3.03. Terrestrial and Aquatic Species

Introduction

Management of wildlife 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 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. 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 public motorized travel can affect wildlife by increasing human-caused mortality, causing changes in behavior due to disturbance, and habitat modification (Gaines et al. 2003, Trombulak and Frissell 2000, USDA Forest Service 1998). It is Forest Service policy to minimize damage to vegetation, avoid harassment to wildlife, and avoid significant disruption of wildlife habitat while providing for motorized public use on NFS lands (FSM 2353.03(2)). Therefore, management decisions related to public motorized travel on NFS lands must consider effects and wildlife and their habitat.

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

Management direction relevant to the Proposed Action as it affects terrestrial and aquatic biota 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.
- **Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act**: The bald eagle was listed by the USDI Fish and Wildlife Service as a federally endangered species under the Endangered Species Act in 1978, reclassified to Threatened status in 1995, and delisted in 2007. Even though they are delisted, bald eagles are still protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. These Acts require some

measures to prevent bald eagle "take" resulting from human activities. Following delisting, the bald eagle was placed on the Region 5 Regional Forester's Sensitive Species List (USDA Forest Service 1999). In the sections below, this document and the Biological Evaluation for the Tahoe NF Motorized Travel Management Project, which is incorporated by reference, analyzes and discloses effects of the alternatives.

- **Migratory Landbird Conservation on the Tahoe National Forest:** 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.

  As part of the Travel Management process, the Tahoe National Forest has conducted an assessment of existing roads and trails within Forest boundaries. Any new construction, reconstruction and maintenance of system roads or trails will be conducted under a separate NEPA analysis and decision. Because current travel management efforts are directed at identifying which existing unauthorized routes will be formally added to the NFTS while prohibiting cross country travel, and because there is no expectation of new construction or development, no changes in the distribution or abundance of habitats available to migratory birds are anticipated. Changes in authorization are not anticipated to contribute to measurable increases in use levels, but the prohibition of cross country travel is expected to result in less use across the landscape. Therefore habitat functionality and levels of disturbance related to use are expected to remain similar to or less than pre-decisional levels.
- **Forest Service Manual and Handbooks (FSM/H 2670)**: Forest Service Sensitive (FSS) species are animal and plant 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 and referenced in this Chapter.
- **Sierra Nevada Forest Plan Amendment (SNFPA)**: The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment identified the following standards and guidelines applicable to motorized travel management and terrestrial biota, which will be considered during the analysis process:
  - **Wetland and Meadow Habitat** (Management Standard & Guideline 70): Avoid wetlands or minimize effects to natural flow patterns in wetlands and avoid road construction in meadows.
  - **California Spotted owl and Northern Goshawk**: Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb nest sites (Management Standard & Guideline 82).

- **Fisher and Marten**: Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites (Management Standard & Guidelines 87 and 89).

- **Riparian Habitat**:
  - Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives (RCOs) at the project level and the AMS goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species (Management Standard & Guideline 92).
  - As part of project-level analysis, conduct peer reviews for projects that proposed ground-disturbing activities in more than 25 percent of the RCA or more than 15 percent of a CAR (Management Standard & Guideline 94).
  - Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity (RCO#2, Management Standard & Guideline 100).
  - Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic-dependent species. Locate water drafting sites to avoid adverse effects to in stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features (RCO#2, Management Standard & Guideline 101).
  - Prior to activities that could adversely affect streams, determine if relevant stream characteristics are within the range of natural variability. If characteristics are outside the range of natural variability, implement mitigation measures and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs (RCO#2, Standard and Guideline 102).
  - Identify roads, trails, OHV trails and staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits, and day-use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic and riparian-dependent species. At the project level, evaluate and consider actions to ensure consistency with standards and guidelines or desired conditions (RCO#3, Management Standard and Guideline 116).

- **Management Indicator Species(MIS) (1982 Planning Rule) (36 CFR 219):** Management indicator species are animal species identified in the 2007 Sierra Nevada Forest MIS Amendment Record of Decision, which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CRF 219). Guidance regarding

management indicator species (MIS) set forth in the Tahoe NF LRMP as amended by the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (USDA Forest Service 2007a) directs Forest Service resource managers to *(1)* at the project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and *(2)* at the bioregional scale, monitor populations and/or habitat trends of MIS. Although, the 2007 SNF MIS Amendment exempted the Tahoe NF Motorized Travel Management Project from adopting the newly amended MIS list, the ROD provides the deciding officer the discretion to elect to apply the new project-level analysis requirements. The Tahoe NF Forest Supervisor has elected to apply the new project-level analysis requirements to this project. Therefore, in the sections below, this document and the Tahoe NF Travel Management Project-Level MIS report, which is hereby incorporated by reference, evaluates and discloses the impacts of the alternatives on the habitat of the twelve (12) Management Indicator Species (MIS) identified in the Tahoe NF LRMP (USDA 1990) as amended by the 2007 SNF MIS Amendment ROD.

- **Tahoe NF Land and Resource Management Plan (Tahoe LRMP):** The Record of Decision (ROD) for the 1990 Tahoe LRMP identified the following standards and guidelines applicable to motorized travel management and terrestrial biota, which will be considered during the analysis process:
- **Deer Habitat Management (Management standard and guideline)**: Limit vehicle access on key deer winter ranges when deer are present. Also limit vehicle access in key summer range habitats during periods of migration and fawning. Retain or establish roadside screening along open roads in areas important for migration, fawning, or concentrated seasonal use.
- **Meadow Edge Habitat (Management standard and guideline)**: Locate roads away from meadow edges where alternative routes are available.

Additional species-specific standards and guidelines are identified below under species effects analysis.

Background on Effects to Terrestrial and Aquatic Habitat

In recent years, the increasing demand for motorized recreational opportunities on NFS lands has lead to controversy over the potential effects of this use on wildlife. Several scientific papers and literature reviews have been written on the interaction between the motorized roads and trails on terrestrial and aquatic wildlife species. The majority of the literature and reviews describe the interactions between wildlife and roads rather than wildlife and trails. Most of the research has focused on wide-ranging carnivores and ungulates (hoofed animals). Most commonly, interactions included displacement and avoidance where animals were reported as altering their use patterns in response to roads. Disturbance at specific sites are also commonly reported, such as disruption at breeding or wintering sites. Collision with vehicles is another common report. Edge effects and habitat fragmentation, especially in regard to late-seral coniferous forests is another commonly identified impact of roads.

The broad general impacts of motorized roads and trails to wildlife and aquatic species are described below (Trombulak and Frissell 2000):

- Increased terrestrial and aquatic species mortality from collision with vehicles
- Modification of animal behavior
- Alteration of the terrestrial and aquatic habitat
- Increased alteration and use of habitats by humans

These general impacts are included in the analysis procedure discussed in the Effects Analysis Methodology section. The causal factors are classified in that section as Disturbance, Habitat Modification, and Mortality.

Mortality from Collisions with Vehicles

Animal mortality or injury from collision with vehicles is well documented in the literature. Trombulak and Frissell (2000) reported animal mortality from vehicle collisions included a wide array of wildlife including deer, wolves, bear, hawks, owls, songbirds, snakes, lizards, and amphibians. Road associated mortally generally increases as traffic volume and speed increases. For large mammals, unpaved forest roads pose less of a concern of mortality or injury from vehicle related collisions. However, amphibians may be especially vulnerable to road collision mortality because their life history involves movement between wetland and upland habitats, and amphibians are inconspicuous and sometimes slow-moving (Trombulak and Frissell 2000). Raptors may also be vulnerable to collisions from forest roads and trails because of their foraging behavior (Loos and Kerlinger 1993); however, the most reports of raptor mortality are in association with highways.

Road and trail corridors may act as habitat sinks for wildlife that are attracted to corridors (Jalkotzy et al. 1997). Direct mortality of animals from vehicle collisions has been documented primarily in relation to paved roads and highways. Little scientific information is available about vehicle collisions on forest roads or motorized trails, though some mortality from use of forest roads and motorized trails is to be expected depending on the type of trail and the amount of use a trail receives.

Indirect mortality along roads and trails is associated with human access. Wildlife populations of hunted and trapped species are subject to increased mortality due to better access by humans. Interior-forest birds breeding adjacent to roads and trails may receive higher nest predation by a variety of bird and mammal predators and some songbird species have shown to have increased brown-headed cowbird parasitism rates.

Modification of Animal Behavior

A road or trail may modify the behavior of animals positively or negatively. Behavior modifications include changes or shifts in home range, changes in movement patterns, loss of reproductive success, flight or escape response, and changes in physiological condition. Some wildlife species are more sensitive to well-traveled roads as opposed to motorized roads and trails that are only used by high clearance 4-wheel drive, motorcycle and all-terrain vehicles (ATVs). Other wildlife is more sensitive to

the latter. In general, all roads and trails, depending on the type of vehicle and the amount of use, have some type of positive or negative impact of wildlife.

The most common interaction identified in literature between motorized roads and trails and wildlife species were displacement and avoidance, which altered habitat use (Kasworm and Manley 1990, Mace et al. 1996 *In:* Gaines et al. 2003). Wildlife often avoids habitats in the vicinity of roads because of repeated disturbances along the corridor (Jalkotzy, et al. 1997). Studies indicated both black bears and grizzly bears shifted their home ranges away from areas of high road density to areas of lower road densities (Brody & Pelton 1989, McLellan & Shackelton 1988). Road avoidance may vary seasonally. Both grizzly and black bears tended to avoid roads less in the spring than in the fall. Elk also avoided roads less in the spring and more in the fall.

Roads may affect the reproductive success of some species. Bald eagles in Oregon and Illinois showed declines in nesting productivity the closer the proximity to roads. Bald eagle nests were preferentially selected away from roads (Trombulak and Frissell 2000).

Havlick (2002) documented numerous studies that show wildlife, including birds, reptiles, and large ungulates, respond to disturbance with accelerated heart rate and metabolic function, and suffer from increased levels of stress. These factors can lead to displacement, mortality, and reproductive failure. Wildlife was also reported to avoid areas with high levels of disturbance.

The impacts of motorized vehicles to terrestrial wildlife can include disturbance from noise generated by OHVs. Determining the effects of noise on wildlife is complicated because responses vary between species. The variation in responses is based upon the type of noise and its duration, frequency, the magnitude, location, the species life history characteristics, habitat type, season, activity at time of exposure, and whether other environmental stresses are occurring coincident to exposure of noise (Busnel 1978 *In*: Radle 1999, Steidl and Powell 2006). Effects of noise can cause physiological responses in wildlife including increased heart rate and altering metabolism and hormone balance. Behavioral responses can include head raising, body shifting, short distance movements, flapping of wings (birds), and escape behavior. Together these effects potentially can lead to bodily injury, energy loss, decrease in food intake, habitat avoidance and abandonment, and reproductive loss. The vast majority of studies conducted on wildlife effects from road and trail-associated noise has been done for bird species.

Many studies have reported interactions between roads and ungulates, particularly elk and deer. Some of the studies are contradictory. Rost and Bailey (1979) reported that elk and mule deer avoided roads within a 200 meter distance. Thomas et al. (1979) indicated that roads open to vehicular traffic will adversely affect the use of an area by elk and, to a lesser extent, by deer.

Alteration of Terrestrial and Aquatic Wildlife Habitat

Forest roads and trails change the biological and physical conditions on and adjacent to them, creating edge effects with influences beyond the extent of the road prism (Trombulak and Frissell 2000). Trombulak and Frissell (2000) describe eight physical characteristics that are altered by roads: soil density, temperature, soil water content, light, dust, surface-water flow, pattern of run-off, and sedimentation.

Long term use of roads causes soil compaction that lasts long after road use is discontinued. Increases in soil density on decommissioned roads can persist for decades.

Potential Effects of Habitat Alteration to Aquatic Species Habitats: Trombulak and Frissell (2000) report that surface temperature of a road increases as water vapor transport decreases. Heat stored on the road surface is released in the atmosphere at night, creating heat islands around roads. Small birds and snakes are attracted to warm roads and increase their risk of mortality from vehicle collision.

Road crossings may fragment stream habitat by acting as barriers to movement of fish and amphibians. Long term barriers can prohibit migration and create isolation in aquatic species, and ultimately reduce distribution and productivity of a population. Stream crossings may also degrade stream and riparian habitat depending on the location of the crossing and the type of substrate.

Roads can change the hydrology of slopes and stream channel characteristics which result in changes to surface-water habitats that may be detrimental to aquatic dependent species. Roads in floodplains may redirect water, sediment and nutrients, causing degradation to wetland and riparian habitats. Roads may alter surface or subsurface flow and can destroy and create wetland habitats. Erosion through channel down cutting, gully formation or head cuts may result when high concentration of runoff on hillslopes is caused by changes in routing of shallow groundwater and surface flow. These processes can be detrimental to aquatic species far downstream for a long period of time. In addition, chronic effects from fine sediment transported from unpaved roads to streams, lakes, and wetlands, increases turbidity, reducing productivity and survival or growth of fishes.

Bury (1980) reported that motorized vehicles crossing creeks pose some risk of gas and oil leaks into the creek. Oil and gas have been shown to have negative effects to the growth and survival in several frog species (Pollet and Bendell-Young 2000; Irwin et al. 1999, Lefcorte et al. 1997).

Potential Effects of Habitat Alteration to Terrestrial Wildlife Habitats: Forest roads and trails can both enhance and decrease habitat for wildlife (Jalkotzy et al. 1997). The road or trail creates edge habitat for species that are habitat generalists, particularly for some mammal species (e.g., coyote and deer mice) and some songbird species. Ravens are more common along roads since carrion is more available along these corridors. For habitat specialists, such as interior dwelling species that require intact, undisturbed patches of habitat such as the American marten and the spotted owl, roads can fragment habitat. Roads and trails can also fragment or disrupt habitat indirectly by introducing exotic or noxious weeds. In addition roads can increase pollutants like dust and vehicle emissions that can contaminate roadside vegetation which wildlife feed upon.

Increased Alteration and Use of Habitats by Humans

Several studies have indicated that high road densities result in adverse impacts on certain wildlife species. Impacts from high densities include excessive harvest including legal and illegal, disturbance/harassment from noise, and habitat alteration. Brocke et al. (1988) reported that high road densities can elicit a variety of negative impacts of certain wildlife species. These effects include human disturbance. In Adirondack counties, the black bear population density index (based on the number of

legal kill) showed a ten-fold decrease when road density increased by ten times. Other studies were cited as showing similar sensitivity to road density for other large predators and ungulates.

Wildlife Effects Analysis Methodology

The Tahoe National Forest (NF) is one of ten national forests within the Sierra Nevada bioregion. The varied landscapes of the Sierra Nevada support a rich diversity of plant and animal species, some of which are found only in the Sierra Nevada. Species vary greatly in abundance and distribution, from very abundant and widespread to extremely rare and locally distributed, and all combinations in between. More than 550 vertebrate species have been identified in the Sierra Nevada bioregion, including approximately 30 amphibian, 35 reptile, 130 mammal, 270 bird, and 95 fish species (SNFPA 2001, Appendix R).

This assessment consists of 4 steps: (1) identify wildlife species (and species groups) that allow for an informed analysis of alternative effects; (2) identify road and trail associated factors for each group; (3) develop and apply assessment processes and GIS models to evaluate the influence of road and trail associated factors on each group; and (4) analyze the effects of the proposed alternatives based on the model outputs and analyses.

