resources, California Polytechnic State University-San Luis Obispo

Experience: One of the original members hired to work with TEAMS, he started as a resource crew leader for TEAMS in 2000. He served as a hydrologist from 2002 to 2007 and currently serves as a GIS specialist and GPS Service's coordinator (since 2007). Prior to TEAMS, Bill served in a variety of timber sale preparation positions on the Tahoe National Forest (1993 to 2000).

Kimberly C Briggs

Position: Fisheries Biologist, Willamette National Forest

Education: B.S., Aquatic and Fisheries Sciences, University of Washington-Seattle

Experience: Currently the district fisheries biologist on the Sweet Home Ranger District of the Willamette National Forest, she has 5 years of experience with the Forest Service.

Cavan Maloney

Position: Hydrologist, TEAMS

Education: B.S., Natural Resources-Hydrology, University of Nevada-Reno

Experience: Hydrologist since 1993. Prior to working with TEAMS, he worked as a hydrologist for the Boise National Forest for 8 years. Cavan has worked on a variety of NEPA projects, including forest management, fuels reduction thinning, post wildfire salvage, coal bed methane well production and pipeline construction, and watershed analysis. Prior to coming to TEAMS (2001), he also worked on burned area emergency rehabilitation team, road decommissioning and stream restoration, and on international post-disaster assessment teams.

Terry R Miller

Position: Botanist, TEAMS

Education: B.A., Plant Biology, Southern Illinois University, Carbondale; M.S., Forest Resources, University of Idaho, Moscow

Experience: Currently a botanist for the TEAMS enterprise unit, he has seven years of experience with the Forest Service.

Mike North

Position: Transportation Planner, TEAMS

Education: B.S., Timber Management, University of California-Berkeley

Experience: Worked in timber sale planning, preparation, and administration since 1980. He has served as logging systems specialist on dozens of project interdisciplinary teams for salvage, green, forest health, and hazardous fuels reduction projects. He is a qualified Forest Service representative, and has served as project manager for layout, cruise, and contract package preparation projects. Mike developed the economic analysis tool used in Forest Service Region 10 for timber sale planning. He has worked with TEAMS since 2002.

Matthew Boisseau

Position: Landscape Architect and Recreation Specialist, TEAMS

Education: Masters of Landscape Architecture, Texas Tech University, Lubbock; B.S., Recreation, Norwich University, Northfield, Vermont

Experience: Landscape architect for the City of San Jose, California; worked for the Lincoln National Forest, New Mexico, and the Tongass National Forest, Alaska. Matt has experience as an accessibility coordinator, a project lead on outdoor recreation site, facility improvement and enhancements projects, and as an interdisciplinary team specialist. Matt has been working for TEAMS since 2008.

Christopher Bielecki

Position: Supervisory Civil Engineer, Lassen National Forest

Education: B.S., Forestry, Humboldt State University; M.S., Forest Engineering, Oregon State University

Experience: He has worked for the Forest Service for 10 years on three national forests and one research station in Regions 3, 5, and 8. Currently serves as the transportation program manager for Lassen National Forest. His experience includes transportation engineering, logging systems, trail construction, and forestry legislation.

Shannon Smith

Position: Archaeologist, Mountain Heritage Associates

Education: B.A., Anthropology and Geology, University of Colorado; M.A., Anthropology, Colorado State University

Experience: 12 years with Federal government in archaeology and cultural resources management, including 8 years with the Forest Service. His experience in cultural resources includes work in 9 states and on more than 20 national forests and parks.

Eric Moser

Position: Hydrologist, TEAMS

Education: B.S., Geology, California State University-Chico; M.S., Physical Sciences, California State University-Chico

Experience: Eric worked in private industry for 4 years as a geologist and a geo-technician. He has worked since 1987 with the Federal government as a hydrologist with the U.S. Fish and Wildlife Service, the National Park Service, and the Forest Service including TEAMS (since 2002).

Joyce Thompson

Position: Travel Management Coordinator, STNF

Education: B.S., Forest Management, Oregon State University; M.S., Geography, Oregon State University

Experience: Joyce has 23 years experience with the Forest Service in project and forest planning.

Kelly Wolcott

Position: Wildlife Biologist, STNF

Education: B.S., Biology, Evergreen State College; M.S. Forest Ecology and Wildlife, University of Washington

Experience: Kelly has worked for the past 30 years as a biologist for the U.S. Fish and Wildlife Service, the U.S. Forest Service, the U.S. Park Service, the Costa Rican National Park Service and for environmental education organizations and consulting firms. He has also taught at the National Conservation Training Center.

Winfield Henn

Position: Heritage Program Manager, STNF

Education: B.A., Anthropology, California State University, San Francisco (1967); MS, Anthropology, University of Oregon (1973); PhD, Anthropology, University of Oregon (1977)

Experience: Heritage Program Manager, US Forest Service, Shasta-Trinity National Forest, 1977 to present.

Mike Hupp

Position: NEPA Specialist and Travel Management Coordinator

Education: B.S., University of Missouri (1974)

Experience: Mike is a past employee of the Forest Service who now works as an environmental consultant and NEPA specialist on selected projects. During his 33 years with the Forest Service he worked as a district ranger on the Shasta-Trinity National Forest and as a forest planning staff officer, environmental coordinator, and forest planner on the Umpqua National Forest. He also worked in various positions on ranger districts on the Umpqua, Olympic, and Wallowa-Whitman National Forests that included developing proposed actions for projects and the associated NEPA documents.

Consultation

Federal Agencies

USDI Fish and Wildlife Service
USDI National Marine Fisheries Service
USDI National Park Service, Whiskeytown NRA
USDI Bureau of Land Management, Redding Field Office
Klamath National Forest
Six Rivers National Forest
Lassen National Forest
Modoc National Forest

State Agencies

State Historic Preservation Office

County Agencies

Shasta County Board of Supervisors
Trinity County Board of Supervisors
Siskiyou County Board of Supervisors
Siskiyou County Natural Resources Department

Distribution of the Final EIS

This FEIS has been distributed to those individuals and organizations that requested a copy of the document. In addition, copies have been sent to the following Federal, State, and local agencies; and federally recognized tribes.

Federal Agencies

Advisory Council on Historic Preservation
BIA Northern California Agency
BLM Redding Field Office
Bureau of Indian Affairs
Environmental Protection Agency, Region 9
Federal Aviation Administration, Western-Pacific Region
Federal Highway Administration
USFWS, Arcata FWO
USFWS, Northern Central Valley FWO
USFWS, California/Nevada FHC
USFWS-Klamath River NWR
USFWS, Northern Central Valley FWO
USFWS, Yreka FWO
Klamath National Forest
Lassen National Forest
Lassen Volcanic NP
Mendocino National Forest
Modoc National Forest
National Marine Fisheries Services, Habitat Conservationists Division, Southwest Region
National Oceanic and Atmospheric Administration
Natural Resources Conservation Service
Six Rivers National Forest
US Army Corp of Engineers, South Pacific Division
US Bureau of Reclamation
US Department of the Interior, Office of Environmental Policy and Compliance
US Geologic Survey
USDA Animal and Plant Health Inspection Service (APHIS)
USDA National Agricultural Library

State and Local Agencies

California Department of Fish and Game
California Department of Forestry
California Department of Transportation, District 02
California Department of Forestry & Fire
California Highway Patrol
California Regional Water Quality
California Waterfowl Association
California Welcome Center
California Geologic Survey
Humboldt State University Center
Mountain Valley Unified School District
North Coast Regional Water Quality Control Board
Shasta College S, I, and NR
Shasta County Board of Supervisors
Shasta County Resource Management Department
Shasta County Roads Department
Shasta County Sheriff Department
Siskiyou County Board of Supervisors
Siskiyou County Sherriff Department
Tehama County Resource Conservation District
Tehama County Board of Supervisors
Trinity County
Trinity County Board of Supervisors
Trinity County Historical Society
Trinity County Planning Department, Natural Resources
Trinity County Res. Com. Dev. Council
Trinity County Resource Conservation District
Trinity County Sheriff's Office
Trinity County Superintendent of Schools
Trinity County Supervisor
Trinity Resource Conservation & Development
Western Shasta Resource Conservation District

Public Libraries

Siskiyou County

Mount Shasta Library
Yreka Library
Fort Jones Branch Library
Etna Branch Library
Dunsmuir Branch Library
Dorris Branch Library
Montague Branch Library
Tulelake Branch Library
Weed Branch Library
McCloud Branch Library
Happy Camp Branch Library

Shasta County

Shasta County Library
Redding Library
Anderson Library
East Shasta County Regional Branch Library

Tehama County

Tehama Public Library
Corning Branch Library
Los Molinos

Trinity County

Trinity County Library
Hayfork Branch Library
Trinity Center Branch Library

Tribes

Federally Recognized Tribes

Pit River Tribe
Quartz Valley Indian Reservation
Hoopa Valley Tribe
Redding Rancheria
Colusa Indian Community Council (official name of the Tribe is Cachil DeHe Band of Wintun Indians of the Colusa Indian Community of the Colusa Rancheria, California)
The Klamath Tribe

Other Tribes

Nor-Rel-Muk Nation
Shasta Indian Nation
The Shasta Tribe, Inc.
United Tribes of Northern California
Winnemem Wintu Tribe
Wintu Tribe
Wintu Tribe of Northern California
Hoopa Tribal Council

Acronyms

4WD	four-wheeled drive
ACHP	Advisory Council on Historic Preservation
APE	area of potential effects
ATV	all terrain vehicle
BA	biological assessment
BE	biological evaluation
BLM	Bureau of Land Management
BOR	Bureau of Reclamation
CA	California
Cal-IPC	California Invasive Plant Council
CARB	California Air Resources Board
CAR	critical aquatic refuge
CC3	Condition Class 3 watershed
CDFA	California Department of Food and Agriculture
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH	critical habitat
CIRA	citizen inventoried roadless area
CNDDB	California Natural Diversity Database
CVC	California Vehicle Code
CWC	California Wilderness Coalition
DEIS	draft environmental impact statement
DFG	California Department of Fish and Game
E.O.	Executive order
EIS	environmental impact statement
EPA	Environmental Protection Agency
EPS	economic profile system
ESA	Endangered Species Act
FP	Forest Plan
FR	Federal Register
FRTA	National Forest Roads and Trails Act
FSEIS	final supplemental environmental impact statement
FSH	Forest Service Handbook
FSM	Forest Service Manual
FSS	Forest Service sensitive
FTE	full time equivalent
GIS	geographic information system
GSIA	geologic special interest area
H&SC	Health and Safety Code
HRM	Heritage Resources Manager
IDT	interdisciplinary taeam
IMPLAN	Impact Analysis for Planning
INFRA	Infrastructure Database
IPM	integrated pest management
IRA	inventoried roadless area
LRMP	STNF Land And Resource Management Plan
LSR	Late Successional Reserve
MIG	Minnesota IMPLAN Group
MIS	management indicator species
ML	maintenance level
MOI	memorandum of intent
MOU	memorandum (memoranda) of understanding
MVUM	motor vehicle use map
mybp	million years before present
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NFTS	National Forest Transportation System
NHPA	National Historic Preservation Act
NOA	naturally occurring asbestos
NOA	notice of availability
NOI	notice of intent
NRA	national recreation area
NRIS	Shasta-Trinity National Forest Natural Resource Information System
NSO	northern spotted owl
NVUM	National Visitor Use Monitoring
NWFP	Northwest Forest Plan
OHV	off-highway vehicle
PA	programmatic agreement
RACR	roadless area values and characteristics
RAP	roads analysis process
RARE	roadless area review and evaluation
RCAs	riparian conservation areas
RMO	road management objective
ROS	recreation opportunity spectrum
RV	recreational vehicle
S&G	standards and guidelines
SIA	Special Interest Area
SEIS	supplemental environmental impact statement
SHPO	state historic preservation officer
SONCC	southern Oregon-northern California coho salmon
SOPA	schedule of proposed actions
SPNM	semi-primitive nonmotorized
SSSP	agency special-status species programs
STNF	Shasta-Trinity National Forest
SUV	sport utility vehicle
TAC	toxic air contaminant
TE	threatened or endangered
TES	threatened, endangered, or sensitive
TM	Travel Management
TMECA	Travel Management Economic Contribution Application
TMO	trail management objective
TRD	Trinity River Division
TRRP	Trinity River Restoration Program
USC	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
VQO	visual quality objective
ybp	years before present

Glossary

Adaptive management - Alternatives may include an adaptive management strategy allowing for adjustment of the action during implementation. As stated in the FS NEPA Procedures:

> The proposed action and one or more alternatives to the proposed action may include adaptive management. An adaptive management proposal or alternative must clearly identify the adjustment(s) that may be made when monitoring during project implementation indicates that the action is not having its intended effect, or is causing unintended and undesirable effects. The EIS [or EA] must disclose not only the effects of the proposed action or alternative but also the effect of the adjustment. Such proposal or alternative must also describe the monitoring that would take place to inform the responsible official during implementation whether the action is having its intended effect. (36 CFR 220.5(e)(2) and §220.7(b)(2)(iv))
>
> Adaptive management provides an implementation tool that goes beyond the "predict-mitigate-implement" model and incorporates an "implement-monitor-adapt" strategy that provides flexibility to account for inaccurate initial assumptions, to adapt to changes in environmental conditions or to respond to subsequent monitoring information that indicates that desired conditions are not being met.