Step 1. Identify wildlife species and groups

Existing information and knowledge about the distribution of the terrestrial and aquatic species on the Tahoe NF were used to develop the list of species and to develop species groups. Federally listed species, Forest Service Sensitive Species, Management Indicator Species, and other species were selected and placed into species groups based on the potential for these species or their habitats to be affected by motorized vehicle use on the Tahoe NF. Local knowledge and sources included corporate databases including distribution of special status species, vegetation maps, etc., which were used to develop species or habitat groups. Table 3.03-1 provides a list of all the special status species described by status, habitat indicator, and distribution on the Tahoe NF.

Table 3.03-1. List of Tahoe NF Special Status Species by Habitat Indicator and Distribution[1]

Species	Federally Listed	Forest Service Sensitive	Management Indicator Species	Other Species of Concern	Indicator Habitat or Ecosystem Component	Distribution on Tahoe NF
American Marten		X	X		Late-seral closed canopy coniferous forests	Forest-wide
Aquatic macro - invertebrates			X		Riverine and lacustrine habitats	Forest-wide
Bald Eagle		X			Mature conifer forest near large bodies of water	Nests near or adjacent to specific reservoirs on theTahoe NF
Band-tailed Pigeon				X	Oak-associated Hardwood and Hardwood/conifer	Forest-wide
Black Bear				X	Early- and late-seral stages within all forest types	Forest-wide
Sooty (Blue) Grouse			X		Late-seral open canopy coniferous forests	Forest-wide

Species	Federally Listed	Forest Service Sensitive	Management Indicator Species	Other Species of Concern	Indicator Habitat or Ecosystem Component	Distribution on Tahoe NF
California Floater (mollusk)		X			In fairly large streams and lakes, in relatively slow currents on soft substrates (mud-sand)	Not known to occur on the TNF, historically documented in Donner Lake adjacent to the Tahoe NF.
California Red-legged Frog	X				Cold water ponds and stream pools with depths exceeding 0.7 meters and with overhanging vegetation such as willows, as well as emergent and submergent vegetation	Suitable habitat on west side of TNF below 4,000 ft;. no known occupied habitat on TNF; 3 known populations on private land adjacent to TNF.
California Spotted Owl		X	X		Mature and late-seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir), tree size 4 & 5 (canopy closures M and D), and tree size 6	Forest-wide
California Wolverine		X			Various habitat types used, coniferous forests, subalpine and alpine areas above 8,000 ft.	Verified detections on the eastside of the Tahoe NF.
Coniferous forest birds				X	Coniferous forests, all seral stages, all canopy closures	Forest-wide
Foothill Yellow-legged Frog		X			Shallow, slow flowing water of rocky streams and rivers in a variety of habitats including riparian, mixed conifer, and wet meadow types below 6000 feet elevation on the west slope of the Sierra Nevada	Below 6000 feet elevation on the west slope of the Tahoe NF
Fox Sparrow			X		Shrubland (west-slope chapparral types)	Westside of the Tahoe NF on the Yuba River Ranger District and American River Ranger District.
Great Gray Owl		X			Mature and late-seral conifer forest adjacent to meadows	One recent confirmed sighting on TNF, but breeding has not been verified. Recent sightings on private land.
Greater Sandhill Crane		X			Wet meadow, shallow lacustrine, and fresh emergent wetland habitat	Only known breeding at Kyburz Flat and Carman Valley on Sierraville RD Reported on pvt land in Sardine Valley.

Species	Federally Listed	Forest Service Sensitive	Management Indicator Species	Other Species of Concern	Indicator Habitat or Ecosystem Component	Distribution on Tahoe NF
Great Basin Ramshorn Snail		X			Lakes and larger, slow streams in and around the northern Great Basin; suitable habitat on TNF within slow segments of the Truckee and Little Truckee Rivers and tributaries	No verified locations on TNF; historically found in the Truckee River downstream of Lake Tahoe, on the LTBMU
Hairy Woodpecker			X		Medium and large snags in green forest	Forest-wide
Hardhead (fish)		X			Great Valley and Foothill belts, and in larger west-slope streams into the Yellow pine belt	No verified locations on TNF; historic report on Sierraville RD
Lahontan Cutthroat Trout	X				Historically and currently occupied streams and lakes	Limited distribution on Sierraville and Truckee ranger districts
Lahontan Lake Tui Chub (Fish)		X			Lakes and reservoirs, known only from Pyramid Lake and Lake Tahoe.	Possible population in Stampede, Boca and Prosser Reservoirs on the Tahoe National Forest.
Mountain Quail			X		Early- and mid-seral coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, eastside pine, tree sizes 1, 2, and 3, all canlopy closures	Forest-wide
Mountain Yellow-legged Frog		X			Low gradient (up to 4%) perennial streams and lakes above 4500 feet elevation	Locations above 4,500 ft. on the TNF, has disappeared from many historic locations on the Tahoe NF
Mule Deer			X		Uses a variety of habitats Forest-wide including mid, early, and late-seral forests; meadows; riparian areas; and shrublands MIS indicator habitat - Oak-associated Hardwood & Hardwood/conifer	Indicator habitat occurs on the westside of the Tahoe NF. Deer populations occur forest-wide.
Northern Flying Squirrel			X		Late-seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir), tree size 5 (canopy closures M and D), and tree size 6	Forest-wide
Northern Goshawk		X			Mature and late-seral moderate to closed canopy, coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, east side pine, and lodgepole), tree size 4 & 5 (canopy closures M and D), and tree size 6	Forest-wide

Species	Federally Listed	Forest Service Sensitive	Management Indicator Species	Other Species of Concern	Indicator Habitat or Ecosystem Component	Distribution on Tahoe NF
Northwestern Pond Turtle		X			Ponds, marshes, rivers, and streams with rocky or muddy bottom and aquatic vegetation/ nest sites consist of sandy to very hard soil types, and can be as much as 325 feet from water (Zeiner et al. 1988)	Yuba River drainage
Pacific Fisher (mammal)		X			Mature and Late-seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir), tree size 4 & 5 (canopy closures M and D), and tree size 6	Suitable habitat only, Tahoe NF falls within identified fisher distribution gap
Pacific Tree Frog			X		Wet Meadow	Forest-wide
Pallid Bat		X			Affinity for oak and mixed hardwood conifer, Roost sites can include buildings, mines, caves, and live oak trees and oak snags.	Primarily below 6,000 feet. Documented at SVRD at Carman Valley.
Sierra Nevada Red Fox		X			Mature subalpine conifer forest and riparian/montane meadow	Suitable habitat, no known or verified detections
Western Gray Squirrel				X	Oak hardwood and mixed oak/conifer forest	Strongly tied to wesdie oak and oak/conifer forests
Western Red Bat		X			Riparian habitat and hardwoods within riparian areas; roosts within tree foliage or shrubs, and often along edge habitat adjacent to streams or open fields (Bolster 1998)	Habitat is generally below 3,000 feet, however detected at Carman Valley on the Sierraville RD at 6,000 ft
Wild Turkey				X	Oak hardwood and mixed oak/conifer forest	Primairly westside of Tahoe NF in suitable habitat
Willow Flycatcher		X			Riparian shrub (willow) and wet meadow	Occurs at discreet willow/meadow habitat on SVRD, TKRD, and YRRD.
Yellow Warbler			X		Riparian	Forest-wide

[1] Valley elderberry longhorn beetle is not included since their habitat is not on the Tahoe NF and are not affected by this project.

The species assessment presented here is organized by **Species Groups** divided along major habitat associations (for example, riparian habitat) or life zones (for example, terrestrial or aquatic). Projected effects of motorized vehicle travel management on sets of species in these major groupings are described. In addition, individual species assessments are presented for federally listed species, Forest Service Sensitive Species, and Management Indicator Species, and other species of concern. More detailed information is also found in the Biological Evaluation and Project-Level Management Indicator Species project report, and Tahoe NF Management Indicator Species report, which are incorporated by reference.

The species group assessment considers 36 species, including the special status species listed in Table 3.03-2. These include aquatic macroinvertebrates, 5 amphibian species, 2 aquatic invertebrate species, 3 fish species, 1 reptile species, 15 bird species, and 9 mammal species. These species were divided into species groups (some species occurred in more than one group) as described in Table 3.03-2.

Species not included in these assessments include the Valley elderberry longhorn beetle since their habitat is not on the Tahoe NF. Assessment for the Valley elderberry longhorn beetle is in the Biological Evaluation and incorporated by reference.

Table 3.03-2. Species group and species represented within groups

Species group	Species
Wide-ranging carnivores	Black bear, wolverine, Sierra Nevada red fox
Ungulates	Mule deer
Oak and oak-conifer associated species	Band-tailed pigeon, mule deer, pallid bat, wild turkey, western gray squirrel
Shrubland (west-slope chaparral) associated species	Fox sparrow
Early- and mid-seral coniferous forest associated species	Mountain quail
Late-seral open canopied coniferous forest	Sooty (blue) grouse
Old forest conifer (late-seral) associated species	California spotted owl, northern goshawk, great gray owl, American marten, Pacific fisher, northern flying squirrel, forest coniferous birds (e.g., brown creeper)
Snag associated species	Hairy woodpecker, pallid bat
Aquatic and riparian associated species [including lacustrine (lakes) and riverine habitat (rivers, streams)]	Bald eagle, great gray owl, greater sandhill crane, willow flycatcher, yellow warbler, aquatic macroinvertebrates, California floater, Great Basin ramshorn snail, Lahontan cutthroat trout, Lahontan tui chub, hardhead, California red-legged frog, foothill yellow-legged frog, mountain yellow-legged frog, Pacific tree frog, northwestern pond turtle, Sierra Nevada red fox, Western red bat.

Step 2. Identify road and trail-associated factors

Several studies have identified a classification or conceptual model of responses of wildlife to road and trail-associated activities (Knight and Cole, and Liddle *in* Gaines, et al. 2003). The causal factors were grouped by impact to wildlife into habitat alteration, mortality (including legal harvesting), and disturbance. (1) **Habitat alteration** occurs when habitat is modified through creation of a path, presence of food, or removal of vegetation. (2) **Mortality** is human-induced where there is a direct and negative impact on the animal such as hunting, fishing, poaching or illegal take, collision with vehicles, and other incidental contact which results in impacts similar to those from hunting. (3) **Disturbance** is when an animal sees, hears, smells, or otherwise perceives the presence of a human but no contact is made and it may or may not alter its behavior.

Based on a review of literature and local knowledge of selected species on the Tahoe NF, these three broad response classifications were used for this assessment. Refer to Table 3.03-3.

Table 3.03-3 lists the road and trail-associated response classifications, response factors and **definitions, and affected species groups**

Response Classification[2]	Road and trail – associated factors[1]	Definition of response factors	Species group affected
Habitat alteration	**Habitat loss and fragmentation**	Loss and resulting fragmentation of habitat due to the establishment of roads, trails, or networks, and associated human activities	• Wide-ranging carnivores • Ungulates • Old forest coniferous species • Early- and mid-seral coniferous pecies • Aquatic-Riparian species
	Edge effects	Changes to habitat microclimate associated with the edge induced by roads or trails	• Old forest conifer species
	Snag or downed log reduction	Reduction in density of snags and down logs due to their removal near roads as facilitated by road access (e.g., fuelwood gathering)	• Wide-ranging carnivores • Old forest coniferous species • Snag dependent species
	Route for competitors and predators	A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise	• Wide-ranging species • Ungulates • Old forest coniferous species • Early- and mid-seral species • Aquatic-Riparian associated • Oak-Associated hardwood & hardwood/conifer species • Snag-dependent species • Shrubland associated species
Mortality	**Hunting and trapping (legal harvest)**	Mortality from hunting or trapping as facilitated by road and trail access	• Wide-ranging carnivores • Ungulates • Oak Associated Species • Early- and mid-seral coniferous forest
	Poaching	Increased illegal take of animals as facilitated by trails and roads	• Wide-ranging carnivores • Ungulates • Oak Associated species • Early- and mid-seral coniferous forest
	Collisions	Mortality or injury resulting from a motorized vehicle running over or colliding with an animal	• Wide-ranging carnivores • Ungulates • Old forest coniferous species • Aquatic-Riparian species
	Collection	Collection of live animals for use as pets (such as amphibians and reptiles) as facilitated by the physical characteristics of roads or trails or by road or trail access	• Old forest coniferous species • Aquatic-Riparian species

Response Classification[2]	Road and trail – associated factors[1]	Definition of response factors	Species group affected
Disturbance	**Disturbance at a specific site**	Displacement of individual animals from a specific location (e.g., such as a site that is being used for reproduction and rearing of young)	• Wide-ranging carnivores • Ungulates • Old forest coniferous species • Early- and mid-seral species • Aquatic-Riparian associated • Oak-associated hardwood & hardwood/conifer species • Snag-dependent species • Shrubland associated species
	Physiological response	Increase in heart rate or stress hormones when near a road or trail or network of roads or trails leading to a potential loss of fitness	• Wide-ranging carnivores • Ungulates • Old forest coniferous species • Early- and mid-seral species • Aquatic-Riparian associated • Oak-Associated hardwood & hardwood/conifer species • Snag-dependent species • Shrubland associated species

[1] Based in part on Wisdom et al. 2000 In: Gaines et al. 2003

[2] **Disturbance** occurs when an animal sees, hears, smells, or otherwise perceives the presence of a human but no contact is made and it may or may not alter its behavior. **Habitat modification** is when habitat is changed in some way. **Mortality** involves human actions in which there is direct and damaging contact with the animal.

Step 3. Processes and models

The assessment process to analyze the effects of motorized travel routes (road and trails) on the Tahoe NF was done in three general steps: (1) Road density was derived within specific wildlife habitats, (2) the effects of travel routes to species groups were assessed based on a similar process completed by Gaines et al. 2003, and (3) the relative environmental risk of roads and trails to habitats was determined. Gaines et al. (2003) used an assessment process that utilizes focal species and groups and GIS models to evaluate road and trail associated influences to species and their habitats.

Step 4. Analysis of effects

The information generated in step 3 was used to analyze the direct, indirect and cumulative effects of the proposed alternatives on wildlife species and groups. Three primary indicators were used to compare and measure project effects of each alternative: density of motorized routes, miles of routes, and Zone of Influence of motorized routes. In addition, for species, such as spotted owls, goshawk, and bald eagles, for which disturbance from motorized use has the potential to effect reproductive status, disturbance to a specific site was analyzed. These measures, described in the next section, are used for relative comparisons of the alternatives. The analysis indicators are focused on assessing the effects of 1) **Prohibiting cross country travel**, 2) **Additions (user created roads/trails and temporary roads) to the NFTS**, 3) **Establishment of Motorized "Open Areas,"** 4) **Changes to the NFTS** including, change in class of vehicles, and change in season of use, and reopening Maintenance Level 1 roads to motorized use, and 5) **Amendments to the Forest Plan**.

Description of Indicators Used to Measure Effects of the Alternatives

Indicators used to measure effects are presented in the environmental consequences section to compare and contrast the effects of the action alternatives. Measures were selected for project effects based on a thorough review of literature on the interaction between wildlife and motorized routes. Because there are limited data and studies for many species, assumptions and generalizations were made for some species where no data were available. Generally, the risk factors described in the section above (habitat alteration, mortality, and disturbance, Table 3.03-3) were considered as well as other factors known to be important.