Administrative unit - A national forest or national grassland.

Adverse Effect - ~ (36CFR800.16) "An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative. Adverse effects on historic properties include, but are not limited to: (i) Physical destruction of or damage to all or part of the property; (ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines; (iii) Removal of the property from its historic location; (iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance; (v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features; (vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and (vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance. (3) Phased application of criteria. Where alternatives under consideration consist of corridors or large land areas, or where access to properties is restricted, the agency official may use a phased process in applying the criteria of adverse effect consistent with phased identification and evaluation efforts conducted pursuant to § 800.4(b)(2). (b) Finding of no adverse effect. The agency official, in consultation with the SHPO/THPO, may propose a finding of no adverse effect when the undertaking's effects do not meet the criteria of paragraph (a)(1) of this section or the undertaking is modified or conditions are imposed, such as the subsequent review of plans for rehabilitation by the SHPO/THPO to ensure consistency with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines, to avoid adverse effects."

Advisory Council on Historic Preservation (ACHP) - An independent United States Federal agency that promotes the preservation, enhancement, and productive use of the nation's historic resources, and advises the President and Congress on national historic preservation policy.

Agency Official - The line officer responsible for legal compliance and land management decisions. Refer to section 2360.4, exhibit 01, for the agency official responsible for specific Heritage Program activities.

All-terrain vehicle (ATV) - Any motorized, off-highway vehicle 50 inches or less in width, having a dry weight of 600 pounds or less that travels on three or more low-pressure tires with a seat designed to be straddled by the operator. Low pressure tires are 6 inches or more in width and designed for use on wheel-rim diameters of 12 inches or less using an operating pressure of 10 pounds per square inch (psi) or less per vehicle-manufacturer recommendations.

Alternative - One set of possible solutions to the collection of management problems identified in the purpose and need. A number of alternatives, which address the purpose and need to varying degrees, are identified and evaluated for their effects on people and the environment. Every alternative addresses each of the management problems to some degree.

Aquatic biota - The community of algae, plants, and animals comprising an aquatic ecosystem.

Area - A separate specifically delineated space smaller than a ranger district.

Area of potential effects (APE) - In regard to cultural resources, area of potential effects means the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36CFR800.16). As defined by the Motorized PA, the APE for this analysis is at least a 30 meters wide corridor centered on linear motor vehicle features and buffers of the same size around other nonlinear transportation features.

Artifact - A portable item of human manufacture, such as a projectile point, ceramic vessel, or basket.

Archaeological Site - A concentration of artifacts and/or features that is thought to represent purposeful and interpretable human behavior. An archaeological site may be prehistoric, protohistoric, historic, or even modern. Examples of archaeological sites on the STNF would include campsites, lithic scatters or knapping stations, historic artifact scatters, hunting blinds, log cabins, railroad grades, or culturally modified trees within a cultural landscape.

At Risk Historic Property - A property that the Forest heritage resources manager identifies as susceptible to being adversely affected as a result of designating a motor vehicle route, or using or maintaining the designated motorized recreation system. An at risk historic property is identified based on property characteristics and proximity to designated routes (e.g., trail corridor, trail head, vista point).

California Natural Diversity Database - A program that inventories the status and locations of rare plants and animals in California.

California Vehicle Code (CVC) - Regulates the use of motor vehicles in California, including motor vehicles used on the national forests. Sets safety standards for motor vehicles and vehicle operators. Defines a highway as “a way or place of whatever nature, publicly maintained and open to the use of the public for purposes of vehicular travel. Highway includes street.” Operational level 2–5 roads meet this definition. Defines the safety equipment needed for highway-legal and off-highway vehicles, and defines the roads and trails where off-highway motor vehicles may be operated.

California Wilderness Coalition (CWC) - Organization dedicated to protecting and restoring California’s wild places and native biodiversity on a statewide level.

California Wildlife Habitat Relationships (CWHR) - A state-of-the-art information system for California’s wildlife. CWHR contains life history, geographic range, habitat relationships, and management information on 694 species of amphibians, reptiles, birds, and mammals known to occur in the State. CWHR products are available to anyone interested in understanding, conserving, and managing California’s wildlife.

Cultural Resources - An object or definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence. Cultural resources are prehistoric, historic, archaeological, or architectural sites, structures, places, or objects and traditional cultural properties. In the Forest Service Manual 2360 direction, cultural resources include the entire spectrum of resources for which the heritage program is responsible from artifacts to cultural landscapes without regard to eligibility for listing on the NRHP. Cultural resources have been referred to as “heritage resources” in the U.S. Forest Service in the recent past. The preferred term for the agency is now “cultural resources.”

Decommission - Activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFR 212.1; FSM 7703).

Deferred maintenance - Maintenance not performed when scheduled and delayed for the future.

Designated road, trail, or area - A National Forest System road, a National Forest System trail, or an area on National Forest System lands designated for motor vehicle use and displayed on a motor vehicle use map (MVUM).

Eligibility. This refers to an evaluation of a cultural resource using the criteria for listing on the NRHP. There are four such criteria, designated by the letters a–d (36CFR60.4):

> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or
>
> (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (d) that have yielded, or may be likely to yield, information important in prehistory or history.

In practice, criteria a–c are usually applied only to historic sites or buildings. Criterion d may be applied to prehistoric or historic archaeological sites. A determination of eligibility refers to an evaluation of eligibility by an agency official that has been concurred with by a State Historic Preservation Officer (SHPO), or a "formal" determination by the keeper of the national register. The eligibility of sites for which no determination of eligibility has been made is referred to either "unevaluated" or "not determined." Such sites must be considered as eligible when an undertaking occurs that might affect them.

Environmental justice - Executive Order 12898: Requires that all Federal actions consider the potential of disproportionate effects on minority and low-income populations in the local region. The principals of environmental justice require agencies to address the equity and fairness implications associated with Federal land management actions.

Environmental consequences - The consequences incurred to the environment or ecosystem, positive or negative, that a particular project could inflict.

Erigeron - A genus of about 390 species of flowering plants in the family Asteracea.

Essential fish habitat - Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity, as defined by regional fishery management.

Evaluation - Applying the criteria of eligibility to the known attributes of an object, archaeological site, building, traditional cultural property, or cultural landscape. Evaluation may sometimes be made on the basis of surface characteristics only, but sometimes documentary research or archaeological excavations may be necessary.

Feature - A non-portable item of human manufacture, such as a road, hearth, or structure.

Fish, anadromous - Fish that live their lives in the sea and migrate to freshwater rivers to spawn.

Forest development road - A forest road under U.S. Forest Service jurisdiction.

Forest development trail - A forest trail under U.S. Forest Service jurisdiction.

Forest highway - A forest road under jurisdiction of and maintained by a public authority and open to public travel.

Forest road or trail - A road or trail wholly or partly within or adjacent to and serving the National Forest System that the U.S. Forest Service deems necessary for protection, administration, and use for the National Forest System and the use and development of its resources.

Forest transportation atlas - A display of an administrative system's roads, trails, and airfields.

Forest transportation facility - A classified road, designated trail, or designated airfield, including bridges, culverts, parking lots, log transfer facilities, safety devices and other transportation network appurtenances under Forest Service jurisdiction that is wholly or partially within or adjacent to National Forest System lands (36 CFR 212.1).

Forest transportation system - The system of National Forest System roads, National Forest System trails, and airfields on National Forest System lands.

Four-wheeled drive way - A National Forest System road included in the forest transportation atlas and commonly used by four-wheel drive, high clearance vehicles with a width greater than 50 inches unless designated and managed as a trail.

Geomorphology - The study of landforms and the processes that shape them.

Geographical information system (GIS) - An information system for capturing, storing, analyzing, managing, and presenting data that is linked to location.

Heritage Assets - A Federal accounting term defined by the Federal Accounting Standards Advisory Board, as "property, plant, and equipment that are unique for one or more of the following reasons: historical or natural significance; cultural, educational, or artistic (for example, aesthetic) importance; or significant architectural characteristics." This definition applies to all Federal accounting. The Forest Service has further defined "priority heritage assets" as those heritage assets of distinct public value that are or should be actively maintained and meet one or more of the following criteria:

1. The significance and management priority of the property is recognized through an official designation such as listing on the NRHP or on a State register.

2. The significance and management priority of the property is recognized through prior investment in preservation, interpretation, and use.

3. The significance and management priority of the property is recognized in an agency-approved management plan.

4. The property exhibits critical deferred maintenance needs and those needs have been documented. Critical deferred maintenance is defined as a potential health or safety risk or imminent threat of loss of significant resource values.

Heritage Professional - A Forest Service staff or advisory position with education and expertise in archaeology, history, cultural resource management, or related disciplines. Heritage professionals are in the GS-170-History, GS-190-General Anthropology, and GS-193-Archaeology job series. They provide professional recommendations and services to help land managers meet their heritage program responsibilities.

Heritage Program - The comprehensive Forest Service program of responsibilities related to historic preservation. The purpose of the heritage program is to manage prehistoric and historic cultural resources for the benefit of the public through preservation, public use, and research.

Heritage Resources - See "Cultural Resources."

Heritage Resources Manager (HRM) - The HRM is the lead position on each national forest in the region that is responsible for: directing and administering the Forest's complex and multifaceted heritage resources management program; planning, developing, and implementing the Forest's heritage resources inventory, evaluation, preservation, and enhancement activities; delegating professional and technical responsibilities to heritage specialists pursuant to the Motorized Recreation PA; providing professional and technical advice to the forest leadership team; coordinating the cultural resources program internally, and with external agencies, organizations, and the public; curating and controlling access to heritage resource records and collections; and meeting other program management responsibilities under the Motorized Recreation PA. The HRM shall meet the professional standards established for either archaeologist or historian, as outlined in 36 CFR 296.8 or in the Secretary of the Interior's Standards and Guidelines for Professional Qualifications (48 FR 44738-44739), and shall meet at least Office of Personnel Management X118 GS-170/193-11 journeyman level qualifications. Under the Motorized Recreation PA, the HRM is the position responsible for approving the Cultural portion of this EIS and of the supporting Cultural Resources Report.

Herpetofauna - Amphibians and reptiles.

Highway Legal or Street Legal - A motor vehicle that is licensed and registered by a state agency such that it can be operated on public streets and highways. In California this would be all vehicles subject to registration under Division 3, Chapter 1, Article 1, and Section 4000 of the California Motor Vehicle Code.

Vehicles that do not meet the definition of "street legal" are vehicles such as motorcycles, trail bikes, dune buggies, all-terrain vehicles, and snowmobiles that are operated exclusively off public roads and highways. A vehicle operated in this manner must be registered in California as an off-highway vehicle (OHV) unless it is registered for regular highway use and is not otherwise exempt from registration. A vehicle registered solely as an OHV cannot be operated on public streets and highways with the OHV registration, and is not considered "Highway Legal" or "Street Legal."

Historic Properties - (36 CFR 800.16) "Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria."

All cultural resources identified within the APE for all alternatives adding facilities to the national forest's transportation system are considered historic properties for the purposes of this undertaking (Motorized Recreation PA), unless they already have been determined not eligible in consultation with the SHPO or through other agreed on procedures (36 CFR 60.4; 36 CFR 800).