Three primary indicators were used to compare and measure project effects of each alternative: density of motorized routes, miles of routes, and Zone of Influence of motorized routes. 1) **Density of motorized routes** has often been used as a surrogate to estimate habitat effectiveness or the direct, indirect, and cumulative effects of motorized routes on terrestrial wildlife habitat. The density of motorized routes provides a way to assess the cumulative impact of motorized routes for the alternatives. 2) **Miles of motorized routes** are used to measure disturbance potential to aquatic and terrestrial wildlife species and their habitats. 3) The **Zone of Influence** is the portion of a species (or species group's) key habitat that is influenced by motorized routes from disturbance, mortality risk or habitat alteration. These measures are used for relative comparisons of the alternatives. Additional analysis measures were required for a few species, especially if directed by policy or regulation; for example, some species require analysis of disturbance at a specific site.

Density of Motorized Routes: Route density thresholds for wildlife have not been established on the Tahoe NF, and thresholds for wildlife in the literature can vary by season and by geographic location. Therefore, route density "thresholds" will not be used to determine effects of the action alternatives, but rather route density is used for a relative comparison of the alternatives. Route density was determined at the scale of 7th field watershed, since this scale is sufficiently large to accurately estimate road densities. Route densities at a larger scale could potentially mask route density effects and therefore, underestimate effects to wildlife species. Route densities at any smaller scale may actually be amplified and therefore overestimate the effects to wildlife. Route density calculations for Alternative 1 include existing unauthorized routes because use of these routes can be assumed to continue as part of continued cross country travel. Route density includes all motorized routes, including existing NFTS system, non-NFS routes, etc. because route density must be calculated across an area (miles per square mile), and therefore serves as a cumulative effects analysis. For the preparation of the DEIS, motorized route densities were prepared for several species as well as a generalized analysis not specific to any species; all of these analyses determined that the relative relationships remained the same regardless of species, thus the generalized table is shown under the section Summary of Effects Common to All Species in Table 3.03-4.

Miles of Motorized Routes: Use of motorized routes has the potential to affect wildlife in a number of ways, such as behavioral changes, increased stress or changes in reproductive success.

Miles of motorized routes is used in addition to route density because many motorized routes are difficult to assess on the scale of the entire forest. Overall miles of motorized routes on the Tahoe NF are used to compare differences in disturbance potential of motorized use among alternatives.

In addition to overall miles of motorized routes across the entire forest, it is important to analyze the disturbance potential at specific sites for some species. The number of miles of motorized routes within a particular distance to a species reproductive site can be used to determine the potential disturbance to wildlife species. The distance from a site used to analyze disturbance potential varies by each species' disturbance threshold based upon literature review. Species-specific disturbance potential of motorized routes was compared for California spotted owl and the northern goshawk reproductive sites (nests or activity centers). In addition, the number of miles of motorized routes occurring within spotted owl Protected Activity Centers (PACs) and Home Range Core Areas (HRCAs) and goshawk Protected Activity Centers (PACs) were also compared by alternative.

Zone of Influence: Motorized routes have a Zone of Influence within which habitat effectiveness or suitability is reduced and wildlife population densities are lower (Trombulak and Frissell 2000, Gaines, et al. 2003). The effects to wildlife extend beyond the immediate road prism itself, into what can 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 considering the proportion of a given species habitat that occurs within this Zone of Influence of motorized routes. 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. The Zone of Influence is a relative index of habitat effectiveness to compare alternatives.

For several species or species groups, several Zones of Influence were analyzed and the results presented in the DEIS. The results of these analyses indicated that insignificant differences were present among the scales (usually 60, 100 and 200 m). Any effects shown to be present at the smaller scales were contained at the largest scale, and the results gained from the smaller scales do not substantially inform the decision. Thus, in this document, the analysis reports only the largest Zone of Influence.

Assumptions for Wildlife Effects Analysis

1. All vehicle types result in approximately the same amount of disturbance effect to wildlife.
2. Disturbance effects were considered to be equal in all seasons because of the difficulty in parsing out effects for each season. Where seasonal ranges are identified, such as for mule deer, or for breeding habitat, this inherently considers a seasonal aspect.
3. Location of route is equal to disturbance effects from that route (e.g., assume all trails provide the same level of disturbance).
4. Habitat is already impacted in the short-term. In the long-term, habitat will remain the same on motorized routes added to the NFTS, but impacts will decrease to at least some degree on non-added trails with the prohibition of cross country motorized travel and subsequent passive restoration (see Soils section for further assumptions).
5. The focus of this analysis is on suitable habitat; suitable habitat is assumed occupied unless it has been surveyed to a standard that determines absence.
6. Noise generated from non-motorized associated disturbance impacts are limited to within 60 meters of motorized roads and trails.
7. The cumulative effects of past projects are incorporated within the existing vegetation and travel system maps.
8. Route densities for the action alternatives are calculated based on existing motorized system routes, private land routes, and proposed motorized route additions to the NFTS. The estimation of route densities for Alternative 1 (no action) includes all existing unauthorized routes, as well as existing motorized system routes, private land routes, and proposed route additions to the NFTS. It is assumed that unauthorized routes would continue to be used under continued cross country travel.
9. Continued cross country motorized travel under the No Action Alternative (Alternative 1) will lead to continued proliferation of motorized routes, which would have a high likelihood of increasing over time (see Chapter 3.07, Recreation and Scenic Values).
10. Although the type and amount of use along the different types of routes may result in different effects to wildlife species, all motorized routes are treated equally in this analysis because the relationship between effects and motorized route type and intensity of use is complex and not well understood. For example, the type of motorized road or trail likely varies in how roads and motorized trails contribute to disturbance and habitat fragmentation: high clearance roads generally receive less use than roads used by passenger vehicles, which would equate to less noise disturbance, and single track motorcycle trails would likely fragment habitat less than

would a passenger road due to the narrower width of the single track motorcycle routes that would result in removing less habitat. However, noise generated from motorcycles along trails may contribute to greater noise disturbance than would a 4x4 jeep. Since impacts to the wildlife species analyzed here are not well understood, impacts from all motorized routes, regardless of motorized route type and intensity of use, are treated the same.

Sources of Information for Wildlife Effects Analysis

GIS layers of the following wildlife resources were used for analysis:

- Bald Eagle – nest sites
- California Spotted Owl – nest sites, Activity Centers, Protected Activity Centers, Home Range Core Areas, CWHR habitat types 4M, 4D, 5M, 5D, and 6
- Northern Goshawk – nest sites, Protected Activity Centers, CWHR habitat types 4M, 4D, 5M, 5D, and 6
- Mule Deer – key deer habitat areas including winter, critical winter, fawning, and critical summer ranges. In addition, oak woodland and oak-conifer woodland habitats were used, since mule deer is a Management Indicator Species for oak and oak-conifer woodland habitats.
- Forest Carnivores (marten, fisher, Sierra Nevada red fox, and wolverine) – Tahoe Forest Carnivore Network, CWHR habitat types 4M, 4D, 5M, 5D, and 6)
- Snag analysis – 60 meters buffered on routes in forested habitats.

Affected Environment and Environmental Consequences by Species Groups

This section describes both the affected environment and environmental consequences of the alternatives arranged by species groups: wide-ranging carnivores, ungulates, oak and oak-conifer forests, shrubland, early- and mid-seral coniferous forest, late-seral open canopied coniferous forest, old coniferous forest, snag, and aquatic and riparian associated species. Selected species represented within each group include Threatened, Endangered, Sensitive, and Proposed (TESP) species, MIS, or other species of concern (such as, snag dependent species and forest coniferous birds) are included. While not all the species within the groups are necessarily analyzed in detail, each species group analysis provides enough information to infer impacts.

Affected Environment Description

The Affected Environment discussion focuses on pertinent literature available for selected species within the wildlife groups and does not represent an exhaustive or comprehensive literature summary on wildlife and road interactions. For some species represented in the group, little information may be available on wildlife interaction with roads and trails. Known information on the distribution and status of the species on the Tahoe NF is also presented in the affected environment section for each selected species, particularly species with special status (threatened, endangered, sensitive or management indicators species).

Environmental Consequences Description

Direct and Indirect Effects Boundary: Direct and indirect effects of each alternative are analyzed on NFS lands within the boundary of the Tahoe National Forest. The analysis area includes motorized roads and trails, collectively referred to as routes. Routes include existing system routes and motorized trails to the NFTS.

Cumulative Effects Boundary: Cumulative effects are bounded spatially and temporally. The geographic boundary for analyzing cumulative effects are lands that fall within the boundary of the Tahoe NF, including all NFS lands and non-NFS lands (private). This habitat type encompasses 821,035 acres of NFS lands and 373,359 acres of non NFS lands. This cumulative effects geographic boundary pertains to all species groups except for greater sandhill cranes and the oak and oak-conifer group. For sandhill cranes, the cumulative effects boundary is known sandhill crane breeding habitat at Sardine Valley, Carman Valley, and at Kyburz Flat on the Sierraville and Truckee Ranger Districts.

The cumulative effects boundary for the oak and oak-conifer species group (65,329 acres) falls within the Yuba River and the American River ranger districts within pure oak woodland and oak-conifer habitat on the west side of the Tahoe NF.

An appropriate scale to analyze cumulative effects of terrestrial and aquatic species for activities associated with motorized roads and trails requires an area sufficiently large to encompass wildlife habitat, movement patterns, and home ranges for the groups of species being analyzed within the project area including old forest associated species, wide-ranging species, riparian associated species and others; such an appropriate scale includes all lands within the boundary of the Tahoe NF.

Within the cumulative effects boundary, cumulative effects from motorized routes are analyzed quantitatively using route density by assessing the accumulation of all past, present, and future route-associated actions, including existing system routes, motorized routes added to the NFTS, and any future routes that would be created within the next 20 years within the boundary of the Tahoe NF (NFS and non-NFS lands). In addition, overall cumulative effects from other past, present, and reasonably foreseeable future actions are described. Twenty years is a reasonable timeframe for estimating cumulative impacts of motorized routes in the reasonably foreseeable future. Past actions include routes that were created within the last 50 to 100 years and will be incorporated into the existing condition, such as closed or decommissioned roads.

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 actions may risk ignoring the important residual effects of past natural events which may contribute to cumulative effects just as much as human actions. 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 events contributed to those effects. Finally the Council on Environmental Quality issued an interpretive memorandum on June 34, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate aggregate effects of past actions without delving into the historical details of individual past actions." For these reasons, the analysis of past actions in this section is based on current environmental conditions and is represented in the current maps used to analyze cumulative effects that have occurred in the past 100 years or more.

In addition, Past actions for the previous 20 years will be discussed under each species as appropriate, including activities as timber harvest, grazing, and non-motorized recreation that provides pertinent information of relatively recent activities that may still be impacting species and their habitats.

Overall Relative Cumulative Impact Scores: As a relative measure of the negative and positive effects from motorized routes under each of the alternatives, a simple sum total of the percentages of some metrics were calculated. Some overlap of percentages may occur where route categories intersect, however, because it is a relative and not absolute score, the relationships remain valid. The metric is intended to provide only a relative measure of effects and does not include all impacts.

Summary of Effects Analysis for All Species and Species Groups

The following effects analysis reflects many detailed conclusions of the effects of the alternatives. This paragraph broadly generalizes the conclusions from all species and species groups. Alternative 1, the existing condition, is by far the most adverse condition for all species and species groups on the Tahoe NF due primarily to the disturbance, habitat alteration and potential mortality associated with unlimited cross country travel, including continued travel on unauthorized routes (user created and temporary roads) and motorized travel in areas where there are currently no unauthorized routes leading to the creation of additional routes. Most wildlife species are adversely affected by human disturbance to varying degrees, and the growth of unlimited cross country travel associated with an expanding human population and growing recreational use of public lands would continue to cause adverse effects into the future. This adverse effect is so great that all of the action alternatives in comparison are greatly beneficial to more or less degree.

All action alternatives have varying effects to each of the species and species groups, and are described in detail in the sections that follow. Due to the magnitude of the beneficial effect of controlling adverse impacts such as existing cross country use, all the action alternatives appear to have similar benefits to wildlife. However, when only the action alternatives are compared at a similar scale, the impacts among the alternatives are more apparent and indicate that Alternative 5 has the greatest potential

to negatively impact wildlife than the other action alternatives. Alternative 5 negatively impacts the most wildlife species and the most wildlife groups of the action alternatives. The species and groups most adversely affected by the existing condition are wide-ranging carnivores, mule deer, spotted owls and northern goshawks because these groups are especially affected by disturbance. Alternative 5 has the greatest negative impacts to these same groups, followed by Alternatives 2, 6, 7, 4, and 3 in descending order. In general, aquatic and riparian associated wildlife species are benefited by Alternatives 4, 5, and 6 which implement wet weather seasonal restrictions and would reduce the potential for sedimentation off of native-surfaced motorized routes into aquatic and riparian ecosystems**.**

Summary of Effects Common to All Species

Wet Weather Seasonal Closures: Wet weather restrictions generally would not affect terrestrial wildlife habitats. However, there is some potential for direct disturbance to terrestrial species from motorized use during the wet weather season. Wet weather restrictions would reduce disturbance to terrestrial species when wet weather restrictions are implemented. In addition, terrestrial wildlife species using riparian and aquatic habitats would benefit from proposed wet weather seasonal restrictions on native surfaced roads and trails. The effects of the alternatives on terrestrial wildlife species that use riparian and aquatic habitats are disclosed under the aquatic and riparian associated species section. Motorized travel on native surfaced routes during the wet weather season has the potential to cause erosion and deliver sediment to aquatic and riparian species and their habitats.

Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and motorized trails. Riparian and aquatic dependent species would be benefited through the reduction of erosion and sedimentation that could occur from wet season wheeled motorized use on routes, especially motorized roads and trails that are within close proximity to, or cross, streams or other riparian aquatic habitats. Alternatives 1, 2, 3, and 7 do not impose wet weather seasonal restrictions on native surfaced motorized routes and therefore, aquatic and riparian dependent species would not benefit from wet weather seasonal restrictions. Alternative 1 has the greatest number of motorized stream crossings and highest Riparian Conservation Area (RCA) route densities. Alternative 1 has the highest potential to deliver sediment to aquatic and riparian habitats from wheeled motorized use on native surfaced routes during the wet weather season.

Change in Class of Vehicles: Although responses to motorized vehicle use vary by species and depend upon the type of vehicle, in addition to the intensity, timing, speeds, and amount of motorized vehicle use, the specific species responses are not well understood. For these reasons, this analysis has assumed that all vehicle types result in the same disturbance to wildlife.

Overall, the change is the class of vehicles would not likely have a measurable effect to habitat, since the change in class of vehicles on existing motorized routes will generally not affect or alter habitat condition. In general, some smoothed surfaced roads may become rough surfaced roads through changed road maintenance. In addition, some existing motorized NFTS roads may receive different maintenance resulting in higher vegetation density at the road margins which would provide additional cover and/or

foraging habitat. The resulting roadway condition would depend upon the amount and type of vegetation present and the amount of maintenance any given road receives.

Therefore, changes in the class of vehicles would not vary in their effects to species or species groups for all the action alternatives.

Density of motorized routes for habitat effectiveness: Route density has often been used as a surrogate to estimate habitat effectiveness or the direct and indirect effects of motorized routes on terrestrial wildlife. Route density thresholds for wildlife have not been established on the Tahoe NF, and thresholds for wildlife in the literature can vary by season and by geographic location. Therefore, road density "thresholds" will not be used to determine effects of the action alternatives, but rather road density is used for a relative comparison of the alternatives. Route density was determined at the scale of 7th field watershed, since this scale is sufficiently large to accurately estimate road densities. Route densities at a larger scale could potentially mask route density effects and therefore, underestimate effects to wildlife species. Route densities at any smaller scale may actually be amplified and therefore overestimate the effects to wildlife. Route density calculations for Alternative 1 include existing unauthorized routes because use of these routes can be assumed to continue as part of cross country travel. Route density includes all motorized routes, including existing NFTS system, non-NFS routes, etc. because route density must be calculated across an area (miles per square mile)

Table 3.03-4 provides a generalized overview of motorized route densities when looked as a measure of effects for all wildlife species for which route density is an issue. In the following sections, route densities are also calculated individually for species or species groups where helpful to determine effects.

Table 3.03-4. Generalized effects of motorized route densities (proportion of Tahoe NF acreage) between 0 miles per square mile and greater than 6 miles per square mile (averaged by 7th field watershed)

Alternatives		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Route Density (Percent of Forest Total)	**0 Miles/Square Mile**	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	0-2 Miles/Square Mile	17.2	26.6	27.7	26.6	25.0	27.2	26.6
	2-4 Miles/Square Mile	44.0	57.7	56.6	57.7	58.2	57.0	57.7
	4-6 Miles/Square Mile	31.4	11.5	11.9	11.5	12.6	11.5	11.5
	>6 Miles/Square Mile	6.9	3.5	3.1	3.5	3.6	3.5	3.5

*Alternative 1 includes miles of user created and temporary routes that would remain with continued use

Establishment of Motorized "Open Areas": One action alternative, Alternative 2, proposes open motorized areas at Greenhorn Area (60 acres) and access to 2,589 acres at the Boca, Stampede, and Prosser reservoirs on dry soils. Alternative 6 allows access to 244 acres at Boca, Stampede, and Prosser reservoirs on dry soils. The other action alternatives do not include this proposal so there would be no effect. For a few species, additional information is included in addition to the discussion below.

The Greenhorn area is located just outside of Nevada City. It is a popular four wheel drive and motorcycle use area by local residents. The majority of the area was hydraulically mined during the gold rush resulting in a lack of vegetation. The area also has a currently operating gravel plant. The Greenhorn area provides suitable habitat for very few species due to the amount of human activity and urban

development in the area. Therefore implementation of Alternative 2 would not likely pose a concern for the species analyzed in this document. If individual animals are using the area, they could receive some localized, direct disturbance, but because the area is already receiving concentrated use by people, any animals using the area likely have adapted to the amount of use occurring or have already avoided the area.

As water levels are drawn down in Boca, Stampede, and Prosser reservoirs, motor vehicles are used to access the shoreline for recreational activities during the summer months (boating, camping, fishing and picnicking). They are typically not used as open play areas as is the Greenhorn Area. The three reservoirs occur on the Truckee Ranger District within eastside pine habitat. Minor and incidental direct impacts to animals traveling in vicinity of the reservoirs may occur. The area used to access the reservoirs has no vegetation, and therefore does not provide cover or forage habitat. Overall, access to the three reservoirs designated in Alternatives 2 and 6 would have no to minimal direct, indirect, or cumulative impact to species analyzed here. Cross country use of these "Open Areas" would continue under Alternative 1.

Wide-Ranging Carnivores Species Group:

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 In Zabel, et al 2003). The wolverine and the Sierra Nevada red fox may be considered to be sensitive to the presence of humans and human activities (Claar et al. 1999, Grinnell et al. 1937). Three species were included in the wide-ranging carnivore habitat assessment group: black bear (*Ursus americana*), the wolverine (*Gulo gulo*), and the Sierra Nevada red fox (*Vulpes vulpes necator*).

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 or trapping as facilitated by road and trail access;
- Increased illegal poaching of animals as facilitated by trails and roads;
- Mortality or injury resulting from a motorized vehicle running over or hitting an animal;
- 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 (euthanasia or shooting) 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;

- A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise;
- Reduction in density of snags and down logs due to their removal near roads as facilitated by road access;
- Displacement of individual animals from a specific location that is being used for reproduction and rearing of young (i.e. fawning habitat); and
- Increase in heart rate or stress hormones when near a road or trail or network of roads or trails.

Wide-Ranging Carnivores Species Group: Environmental Consequences

Direct and Indirect Effects Common to All Wide-ranging Carnivores

Cross Country Travel: Wide ranging species would benefit under the action alternatives from the prohibition of cross country travel on NFS lands including areas that were previously prohibited to cross country motorized use. Under Alternative 1, cross country travel would continue on all NFS lands, except for areas previously prohibited to motorized use. Under Alternative 2, cross country travel would be prohibited on 715,200 acres of habitat. For Alternative 6, cross country travel would be prohibited on 717,600 acres of habitat and for the remaining action alternatives, cross country travel would be prohibited on 717,900 acres of habitat.

Establishment of Motorized "Open Areas": In addition to the discussion in Effects Common to All Species, the following additional discussion for wide-ranging carnivores is pertinent.

The three reservoir areas Boca, Stampede, and Prosser would be designated open for Alternative 2 on almost 2,700 acres (when combined with the designation of the Greenhorn Area) and for Alternative 3 on almost 300 acres. The reservoirs occur on the Truckee Ranger District within eastside pine habitat. Eastside pine habitat is generally lower in elevation than where wolverine and the Sierra Nevada red fox are known to occur (subalpine and alpine habitats) during the summer months when the reservoirs are used for recreational activities, and therefore would not affect wolverine and the red fox. Bear, wolverine, or red fox traveling in vicinity of the reservoirs may have minor and incidental direct impacts from disturbance. The area used to access the reservoirs has no vegetation, and therefore does not provide cover or forage habitat for bear, wolverine, and red fox. Overall, access to the three reservoirs would have no to minimal direct or indirect impacts to wide-ranging species.

Changes to the NFTS (Changes in Season of Use): Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and trails, where wide-ranging species would be benefited through the reduction of noise and disturbance associated with motorized use, especially motorized routes that are within wide-ranging species habitats. Alternatives 1, 2, 3, and 7 do not impose wet weather restrictions on native surfaced motorized routes and therefore, there would be no benefit to wide-ranging species from wet weather seasonal restrictions under these alternatives.

Amendments to the Forest Plan: Under Alternatives 2, 5, and 6, an amendment to the Forest Plan would remove the Tahoe NF Forest Plan direction to restrict motorized vehicle use within key deer winter

range in Management Area 84 (Humbug-Sailor) from November 1 to May 1. Alternatives 1, 3, 4, and 7 would not have an amendment. Currently the area receives high recreational use, especially during the summer months. Implementing these alternatives would likely have a slight negative impact from potential disturbance to animals including bear, wolverine, and red fox. However, since the area receives concentrated recreational use, it likely does not currently provide high quality habitat for these species, particularly the wolverine and red fox, since the wolverine likely would avoid areas with concentrated human activity. Additionally, the area does not provide high quality wolverine denning habitat such as subalpine habitat with late persistent snow into the spring months. Overall, the potential for adverse effects would be minimal and would not likely be measurable, since these species are wide-ranging in nature.

Wide-ranging Carnivores Species Group: Cumulative Effects

The geographic boundary for analyzing cumulative effects to wide-ranging species (wolverine, Sierra Nevada red fox, and bear) are lands that fall within the boundary of the Tahoe NF including all NFS lands and non-NFS lands (private). The Tahoe NF boundary is sufficiently large to encompass the home ranges of wide-ranging species located on the Tahoe NF. In addition, the Forest boundary encompasses a wide variety of habitats used by these species, from early-seral to late-seral forests, subalpine and alpine habitats, meadows and riparian habitats, and oak and oak-conifer woodlands. The cumulative effects of past actions rely upon current environmental conditions as a proxy. As previously stated, 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. However, some past actions are presented in order to describe potential habitat changes of wide-ranging species that have occurred in the past.

The timeframe for analyzing cumulative effects of reasonably foreseeable future actions for wide-ranging species is approximately twenty years into the future. Twenty years into the future is a reasonable amount of time to estimate potential cumulative impacts to wide-ranging species from future foreseeable activities. The cumulative effects to wide-ranging carnivores are discussed for each species in the sections below.

Black Bear: Affected Environment

The black bear is a Management Indicator Species on the Tahoe NF. The Tahoe LRMP describes important bear habitat as all forested types, particularly in the early- and late-seral vegetation types. California Wildlife Habitat Relationships program (CWHR 2005) describes black bear habitats as dense, mature stands of forest habitats, and black bears 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. Large undeveloped blocks of habitat, where bears will encounter few humans in the core areas within these blocks, are assumed to be important for black bear.

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). On the Tahoe NF, bear collisions have been reported at various locations, primarily along state highways such as Interstate 89 and Interstate 49. The frequency of bear-vehicle collisions is relatively low.

Collisions, Hunting and Poaching: The California Department of Fish and Game (2004) report that the level of bear-vehicle collisions are low, and most probably occur on higher speed paved highways. Collisions on 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 Tahoe NF, access for bear hunting and poaching increase. However, statewide bear monitoring indicates bear population trends are either stable or increasing. CDFG (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 Tahoe NF.

Negative Bear-Human Interactions: As human access increases, the potential for negative human interactions with bears also increases. On the Tahoe NF, negative bear-human interactions have primarily occurred at campgrounds, ski resorts, developed recreational facilities, etc. As bear populations in the Sierra Nevada continue to increase, bear-interactions on the Tahoe NF are also expected to increase. 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 Tahoe NF.

Displacement or Avoidance: Little research has been conducted on the impacts on black bears from recreation in relation to the use of roads and trails. Therefore, impacts to black bears from OHV activities associated with roads and trails are not well understood. However, in Idaho, black bears are reported to respond to increases in road density by shifting their home ranges to areas of lower road densities (Young and Beecham 1986 *In* Joslin and Youmans, coordinators 1999). 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. A study in North Carolina indicated that road density had no effect in bear movement within their home ranges (Brody and Pelton 1989 *In* Joslin and Youmans, coordinators 1999).

Black Bear: Environmental Consequences

Black Bear: Indicators used to Measure Effects

The analysis measures used to analyze direct, indirect effects, and cumulative effects of the proposed alternatives for black bear are:

Cross Country Travel: Motorized cross country travel is analyzed to determine how black bear habitat is affected.

Establishment of Motorized "Open Areas": The establishment of motorized "Open Areas" is analyzed under effects common to all wide-ranging species.

Additions to the NFTS (Zone of Influence): Additions to the NFTS are measured by the Zone of Influence of motorized miles of route additions. Kasworm and Manley's (1990) studies in Montana found that black bears avoided habitat within 274 meters of roads. Although the habitat conditions on the Tahoe NF are quite different, a Zone of Influence of 274 meters from motorized routes will be used as an approximate analysis measure to compare alternatives for relative habitat effectiveness.

Changes to the NFTS: Change in class of vehicles is analyzed under environmental consequences common to all species and change is season of use is analyzed under environmental consequences common to all wide-ranging species. Reopening of Maintenance Level 1 roads are analyzed for bear by determining the Zone of Influence within 274 meters of Level 1 roads that would be reopened.

Black Bear: Direct and Indirect Effects

Cross Country Travel: Alternative 1 poses the greatest risk to black bear from the continuance of cross country travel on existing unauthorized routes, where 20% of bear habitat would be negatively influenced within 274 meters. The action alternatives benefit black bear habitat where cross country travel would be prohibited, including within 18% to 20% (Alternatives 5 and 6 would be the least percent prohibited, Alternatives 2, 3, 4, 7 would be the most percent prohibited) habitat within 274 meters of motorized unauthorized routes. Under the action alternatives, bear would benefit from the ban on cross country travel and associated concentrated use on unauthorized routes, resulting in increased bear habitat effectiveness by approximately 18% (Alternatives 5 and 6) to 20% (Alternatives 3 and 7).

Additions to the NFTS (Zone of Influence): Table 3.03-5 displays the direct, indirect, and cumulative effects to bear habitat within a 274-meter Zone of Influence of motorized miles of road/trail additions. As stated above, Alternative 1 reduces bear habitat effectiveness to the greatest extent (20%) because motorized use can be expected to continue on unauthorized routes during continued cross country travel where bear habitat effectiveness could be reduced or where negative bear-human interactions have the potential to occur.

Motorized routes added to the NFTS under the action alternatives would directly and indirectly influence from 0% to 2% bear habitat on the Tahoe NF, which would not measurably affect overall bear habitat effectiveness.

Changes to the NFTS: Table 3.03-5 indicates that Alternative 5 proposes reopening ML 1 roads which may negatively affect 1% of bear habitat on the Tahoe NF. Alternatives 4, 6, and 7 propose to reopen ML1 roads that many negatively affect less than 1% of bear habitat on the Tahoe NF. Affecting 1% bear habitat should not reduce the overall habitat effectiveness, but may increase bear disturbance or increased bear-human interactions at a local level. The remaining alternatives do not propose to reopen any existing ML 1 roads, and therefore would not increase bear-human interaction potential and would not affect bear habitat effectiveness.

Table 3.03-5. Proportion of Black Bear Habitat within a 274-meter "Zone of Influence" of Motorized Routes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect Effects of Proposed Alternatives							
Proposed motorized route additions to NFTS (negative impact)*	20%	2%	0%	1%	1%	2%	<1%
Reopened Maintenance Level 1 roads (negative impact)	0%	0%	0%	<1%	1%	<1%	<1%
Cumulative Effects of Past, Present, and Proposed Actions							
Existing motorized routes - NFS lands (negative impact)	28%	28%	28%	28%	28%	28%	28%
Existing motorized routes - non-NFS lands (negative impact)	15%	15%	15%	15%	15%	15%	15%
Positive Cumulative Effects (Past Actions)							
Decommissioned and Roads Closed in Previous NEPA (positive impact)	4%	22%	23%	23%	21%	22%	23%
Total Cumulative Effects							
Overall Relative Cumulative Impact Score = Sum Total of Motorized Routes both positive and negative (**Note**: Some overlap may occur where route categories intersect)	**63%**	**45%**	**43%**	**44%**	**46%**	**44%**	**43%**

*Motorized route additions: Alternative 1 includes existing unauthorized routes and use associated with continued cross country travel.

Black Bear: Summary of Direct and Indirect Effects

Table 3.03-6 summarizes the overall net effect to black bear from the proposed actions from motorized route additions, prohibition of cross country travel, wet weather restrictions, and seasonal closures.

Table 3.03-6. Black Bear: Summary of Overall Net Direct and Indirect Effect

Indicator		Alt 1[2]	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel								
Trend of Effect		Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres of Habitat Where Cross Country Travel is Prohibited		0	715,200	717,900	717,900	717,900	717,600	717,900
ZOI Percentage Affected[1]		0%	19%	20%	19%	18%	18%	20%
Proposed Motorized Route Additions to NFTS								
% ZOI Affected		20%	2%	0%	1%	1%	2%	<1%
Establishment of Motorized "Open Areas"		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Changes to the NFTS	**Change in Class of Vehicles**	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Wet Weather Restrictions	No Effect	No Effect	No Effect	Slight benefit from reduced disturbance	Slight benefit from reduced disturbance	Light benefit from reduced disturbance	No Effect
	Reopened ML 1 Roads (miles)	0	0	0	0.12	93.4	11.4	1.1
Amendments to the Forest Plan		No Effect	Localized disturbance in winter months	No Effect	No Effect	Localized increased disturbance in winter months	Localized increased disturbance in winter months	No Effect
Overall Net Effect of Proposed Actions		Negatively affects black bear habitat where cross country travel continued, including within 20% habitat within ZOI	Benefits black bear habitat where cross country travel is prohibited, including within 19% habitat within ZOI; although minor negative effects from route additions; overall reduces habitat fragmentation	Benefits black bear habitat where cross country travel is prohibited, including within 20% habitat within ZOI	Benefits black bear habitat where cross country travel is prohibited, including within 19% habitat within ZOI; although minor negative effects from route additions; overall reduces habitat fragmentation	Benefits black bear habitat where cross country travel is prohibited, including within 18% habitat within ZOI; although minor negative effects from route additions; overall reduces habitat fragmentation	Benefits black bear habitat where cross country travel is prohibited, including within 18% habitat within ZOI; although minor negative effects from route additions; overall reduces habitat fragmentation	Benefits black bear habitat where cross country travel is prohibited, including within 20% habitat within ZOI; although minor negative effects from route additions; overall reduces habitat fragmentation

[1]Zone of Influence is habitat within 274 meters of existing unauthorized routes

[2]Alternative 1 includes existing unauthorized motorized routes that would continue with cross country travel, while all the action alternatives include proposed route additions.