Indian Tribe - NHPA defines Indian tribe as "an Indian tribe, band, nation, or other organized group or community, including a native village, regional corporation or village corporation, as those terms are defined in section 3 of the Alaska Native Claims Settlement Act (43 U.S.C. 1602), which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians."

Interdisciplinary team - A group of people from a range of disciplinary backgrounds, working together to ensure the integrated use of natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment.

Integrated pest management - A pest management strategy that focuses on long-term prevention or suppression of pest problems through a combination of techniques, such as encouraging biological control, use of resistant varieties, and adoption of alternate cultural practices.

Inventoried roadless area - A group of Forest Service lands that have been identified by government reviews as lands without existing roads that could be suitable for roadless area conservation as wilderness or other non-standard protections.

Isolated Find, Artifact, or Occurrence - This is an occurrence of one or a few artifacts or features, thought to be the result of incidental human behavior (cf. Archaeological site). These are sometimes referred to as simply "isolates," or by the acronyms IF, IA, or IO.

Jurisdiction - The legal right to control and regulate the use of a transportation facility. Roads on National Forest System lands are under the control of the U.S. Forest Service except for public roads established under the Act of July 26, 1866; private roads; roads for which the U.S. Forest Service has granted rights-of-way to private landowners or public road agencies; and roads whose use and rights pre-date the National Forest.

Linear Feature or Site - A linear archaeological site may be prehistoric, like a trail, or historic, like a road, railroad grade, fenceline, or utility line. A linear feature may be associated with other structures and artifacts as part of a larger archaeological site, or exist in isolation from other known or extant features, and thus be a site on its own.

Maintenance levels - The level of service provided by and maintenance required for a specific road, consistent with road management objectives and maintenance criteria.

Maintenance level 1 - Assigned to intermittent service roads when they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. While being maintained at level 1, roads are closed to vehicular traffic but may be open and suitable for nonmotorized uses.

Maintenance level 2 - Assigned to roads open for use by high-clearance vehicles. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. (Log haul may occur at this level.)

Maintenance level 3 - Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material.

Maintenance level 4 - Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. Roads may be paved and/or dust abated.

Maintenance level 5 - Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double-lane, paved facilities. Some may be aggregate surfaced and dust abated.

Mass wasting - The geomorphic process by which soil, regolith, and rock move downslope under the force of gravity.

Motor vehicle - Any self-propelled vehicle other than a vehicle operated on rails or any wheelchair or mobility device, including battery-powered chairs, designed solely for use by a mobility-impaired person for locomotion and suitable for use in an indoor pedestrian area.

Motor vehicle use map (MVUM) - A map reflecting designated roads, trails, and areas on a National Forest System administrative unit or ranger district.

Motorized Recreation PA – Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, U.S.D.A. Forest Service, Intermountain Region's Humboldt-Toiyabe National Forest, California State Historic Preservation Officer, and Advisory Council on Historic Preservation Regarding the Process For Compliance with Section 106 of the National Historic Preservation Act for Designating Motor Vehicle Routes and Managing Motorized Recreation on the National Forests In California.

This agreement (the Motorized Recreation PA) defines the Area of Potential Effect (APE) (36 CFR 800.4(a)(1)) and includes a strategy outlining the requirements for cultural resource inventory, evaluation of historic properties, and effects determinations. It also includes protection and resource management measures that may be used where effects may occur. The Motorized Recreation PA contains provisions for amendment as needed to provide additional requirements or address Forest-specific issues. The Pacific Southwest Region, in consultation with the California State Historic Preservation Officer and the Advisory Council on Historic Preservation, has developed an amendment (Appendix E of the Motorized Recreation PA) to modify the heritage strategy and add procedures for considering and mitigating motorized vehicle effects to cultural resources within reservoirs (i.e., in areas exposed when water levels are drawn down). The forest is utilizing the amended Motorized Recreation PA requirements in the Final EIS.

National Environmental Policy Act (NEPA) procedures - The rules, policies, and procedures governing agency compliance with the National Environmental Policy Act.

National Forest System - As defined in the Forest Rangeland Renewable Resources Planning Act, the National Forest System includes all National Forest lands reserved or withdrawn from the public domain of the United States, all national forest lands acquired through purchase, exchange, donation, or other means; the national grasslands and land use projects administered under Title III of the Bankhead-Jones Farm Tennant Act (50 Stat. 525, 7 U.S.C. 1010- 1012); and other lands, waters, or interests therein administered by the U.S. Forest Service or are designated for administration through the U.S. Forest Service as part of the system.

National Forest System land - All Forest Service-administered lands, waters, or interests therein.

National Forest System road - A forest road other than a road that has been authorized by a legally documented right-of-way held by a State, County or other local public road authority.

National Forest System trail - A forest trail other than a trail that has been authorized by a legally documented right-of-way held by a State, county, or other local public road authority.

National Historic Preservation Act (NHPA) - or the “Act.” NHPA or the “Act” means the National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470-470w-6. The goal of the Act, which established the ACHP in 1966, is to have Federal agencies act as responsible stewards of our nation’s resources when their actions affect historic properties.

National recreation trail - A trail that provides a variety of outdoor recreation uses in, or reasonably accessible to, urban areas.

National Register of Historic Places - The National Historic Preservation Act of 1966 authorized the Secretary of Interior “to expand and maintain a National Register of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering and culture” (36CFR60.1). The national register is a list of historic properties determined eligible for listing on the register. Listing requires completion of forms and many levels of review. Many states have versions of the national register.

Northwest Forest Plan (NWFP) - A series of Federal policies and guidelines governing land use on Federal lands in the Pacific Northwest region of the United States. It covers areas ranging from northern California to western Washington.

Off-highway vehicle (OHV) - Any motorized vehicle designed for or capable of cross-county travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain.

Off-road vehicle - Synonymous with off-highway vehicle (OHV).

Objective maintenance level - The desired condition of a road.

Operational maintenance level - The current maintenance level of a road.

Over-snow vehicle - A motor vehicle designed for use over snow that runs on a track or tracks and/or a ski or skis while in use over snow.

Passenger cars - Vehicles that are passenger cars of all sizes; sport/utility vehicles; minivans; vans; and pickup trucks.

Prescription XI - Part of the Shasta-Trinity National Forest Land and Resource Management Plan dealing with cultural resources. It applies where:

- This prescription will be applied to specific sites within areas that have been determined to be eligible for the National Register of Historic Places, and which have one or more of the following attributes:
- The site has known or potential scientific values that are highly important or unique and are conducive to long-term study.
- The site has a potential for interpretation of cultural resource values to Forest visitors.
- The site has cultural importance to Native Americans.

Some of the standards and guidelines are of particular interest:

1. Heritage resources will be protected primarily by locating trails and camp sites away from sensitive areas. Recreational activities and development will be limited in such a way that visitor use does not take place on or in the immediate vicinity of cultural resources, unless it is an interpretive activity.

6. No new road or trail construction will be allowed unless approved by the Forest Supervisor. Reconstruction will be allowed only if adverse effects are not created.

8. Off-highway vehicle use will be prohibited.

Programmatic Agreement - A programmatic agreement is a document between the USDA Forest Service and another federal or state agency that records the terms and conditions agreed upon to resolve the potential adverse effects of a Federal agency program, complex undertaking or other situations.

Public road - Any road or street under the jurisdiction of and maintained by a public authority and open to public travel.

Right-of-way - A privilege or right to cross over or use the land of another party for egress and ingress such as roads, pipelines, irrigation canals, or ditches. The right-of-way may be conveyed by an easement, permit, license, or other instrument.

Riparian areas - Geographically delineable areas with distinctive resource values and characteristics that compose the aquatic and riparian ecosystems.

Riparian habitat - The transition zone between aquatic and upland habitat. These habitats are related to and influenced by surface or subsurface waters, especially the margins of streams, lakes, ponds, wetlands, seeps, and ditches.

Road - A motor vehicle travelway over 50 inches wide, unless designated and managed as a trail. A road may be authorized NFTS, or unauthorized (36 CFR 212.1).

Road construction or reconstruction - Supervising, inspecting, actual building, and incurrence of all costs incidental to the construction or reconstruction of a road.

Road decommissioning - Activities that result in stabilizing and restoring unneeded roads to a more natural state.

Road density - The quantity of roads per unit area, measured as miles per square mile.

Road maintenance - The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective (FSM 7712.3).

Road management objectives - The intended purpose of an individual road based on management area direction and access management objectives. Road management objectives contain design criteria, operation criteria, and maintenance criteria.

Sacred Site - (E.O. 13007, Indian Sacred Sites) "Any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the Indian tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site."

Seed bank - The reservoir of viable seeds present in the soil.

Significant/Significance - Terms with legal and regulatory application in the National Historic Preservation Act and at 36 CFR part 60, which mean that a cultural resource meets the eligibility criteria for listing on the NRHP because of its significance at the local, State, or national level.

Spatial boundary - The area examined in the assessment (i.e., study area).

Special use authorization - A permit, term permit, lease, or easement that allows occupancy, use, rights, or privileges of National Forest System land.

State Historic Preservation Officer (SHPO) - Means the official appointed or designated pursuant to section 101(b)(1) of the act to administer the State historic preservation program or a representative designated to act for the State historic preservation officer.

Street Legal (see "Highway Legal or Street Legal")

Temporary road or trail - A road or trail necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road or trail and that is not included in a forest transportation atlas.

Traditional Cultural Property - A cultural resource that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. The entity evaluated for eligibility for inclusion in the NRHP must be a tangible property; that is, a district, site, building, structure, or object as defined in 36 CFR 64.4.

Trail - A route 50 inches or less in width or a route over 50 inches wide that is identified and managed as a trail.

Trail vehicle - A vehicle designed for trail use, such as bicycles, snowmobiles, trail bikes, trail scooters, and all-terrain vehicles.

Transportation facilities - A classified road, designated trail, or designated airfield, including bridges, culverts, parking lots, log transfer facilities, safety devices and other transportation network appurtenances under Forest Service jurisdiction that is wholly or partially within or adjacent to National Forest System lands (36 CFR 212.1).

Travel management atlas - An atlas that consists of a forest transportation atlas and a motor vehicle use map (MVUM) or maps.

Travel Management Economic Contribution Application (TMECA). - A spreadsheet that uses these response coefficients along with data collected from the NVUM survey to estimate the local economic contribution of different types of recreational activities based on whether the recreationists stayed only for a day or overnight. USDA Forest Service, 2009. Inventory and Monitoring Institute. “Instructions for using the Travel Management Economic Contribution Applications (TMCA).” May 12, 2009

Unauthorized route - A road or trail that is not a forest road or trail or a temporary road or trail and is not included in a forest transportation atlas.

Visual Quality Objective (VQO) - An approved resource management objective that reflects a desired level of visual quality based on the physical and sociological characteristics of the area; refers to the degree of acceptable human alteration to the characteristic landscape.

Wheelchair - A device designated solely for use by a mobility impaired person for locomotion and suitable for use in an indoor pedestrian area.

References Cited

Note: *References are listed by resource area.*

Chapters 1 and 2

Bureau of Reclamation dated December 31, 1986 for Shasta and Trinity Lakes

USDA Forest Service. 1995. Shasta-Trinity National Forest land and resource management plan. Shasta-Trinity NF, Redding, CA.

USDA Forest Service 2005. Travel Management; Designated Routes and Areas for Motor Vehicle Use. Final Rule. 36 CFR Parts 212, 251, 261, and 295. Federal Register / Vol. 70, No. 216 / Wednesday, November 9, 2005. pp. 68264-68291.

USDA Forest Service 2006. Four Threats to the Health of the Nation's Forests and Grasslands. http://www.fs.fed.us/projects/four-threats/ (accessed January 18, 2010).

USDA Forest Service 2008. Notice of Intent to prepare an Environmental Impact Statement. Shasta-Trinity National Forest, California; Shasta-Trinity National Forest Motorized Travel Management EIS. Federal Register / Vol. 73, No. 154 / Friday, August 8, 2008. pp. 46238 – 46242.

USDA Forest Service, 2009. Forest Service Manual 7700 Travel Management. http://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsm?7700 (accessed January 22, 2010).

Recreation

Martin, S.A.; Leung, A.; Pallini, P. 2005. California off-highway vehicle noise study: A report to the California legislature as required by Public Resources Code Section 5090.32(0). Prepared for: State of California Department of Parks and Recreation Off-Highway Motor Vehicle Recreation Division. Wyle Laboratories.