Black Bear: Cumulative Effects

The geographic boundary for analyzing cumulative effects to bear are lands that fall within the boundary of the Tahoe NF including all NFS lands and non-NFS lands (private). The Tahoe NF boundary is sufficiently large to encompass the home range of bears located on the Tahoe NF. In addition, the Forest boundary encompasses a wide variety of habitats used by the bear--from early-seral to late-seral forests, meadows and riparian habitats, and oak and oak-conifer woodlands. The timeframe for analyzing cumulative effects for the bear is approximately twenty years into the past and into the future. Twenty years into the future is a reasonable amount of time to estimate potential cumulative impacts to bear from future foreseeable activities.

Cumulative Effects from Motorized Routes:

Zone of Influence: The cumulative effects of existing authorized motorized routes on both NFS and non-NFS lands are displayed in Table 3.03-5 above. Cumulative effects of existing authorized motorized routes on NFS and non-NFS lands would influence 28% and 15%, respectively.

Route Density: Route density is a useful way to measure cumulative effects to bear from the sum total of all relevant past, present, and reasonably foreseeable future impacts associated with motorized routes. To assess the extent the action alternatives may influence bear habitat, including effects from hunting, poaching, and displacement, the density of motorized roads/trails across the Tahoe NF (includes both NFS and non-NFS lands) was determined by 7th field watersheds (Table 3.03-7). Motorized route density thresholds for black bear are not readily available in the literature, however, Hurley et al. (1981) recommended that preferred black bear habitat (high capability) has road densities below 0.5 miles per square mile, and moderate habitat capability has road densities below 5 miles per square mile. Therefore, bear habitat capability is highest where route density is lowest.

Table 3.03-7 displays percent of black bear habitat in route density categories (low, medium, and high), ranging from 0 to greater than 5 miles/square mile. Areas with lower the route densities provide higher bear habitat capability where security habitat is provided. Areas with higher route densities provide lower habitat capability where security habitat is at greater risk.

The cumulative effects of route density would be greatest under Alternative 1 (no action) compared to all the other alternatives, followed by Alternative 5. Under Alternative 1, approximately 19% of the Tahoe NF would be in low habitat capability where route density exceeds 5 miles/square miles, and approximately 20% of bear habitat would have reduced effectiveness within 274 meters of unauthorized routes. Unmanaged cross country travel would continue and increase over the next 20 years based on the increasing trend in sales of ATVs, motorcycles and 4 wheeled drive vehicles in recent years, likely resulting in an increase in unauthorized routes. The overall cumulative effects of Alternative 5 would only be slightly greater than Alternatives 2, 3, 4, 6, and 7. Alternatives 2, 3, 4, 6 and 7 would have similar cumulative effects and would not result in an appreciable change in overall bear habitat capability since the addition of unauthorized routes to the NFTS system would only cumulatively add between 0-2 percent. Refer to Table 3.03-8.

Motorized Route Density:

- **High habitat capability** for bear where motorized road/trail densities are less than 0.5 miles/square mile are similar for all the alternatives ranging from approximately 4 to 7 percent of the landscape on the Tahoe NF.
- **Moderate habitat capability** for bear (where motorized road/trail densities fall between 0.5 and 5 miles/square mile), would be the lowest in Alternative 1 (77%). The remaining alternatives provide similar amounts of moderate habitat capability for bear, ranging from about 86 to 88 percent.
- **Low bear habitat capability** has the highest route density at greater than 5 miles/square mile**.** Alternative 1 has the greatest amount of low habitat capability for bears at 19% of the Forest compared to all the alternatives. Alternative 5 provides the next highest amount of low capability bear habitat. The rest of the alternatives are similar in the amount of low bear habitat capability ranging from 6-7 percent.

Table 3.03-7. Black Bear: Percentage of Tahoe NF within high, moderate, and low habitat capability

		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Route Density (Percent of Habitat in Route Density Categories)	**High Capability** (Lowest Route Density - 0-0.5 Miles/Square Mile)	4.1%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%
	Moderate Capability (Moderate Route Density - 0.5-5 Miles/Square Mile)	77.0%	87.0%	87.6%	87.0%	86.3%	87.0%	87.0%
	Low Capability (Highest Route Density - >5 Miles/Square Mile)	18.9%	6.6%	6.0%	6.6%	7.2%	6.6%	6.6%

Table 3.03-8. Black Bear: Cumulative Effects Summary

Alternatives	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Past and Present Effects – Proportion of Forest with low bear habitat capability (>5mi/square mile)	18.9%	6.6%	6.0%	6.6%	7.2%	6.6%	6.6%
Future Effects – Likelihood of increased route density contributing to low bear habitat capability	**High** potential for adversely affecting bear habitat capability from Unmanaged cross country travel will continue and increase over time	**Low** potential for adversely affecting bear habitat capablity, since cross country travel would be prohibited	**Low** potential for adversely affecting bear habitat capablity, since cross country travel would be prohibited	**Low** potential for adversely affecting bear habitat capablity, since cross country travel would be prohibited	**Low** potential for adversely affecting bear habitat capablity, since cross country travel would be prohibited	**Low** potential for adversely affecting bear habitat capablity, since cross country travel would be prohibited	**Low** potential for adversely affecting bear habitat capablity, since cross country travel would be prohibited
Overall Cumulative Effects	Lowest Habitat capability. Bear Habitat Capability is likely to be reduced in the long term.	2nd most beneficial alternative, shared with alternatives 4, 6, & 7. Bear Habitat Capability would improve compared to existing situation from reduced route densities.	Most beneficial alternative, no motorized route additions. Bear Habitat Capability would improve compared to existing situation from reduced route densities.	2nd most beneficial alternative, shared with alternatives 2, 6, & 7. Bear Habitat Capability would improve compared to existing situation from reduced route densities.	Least beneficial alternative. Bear Habitat Capability would improve compared to existing situation from reduced route densities, however route densities would be slightly greater than Alts 2, 4, 6, & 7.	2nd most beneficial alternative, shared with alternatives 2, 6, & 7. Bear Habitat Capability would improve compared to existing situation from reduced route densities.	2nd most beneficial alternative, shared with alternatives 2, 4, & 6. Bear Habitat Capability would improve compared to existing situation from reduced route densities.

Overall Cumulative Effects from Past, Present and Reasonably Foreseeable Future Actions: Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on private lands within the Tahoe NF boundary. Past and current cumulative effects to bear include loss of habitat through catastrophic wildfires; timber and fuels management where cover and forage has been reduced or removed; urban development and expansion within a highly checkerboard land ownership pattern; and recreational activities including hunting, camping, and general recreation activities including all forms of motorized use including 4 wheel drive vehicles, ATVs, and motorcycles.

Since 1990, more than 130,000 acres of vegetation management activities have occurred on the Tahoe NF. Some, but not all, have resulted in impacts to habitats for bear. Between 2001 and 2008, nearly 17,000 acres of forest vegetation and fuels projects were completed, which primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. In general, management treatments which maintain cover and/or enhance foraging habitat for bear should benefit the bear, particularly projects that would promote bear forage species, such as fruit bearing shrubs and forbs.

Vegetation and fuels treatments generally do not increase forage quality and quantity for bear because they do not usually result in reducing the canopy cover below 40%. Higher canopy cover would not increase the production of understory species important for bear foraging. These treatments may result in the short-term reduction in cover for the bear, though it is expected that in the longer term, habitat will be protected by reducing wildfire risk. Between 1994 and 2008, approximately 95,000 acres of NFS lands burned on the Tahoe NF, some of which have removed forested habitat for bear.

Thinning projects designed to reduce hazardous fuels will continue to be the primary activity affecting wide-ranging species habitat on the Tahoe (see Appendix H, Reasonably Foreseeable Projects and Cumulative Effects). It is expected that suitable habitat would be maintained, and it is anticipated that these treatments would reduce the amount forested wildlife habitat potentially lost from future stand replacing wildfires (USDA Forest Service 2004). The California Department of Forestry and Fire Protection currently lists approximately 12,000 acres of private land within the Tahoe NF administrative boundary for which timber harvest plans have been submitted. Timber harvest on private lands is generally more intensive and often changes the amount of forest cover available, but may increase foraging availability by increasing shrub habitats, particularly for bear.

Currently, there is a high demand for recreational use on the Tahoe NF due to its close proximity to urban centers. The Tahoe NF provides a wide variety of recreational experiences including developed and dispersed camping, hiking, fishing, hunting, wildlife viewing, winter sports activities (downhill skiing, cross country skiing, snowmobiling), summer OHV use, and a variety of other non-motorized use (equestrian use and mountain biking). Recreational use on the Tahoe NF has significantly increased compared to the past 20 to 30 years. Because of the proximity to urban areas and population growth, increased recreational use on the Tahoe NF is expected to continue to increase in the future including camping, hiking, fishing, wildlife viewing, hunting, and OHV use. Generally, the increase in recreational use on the Tahoe NF has the potential to cause an increase in negative interactions between humans and bears. Developed recreational sites such as campgrounds and other facilities have the potential to be bear

attractant sites. Currently the Tahoe NF has a number of developed campgrounds and an unknown number of dispersed camp sites. Future increase in recreational use on the Tahoe NF is expected, and therefore, increased negative human-bear interactions would be expected, particularly during the summer months. Appendix H lists the reasonably foreseeable recreation projects that are expected to occur. Two non-motorized routes are being proposed for development in the near future. The development and use of these routes are not expected to considerably increase human-bear interactions, but rather the sheer increase in humans using the Tahoe NF will likely lead to increased negative human-bear interactions. In addition, non-motorized use (hiking, mountain biking, equestrian) may occur on existing unauthorized routes until these areas are revegetated and recovered through active or passive restoration means. It is expected that, generally, non-motorized recreation on unauthorized routes is less of an impact than motorized recreation due to reduced noise levels, although this is uncertain.

Wolverine and Sierra Nevada Red Fox: Affected Environment

The wolverine and the Sierra Nevada red fox are wide-ranging carnivores that use a variety of vegetation types, but appear to select areas that are relatively free from significant human disturbance. Both the wolverine and the Sierra Nevada red fox are designated by the Regional Forester in the Pacific Southwest Region of the Forest Service as Sensitive.

In the Sierra Nevada, wolverines are known to occur from over 4,000 feet elevation to over 10,000 feet elevation. According, to Aubrey et al. (2008, pers. comm.), wolverine natal den sites are highly correlated with subalpine and alpine regions that have late persistent snow during April and May. Until recently, no verified sightings of wolverine have been documented within the State of California since the 1920's, though several anecdotal wolverine observations have been reported throughout the Sierra Nevada including several apparently reliable observations on the Tahoe NF in recent years.

In February and March 2008, four verified wolverine photographic detections were taken from remote controlled camera stations on the Tahoe NF between the towns of Truckee, CA, and Sierraville, CA. Wolverine photographs were documented from four separate baited camera locations. Genetic results indicate the DNA evidence that has been collected to date is from a single individual male. DNA testing also indicates this individual is not related to the wolverine population from the southern Sierra Nevada region and it is also not related to wolverine populations in the Cascades region of Washington state (Mike Schwartz, 2008,personal communication). DNA results indicate that this particular wolverine has haplotype A, which is ubiquitous and shared with wolverine populations in the Rocky Mountains, Canada, and Alaska. At this time, the origin of this individual is unknown. Given the results of DNA testing, three possibilities remain of this wolverine's origin: (1) it escaped from captivity, (2) it dispersed from the nearest known populations in the Rocky Mountains or (3) it is from native northern Sierra Nevada population that was previously undetected by Grinnell et al. (1937).

Between December 2008 and February 2009, Sierra Pacific Industries (SPI) documented nine additional verified wolverine detections on SPI lands located northwest of the four original Tahoe NF detections, ranging from the Henness Pass vicinity heading northwest near the town of Bassetts.

Subsequent DNA analysis indicated the wolverine detections on SPI lands were the same male detected in February/March 2008.

Wolverines are known to be sensitive to humans and road associated factors, but are not necessarily affected by summer recreation trails (Gaines et al. 2003). Gaines et al. (2003) reported that wolverines may be displaced from natal dens in subalpine cirques as a result of winter recreation activities.

Road and trail-associated factors that may affect wolverine include reduction in down logs, trapping, disturbance at a specific site, and vehicle collisions. Road density can be used as a relative measure of human influence on the wolverine, though no empirical data exist which correlate motorized route density with wolverine population numbers due to the scarcity of research, the low population numbers, and overall difficulty in studying species that encompass large home ranges. Studies indicate that home ranges in North America may vary from less than 38.6 square miles to over 347.5 square miles.

The current distribution and population status of the Sierra Nevada red fox is uncertain (CDFG 2004). The Sierra Nevada red fox has not been verified to occur on the Tahoe NF, though habitat for this species occurs within subalpine conifer habitats interspersed with meadows. The nearest known population of the native Sierra Nevada red fox is a small population located in the Lassen Peak vicinity (Lassen National Park and Lassen National Forest) which represents the only verified detections of the subspecies in recent years (Perrine 2005, Perrine et al. 2007). Road construction and increased human settlement in the Sierra Nevada has the potential to facilitate the dispersal of non-native red foxes into the historic range of the Sierra Nevada red fox, by providing access to areas previously unavailable to the exotic foxes. Roads provide a potential travel corridor for valley foxes to move into Sierra Nevada red fox habitat. Although the tolerance of Sierra Nevada red fox to the presence of humans is an unknown, it is evident that the non-native red foxes thrive in human-altered environments (Lewis et al. 1999, Kamler and Ballard 2002). In addition, urban development within the range of Sierra Nevada red fox may pose a risk to the species through an increased risk of predation from domestic pets, disease transmission, automobile collisions, and other human-wildlife conflicts.

Wolverine and Sierra Nevada Red Fox: Environmental Consequences

Wolverine and Sierra Nevada Red Fox: Indicators used to Measure Effects

Cross Country Travel, Changes to the NFTS (Change in Class of Vehicles and Changes is Season of Use): The prohibition of cross country travel and Changes to the NFTS (the change in class of vehicles and changes to season of use) are discussed under "Wide-ranging Carnivores Species Group: Environmental Consequences."

Establishment of Motorized "Open Areas": The establishment of motorized "Open Areas" is analyzed under effects common to all wide-ranging species.

Zone of Influence: The Zone of Influence within 60 meters of routes (route miles buffered by 60 meters on each side of route added) was used as a measure for analyzing habitat fragmentation as it pertains to loss of snags and down logs along routes within mature to late-seral coniferous forest habitat as classified by 4M, 4D, 5M, 5D, and 6 CWHR types within the Tahoe NF. Sixty meters is the maximum distance within which the removal of hazard trees for roads and trails would occur where logs and snags

important for wolverine and red fox may be lost due to public safety concerns. Additional analysis of habitat fragmentation is presented within Old Forest Emphasis Areas (OFEAs) and within the Tahoe NF Forest Carnivore Network, which is presented in the section for Late-seral coniferous Forest Associated Species Group.