Ouren D.S.; Hass, C.; C.P. Melcher, [and others]. 2007. Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources open file report 2007-1353. USDI U.S. Geological Survey.

Pilcher, E.; Turina, F. 2006. Protecting natural sounds in national parks: Soundscape workshop visitor experience and soundscapes annotated bibliography. March 1-2; National Park Service and Colorado State University.

USDA Forest Service. 1995. Shasta-Trinity National Forest land and resource management plan. Shasta-Trinity NF, Redding, CA.

Watersheds

Beschta , R.L.; Pyle, M.R.; Skaugset, A.E.; Surfleet, C.G. 2000. Peak flow response to forest guidelines in the western cascades of Oregon, USA. Journal of Hydrology 233: 102–120.

Bilby, R.E.; Sullivan, K.; Duncan, S.H. 1989. The generation and fate of road-surface sediment in forested watersheds in southwestern Washington. Forest Science 35(2): 453–468.

Foltz, R.B. 2006. Erosion from all terrain vehicle (ATV) trails on national forest lands. American Society of Agricultural and Biological Engineers, paper number 068012.

Forsyth, A.R.; Bubb, K.A.; Cox, M.E. 2006. Runoff, sediment loss and water quality from forest roads in a southeast Queensland coastal plain *Pinus* plantation. Forest Ecology and Management 221: 194–206.

Grant, G.E.; Lewis, S.L.; Swanson, F.J.; Cissel, J.H.; McDonnell, J.J. 2008. Effects of forest practices on peak flows and consequent channel response: A state-of-science report for western Oregon and Washington. USDA Forest Service General Technical Report PNW-GTR-760. 76 p.

Gucinski, H.; Furniss, M.J.; Ziemer, R.R.; Brookes, M.H. 2001. Forest roads: A synthesis of scientific information. USDA Forest Service General Technical Report PNWGTR-509, Pacific Northwest Research Station, Portland, OR. 103 p.

Jones, J.A.; Grant, G.E. 1996. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon. Water Resources Research 32(4): 959–974.

Jones, J.A. 2000. Hydrologic processes and peak discharge response to forest removal, regrowth and roads in 10 small experimental basins, western Cascades, Oregon. Water Resource Research 36(9): 2621–2642.

Lanspa, K. 1994. Soil survey of Shasta-Trinity National Forest area, California. USDA Forest Service.

Laurent, T. 2009. Personal communication. Soil scientist, Klamath National Forest.

Luce, C.H.; Black, T.A. 1999. Sediment production from forest roads in western Oregon. Water Resources Research 35(8): 2561–2570.

Reid, L.M.; Dunne, T. 1984. Sediment production from forest road surfaces. Water Resources Research 20(11): 1753–1761.

Sheridan, G.J.; Nose, P.J.; Whip, R.K.; Wijesinghe, N. 2006. The effect of truck traffic and road water content on sediment delivery from unpaved forest roads.

State of California. 2006a. Proposed 2006 CWA section 303(d) list of water quality limited segments.

State of California. 2006b. Fact sheets supporting the revision of the section 303(d) list. California Water Quality Control Boards.

Thomas, R.B.; Megahan, W.F. 1998. Peak flow responses to clear-cutting and roads in small and large basins, western Cascades, Oregon: A second opinion. Water Resources Research 34(12): 3393–3403.

Trombulak, S.C.; Frissell, C.A. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14: 18–30.

USDA Forest Service. 1990. Soil and water conservation handbook. Chapter 50. Equivalent roaded acre methodolgy. USDA Forest Service Region 5, Redding, CA.

USDA Forest Service. 1995. Land management and resource plan. Shasta-Trinity National Forest, Redding, CA.

USDA Forest Service. 1999. Soil interpretations. Forest Service Region 5, San Francisco, CA.

USDA Forest Service. 2000. Water quality management for forest system lands in California; best management practices. Pacific Southwest Region. 137 p.

USDA Forest Service. 2004. Trinity serpentine soil survey. Shasta-Trinity National Forest, Redding, CA. http://www.fs.fed.us/r5/shastatrinity/publications/trinity-serpentine.shtml [Mar 2009]

USDA Forest Service. 2007. Forest Service Strategic Plan, 2007–2012. Washington, D.C.

Wemple, B.C.; Jones, J.A.; Grant, G.E. 1996. Channel network extension by logging roads in two basins, western cascades, Oregon. Water Resources Bulletin 32; 1195–1207.

Wemple, B.C.; Jones, J.A. 2003. Runoff production on forest roads in a steep mountain catchment. Water Resources Research 39(8).

Wright, K.A.; Sendek, K.H.; Rice, R.M.; Thomas, R.B. 1990. Logging effects on stream flow: Storm runoff at Caspar Creek in northwestern California. Water Resources Research 26(7): 1657–1667.

Zeimer, R.R. 1998. Flooding and stormflows. USDA Forest Service General Technical Report PSW-GTR 168. Pp. 15–24.

Aquatics

Briggs, K.C. 2009. Biological Assessment / Biological evaluation for Threatened, Endangered, Proposed and Sensitive Species that may be affected by Motorized Travel Management, USDA Forest Service, Shasta-Trinity National Forest.

Briggs, K.C. 2009. Aquatic Biota Biological evaluation for Sensitive Species that may be affected by Motorized Travel Management, USDA Forest Service, Shasta-Trinity National Forest.

Briggs, K.C. 2009. Herptofauna (Amphibian and Reptile) Biological evaluation, USDA Forest Service, Shasta-Trinity National Forest.

Briggs, K.C. 2009. MIS Project Level Assessment, Effects of Project on MIS Habitats, USDA Forest Service, Shasta-Trinity National Forest

Brock, W. A. 2010. Biological Assessment / Biological evaluation for Threatened, Endangered, Proposed and Sensitive Species that may be affected by Motorized Travel Management, Supplement #1, USDA Forest Service, Shasta-Trinity National Forest

Brock, W. A. 2010. Supplement to the Aquatic Biota Biological evaluation for Sensitive Species that may be affected by Motorized Travel Management, USDA Forest Service, Shasta-Trinity National Forest.

Cederholm, C.J.; Reid, L.M.; Salo, E.O. 1981. Cumulative effects of logging road sediment on salmonid populations in the Clearwater River, Jefferson County, Washington. *In:* Proceedings from salmon spawning gravel: A renewable resource in the Pacific Northwest .Report 39, pp. 38–74. State of Washington Water Research Center, Pullman.

Ratcliff, D. 2009. Personal communication. Fisheries Biologist, Shasta-Trinity National Forest.

Gaines, W.L.; Singleton, P.H.; Ross, R.C. 2003 Assessing the cumulative effects of linear recreation routes on wildlife habitats on the Okanogan and Wenatchee National Forests. USDA Forest Service General Technical Report PNW-GTR-586, Portland, OR.

Jennings, M.R. 1996. Status of amphibians. Sierra Nevada Ecosystem Project final report to Congress, Vol. II, Assessments and scientific basis for management options. University of California-Davis Centers for Water and Wildland Resources.

Mease, C. 2010. Biological Assessment / Biological evaluation for Threatened, Endangered, Proposed and Sensitive Species that may be affected by Motorized Travel Management, Supplement #2, USDA Forest Service, Shasta-Trinity National Forest

Moyle, P.B.;Randall, P.J. 1996. Sierra Nevada Ecosystem Project, final report to Congress, Vol. II, Assessments and scientific basis for management options. University of California-Davis Centers for Water and Wildland Resources.

Moyle, P.B.; Yoshiyama, R.M.; Williams, J.E.; Wikramanayake, E. 1996. Fish species of special concern in California. California Department of Fish and Game, Sacramento.

Ouren D.S.; Hass, C.; C.P. Melcher, [and others]. 2007. Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources open file report 2007-1353. USDI U.S. Geological Survey.

Reeves, G.H.; Everest, F.H.; Hall, J.D. 1987. Interactions between redside shiner (*Richardsonius balteatus*) and the steelhead trout (*Salmo gairdneri*) in western Oregon: The influence of water temperature. Canadian Journal of Fisheries and Aquatic Science 44: 1603–1613.

Sigler, J.W.; Bjornn, T.C.; Everest, F.H. 1984. Effects of chronic turbidity on density and growth of steelheads and coho salmon. Transactions of the American Fisheries Society 113: 142–150.

Trombulak, S.C.; Frissell, C.A. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14(1): 18–30.

U.S. Bureau of Reclamation Trinity River Flow Evaluation Final Report (http://www.trrp.net/TrinityRiver/facilities.htm)

USDA Forest Service. 2000. Forest Service roadless area conservation final environmental impact statement biological evaluation for threatened, endangered and proposed species and sensitive species. Brown, S., R. Archuleta; signed November 13, 2000. 90 p.

Herpetofauna

Alford, R.A., Richards, S.J., 1999. Global amphibian declines: a problem in applied ecology. Annual Review of Ecology and Systematics 30, 133–165.

AmphibiaWeb: Information on amphibian biology and conservation. [web application]. 2009. Berkeley, California: AmphibiaWeb. Available: http://amphibiaweb.org/.

Baillie, J.E.M., Hilton-Taylor, C., Stuart, S.N., 2004. IUCN Red List of Threatened Species. A Global Species Assessment. IUCN Gland, Switzerland and Cambridge, UK.

Bowne, D.R., Bowers, M.A., 2004. Interpatch movements in spatially structured populations: a literature review. Landscape Ecology 19 (1), 1–20.

Briggs, K.C. 2009. Herptofauna (Amphibian and Reptile) Biological evaluation, USDA Forest Service, Shasta-Trinity National Forest.

Carr, L.W., Fahrig, L., 2001. Effect of road traffic on two amphibian species of different vagility.ConservationBiology15(4),1071–1078.

Carr, L.W., Pope, S.E., Fahrig, L., 2002. Impacts of landscape transformation by roads. In: Gutzwiller, K.J. (Ed.), Concepts and Applications of Landscape Ecology in Biological Conservation. Springer-Verlag, New York

Clinton, B. D. and J. M. Vose. 2003. Differences in Surface Water Quality Draining Four Road Surface Types in the Southern Appalachians. Southern Journal of Applied Forestry 24(2).

Cushman, S.A. 2006. Effects of habitat loss and fragmentation on amphibians: A review and prospectus. Biological Conservation 128: 231-240.

deMaynadier, P.G., Hunter Jr., M.L., 2000. Road effects on amphibian movements in a forested landscape. Natural Areas Journal 20:56–65.

Diller, L.V., Wallace, R.L., 1996. Distribution and habitat of Rhyacotriton variegatus in managed, young growth forests in north coastal California. J. Herpetol. 30, 184– 191.

Doughtery, C. K. and G. R. Smith. 2006. Acute effects of road de-icers on the tadpoles of three anurans. Applied Herpetology 3(2):87-93.

Fahrig, L., Pedlar, J.H., Pope, S.E., Taylor, P.D., Wegner, J.F., 1995. Effect of road traffic on amphibian density. Biological Conservation 73, 177–182.

Fellers, G. M., K. L. Pope, J.E. Stead, M. S. Koo, H.H. Welsh Jr. 2007. Turning Population Trend Monitoring Into Active Conservation: Can We Save the Cascade Frog (Rana Cascadae) In the Lassen Region of California? Herpetological Conservation and Biology 3(1):28-39.

Fellers G. M. and C. A. Drost. 1993. Disappearance of the Cascade Frog Rana Cascadae at the Southern End of its Range, California, USA. Biological Conservation, 65: 177-181.

Forman, R. T. T., and L. E. Alexander. 1998. Roads and their major ecological effects. Annual Review of Ecology and Systematics 29:207–231.

Frid, A. and L. M. Dill. 2002. Human-caused disturbance stimuli as a form of predation risk. Conservation Ecology 6(1): 11.

Gaines, W. L., P. H. Singleton, R. C. Ross. 2003. Assessing the cumulative effects of linear recreation routes on wildlife habitats on the Okanogan and Wenatchee National Forests. Gen. Tech. Rep. PNW-GTR-586. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 79 p

Gibbs J. P.and W. G. Shriver 2005. Can road mortality limit populations of pool-breeding amphibians? Wetlands Ecology and Management 13: 281–289.

Gibbs J. P. and D. A. Steen. 2005. Trends in Sex Ratios of Turtles in the United States: Implications of Road Mortality.