Disturbance to a Specific Site (Wolverine only): The Sierra Nevada Forest Plan Amendment (2004) directs that upon detection of a verified wolverine, management impacts within 5 miles of the verified detection be analyzed. Activities associated with motorized routes represent potential direct disturbance to wolverine using the area. Therefore, the miles of routes proposed to be added to the NFTS within five miles of verified wolverine photographic detection sites on the Truckee and Sierraville Ranger Districts of the Tahoe NF and on Sierra Pacific Industries lands were evaluated for each of the action alternatives.

Several studies indicate wolverine den sites are strongly associated with subalpine or treeline habitats, and have late persistent snow during the months of April and May (Banci 1994, Aubry et al. 2007, Copeland et al. 2007, Aubry et al. 2008 – pers. com.). On the Tahoe NF, subalpine and treeline habitats generally occur near or above 8,000 feet; areas that have late spring, deep, persistent snow vary depending on the precipitation and the aspect. Activities associated with motorized routes are assessed for their potential to disturb wolverine den sites.

Changes to the NFTS (Reopened ML 1 Roads): Reopening ML 1 roads also have the potential to increase disturbance and fragment habitat within close proximity to known wolverine detections. The alternatives are analyzed for their potential to impact areas within 5 miles of known wolverine detections on the Tahoe NF.

Amendments to the Forest Plan: Amendments to the Forest Plan is analyzed under effects common to all wide-ranging species.

Wolverine and Sierra Nevada Red Fox: Direct and Indirect Effects

Cross Country Travel: Except for Alternative 1, no action, all the action alternatives would benefit the wolverine and red fox and their habitats, since 81,884 acres of habitat would be prohibited to cross country travel. Therefore, disturbance, avoidance and displacement to these species would be reduced under the action alternatives.

Additions to the NFTS and Reopened ML 1 Roads

Zone of Influence: Snags and down logs are important habitat components for wolverine and red fox. Habitat fragmentation, as measured by potential impacts to snags and down logs that may be removed for public safety, is determined by assessing the Zone of Influence within 60 meters of added motorized routes. The Zone of Influence within mature forest (CWHR 4M, 4D, 5M, 5D, 6), Old Forest Emphasis Areas, and the Tahoe NF Carnivore Network are analyzed for their potential impact of habitat fragmentation (potential loss of snags and down logs) along all motorized routes. These habitat types serve as a broad landscape proxy to evaluate habitat connectivity and fragmentation for mature and old forest conditions that are important for wide-ranging species such as the wolverine and Sierra Nevada red fox.

Motorized routes to be added to the NFTS are evaluated for each alternative as it relates to habitat fragmentation for the wolverine and the Sierra Nevada red fox. From a Forest-wide landscape perspective, Alternative 1 would contribute to the highest amount of potential habitat fragmentation through the incidental loss of snags and down logs on approximately 6% of mature and late-seral coniferous forest habitat by allowing cross country motorized use, including use on approximately 291 miles of identified motorized unauthorized routes, to continue on the Tahoe NF (Table 3.03-9). Alternatives 2, 4, 5, 6, and 7 all minimally affect landscape fragmentation through potential loss of down logs and snags that may be removed for public safety, at less than 1% or between 0.5 miles and 7.8 miles. Alternative 3 would not contribute to habitat fragmentation since unauthorized routes would not be added to the NFTS under this alternative.

Reopened ML 1 roads would contribute to less than 1% for Alternatives 2, 4, 5, 6, and 7, with Alternative 5 contributing to the greatest amount of potential loss in snags and down logs along 32.8 miles or 0.4% of old forest CWHR habitat within a 60 meter zone of influence, followed by Alternatives 6, 4, 2, and 7 in descending order. Alternatives 2, 4, 6, and 7 should not significantly affect the amount of available snags and down logs at the Forest-wide scale considering that less than 0.1% of Old Forest CWHR habitat types could be impacted by the incidental of removal of snags for public safety, and considering that the development and recruitment of snags and down logs is a dynamic process.

Table 3.03-9. Percent of NFS lands within a 60 meter "Zone of Influence" of motorized route additions and reopened ML 1 roads within Old Forest Habitat (CWHR 4M, 4D, 5M, 5D, and 6)

Alternatives	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Zone of Influence (Motorized Additions)	7%	0.3%	0%	0.1%	0.4%	0.3%	0.2%
Miles Added	290.9	4.4	0	0.5	7.5	7.8	0.9
Zone of Influence (Reopened ML1 Roads)	0%	<0.1%	0%	<0.1%	0.4%	<0.1%	<0.1%
Miles of ML1 Roads Reopened	0.0	1.2	0.0	1.7	32.8	3.9	0.7

*Alternative 1 includes existing unauthorized routes

Disturbance to a Specific Site (Wolverine only): The Sierra Nevada Plan Amendment Standard and Guideline #32 (SNFPA ROD 2004) directs that upon detection of a verified wolverine, an analysis be conducted to determine if activities within 5 miles of the detection have the potential to affect the species. Thirteen individual, verified wolverine detections were documented on the Tahoe NF and SPI lands during the winters of 2008 and 2009. For this analysis, the miles motorized routes that are proposed to be added to the NFTS under each alternative were evaluated to determine the potential for motorized use to disturb wolverine that may be foraging or traveling through the area within 5 miles of the thirteen verified wolverine detections. Generally, wolverines move up into the higher elevation subalpine and treeline environments during the breeding period (January 1 to June 30). High elevation subalpine and alpine habitat within close proximity to the wolverine detection sites occurs at Mt. Lola, Basin Peak and Castle Peak with elevations above 8,000 feet. Mt. Lola is the nearest location with subalpine and treeline conditions to the verified wolverine detections. It is unknown whether the wolverine that was detected during February and March of 2008 on the Truckee and Sierraville Ranger Districts would be in the

vicinity where it was originally detected during the time when the majority of motorized use would occur. However, if wolverine are foraging or traveling in an area when motorized use occurs, Alternative 1 results in the greatest miles of routes within 5 miles of verified wolverine detections where direct disturbance could potentially occur (Table 3.03-10) within the 5 miles. Alternative 5 results in the next greatest potential disturbance to wolverine by activities associated with motorized unauthorized routes that would be added to the NFTS (9 miles), followed by Alternatives 2, 6, 7, and 4 in descending order. Alternative 3 does not add any motorized routes to the NFTS, and therefore, would not have any direct effects to wolverine within 5 miles of known detection locations.

Effects to potential alpine/subalpine denning habitat above 8,000 feet: The largest and most contiguous potential wolverine alpine/subalpine denning habitat within 5 miles of verified wolverine detections occurs in the vicinity of Mt. Lola. Smaller alpine/subalpine areas above 8,000 feet are scattered near the Pacific Crest trail, Webber Peak, Maiden Valley, and the Sierra Buttes. Generally, areas above 8,000 feet are primarily non-motorized due to the steep terrain condition and inaccessibility.

None of the proposed route additions for any of the action alternatives falls within the Mt. Lola area. The majority of proposed routes additions are located well below alpine/subalpine habitat in areas that currently are moderately to highly roaded. Motorized use on the proposed routes would occur when they are snow-free and outside of the wet weather seasonal restriction period (Open April 1 to December 31 and /or May to December 31).

Motorized activities on the proposed route additions for the preferred alternative, Alternative 6, would not likely affect denning wolverine habitat and would not require a Limited Operating Period from January 1 to June 30. Only Alternative 5 proposes a route addition within a very small isolated habitat area above 8,000 feet, just west of Maiden Valley and may not be suitable for wolverine denning due to the small area and isolated nature. This small patch of denning habitat is located adjacent to an area with an existing high density of motorized routes.

In addition, potential subalpine denning habitat in the Basin Peak and Castle Peak area occur just beyond 5 miles of any wolverine detections, and no proposed route additions occur within these areas. All the action alternatives benefit wolverine from the ban of cross country travel, including on 93 to 104 miles (Alternative 5 would benefit the least, Alternative 3 would benefit the most).

Table 3.03-10. Miles of Proposed Motorized Route Addition to the NFTS and Existing Unauthorized Motorized Routes within 5 miles of Known Verified Wolverine Detections

Within 5 Miles of Wolverine Detections	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Proposed Motorized Route Additions to NFTS	104	4	0	2	9	3	2
Unauthorized Motorized Routes where cross country travel would be prohibited	0	100	104	102	93	101	102

*Alternative 1 includes existing unauthorized routes that are associated with continued cross country travel

Changes to the NFTS (reopened Maintenance Level 1 Roads)

Disturbance to a Specific Site (Wolverine): Alternative 5 has the greatest potential to impact areas within 5 miles of known wolverine detections from reopening ML 1 roads, where 7.5 miles would be

reopened where wolverine could be directly disturbed and habitat could be affected from fragmentation though snag and down log removal (Table 3.03-11). Alternative 6 proposes to reopen 0.6 miles (SV005), which would slightly affect wolverine which could potentially increase disturbance from vehicle related noise. However, since wolverine have large home ranges and can travel long distances within a day, reopening less than 1 mile of ML 1 road should not be a pose a significant risk to wolverine. The remaining alternatives do not propose reopening any ML 1 roads within 5 miles of known detections and therefore would not affect wolverine or its habitat within 5 miles of wolverine detections.

Effects to potential alpine/subalpine denning habitat above 8,000 feet: None of the ML 1 roads proposed for reopening occurs within alpine/subalpine habitat above 8,000 feet potentially suitable for wolverine denning, and therefore there is no need to implement a Limited Operating Period.

Zone of Influence at 60 meters (Disturbance to a Specific site for Wolverine Only): Only Alternatives 5 and 6 propose to reopen any ML 1 routes within 5 miles of wolverine detections. The Zone of Influence within 60 meters of reopened ML1 routes within 5 miles of wolverine detections was determined to affect less than one percent of the area for both Alternatives 5 and 6. Alternative 5 has the most potential to directly and indirectly affect wolverine through direct disturbance or habitat modification, where approximately 7.5 miles of ML 1 roads would be reopened within 5 miles of known wolverine detections (Table 3.03-11). These ML 1 roads are historic roads which were primarily used for timber harvest. Alternative 6 proposes to reopen 0.6 miles of ML 1 roads (SV-005) within 5 miles of known wolverine detections. Although Alternative 5 affects a slightly greater proportion of wolverine habitat than Alternative 6, this amount of motorized influence would not be measurable at the landscape scale, and therefore would not likely affect the wolverine either through disturbance or habitat condition.

The remaining alternatives would not reopen any ML 1 roads within 5 miles of known detections, and therefore would not directly or indirectly affect the wolverine.

Table 3.03-11. Miles and Zone of Influence of Reopened Maintenance Level 1 Roads within 5 miles of Known Verified Wolverine Detections

Alternatives	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
ZOI Percentage Affected (Reopened ML 1 Roads)	0%	0%	0%	0%	<1%	<1%	0%
Miles of Reopened ML 1 Roads	0	0	0	0	7.5	0.6	0

Wolverine and Sierra Nevada Red Fox: Summary of Direct and Indirect Effects

Table 3.03-12 summarizes the overall net effect to red fox and wolverine from the proposed actions from motorized route additions, prohibition of cross country travel, establishment of “Open Areas,” and changes to the NFTS.

Table 3.03-12. Wolverine and Sierra Nevada Red Fox: Summary of Overall Net Direct and Indirect Effects

Indicator			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel									
Trend of Effect			Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres of Habitat Where Travel is Prohibited			0	715,200	717,900	717,900	717,900	717,600	717,900
ZOI Percentage Affected[1]			0%	6%	6%	6%	6%	6%	6%
Proposed Motorized Route Additions to NFTS									
Trend of Effect			Negative (existing unauthorized routes)	Negative	No effect	Negative	Negative	Negative	Negative
% ZOI Affected			6%	<1%	0%	0%	<1%	<1%	<1%
Miles Added[2]			290.9	4.4	0	0.5	7.5	7.8	0.9
Establishment of Motorized "Open Areas"			No Effect	Localized Adverse effects at Greenhorn Creek (60ac) and Boca, Stampede, and Prosser Reservoirs (2,589 ac)	No Effect	No Effect	No Effect	Localized minimal adverse effects at Boca, Stampede, and Prosser Reservoirs	No Effect
Changes to the NFTS	**Change in Class of Vehicles**		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Change in Season of Use		No Effect	Slight Benefit	No Effect	Slight benefit from reduced disturbance	Slight benefit from reduced disturbance	Light benefit from reduced disturbance	No Effect
	Reopening Maintenance Level 1 roads	**Trend of Effect**	No Effect	No Effect	No Effect	No Effect	Negative	Minimal Negative	No Effect
		ZOI Percentage Affected within 5 miles of wolverine detections	0%	0%	0%	0%	<1%	<1%	0%

Indicator			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
		Miles of Reopened within 5 miles of wolverine detections	0	0	0	0	7.5	0.6	0
		ZOI Percentage Affected within 5 mi. of wolverine detections	0%	0%	0%	0%	<1%	<1%	0%
		Miles Reopened within old forest CWHR habitat	0	1.2	0.0	1.7	32.8	3.9	0.7
Amendments to the Forest Plan			No Effect	Negligible localized negative effect	No Effect	No Effect	Negligible localized negative effect	Negligible localized negative effect	No Effect
Overall Net Effect (compared to Alternative 1)			Negative effects because unauthorized cross country travel would continue; lowest habitat security because the most habitat is in highest route density categories.	Beneficial effect from prohibited cross country travel; although minor negative effects from route additions; higher habitat security from increased proportion of roads in lowest road density categories; overall reduces habitat fragmentation.	Beneficial effect from prohibited cross country travel; higher habitat security from increased proportion of roads in lowest road density categories. Greatest habitat security increase among the action alternatives.	Beneficial effect from prohibited cross country travel; although minor negative effects from route additions;higher habitat security from increased proportion of roads in lowest road density categories; overall reduces habitat fragmentation.	Beneficial effect from prohibited cross country travel; although minor negative effects from route additions; higher habitat security from increased proportion of roads in lowest road density categories; overall reduces habitat fragmentation.	Beneficial effect from prohibited cross country travel; although minor negative effects from route additions; higher habitat security from increased proportion of roads in lowest road density categories; overall reduces habitat fragmentation.	Beneficial effect from prohibited cross country travel; although minor negative effects from route additions; higher habitat security from increased proportion of roads in lowest road density categories; overall reduces habitat fragmentation..

[1]Zone of Influence for Wolverine and Red Fox is 60 m.

[2]Route Miles Added to NFTS: Alternative 1 includes unauthorized routes with continued cross country travel.

Wolverine and Sierra Nevada Red Fox: Cumulative Effects

Cumulative Effects from Motorized Routes: The geographic boundary for analyzing cumulative effects to wolverine and the Sierra Nevada red fox are lands that fall within the boundary of the Tahoe NF including all NFS lands and non-NFS lands (private). The Tahoe NF boundary is sufficiently large to encompass the home ranges of the wolverine and Sierra Nevada red fox located on the Tahoe NF. In addition, the Forest boundary encompasses a wide variety of habitats used by the wolverine and red fox: various forested habitats, subalpine meadow habitats, and riparian streamside habitats. The timeframe for analyzing reasonably foreseeable cumulative effects for the wolverine and Sierra Nevada red fox is approximately 20 years into the past and into the future, which is a reasonable amount of time to estimate potential cumulative impacts to these species from future foreseeable activities.