Gillespie G. R. 2002 Impacts of sediment loads, tadpole density, and food type on the growth and development of tadpoles of the spotted tree frog Litoria spenceri: an in-stream experiment. Biological Conservation 106: 141–150.

Glista D.J., T.L. DeVaultet, J.A. DeWoody. 2007. Vertebrate Road Mortality Predominantly Impacts Amphibians. Herpetological Conservation and Biology. 3(1):77-87.

Hayes, M.P. and M.R. Jennings. 1988. Habitat Correlates of Distribution of Red-legged Frog (Rana aurora draytonii) and the Foothill Yellow-legged frog (Rana boylii): Implications for Management. Management of Amphibians, Reptiles and Small Mammals in North America Symposium. Flagstaff, AZ 1988.

Herman, A. E. 2003. Aspects of the Ecology of the Shasta Salamander (Hydromantes shastae), near Samwell Cave, Shasta County, California.

Holland, D. C. 1994. The western pond turtle: habitat and history. ODFG final report.

Houlahan, J.E., Findlay, C.S., 2003. The effects of adjacent land use on wetland amphibian species richness and community composition. Canadian Journal of Fisheries and Aquatic Sciences 60, 1078–1094.

Houlahan, J.E., Findlay, C.S., Schmidt, B.R., Meyer, A.H., Kuzmin, S.L., 2000. Quantitative evidence for global amphibian population declines. Nature 404, 752–755.

Jennings, M. R., and M. P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California., California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova.

Jennings, M.R. 1996. Status of Amphibians. p. 921-944. In: Sierra Nevada ecosystem project: final report to Congress, Vol. II. Univ. of California, Davis, Centers for Water and Wildlife Resources, Davis, CA.

Johnson, S.L., Jones, J.A., 2000. Stream temperature responses to forest harvest and debris flows in western Cascades, Oregon. Can. J. Fish. Aquat. Sci. 57 (Suppl. 2), 30–39.

Jones, J.A., F. J. Swanson, B. C. Wemple, K. U. Snyder. 2000. Effects of Roads on Hydrology, Geomorphology, and Disturbance Patches in Stream Networks. Conservation Biology 14(1):76-85.

Karraker, N. E. 1999. Rhyacotriton variegatus (Southern Torrent Salamander) nest site. Herpetological Review 30:160–161.

Kiesecker, J.M., Blaustein, A.R., Belden, L.K., 2001. Complex causes of amphibian population declines. Nature 410, 681–684.

Kupferberg, S. 1996. Hydrologic and geomorphic factors affecting conservation of a river-breeding frog (Rana boylii). Ecological Applications 6(4):1322-1344.

Lewendal, P. 1995. Habitat-use by the Shasta salamander (*Hydromantes shastae*).

Lind, A. J. 2005. Reintroduction of a Declining Amphibian: Determining an Ecologically Feasible Approach for the Foothill Yellow-legged Frog (*Rana boylii*) through Analysis of Decline Factors, Genetic Structure and Habitat Associations. U.C. Davis PhD Dissertation.

Lind, A. J., H. H. Welsh, Jr., and R. A. Wilson. 1996. The effects of a dam on breeding habitat and egg survival of the foothill yellow-legged frog (*Rana boylii*) in northwestern California. Herpetological Review 27(2):62-67.

Lindstrand, L. III. 2000. Discovery of Shasta salamanders in atypical habitat. California Fish and Game 86: 259-261.

Nauman, R. S. and D. H. Olson. 2004. Surveys for Terrestrial Amphibians in Shasta County, California, With Notes on the Distribution of Shasta Salamanders (Hydromantes Shastae). Northwestern Nat. 85:35–38

Newcombe C. P., Macdonald D. D. 1991. Effects of Suspended Sediments on Aquatic Ecosystems. North American Journal of Fisheries Management 11:72-82.

Newcombe C. P., O. T. Jensen Jorgen. 1996. Channel Suspended Sediment and Fisheries: A Synthesis for Quantitative Assessment of Risk and Impact. North American Journal of Fisheries Management 16:693-727.

Nussbaum, R.A., Brodie Jr., E.D., Storm, R.M., 1983. Amphibians and reptiles of the Pacific Northwest. University of Idaho Press, Moscow, Idaho, USA.

Power Mary E. 1990. Resource Enhancement by Indirect Effects of Grazers: Armored Catfish, Algae, and Sediment. Ecology, Vol. 71, No. 3 pp. 897-904.

Pringle C.M., R.J. NAIMAN, G. Bretschko, J.R. Karr, M.W. Oswood, J.R. Webster, R.L. Welcomme, M.J. Winterbourn. 1988. Patch Dynamics in Lotic Systems: the Stream as a Mosaic. J. N. Am. Benthol. Soc., 1988, 7(4):503-524

Rathbun, G. B., N. Seipel, and D. Holland. 1992. Nesting behavior and movements of western pond turtles. Clemmys marmorata. Southwest. Nat. 37(3):319-324.

Reid, L. M., T. Dunne. 1984. Sediment Production from Forest Road Surfaces Water Resources Research. 20(11):1753-1761.

Reese, D. A., and H. H. Welsh. 1997. Use of terrestrial habitat by western pond turtles, Clemmys marmorata: implications for management. In J. Van Abbema (ed.), Conservation, Restoration and Management of Tortoises and Turtles-An International Conference, pp. 352-357. WCS Turtle Recovery Program and the New York Turtle and Tortoise Society, New York.

Reijnen Rien and Foppen Ruud. 1994. The Effects of Car Traffic on Breeding Bird Populations in Woodland. I. Evidence of Reduced Habitat Quality for Willow Warblers (Phylloscopus trochilus) Breeding Close to a Highway. Journal of Applied Ecology. 31(1):85-94

Rost G.R., Bailey J.A. 1979. Distribution of Mule Deer and Elk in Relation to Roads. Journal of Wildlife Management. 43(3): 634-641

Semlitsch, R.D., 2000. Principles for management of aquatic-breeding amphibians. Journal of Wildlife Management 64, 615–631

Tait, C.K., Diller, L.V. 2006. Life History of the Southern Torrent Salamander (Rhyacotriton variegatus) in Coastal Northern California. Journal of Herpetology. 40(1):43–54.

Trenham, P.C., Koenig, W.D., Mossman, M.J., Stark, S.L., Jaagger, L.A., 2003. Regional dynamics of wetland-breeding frogs and toads: turnover and synchrony. Ecological Applications 13 (6), 1522–1532.

Trombulak and Frissell 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology. 14: 18-30.

Walther Fritz R. 1969. Flight Behaviour and Avoidance of Predators in Thomson's Gazelle (Gazella Thomsoni Guenther 1884). Behaviour 34(3):184-221

Welsh Jr., H.H., 1990. Relictual amphibians and old-growth forests. Cons. Biol. 4 (3), 309–319.

Welsh H.H. Jr., A.J. Lind. 1996. Habitat correlates of the southern torrent salamander, Rhyacotriton variegates (Caudata: Rhyacotritonidae), in northwestern California. Journal of Herpetology, 30, 385–398.

Welsh H.H. Jr., L.M. Ollivier. 1998. Stream Amphibians as Indicators of Ecosystem Stress: A Case Study From California's Redwoods. Ecological Applications, 8(4): 1118–1132.

Zeiner, D. C., W. F. Laudenslayer, Jr., and K. E. Mayer, eds. 1988. California's wildlife, volume 1, amphibians and reptiles. California Department of Fish and Game. 272 pp.

Wildlife

Allen, A. 1987. The relationship between habitat and furbearers. *In:* Nowak, M.; Baker, J.; Obbard, E.; Malloch, B.; eds. Wild furbearer management and conservation in North America. Ministry of Natural Resources, Toronto, ON. Pp. 164–79.

Anderson, D. R., J. Bart, et al. (1990). 1990 Status Review - Northern Spotted Owl. USFWS, Department of the Interior. Portland, OR, U.S. Fish and Wildlife Service. 102 pp.

Anthony, R.G.; Isaacs, F.B. 1989. Characteristics of bald eagle nest sites in Oregon. Journal of Wildlife Management 53(1): 148–159.

Barber, J. R., K. R. Crooks, et al. (2009). "The Costs of chronic noise exposure for terrestrial organisims." Trends in Ecology & Evolution, In press, volume 1276.

Beier, P.; Drennan, J.E. 1997. Forest structure and prey abundance in foraging areas of northern goshawks. Ecological Applications 7(2): 564–571.

Bias, M.A.; Gutierrez, R.J. 1992. Habitat associations of California spotted owls in the central Sierra Nevada. Journal of Wildlife Management 56(3): 584–595.

Brawn, J. D., S. K. Robinson, et al. (2001). "The role of disturbance in the conservation of birds." Annual Review of Ecological Systematics 32: 251-276.

Buck, S. G., Curt Mullis, et al. (1994). Habitat Use by Fishers in Adjoining Heavily and Lightly Harvested Forest. Martens, sables, and fishers: Biology and Conservation. S. W. H. Buskirk, Alton S.; Raphael, Martin G.; Powell, Roger A., eds. Ithaca, NY: Cornell University Press:**:** 368-376.

Buck, S., C. Mullis, et al. (1983). Corral Bottom-Hayfork Bally Fisher Study - Final Report. Department of Agriculture, U.S. Forest Service, Shasta-Trinity NF.

Buehler, D.A.; Mersmann, T.J.; Fraser, J.D.; Seegar, J.K.D. 1991. Effects of human activity on bald eagle distribution on the northern Chesapeake Bay. Journal of Wildlife Management. (55)2: 282–290.

Bull, E. L. and J. A. Jackson (1995). The Pileated Woodpecker (*Dryocopus pileatus*),. Birds of North America Online. E. A. Poole. Ithaca, Cornell Lab of Ornithology. Retrieved from the Birds of North America Online.

Bull, E. L., C. G. Parks, et al. (1997). Trees and logs important to wildlife in the interior Columbia River Basin. Portland, Oregon, USDA Forest Service, Pacific Northwest Research Station.

Buskirk, S. W. and R. A. Powell (1994). Habitat ecology of fishers and American martens. Martens, Sables and Fishers: Biology and Conservation. S. W. Buskirk, A. Harestad, M. G. Raphael and R. A. Powell. Ithaca, NY, Cornel University Press**:** 283-296.

Buskirk, S.W.; Zielinski, W.J. 2003. Chapter 7: Small and mid-sized carnivores. *In:* Zabel, C.J.; Anthony, R.G.; eds. Mammal community dynamics – Management and conservation in the coniferous forests of western North America. Cambridge University Press.

California Department of Fish and Game (2009, July). Special Animals (883 taxa). Sacramento, CA, State of California, The Natural Resources Agency.

California Department of Fish and Game and California Interagency Wildlife Task Group (2005). California Wildlife Habitat Relationships version 8.1 personal computer program. Sacramento, California.

California Department of Fish and Game, C. I. W. T. G. (2005). California Wildlife Habitat Relationships version 8.1 personal computer program. Sacramento, California.

California Department of Fish and Game. (2009). "Species of Special Concern - Mammals, Birds, Reptiles, Amphibians, Fishes." 2010, from www.dfg.ca.gov/wildlife/nongame/ssc/.

California Department of Fish and Game. 2004. Bear harvest report. Sacramento, CA.

Carroll, C. (2005). A Reanalysis Of Regional Fisher Suitability Including Survey Data From Commercial Forests in the Redwood Region. Arcata, CA, Unpublished manuscript submitted to USDA Forest Service, Pacific Southwest Research Station**:** 17pp.

Carroll, C. (1997). Predicting the distribution of the Fisher (*Martes pennati*) in Northwestern California, USA, using Survey Data and GIS Modeling. Corvallis, OR, Oregon State University. Masters of Science: 182 p.

Carroll, C., W. J. Zielinski, et al. (1999). "Using presence-absence data to build and test spatial habitat models for the fisher in the Klamath Region, USA." Conservation Biology **13**(6): 1344-1359.

Chandler, S.K.; Fraser, J.D.; Buehler, D.A.; Seegar, J.K.D. 1995. Perch trees and shoreline development as predictors of bald eagle distribution on Chesapeake Bay. Journal Wildlife. Management 59(2): 325–332.

Courtney, S. P., J. A. Blakesley, et al. (2004). Scientific evaluation of the status of the northern spotted owl**:** Sustainable Ecosystems Institute, Portland, Oregon. 508 pages.