Motorized Route Density: Motorized route density thresholds for wolverine and Sierra Nevada red fox have not been established, and are hard to determine because of the rarity of these species and their elusive behavior patterns. Therefore, motorized route density across the Tahoe NF provides a relative measure of habitat effectiveness and/or the amount of security habitat available to the wolverine and the Sierra Nevada red fox at the broad landscape scale for which to compare the proposed alternatives. Many literature references indicate wolverine and red fox are primarily associated with remote, secluded areas and may be sensitive to human presence. Therefore, it would follow that as route density increases, human presence may also increase and which reduces security habitat for wolverine and red fox. To compare alternatives, route density categories between 0 to greater than 6 miles/square mile are presented.

The motorized route density within 7th field watersheds was determined for all motorized routes including those on NFS lands and non-NFS lands. Motorized route density represents the sum total cumulative route density for all motorized routes. Since the wolverine is known to avoid areas within high concentrations of human presence, security habitat is best provided for where route densities are the lowest. In addition, motorized route densities are compared within old forest habitat types (CWHR types 4M, 4D, 5M, 5D, and6), Old Forest Emphasis Areas, and within the Tahoe NF Forest Carnivore Network (See Old Forest Associated Species Section).

Table 3.03-13 provides data on the proportion of lands within the Tahoe NF with motorized route densities between 0 and greater than 6 miles/square mile. Alternative 1 has the lowest proportion of land with motorized routes density less than 2 miles/square mile (17% - high to moderate security). The remaining alternatives are similar in their proportion of land base with motorized route density less than 2 miles/square mile (25% to 26%). Moderate security habitat represented by motorized route density category of 2-4 miles/square mile indicates Alternative 1 provides the least amount (44%) moderate security habitat, followed by Alternative 5. The remaining action alternatives provide slightly greater amounts of moderately secure habitat. Alternative 1 provides the most amount of area with lower (32% - 4 to 6 mi/sq. mi.) and least secure habitat (7% greater than 6 mi/sq. mi.). Therefore, Alternatives 3, 4, 2, 6, 7, and 5 in descending order provide the most security habitat for the wolverine and Sierra Nevada red fox, and Alternative 1 provides the least amount of security habitat for these two species.

Table 3.03-13. Percent of Tahoe NF with motorized route densities between zero and greater than 6 miles/square mile

Motorized Route Density	Security Risk*	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
0 Miles/Square Mile	High Security	<1%	<1%	<1%	<1%	<1%	<1%	<1%
0-2 Miles/Square mile	Moderately High Security	17%	25%	26%	25%	25%	25%	25%
2-4 Miles/Square mile	Moderate Security	44%	56%	57%	57%	53%	57%	57%
4-6 Miles/Square mile	Lower Security	32%	15%	13%	14%	17%	14%	14%
>6 Miles/Square mile	Least Security	7%	4%	4%	4%	5%	4%	4%

*Security risk was developed based on a review of literature from various sources on wide-ranging species and professional judgment.

The overall cumulative effects to wolverine and Sierra Nevada red fox from motorized routes are evaluated by analyzing the effects of the alternatives in terms of motorized route density, habitat fragmentation, and disturbance to a specific site (wolverine only) from past, present, and reasonably foreseeable actions (Table 3.03-14). Past and present motorized route densities are combined to represent the current existing condition. Since no thresholds of motorized route density for these species have been established, motorized route density is only used to compare the relative differences between the alternatives. Motorized route densities categories greater than 4 miles/square mile ("lower security" and "least security") are used as a metric to compare relative route densities of the alternatives where human impacts of motorized routes may render habitat less suitable and/or secure to wolverine and red fox. Habitat fragmentation through removal of snags and down logs for public safety is also used to evaluate the cumulative impacts of the proposed alternatives.

Table 3.03-14. Wolverine and Sierra Nevada Red Fox Cumulative effects from Motorized Route Density, Habitat Fragmentation, and Disturbance to a Specific Site

Alternatives		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Present and Past Effects								
Acres of Cross Country Travel Prohibited		0	715,200	717,900	717,900	717,900	717,600	717,900
Total Combined Percent with route density categories of 4 to 6 Miles/square mile (lower security) and >6 miles/square mile (least security habitat)		39%	19%	17%	18%	23%	19%	19%
Cumulative Motorized Route Density								
Zone of Influence (60 meters)		26%	<20%	<20%	<20%	22%	<20%	<20%
Miles Added (Disturbance to a specific site – within 5 miles of wolverine site)		0	4.4	0	0.5	7.5	7.8	0.9
Establishment of Motorized "Open Areas"		None	Slight Negative Effect Greenhorn Area (60 ac), Prosser, Boca, and Stampede Reservoirs (2,589 ac)	None	None	None	Slight negative effect at Prosser, Boca, and Stampede Reservoir Access Areas (244 acres)	None
Changes to NFTS	**Change in Class of Vehicles**	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Change in Season of Use	No Effect	No Effect	No Effect	Slight benefit from reduced disturbance	Slight benefit from reduced disturbance	Light benefit from reduced disturbance	No Effect
	Miles Reopened ML 1 Roads (Disturbance to a specific site – within 5 miles of wolverine site)	0	0	0	0	7.5	0.6	0

Alternatives	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Future Effects							
Potential for route proliferation contributing to motorized route density and habitat fragmentation into the future	High potential for increased route density and habitat fragmentation in the future due to unmanaged cross country travel	Low potential for increased route density and habitat fragmentation– Cross country travel would be prohibited	Low potential for increased route density and habitat fragmentation– Cross country travel would be prohibited	Low potential for increased route density and habitat fragmentation– Cross country travel would be prohibited	Low potential for increased route density and habitat fragmentation– Cross country travel would be prohibited	Low potential for increased route density and habitat fragmentation– Cross country travel would be prohibited	Low potential for increased route density and habitat fragmentation– Cross country travel would be prohibited
Cumulative Effects							
Overall Cumulative Effect of past, present and future motorized routes to wolverine and red fox	Greatest cumulative effect from route density and proportion of Forest fragmented by routes	Cumulative effects of route density and habitat fragmentation are similar to Alternatives 3, 4, 6, 7	Cumulative effects of route density and habitat fragmentation are similar to Alternatives 2, 4, 6, 7	Cumulative effects of route density and habitat fragmentation are similar to Alternatives 2, 3, 6, 7	Next highest Cumulative effect after Alternative 1, slightly higher cumulative effect than Alternatives 2, 3, 4, 6, & 7	Cumulative effects of route density and habitat fragmentation are similar to Alternatives 2, 3, 4, 7	Cumulative effects of route density and habitat fragmentation are similar to Alternatives 2, 3, 4, 6

*Alternative 1 includes existing unauthorized routes under continued motorized cross country travel.

Overall Cumulative Effects from Past, Present, and Reasonably Foreseeable Future Actions: Past and current cumulative effects to wolverine and Sierra Nevada red fox include current and historic grazing; loss of habitat through catastrophic wildfires; timber and fuels management where cover and forage has been reduced or removed; urban development and expansion within a highly checkerboard land ownership pattern; and recreational activities including hunting, camping, winter recreation (skiing and snowmobiling), and general recreation activities including all forms of motorized use including 4 wheel drive vehicles, ATVs, and motorcycles.

The Tahoe NF currently has 31 active livestock grazing allotments including both cattle and sheep. Tahoe LRMP standards and guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands. Improved range conditions as a result of implementing the revised grazing standards and guidelines should benefit prey species for both the wolverine and red fox, especially as site specific allotment management plans are developed.

Since 1990, more than 130,000 acres of vegetation management activities have occurred on the Tahoe NF. Some, but not all, have resulted in impacts to habitats for wolverine and red fox. Between 2001 and 2008, approximately 17,000 acres of forest vegetation and fuels projects were completed, which primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. It is uncertain how vegetation treatments actually affect the wolverine as no empirical data exists on how vegetation management affects habitat quality for both the wolverine and the red fox. In general, management treatments which maintain or enhance habitat for deer should benefit the wolverine.

Vegetation and fuels treatments generally do not increase forage quality and quantity for deer (wolverine prey species) because they do not usually result in reducing the canopy cover below 40%. Higher canopy cover would not increase the production of understory species important for deer foraging. These treatments may result in the short-term reduction in cover for the California wolverine and the Sierra Nevada red fox, though it is expected that in the longer term, habitat would be protected by reducing wildfire risk. Between 1994 and 2008, approximately 95,000 acres burned on the Tahoe NF, some of which have removed forested habitat for wide-ranging species.

On the Tahoe NF, present and past recreational impacts to the wolverine and red fox are far-reaching. The impact of humans from commercial harvest and trapping of wolverine during the turn of the century likely significantly contributed to the decline (and potential extirpation) in wolverine compared to historic conditions in the Sierra Nevada. The Tahoe NF recreation activities include many forms of recreation including both passive and active recreation. Summer recreation includes fishing, hiking, camping at developed and dispersed sites, hunting, off highway use, and wildlife viewing. Winter recreation includes developed ski areas, cross country skiing, and over snow recreation. Since no scientific studies are available that show how these activities impact these species, it is unknown how these recreational activities affect the distribution and abundance of wolverine and the red fox.

The wolverine and the red fox are considered to be primarily associated with areas with low human influence, such as remote wilderness and roadless areas. Increased recreational use on the Tahoe NF in the near future has the potential to impact wolverine if den sites at high elevation subalpine and alpine areas

are disrupted during the breeding period (January to June 30). Increases in recreational activities associated with motorized routes are generally not likely to affect subalpine and alpine areas considered to be suitable for wolverine and red fox denning habitat when they are covered by snow.

When considering all the cumulative effects of past, present, and reasonably foreseeable future impacts from vegetation/fuels projects, wildfires, and recreation, Alternative 1 poses the greatest risk to the wolverine and red fox on the Tahoe NF, where 39% of the Tahoe NF has motorized route densities that fall in the lower security (motorized route density category 4-6 mi/sq. mi.) and least secure (motorized route density category greater than 6 mi/sq. mi.) habitat condition, followed by Alternative 5 (23%). The remaining action alternatives are similar to each other and only slightly increase overall cumulative impacts to wolverine and Sierra Nevada red fox on the Tahoe NF. Alternative 3 does not add any routes to the NFTS, so it does not add to existing cumulative impacts. All the action alternatives would result in a beneficial impact to wolverine prey (mule deer) from the ban of cross country travel on over 715,000 acres, including the use on between 257 and 390 miles of existing unauthorized routes, depending on the alternative (Alternative 5 least benefit to Alternative 3 greatest benefit), compared to Alternative 1.

Non-motorized (hiking, mountain biking, equestrian) use may occur on existing unauthorized routes. Generally, it is expected that non-motorized recreation would be less impactive than motorized recreation, but the degree of the reduced impact depends upon the type and intensity of non-motorized use. Over time, it is expected that these existing motorized routes would eventually become revegetated through active or passive restoration. The time of recovery would depend upon the site-specific soil and vegetative conditions.

In addition, Alternatives 4, 5, and 6 would benefit wolverine prey on deer winter ranges through the implementation of wet weather closures on native surfaced roads and trails. Finally, Alternative 1, with continued cross country travel, including continued use of existing unauthorized routes, has the greatest number of route miles occurring within a 5-mile radius of verified wolverine detections (104 mi.), followed by the remaining alternatives in descending order (Alternative 5, 9 mi.; Alternative 2, 4 mi.; Alternative 6, 3 mi.; Alternatives 4 and 7, 2 mi.; Alternative 3, none).

Wolverine and Sierra Nevada Red Fox: Management Direction

Sensitive Species Determination: The Biological Evaluation for the Travel Management EIS project (Project file, which is incorporated by reference) made a determination that implementation of Alternative 6, the Preferred Alternative, may affect the California wolverine and the Sierra Nevada red fox, but is not likely to result in a trend toward Federal listing or loss of viability for the California wolverine or the Sierra Nevada red fox within the planning area of the Tahoe National Forest. Alternative 6 would prohibit current and future cross country travel, including motorized use on 104 miles of unauthorized routes within 5 miles of verified wolverine detections, would impact less than 1 % of wolverine and the Sierra Nevada red fox habitat, would result in route densities of >4 miles/square mile (low security risk) in 18% of the Tahoe NF, would not affect alpine or subalpine habitat above 8,000 feet, and would only add 3 miles of routes to the NFTS within 5 miles of verified wolverine detections. Beneficial effect from

prohibited cross country travel; although minor negative effects from route additions; higher habitat security from increased proportion of roads in lowest road density categories; overall reduces habitat fragmentation. In the absence of a range-wide viability assessment, this viability determination is based on local knowledge of this species as discussed previously in this evaluation, and professional judgment.

Compliance with the Forest Plan and Other Direction: The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment identified the following standard and guideline applicable to wolverine and red fox was analyzed for the Motorized Travel Management Project:

Wolverine and Sierra Nevada Red Fox Detections: Detection of a wolverine or Sierra Nevada red fox will be validated by a forest carnivore specialist. When verified sightings occur, conduct an analysis to determine if activities within 5 miles of the detection have a potential to affect the species. If necessary, apply a limited operating period from January 1 to June 30 to avoid adverse impacts to potential breeding. Evaluate activities for a 2-7 year period for detections not associated with a den site (Standard and Guideline 32). This standard and guideline does not apply to the Sierra Nevada red fox because there have been no verified detections of it on the Tahoe NF.

The Travel Management Project analyzed how proposed motorized route additions would affect the area within a 5 mile radius of known verified wolverine detections. The analysis shows when wolverine may be using the area for foraging or traveling when motorized use tends to occur, motorized use has the potential to disturb the wolverine. Alternative 1 continues cross country travel, where use on 104 miles of unauthorized routes would occur within 5 miles of verified wolverine detections where direct disturbance could potentially occur. Alternative 5 results in the next greatest potential disturbance to wolverine by activities associated with 9 miles of proposed motorized route additions within 5 miles of known wolverine detections, followed by Alternatives 2, 6, 7, and 4 in descending order. Alternative 3 does not add motorized trail to the NFTS, and therefore, would not have any direct effects to wolverine within 5 miles of known detection locations. In addition, the prohibition of cross country travel on approximately 715,000 acres of habitat across the Forest significantly improves habitat effectiveness for all the action alternatives.

Alternative 6 would not propose any route additions to the NFTS or would reopen any ML 1 roads within alpine and subalpine areas above 8,000 feet (i.e. Mt. Lola area) that may be suitable for wolverine denning habitat, and therefore would not require a Limited Operating Period from January 1 to June 30. No verified detections of the Sierra Nevada red fox are known at this time, and therefore, a site-specific analysis is not warranted.

Mule Deer (Ungulates): Affected Environment

The mule deer is the only species in the Ungulate Species Group. The mule deer is a Management Indicator Species on the Tahoe NF. The Tahoe LRMP indicates that mule deer use a mix of all successional stages, but the most important mule deer habitat types are early successional types, hardwoods, and shrublands. Most deer on the Tahoe NF migrate seasonally between higher elevation summer range and low elevation winter range. In general, critical winter range, critical summer range,

and fawning habitats represent key habitats for deer where heavier use and higher quality habitats for wintering and summer use are expected to occur.

The Tahoe National Forest has four main deer herds within its administrative boundaries: Downieville, Nevada City, Blue Canyon and Loyalton/Truckee. The Sloat, Mooretown and Doyle herds overlap with small portions of the Tahoe NF in the extreme north sections of the administrative boundaries and are insignificant on a forest scale.

The Tahoe LRMP currently has restrictions on cross country travel within the four primary deer herd boundaries, including Blue Canyon (49,542 acres), Downieville (71 acres), Nevada City (16,819 acres) and Loyalton-Truckee (4,053 acres).