Damiani, L., and Jacobson (2007). Effects of Noise Disturbance on Northern Spotted Owl Reproductive Success**:** 16. Research Report to the U.S. Forest Service, Shasta-Trinity National Forest

Dark, S.J. 1997. A landscape-scale analysis of mammalian carnivore distribution and habitat use by fisher. M.S. thesis, Humboldt State University, Arcata, CA. 67 p.

Daw, S.K.; DeStefano, S. 2001. Forest characteristics of northern goshawk nest stands and post-fledging areas in Oregon. Journal of Wildlife Management 65(1): 59–65.

Delaney, D. K. and T. G. Grubb (2001). Effects of off-highway vehicle noise on northen spotted owls: sound data results, USFS Rocky Mountain Research Station.

Delaney, D., T. Grubb, et al. (1997). Effects of Helicopter Noise on Nesting Mexican Spotted owls. Report to the U.S. Air Force, Holloman Air Force Base.

deVos, J.C.; Conover, M.R.; Headrick, N.E. 2003. Mule deer conservation: Issues and management strategies. Berryman Institute Press, Logan, UT.

Duncan N., T. Burke, S. Dowlan, and P. Hohenlohe. 2003. Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan, Version 3.0, 70 pp. USDA Forest Service and USDI Bureau of Land Management.

Fahrig, L. and T. Rytwinski (2009). "Effects of roads on animal abundance: an emperical review and synthesis." Ecology and Society 14 (1): pp. 21-41.

Folliard, L. B. R., Kerry P./Diller, Lowell V. (2000). "Landscape characteristics of northern spotted owl nest sites in managed forests of northwestern California." Journal of Raptor Research **34**(2): 75-84.

Forman, R.T.T.; Sperling, D.; Bissonette, J.A.; [and others]; eds. 2003. Road ecology: science and solutions. Island Press, Washington, D.C.

Franklin, A. (1997). Factors Affecting Temporal and Spatial Variation in Northern Spotted Owl Populations in Northwest California. PhD Thesis, Fort Collins, Colorado, Colorado State University.

Franklin, A. B., D. R. Anderson, et al. (1996). "Methods for collecting and analyzing demographic data on the northern spotted owl." Studies in Avian Biology (17): 12-20.

Franklin, A., J. P. Ward jr., et al. (1990). "Density of Northern Spotted Owls in Northwest California." J. Wildl. Manage. 54(1): 1-10.

Fraser , J.D.; Frenzel, L.D.; Mathisen, J.E. 1985. The impact of human activities on breeding bald eagles in north-central Minnesota. Journal of Wildlife Management 49(3):585–592.

Freddy, D.J.; Bronaugh, W.M.; Fowler, M.C. 1986. Responses of mule deer to disturbance by persons afoot and snowmobiles. Wildlife Society Bulletin 14(1): 63–68.

Gaines, W.L.; Singleton, P.H.; Ross, R.C. 2003. Assessing the cumulative effects of linear recreation routes on wildlife habitats on the Okanogan and Wenatchee National Forests. General Technical Report PNW-GTR-586, USDA Forest Service Pacific Northwest Research Station, Portland, OR. 79 p.

Golightly, R. T.; Penland, T.F.; Zielinski, W.J.; Higley, J.M. 2006. Fisher diet in the Klamath/North Coast Bioregion. Unpublished report, Department of Wildlife, Humboldt State University, Arcata, CA.

Grinnell, J., J.S. Dixon, et al. (1937). Fur-bearing Mammals of California. Vols. 1 and 2. Berkeley, CA, Univ. of California Press.

Grubb T.G. 1995. Food habits of bald eagles breeding in the Arizona desert. Wilson Bulletin 10: 258–274.

Grubb, T.G.; Bowerman, W.; Giesy, J.P.; Dawson, G.A. 1992. Responses of breeding bald eagles to human activities in northcentral Michigan. Canadian Field-Naturalist 106: 443–453.

Grubb, T.G.; King, R.M. 1991. Assessing human disturbance of breeding bald eagles with classification tree models. Journal of Wildlife Management 55(3): 500–511.

Grubb, T.G.; Pater, L.L.; Delaney, D.K. 1998. Logging truck noise near nesting northern goshawks. Research Note RMRS-RN-3, USDA Forest Service Rocky Mountain Research Station, Fort Collins, CO. 2 p.

Gutiérrez, R. J., A. B. Franklin, et al. (1995). Population Ecology of the Northern Spotted Owl (Strix occidentalis caurina) in northwestern California: Annual results, 1994. Arcata, Humboldt State University: 19 p.

Hamann, B.; Johnston, H.; McClelland, P.; [and others]. 1999. Birds. *In:* Joslin, G.; Youmans, H.; coords. Effects of recreation on Rocky Mountain wildlife: A review for Montana. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society, Helena, MT. Pp. 3.1–3.34.

Hargis, C.D.; Bissonette, J.A.; Turner, D.L. 1999. Journal of Applied Ecology. 36(1): 157–172.

Hargis, C.D.; McCullough, D.R. 1984. Winter diet and habitat selection of marten in Yosemite National Park. Journal of Wildlife Management. 48(1): 140–146.

Harmata, A.R.; Oakleaf, B. 1992. Bald eagles in the greater Yellowstone ecosystem: An ecological study with emphasis on the Snake River, Wyoming. Wyoming Game and Fish Department, Cheyenne, WY.

Heinemeyer, K. S. and J. L. Jones (1994). Fisher biology and management: a literature review and adaptive management strategy. USFS Northern Region. Missoula, MT:**:** 108 pp.

Jackson, J.A.; Ouellet, H.R.; Jackson, B.J.S. 2002. Hairy woodpecker(*Picoidesv illosus*). *In:* Poole, A.; Gill, F.; eds. The birds of North America, No. 702. The Academy of Natural Sciences, Philadelphia, PA.

Jenkins, J.M.; Hunt, W.G.; Jackman, R.E.; Thelander, C.G.; Gerstell, A.T. 1992. Foraging ecology of bald eagles on a regulated river. Journal of Raptor Research 26(4): 243–256.

Johnson, B.K.; Kern, J.W.; Wisdom, M.J.; [and others]. 2000. Resource selection and spatial separation of mule deer and elk during spring. Journal of Wildlife Management 64(3): 685–697.

Kasworm, W. J.; Manley, T.L. 1990. Road and trail influences of grizzly bears and black bears in northwest Montana. International Conference of Bear Research and Management 8: 79–84.

Kilpatrick, H. J. and P. W. Rego (1994). "Influence of season, sex, and site availability on fisher (Martes pennanti) rest-site selection in the central hardwood forest." Canadian Journal of Zoology **72**: 1416-1419.

Klug, R. R. (1997). Occurrence of Pacific fisher (*Martes pennanti pacifica*) in the redwood zone of northern California and the habitat attributes associated with their detections. Thesis for the Wildlife Sciences Department. Arcata, California, Humboldt State University. M.S. thesis.

Knight, R.L.; Gutzwiller, K.J. 1995. Wildlife and recreationists: Coexistence through management and research. Island Press, Washington, D.C. 372 p.

Lindstrand III, L. (2006). "Detections of pacific fisher around Shasta Lake in Northern California." Transactions of the Western Section of the Wildlife Society 42: 47-52.

McGarigal, K. 1988. Human-eagle interactions on the Lower Columbia River. M.S. thesis, Oregon State University, Corvallis. 115 p.

Mellen, K., B. G. Marcot, et al. (2002). DecAID: A Decaying Wood Advisory Model for Oregon and Washington. USDA Forest Service Gen. Tech. Rep., USDA, Forest Service. PSW-GTR-181: 527-533.

Mellen, K., B. G. Marcot, et al. DecAID, the Decayed Wood Advisor for Managing Snags, Partially Dead Trees, and Down Wood for Biodiversity in Forests of Washington and Oregon. On line data resource, URL: http://www.fs.fed.us/r6/nr/wildlife/decaid/

Morrison, M. L., K. A. With, et al. (1987). "Foraging behavior of bark-foraging birds in the Sierra Nevada." Condor **89** (201-204).

Moser J. 2009. Wildlife Biological Evaluation for the Travel Management Project Environmental Impact Statement, USDA Forest Service, Shasta-Trinity National Forest.

Pater, L. L., T. G. Grubb, et al. (2009). "Reccomendations for improved assessment of noise impacts on wildlife." The Journal of Wildlife Management **73**(5): 788-795.

Perry, C.; Overly, R. 1977. Impact of roads on big game distribution in portions of the Blue Mountains of Washington, 1972–1973. Bulletin 11, Washington Department of Game, Applied Research Section, Olympia, WA. 39 p.

Polite, C. and J. Pratt (August 2005). Northern Goshawk (Accipiter gentilis). California Wildlife Habitat Relationships (CWHR), California Department of Fish and Game.

Potvin, F.; Belanger, L.; Lowell, K. 2000. Marten habitat selection in a clearcut boreal landscape. Conservation Biology 14(3): 844–857.

Powell, R. A. and W. J. Zielinski (1994). Fisher. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States, 184 pp. L. F. Ruggerio, K.B. Aubry, S.W. Buskirk, L.Jack Lyon and W.J. Zielinski. Fort Collins, CO, U. S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. Gen.Tech. Rep. RM-254.**:** Pages 38-73.

Rosenberg, K. V. a. M. G. R. (1986). Effects of forest fragmentation on vertebrates in Douglas-fir forests. Wildlife 2000: Modeling habitat relationships of terrestrial vertebrates. M. L. M. J. Verner, and C. J. Ralph,. Madison, WI, Univ. of Wisconsin Press**:** Pp 263–272.

Salafsky, S. R., R. T. Reynolds, et al. (2007). "Reproductive Responses of Northern Goshawks to Variable Prey Populations." Journal of Wildlife Management **71**(7): 2274-2283.

Sauer, J. R., J. E. Hines, et al. (2008). The North American Breeding Bird Survey, Results and Analysis 1966 - 2007. Version 5.15.2008. Laurel, MD.

Seglund, A. E. (1995.). The use of resting sites by Pacific fisher. Wildlife Sciences Department. Arcata, California., Humboldt State University. M.S. Thesis.

Skagen, S. K.; Knight, R.L.; Orians, G.H. 1991. Human disturbance of an avian scavenging guild. Ecological Applications 1: 215–225.

Skinner, C. (2002). Influence of Fire on the Dynamics of Dead Woody Material in Forests of California and Southwestern Oregon, USDA Forest Service. Rep. PSW-GTR-181: 445-454.

Squires, J. R. and R. T. Reynolds (1997). Northern Goshawk (Accipiter gentilis). The Birds of North America Online. A. Poole and F. Gill. Ithaca, NY Cornell Lab of Ornithology**:** Retrieved from the Birds of North America Online.

Stalmaster, M.V.; Newman, J.R. 1978. Behavioral responses of wintering bald eagles to human activity. Journal of Wildlife Management 42(3): 506–513.

Tempel, D. J. and R. J. Guitierrez (2003). "Fecal corticosterone levels in California spotted owls exposed to low-intensity chainsaw sound." The Wildlife Society Bulletin **31**(3).

Trombulak, S. C. and C. A. Frissell (2000). "Review of Ecological Effects of roads on terrestrial and aquatic communities." Conservation Biology **14**(1): 18-30.

USDA Forest Service (2010). Project -Level Management Indicator Assemblage Report for the 2010 Motorized Travel Management for the Shasta-Trinity National Forest. S.-T. N. F. (Redding, CA: 30 pp.

USDA Forest Service, U.S. Fish and Wildlife Service, et al. (1994, February). Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl; Appendix B2: Ecological Principles for Management of Late-Successional Forests. Portland, Oregon, , U.S. Department of Agriculture, U.S. Department of the Interior. Volume 2 - Appendices.

USDA Forest Service, USDI Fish and Wildlife Service. 2008. Memorandum of Understanding between the US Department of Agriculture Forest Service and the US Fish and Wildlife Service to promote the conservation of migratory birds. FS Agreement #08-MU-1113-2400-264. Washington, D.C.

USDA Forest Service. 1995. Shasta-Trinity National Forest land and resource management plan. Shasta-Trinity National Forest, Supervisor's Office, Redding, CA.

USDA Forest Service. 2000. Forest Service roadless area conservation final environmental impact statement biological evaluation for threatened, endangered and proposed species and sensitive species. Brown, S., R. Archuleta; signed November 13, 2000. 90 p.

USDA Forest Service. 2000. Landbird Strategic Plan, FS-648. Washington, D.C.

USDA Forest Service. 2004. Ruggiero, L.F.; Aubry, K.B.; Buskirk, S.W.; [and others]; tech. eds. 1994. The scientific basis for conserving forest carnivores: American marten, fisher, lynx and wolverine in the western United States. General Technical Report RM-254, Rocky Mountain Forest and Range Experiment Station, Ft. Collins, CO. 184 p.

USDA Forest Service. 2006. Route Designation Project Design Criteria for "No Effect" or "May Affect Not Likely to Adversely Affect" Determination for TE Species- October 2006 version 1. Pacific Southwest Region.

USDA Forest Service. 2007. Shasta-Trinity National Forest Management Indicator Assemblage Habitat Report. Shasta-Trinity National Forest, Supervisor's Office, Redding, CA.

USDI Fish and Wildlife Service (2006). Estimating the effects of auditory and visual disturbance to northern spotted owls and marbled murrelets in northwestern California. Arcata, CA, USDI Fish and Wildlife Service**:** 175 pp.

USDI Fish and Wildlife Service (2007). Noise Impact Assessment. US Fish and Wildlife Service, Arcata, CA

USDI Fish and Wildlife Service. 2004. A Blueprint for the Future of Migratory Birds. Migratory Bird Program Strategic Plan 2004-2014. Migratory Birds and State Programs, Arlington, VA. http://birds.fws.gov/

Wisdom, M.J.; Holthausen, R.S.; Barbara C. Wales, B.C.; [and others]. 2000. Source habitats for terrestrial vertebrates of focus in the Interior Columbia Basin: Broad-scale trends and management implications. Volume 1: Overview. (Quigley, T.M.; tech. ed.; Interior Columbia Basin Ecosystem Management Project: Scientific Assessment). General Technical Report PNW-GTR-485, USDA Forest Service Pacific Northwest Research Station, Portland, OR. 3 vol.

Wolcott, K., (2010), Wildlife Biological Assessment for the Travel Management Project Environmental Impact Statement, USDA Forest Service, Shasta-Trinity National Forest.

Wolcott, K. 2010. Management Indicator Species Report, USDA Forest Service, Shasta-Trinity National Forest.

Woodbridge, B. and C. D. Hargis (2006). Northern Goshawk Inventory and Monitoring Technical Guide. F. S. U.S. Department of Agriculture, Washington Office, Ecosystem Management Coordination Staff. Washington, DC, U.S. Forest Service. Gen. Tech. Rep WO-71**:** 80 p.

Yeager, S. (2005). Habitat at fisher resting sites in the Klamath Province of Northern California. Arcata, California, Humboldt State University. M.S. Thesis.

Zabel, C. J., J. R. Dunk, et al. (2003). "Northern spotted owl habitat models for research and management application in California (USA)." Ecological Applications **13**(4): 1027-1040.

Zabel, C. J., L. M. Roberts, et al. (1999). A collaborative approach in adaptive management at a large landscape scale. Predicting Species Occurrences: Issues of Accuracy and Scale.

Zabel, C., J. Dunk, et al. (2000). "Analysis of the effectiveness of various northern spotted owl definitions at predicting their presence or absence in California." Northwestern Naturalist **81**(2): 93-94.

Zeiner, D.; Laudenslayer, W.; Mayer, K.; White, M. 1990. California's wildlife. Volume II. birds. California Statewide Wildlife Habitat Relationships System, The Resources Agency, Department of Fish and Game, Sacramento, CA.

Zielinski, W. J. and N. P. Duncan (2004). "Diets of sympatric populations of american martens (martes americana) and fishers (martes pennanti) in California." Journal of Mammology **83**(5): 470-477.

Zielinski, W. J., R. L. Treux, et al. (2004). "Home range characteristics of Fishers in California." Journal of Mammology, **85**(4): 649-657.

Zielinski, W. J., R. L. Truex, et al. (2004). "Resting habitat selection by fishers in california." Journal of Wildlife Management **68**(3): 475-492.

Zielinski, W. J., R.L. Truex, et al. (1997). Detection surveys for fishers and American martens in California, 1989-1994: Summary and interpretations. Martes: Taxonomy, Ecology, Techniques and Management. H. N. B. G. Proulx, and P.M. Woodard. Alberta, Canada. , Provincial Museum of Alberta, **:** Pages 372-392.

Zielinski, W. J., T. E. Kucera, et al. (1995). "Current distribution of the fisher, *Martes pennanti*, in California." California Fish and Game **81**((3)): 104-112.

Zielinski, W.J.; Slauson, K.M.; Bowles, A.E. 2007. Effects of off-highway vehicle use on the American marten. Journal of Wildlife Management. 72(7): 1558–1571.

Cultural Resources

Arnold, M. 2008. Travel management project, Shasta, Tehama, and Trinity Counties, California. Manuscript of ARR on file, Shasta-Trinity National Forest.

Byrd, B.F.; Brandy, P.; Hildebrandt, W.R.; [and others]. 2008. Cultural resources alternatives assessment for the Shasta Lake water resources investigation, Shasta and Tehama Counties, California. Far Western Anthropological Research Group. On file at the Shasta-Trinity National Forest Supervisor's Office.

Chartkoff, J.L.; Chartkoff, K.K. 1984. The archaeology of California. Stanford University Press, San Jose, CA.

Lapena, F.R. 1978. Wintu. *In:* Handbook of North American Indians, Vol. 8, California. Heizer, R.F.; ed. Smithsonian Press, NY. Pp. 321–340.

Rosenthal, J.S.; White, G.G.; Sutton, M.Q. 2007. The central valley: A view from the catbird's seat. *In:* California prehistory: Colonization, culture, and complexity. Jones, T.L.; Klar, K.A.; eds. Alta Mira Press, NY. Pp. 147–163.

USDA Forest Service. 2005. Policy for section 106 of the NHPA compliance in travel management: designated routes for motor vehicle use. On file, USDA Forest Service Pacific Southwest Region, Vallejo, CA.

USDA Forest Service. 2006. Programmatic agreement among the U.S.D.A. Forest Service Pacific Southwest Region, U.S.D.A. Forest Service Intermountain Region's Humboldt-Toiyabe National Forest, California State Historic Preservation Officer, and Advisory Council on Historic Preservation regarding the process for compliance with section 106 of the National Historic Preservation Act for designating motor vehicle routes and managing motorized recreation on the national forests in California. On file, USDA Forest Service Pacific Southwest Region, Vallejo, CA.

USDA Forest Service Mountain Heritage Associates. 2010. A Travel Management Project Cultural Resources Report (CRR) Part II on the Shasta-Trinity National Forest in Humboldt, Shasta, Siskyou, Tehama, and Trinity Counties, California. On file at the Shasta-Trinity National Forest Supervisor's Office.

Botany

Bais, H., R., Vepachedu, S. Gilroy, R. Callaway, and J. Vivanco. 2003. Allelopathy and exotic plant invasion: from molecules and genes to species interactions. Science vol. 301: 1377-1380.

Brooks, M.L. 1995. Benefits of protective fencing to plant and rodent communities of the western Mojave Desert, California: Environmental Management, v. 19, no. 1, p. 65–74.

Bolling, J.D. and L.R. Walker 2000. Plant and soil recovery along a series of abandoned desert roads. Journal of Arid Environments 46: 1–24.

CNPS 2008. California On-line Inventory of Rare and Endangered Plants of California. Available online at: http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi

California Natural Diversity Database 2009 (CDFG 2009). RareFind Version 3.1.0 California Department of Fish and Game. Accessed February 2009.

Cole, D.N. and Bayfield, N.G. 1993 Recreational Trampling Of Vegetation: Standard Experimental Procedures. Biological Conservation 63: 209-215

Davidson, E. and M. Fox. 1974. Effects of off-road motorcycle activity on Mojave Desert vegetation and soil. Madroño 22: pp. 381-412.

Harrison, S. 1999. Local and regional diversity in a patchy landscape: native, alien, and endemic herbs on serpentine. Ecology 801(1): pp. 70-80.

Harrison, S. and E. Bruna. 1999. Habitat fragmentation and large-scale conservation: What do we know for sure? Ecography, Volume 22, Issue 3, pp. 225-232.

Harrison, S., Safford, H.D., Grace, J.B., Viers, J.H. and Davies, K.F. 2006. Regional and local species richness in an insular environment: serpentine plants in California. Ecological Monographs, 76 (1): pp. 41-56.

Hickman, James C. (ed.). 1993. The Jepson Manual. Berkeley, CA: University of California Press.

Lovich, J.E., and D. Bainbridge. 1999. Anthropogenic degradation of the southern California desert ecosystem and prospects for natural recovery and restoration: Environmental Management, v. 24, no. 3, p. 309–326.

MacDonald, L. H. 2000. Evaluating and managing cumulative effects: process and constraints. Environmental Management Vol. 26, No. 3, pp. 299-315.

Mack R. N., Simberloff D, Lonsdale WM,Evans H, Clout M, Bazzaz FA. 2000. Biotic invasions: Causes, epidemiology, global consequences and control. Ecological Applications 10: 689–710.

Miller, T.R. 2009. Shasta-Trinity National Forest Public Wheeled Motorized Travel Management EIS: Biological Evaluation of Potential Effects to Threatened, Endangered and Sensitive Plant Species, USDA Forest Service, Shasta-Trinity National Forest

Nakamura, G. and J. K. Nelson. 2001. Illustrated field guide to selected rare plants of Northern California. University of California Agriculture and Natural Resources Publication 3395, Oakland, CA.

National Forest Management Act. 1976. Available online at: http://www.fs.fed.us/emc/nfma/includes/NFMA1976.pdf.

NatureServe 2008. NatureServe Conservation Status. Version 7.0 (1 February 2008). Data last updated June 2008. http://www.natureserve.org/explorer/ranking.htm#global. Data accessed July 2008.

Ouren, D.S., Haas, Christopher, Melcher, C.P., Stewart, S.C., Ponds, P.D., Sexton, N.R., Burris, Lucy, Fancher, Tammy, and Bowen, Z.H. 2007. Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources: U.S. Geological Survey, Open-File Report 2007-1353, 225 pages

Powell, B.E. 2001 Rare Plant Management on the National Forests and Grasslands in California chapter in Tibor D. P. [ed.] 2001 CNPS inventory of rare and endangered plants of California, 6th ed. California Native Plant Society, Sacramento, California, USA .

Resource Planning Act. 1974. Available online at: http://www.ncrs.fs.fed.us/4801/national-programs/rpa/.

Safford, H., Viers, J.H., and S. Harrison. 2005. Serpentine endemism in the California flora: a database of serpentine affinity. Madroño 52(4): pp. 222-257.

Spellerburg, I.F., and Morrison, T., 1998, The ecological effects of new roads–A literature review: Wellington, New Zealand, New Zealand Department of Conservation, Technical Report, 55 p.

Trombulak, S.C., and C.A. Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14(1):18-30.

USDA Forest Service, Shasta-Trinity National Forest. 1995. Land and Resource Management Plan.

USDA Forest Service. 1997. Forest Service Manual. Available online at http://www.fs.fed.us/im/directives/dughtml/fsm.html. Updated November 1997.

USDA Forest Service 2000. Forest Service Habdbook. Available online at: http://www.fs.fed.us/im/directives/dughtml/fsh_1.html.

USDA Forest Service. 2003. Herger-Feinstein Quincy Library Group Forest Recovery Act Final Supplemental Environmental Impact Statement. Biological Evaluation Assessment for Threatened, Endangered or Sensitive Plant Species. USDA Forest Service, Pacific Southwest Region, Vallejo, CA. July 2003. 68 pages.

USDA Forest Service. 2006. Region 5 sensitive species list, plant species update.

USDI. U. S. Fish and Wildlife Service (USFWS). 2009. Arcata Fish and Wildlife Office Species List Search Page. Located on-line at http://www.fws.gov/arcata/specieslist/search.asp. Last accessed May 20, 2009

Vollmer, A.T., Maza, B.G., Medica, P.A., Turner, F.B., and S.A. Bamburg. 1976. The impact of off-road vehicles on a desert ecosystem. Environmental Management 1: 115-129.

Von der Lippe, M. and I. Kowarik. 2007. Long-distance dispersal of plants by vehicles as driver of plant invasions. Conservation Biology, 21 (4), 986-996.

Walker, D.A., and Everett, K.R., 1987, Road dust and its environmental impact on Alaskan taiga and tundra: Arctic and Alpine Research, v. 19, no. 4, p. 479–489.

Whittaker, R.H. 1954. The ecology of serpentine soils. Ecology 35(2): 258-288.

Wilshire, H.G., Shipley, S., and Nakata, J.K. 1978. Impacts of off-road vehicles on vegetation: Transactions of the North American Wildlife and Natural Resources Conference, v. 43, p. 131–139.

NNIS

Belcher, J.W. and S.D. Wilson 1989. Leafy Spurge and the Species Composition of a Mixed-Grass Prairie, Journal of Range Management, Vol. 42, No. 2 (Mar., 1989), pp. 172-175

Brooks, M.L. 1995. Benefits of protective fencing to plant and rodent communities of the western Mohave Desert, California. Environmental Management 19 (1): pp. 65-74.

Brooks, M.L.; Lair, B. 2005. Ecological effects of vehicular routes in a desert ecosystem. Report prepared for the United States Geological Survey, Recoverability and Vulnerability of Desert Ecosystems Program (http://geography.wr.usgs.gov/mojave/rvde).

Byers, J.E. 2002. Impact of non-indigenous species on natives enhanced by anthropogenic alteration of selection regimes. OIKOS 97:3 pp. 449-458.

California Department of Food and Agriculture (CDFA). 2004. ENCYCLOWEEDIA: Notes on identification, biology, and management of plants defined as noxious weeds by California law. http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm. Accessed December 2004.

California Department of Food and Agriculture(CDFA). 2007. Noxious weed pest ratings. Accessed at http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/pdfs/noxiousweed_ratings.pdf. Last updated January 2007.

Cal-IPC. 2006. California invasive plant inventory. Cal-IPC Publication 2006-02, California Invasive Plant Council, berkeley, CA. Available: www.cal-ipc.org.

Christen, D.C; Matlack, G.R. 2008. The habitat and conduit functions of roads in the spread of three invasive plant species. Biological Invasions 11: 453–465.

Gelbard, J. L. and J. Belnap. 2003. Roads as conduits for exotic plant invasions in a semiarid landscape. Conservation Biology 17: 420-432.

Gelbard, J.L.; Harrison, S. 2003. Roadless habitats as refuges for native grasslands: Interactions with soil, aspect, and grazing. Ecological Applications 13(2): 404–415.

Lonsdale, W.M. and Lane, A.M. 1994. Tourist vehicles as vectors of weed seeds in Kakadu National Park, northern Australia Biological Conservation 69: 277-283

Mack RN, Simberloff D, Lonsdale WM,Evans H, Clout M, Bazzaz FA. 2000. Biotic invasions: Causes, epidemiology, global consequences and control. Ecological Applications 10: 689–710.

Mack R.N. and M. Lonsdale 2001. Humans as Global Plant Dispersers: Getting More Than We Bargained For. BioScience. Vol. 51 No. 2 pp: 95-102.

Nelson, J. 2007. Shasta-Trinity National Forest Invasive Plant Prevention & Management--Best Management Practices (Proposed Oct. 17, 2007). Unpublished Forest Service Document.

Ouren, D.S., Haas, Christopher, Melcher, C.P., Stewart, S.C., Ponds, P.D., Sexton, N.R., Burris, Lucy, Fancher, Tammy, and Bowen, Z.H., 2007, Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources: U.S. Geological Survey, Open-File Report 2007-1353, 225 pages

Parendes, L.A. and Jones, J.A. 2000. Role of light availability and dispersal in exotic plant invasion along roads and streams in the H.J. Andrews Experimental Forest, Oregon. Conservation Biology 14 (1): 64-75

Prose, D. V., S. K. Metzger, and H. G. Wilshire.1987. Effects of substrate disturbance on secondary plant succession: Mojave Desert, California. Journal of Applied Ecology 24:305-313.

Sax D.V. 2002. Native and naturalized plant diversity are positively correlated in scrub communities of California and Chile. Diversity and Distributions 8:193–210.

Schmidt, W. 1989. Plant dispersal by motor cars. Vegetatio 80: 147-152.

Sher A.A, D.L Marshall, and J.P. Taylor. 2002. Establishment Patterns of Native Populus and Salix in the Presence of Invasive Nonnative Tamarix. Ecological Applications, 12(3), pp. 760–772.

Trombulaak, S.C.; Frissell, C. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14(1): 18–30.

Tyser R.W.; Worley, C.A. 1992. Alien flora in grasslands adjacent to road and trail corridors in Glacier National Park, Montana (U.S.A.). Conservation Biology 6(2): 253–262.

USDA Forest Service. 1995. Forest Service Manual, Chapter 2080. Noxious weed management.

Von Der Lippe, M.; Kowarik, I. 2007. Long-distance dispersal of plants by vehicles as a driver of plant invasions. Conservation Biology 21(4): 986–996.

Visual Resources

USDA Forest Service. 1995. Shasta-Trinity National Forest land and resource management plan. Shasta-Trinity National Forest, Supervisor's Office, Redding, CA. Pp. 4-27–4-28.

USDA Forest Service. 1974. National Forest landscape management, Volume 2, Chapter 1 of the Visual Management System.

Inventoried Roadless Areas

Bilby, R.E.; Sullivan, K.; Duncan, S.H. 1989. The generation and fate of road-surface sediment in forested watersheds in southwestern Washington. Forest Science 35(2): 453–468.

Sheridan, G.J.; Nashe, P.J.; Whipp, R.K.; Wijesinghe, N. 2006. The effect of truck traffic and road water content on sediment delivery from unpaved forest roads. Hydrological Processes 20: 1683–1699.

USDA Forest Service. 1995. Shasta-Trinity National Forest land and resource management plan. Shasta-Trinity National Forest, Supervisor's Office, Redding, CA.

Socio-Economics

California Department of Finance. 2008. <www.dof.ca.gov> Accessed October 30, 2008.

Cann, B. 2009. Outdoor recreation planner. DOI Bureau of Land Management, Arcata Field Office. Email correspondence, February 18, 2009.

Cordell, H.K.; Overdevest, C. 2001. Footprints on the land: An assessment of demographic trends and the ruture of natural lands in the United States. Sagamore Publishing.

English, D.B.K.; Kocis, S.M.; Zarnoch, S.J.; Arnold, J.R. 2008. Forest Service national visitor use monitoring process: Research method documentation. USDA Forest Service. May 2001. <http://www.fs.fed.us/recreation/programs/nvum/methods/methods052001.rtf> Accessed November 14, 2008.

Fischer, G. 2001. Communities of interest: Learning through the interaction of multiple knowledge systems. Center for Life Long Learning and Design, University of Colorado, Boulder. 13 p.

Headwaters Economics. 2007. Economic Profile System (EPS). 2007 Version. <www.headwaterseconomics.org> October 23, 2008.

Minnesota IMPLAN Group (MIG). 2006. 2006 IMPLAN Data.

Seesholtz, D.; Wickwar, D.; Russell, J. 2004. Social economic profile technical guide. USDA Forest Service Inventory Monitoring Institute.

State of California. 2008. Department of motor vehicles. Annual reports of off highway vehicles currently registered.

Stynes, D.J.; White, E.M. Spending profiles of National Forest Visitors, NVUM four year report. Joint venture agreement between USDA Forest Service IMI and Michigan State University, Joint Venture Agreement # 01-JV-11130149-203. May 2005.

US Bureau of Labor Statistics. 2008. <www.bls.gov> Accessed October 30, 2008.

US Bureau of Labor Statistics. 2008. North American Industry Classification System (NAICS) <www.bls.gov/bls/naics> Accessed October 30, 2008.

US Census Bureau. 2006. American Community Survey 2006. Accessed via American Fact Finder. <www.factfinder.census.gov> Accessed October 23, 2008.

US Census Bureau. 2008. Guidance on the presentation and comparison of race and Hispanic origin data. <http://www.census.gov/population/www/socdemo/compraceho.html> Accessed October 30, 2008.

US Census Bureau. 2008. US Census 2000. Accessed via American Fact Finder. <factfinder.census.gov> Accessed October 23, 2008.

US Census Bureau. 2008. Small area income and poverty estimates. <http://www.census.gov/hhes/www/saipe/> Accessed December 9, 2008.

USDA Forest Service. 1992. Forest Service Manual 1900 – Planning (FSM 1900). Amendment No. 1900-92-2. Washington D.C.

USDA Forest Service, 2009. Inventory and Monitoring Institute. "Instructions for using the Travel Management Economic Contribution Applications (TMCA)." May 12, 2009

USDA Forest Service. 2008. NRIS NVUM-HD 1.2.2.33. Accessed October 23, 2008

USDA Forest Service. 2008. Shasta-Trinity National Forest. General forest history. <www.fs.fed.us/r5/shastatrinity/about/index> Accessed October 30, 2008.

USDA Forest Service. 2009. Shasta-Trinity National Forest. schedule of proposed actions (SOPA) report. February 6.

USDA Forest Service. 1995. Shasta-Trinity National Forest land and resource management plan. Shasta-Trinity National Forest, Supervisor's Office, Redding, CA.

Zaffarano, S. 2009. Outdoor recreation planner, DOI Bureau of Land Management, Redding Field Office. Personal interview, February 5.

Transportation

Region 5 Regional Office. 2008. Road annual maintenance cost: Rd maint costing spd_041608.xls

Region 5 Regional Office. 2009. R5 calculated DM.xls

USDA Forest Service. 2009. Tahoe National Forest motorized trail annual maintenance cost: Local data not available; information is from Tahoe National Forest; Tahoe Engineering Chapter 3deis_vol_3e.pdf

Geology

Alexander, E.B. 2001. Trinity serpentine soil survey. Shasta-Trinity National Forest.

FSM Minerals and Geology, Chapter 2880-Geologic Resources, Hazards, and Services.

USDA Forest Service; USDI Bureau of Land Management. 1994. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl (Northwest Forest Plan), section C-Riparian Reserves.

USDA Forest Service. 1995. Shasta-Trinity National Forest land and resource management plan. (Chapter 4, Management Direction and Special Area Management; and subsection 4, Riparian Reserves.) Shasta-Trinity National Forest, Supervisor's Office, Redding, CA.

USDA Forest Service; USDA Soil Conservation Service. 1994. Soil survey of Shasta-Trinity Forest area, California.

Air Quality

Agency for Toxic Substances and Disease Registry. 2001a. ToxFAQs – Asbestos CAS# 1332-21-4. U.S. Department of Health and Human Services, Public Health Service.

Agency for Toxic Substances and Disease Registry. 2001b. Toxicological profile for asbestos. U.S. Department of Health and Human Services, Public Health Service. 441 p.

Agency for Toxic Substances and Disease Registry. 2005. Limiting environmental exposure to asbestos in areas with naturally occurring asbestos. U.S. Department of Health and Human Services, Public Health Service.

Ahuja, S. 2009. Gemmill Thin Project final environmental impact statement air quality specialist report. USDA Forest Service Shasta-Trinity National Forest, Redding, CA.

EPA Green Book. Access at http://www.epa.gov/air/oaqps/greenbk/.

EPA, 2007. State of Knowledge paper. Access at http://www.epa.gov/climatechange/science/stateofknowledge.html

Intergovernmental Panel on Climate Change (IPCC, 2007). Access at http://www.ipcc.ch/

National Institute of Standards and Technology. 2007. Material safety data sheet packet (MSDS 1966b)–Common commercial asbestos. National Institute of Standards and Technology, Standard Reference Materials Program, Gaithersburg, MD.

Rust, B. 2009. Sampling Results: Naturally occurring asbestos–Trinity Lake sediments STNF. USDA Forest Service Shasta-Trinity National Forest, Redding, CA.

State of California. 2000. A general location guide for ultramafic rocks in California–Areas more likely to contain naturally occurring asbestos. Open-file report 2000-19. Department of Conservation, Division of Mines and Geology.

U.S. Environmental Protection Agency (EPA). 2008. Naturally occurring asbestos: Approaches for reducing exposure. Office of Superfund Remediation and Technology Innovation, EPA 542-F-08-001.

USDA Forest Service. 2009. Region 5 Regional Forester letter on naturally occurring asbestos. February 11, 2009. Region 5, Vallejo, CA.

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