Table 3.03-15 shows deer habitat acreage by deer habitat type for each of the primary deer herds (Blue Canyon, Downieville, Nevada City, and Loyalton-Truckee) occurring on NFS lands and non-NFS lands within the boundary of the Tahoe NF.

Table 3.03-15. Mule Deer Acreage of Habitat by type for each major deer herd within Tahoe NF boundary

Deer Herd	Habitat Type	Total Acres	FS Acres
Blue Canyon	Critical Summer	**64,829**	51,463
	Critical Winter	**12,115**	11,196
	Fawning	**730**	700
	Holding	**846**	846
	Summer	**170,000**	123,563
	Winter	**60,533**	49,871
Downieville	Critical Summer	**60**	22
	Critical Winter	**4,868**	1,973
	Fawning	**0**	0
	Holding	**0**	0
	Summer	**247,422**	185,859
	Winter	**56,679**	38,541
Nevada City	Critical Summer	**60,162**	37,853
	Critical Winter	**14,101**	9,066
	Fawning	**8,118**	4,107
	Holding	**2,455**	572
	Summer	**110,000**	60,651
	Winter	**37,071**	19,309
Loyalton-Truckee	Critical Summer	**25,748**	20,474
	Critical Winter	**8,524**	5,876
	Fawning	**4,440**	2,120
	Holding	**0**	0
	Summer	**301,974**	197,891
	Winter	**4,508**	2,173

Many studies have been conducted on the interaction of road and trail-associated activities and mule deer, and have shown that road and trail-associated factors have the potential to impact mule deer 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. Roads and trails can result in the disturbance or disruption of individuals in a deer population. Deer inhabiting areas near roads and trails may move away from the area when disturbed by humans. Several factors affect the degree to which trail and road associated human activities disrupt deer. This section will highlight some examples of the way in which roads and trails can affect individual deer and deer populations. Studies on both white-tailed deer and mule deer are included in the summaries.

Displacement or Avoidance: In general, mule deer 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. Deer 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).

Various studies have shown that mule deer have displacement distances that vary between 200 and 800 meters, depending upon the road type and traffic level, and the surrounding habitat (Perry and Overly 1977, Rost and Bailey 1979, Johnson et al. 2000). One study found that if habitat was available away from a linear road or trail, then deer avoided the disturbance corridor (Jalkotzy et al. 1997). However, when no suitable deer habitat was available away from the road or trail, then deer used the habitat adjacent to the road or trail. Rost and Bailey (1979) reported that deer and elk in Colorado avoided roads, especially within 200 meters of a road. Perry and Overly (1977) reported that deer were displaced up to 800 meters from roads.

Main roads were found to reduce deer use up to 0.5 miles (800 m), 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).

Mortality: *Hunting and Poaching:* Greater human access can increase opportunities for hunting as well as poaching of deer. During the hunting season, deer may become more wary of humans, and disturbance to deer is greater when being hunted. In New York State, antlered deer were found to have longer flight distances than deer that were not hunted (Jalkotzky et al. 1997). Hunted deer populations tend to have stronger reactions to people on foot than motorized vehicles. This may be due to the fact the deer can detect a vehicle from greater distances rather than getting surprised by quieter humans on foot.

Roads and trails can facilitate deer harvest success. A study using 143 radio-collared deer in Minnesota revealed that deer mortality during the hunting season was 2-4 times higher for deer that lived 0.2 km from a road versus those that were at greater than 0.3 km from a road. Major access routes radiating from urban centers into deer range provide increased opportunities for hunters.

Since hunting levels for deer are controlled through hunting zone quotas and tag limits established by the California Department of Fish and Game (CDFG), an increase in hunting opportunity or hunter success is unlikely to impact deer 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 herds on the Tahoe NF (CDFG 2003, CDFG 1998).

Thomas et al. (1979) used Perry and Overly's data to develop a habitat effectiveness model based on road densities. The model indicated that a 20% loss in habitat effectiveness occurred when road densities were about 2 miles/mi^2 for summer range habitat. At road densities of 6 miles/mi^2, habitat effectiveness declined by 50-95% depending on the type of road.

One study found that all terrain vehicles altered deer feeding and use patterns, and these deer produced fewer young the following year (Yarmaloy 1988). An Arizona study using deer and elk decoys reported that illegal road hunting was widespread (Bancroft *IN* Watson 2005). Eleven of 19 archery elk and deer hunters and 41of 53 firearms hunters committed violations by attempting illegal take after observing a decoy from their vehicle.

Collisions: Vehicle collisions with deer can contribute considerably to direct deer mortality. Deer are probably the most frequently-killed large mammal along North America's roads. The Insurance Institute for Highway Safety commissioned a study which estimated that more than 1.5 million deer/vehicle collisions occur annually, resulting in more than 29,000 human injuries and 150 deaths. Romin and Bissonette (1996), conservatively estimated that the U.S. national deer road kill in 1991 totaled at least 500,000 deer. Deer road kills vary considerably by region and by season. In California, mule deer road kill along a 3 mile stretch of secondary highway was estimated at 3.7 and 4.8 per kilometer per year during spring and fall migrations, respectively (Jalkotzy et al. 1997).

There are little to no data on deer road kills along Forest roads, however roads maintained at a higher standard for passenger vehicle (Maintenance Levels 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 (maintenance level 2 roads) are probably not appreciable in number due to the lower speeds and the amount of use received by these roads.

Summary of trail and road associated impacts to mule deer:

- Mortality from hunting or trapping as facilitated by motorized road and trail access
- Increased illegal take of animals as facilitated by trails and roads
- Mortality or injury resulting from a motorized vehicle colliding with an animal
- Loss and resulting fragmentation of habitat due to the establishment of roads, trails, or networks, and associated human activities.

- Increased mortality of animals (euthanasia or shooting) due to increased contact with humans, as facilitated by road and trail access
- 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 that is 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.

Mule Deer: Environmental Consequences

Mule Deer: Indicators used to Measure Effects

Cross Country Travel: The prohibition of cross country travel is analyzed for its effects on the Blue Canyon, Downieville, Nevada City, and Loyalton-Truckee deer herds within each deer habitat type.

Additions to the NFTS (miles of motorized routes and Zone of Influence): To assess the potential direct and indirect impacts to deer from motorized route associated disturbance including noise, hunting, poaching, etc., the miles of motorized routes to be added to the NFTS were determined for each alternative by key deer habitat type (critical summer, fawning, winter, and critical winter) within each of the deer herds - Blue Canyon, Downieville, Nevada City, and Loyalton-Truckee.

Critical winter range is considered to provide key habitat for deer during the winter months, and fawning habitat and critical summer range is expected to receive heavier deer use in the summer months. Determining the proportion of critical winter range and the proportion of critical fawning and summer range occurring within a Zone of Influence associated with roads or motorized trails, provides another measure of the effects of action alternatives upon these key deer types.

Based upon the Rost and Bailey's 1979 study in Colorado, which indicated that deer were displaced within a 200 meter distance of secondary roads, a distance of 200 meters was applied to represent the Zone of Influence related to motorized routes, since the majority of Tahoe NF roads and trails are likely most similar to those roads addressed in the Colorado study area. The use of a larger Zone of Influence (i.e., 400 meters or 800 meters) could potentially exaggerate the effects of motorized routes, as the science of motorized route effects vary upon many factors. The proportion of each deer herd's critical winter range habitat and critical summer range and fawning habitat occurring within this Zone of Influence was determined for each Alternative. Thresholds associated with this measure have not been established, but relative changes in habitat effectiveness can be evaluated and compared.

Changes to the NFTS: (Changes to Wet Weather Seasonal Restrictions, and Reopening Maintenance Level 1 Roads): Wet weather seasonal restrictions would apply to Alternatives 4, 5 and 6 on native surfaced roads and motorized trails. The benefits to deer of these additional wet weather closures are analyzed for the alternatives. Reopening Maintenance Level 1 Roads that were previously closed to motorized use is analyzed for its potential for disturbance to the four major deer herds.

Amendments to the Forest Plan: The 1990 Tahoe LRMP (Forest Plan) recognizes that the restriction of motorized vehicle access within certain deer habitat areas is important to deer, especially within key deer winter ranges. Seasonal restrictions for deer habitat as specified in the 1990 Tahoe Forest Plan and contained in existing Forest Orders would be continued. Table 3.03-16 displays the current seasonal restrictions specified in the Forest Plan. These seasonal restrictions apply to all native surface roads and motorized trails within the specified Management Areas.

Table 3.03-16. Tahoe Forest Plan Motor Vehicle Deer Seasonal Restrictions by Management Area (MA)

MA #	MA Name	Motor Vehicle Use Restriction	Restricted Dates
11	Smithneck	Prohibit wheeled vehicle travel off of designated routes in Bear and Jones Valleys for protection of winter deer range	None specified
12	Antelope	Key Deer Winter Range and Migration Corridor – Closed to all motorized vehicle use. Designated routes only in summer season. Restricted period can be amended if weather conditions are such that deer are not on the winter range.	November 1 to May 1
23	Pendola	Designated routes only, except closed south of the Long Point Road on key deer winter range. This restriction can be amended if weather conditions are such that deer are not on the winter range.	November 1 to May 1
24	Oregon	Designated routes only, except closed November 1 to May 1 in wildlife areas such as Plum Valley, Lohman Ridge, and Studhorse Canyon. This restriction can be amended if weather conditions are such that deer are not on the winter range.	November 1 to May 1
42	South Yuba	Designated routes only, southwest of Bloody Run Creek and the Graniteville Road is closed November 1 to May 1 on deer winter range. Restricted period can be amended if weather conditions are such that deer are not on the winter range.	November 1 to May 1
59	Casa Loma	Key Deer Winter Range - Designated routes only, except closed November 1 to May when deer are using the area.	November 1 to May 1
65	Chalk	Key Deer Winter Range - Prohibit wheeled vehicle travel off of designated routes, trails, and limited off highway vehicle (OHV) use areas. This restriction can be amended if weather conditions are such that deer are not on the winter range in the Burlington Ridge and Greenhorn areas.	November 1 to May 1
84	Humbug-Sailor	Key Deer Winter Range - Closed November 1 to May 1. This restriction can be amended if weather conditions are such that deer are not on the winter range.	November 1 to May 1
102	End of the World	Designated routes only, except seasonal closure of deer holding area during the period September 15 to December 31 annually. During winters with low preceipitation, this area will be closed. This restriction can be amended if weather conditions are such that deer are not on the holding area.	September 15 to December 31
106	Big Oak	Designated routes only in summer. Closed November 1 to May 1on key deer winter range. This restriction can be amended if weather conditions are such that deer are not on the winter range.	November 1 to May 1
108	Little Oak	Designated routes only in summer. Closed November 1 to May 1 on key deer winter range. This restriction can be amended if weather conditions are such that deer are not on the winter range.	November 1 to May 1

For Alternatives 2, 5 and 6, the Forest Plan would be amended to remove the November 1 to May 1 seasonal closure in Management Area 84 (Humbug-Sailor) on key winter deer range.

Mule Deer: Direct and Indirect Effects

Cross Country Travel: The prohibition of cross country travel was analyzed for the Blue Canyon, Downieville, Nevada City, and Loyalton-Truckee deer herds within each deer habitat type. The Tahoe NF LRMP has previously designated some areas within the deer herd boundaries closed to cross country travel which would continue for all alternatives. For each of the deer herds, under Alternative 1, cross country travel would continue (except for the existing LRMP closures), resulting in disturbance, disruption, avoidance, and abandonment of suitable habitats. Acreages where cross country travel is not currently prohibited for the four primary herds total 753,640 acres (Blue Canyon: 188,096 acres; Downieville: 226,324 acres; Nevada City: 114,739 acres; Loyalton-Truckee: 224,481 acres). For all action alternatives, for all herds, and in all seasonal ranges, the acres of proposed cross country motorized travel prohibitions would be equal to the amount of habitat available in each seasonal type, thus all action alternatives would substantially benefit all deer herds and reduce negative effects associated.

Additions to the NFTS: Table 3.03-17 displays the miles of proposed motorized route additions to the NFTS for the action alternatives, and the total miles of existing unauthorized routes for Alternative 1 for each deer herd. Motorized route additions displays a way to compare alternatives to assess the direct and indirect impacts to deer from motorized routes where access for hunting and poaching, and disturbance and avoidance may occur. Key deer habitat within Critical Summer, Fawning, Critical Winter, and Winter Ranges are shown below. Alternative 1 poses the greatest risk to all deer herds on all deer seasonal ranges where over 450 miles of existing motorized unauthorized routes would continue to be used with continued cross-country travel. The action alternatives (except Alternative 3) range from adding 5 to 12 miles of motorized routes, in ascending order (Alternatives 4, 7, 2, 6, and 5). Alternative 3 does not add any motorized routes, and therefore, does not add additional motorized impacts within key seasonal ranges for any of the major deer herds on the Tahoe NF.

Blue Canyon Deer Herd: Alternative 1 poses the greatest risk to the Blue Canyon Deer Herd on both critical summer and critical winter/winter ranges. The action alternatives (except Alternative 3) add 4 to 6 miles (Alternative 4 – least to Alternative 5 – most) of motorized routes within critical summer and critical winter/winter ranges. Within Critical Summer Range, implementing Alternative 1, with continued cross-country travel and associated use of unauthorized routes, would have motorized route miles that exceed all the action alternatives by about 50 miles. Within winter and critical winter ranges, Alternative 1 exceeds action alternatives (Alternatives 2, 3, 4, 5, 6, 7) by least 130 miles.

Downieville Deer Herd: Alternative 1 poses the greatest risk to the Downieville Deer Herd on both critical winter and winter ranges where resources may be scarce and deer may be stressed during the winter months. For the Downieville Deer Herd, only about 60 acres of critical summer and no fawning areas fall within the boundaries of the Tahoe NF. Within critical winter range, Alternative 1 has 17 motorized route miles, and the all the action alternatives have 14 miles of motorized routes each. Within winter range, Alternative 1 has the highest number of motorized route miles (76.3 miles), where direct

and indirect disturbance associated with motorized routes could occur when deer are stressed during the winter. Alternatives 2, 4, 5, 6, and 7 each adds 0.2 miles of motorized route miles within winter range,

Nevada City Deer Herd: Alternative 1 poses the greatest risk to the Nevada City Deer Herd on all key deer habitat types - critical summer, critical winter, and winter habitats when deer are most vulnerable to disturbance. Motorized miles in Alternative 1 exceeds the action alternatives in all key seasonal ranges by at least 138 miles, with Alternative 5 having the most motorized additions (5 miles) followed by Alternatives 2, 6, 7, 4.

When comparing critical summer and fawning habitat for the Nevada City Deer Herd, Alternative 1 exceeds the action alternatives by at least 37 miles (in descending order - Alternatives 6, 5, 2, 7, 4, and 3). For critical winter habitat and winter ranges, Alternative 1 exceeds the action alternatives by 100 miles. Alternative 5 adds 3 miles of motorized routes, followed by Alternatives 2 and 6, with 1 mile and 0.1 mile added, respectively within key winter ranges. The remaining alternatives would not add motorized routes in key winter ranges.

Loyalton-Truckee Deer Herd: Motorized route miles for the Loyalton-Truckee Deer Herd are greatest under Alternative 1, where motorized route miles exceed all the action alternatives by at least 50 miles within all seasonal ranges (Table 3.03-17). With the exception Alternative 6 where 1 mile of motorized route is added within critical summer habitat, the remaining action alternatives do not add any motorized miles to the NFTS within any seasonal ranges for the Loyalton-Truckee Deer Herd.

Table 3.03-17. Miles of Motorized Route Additions on within deer herd winter ranges, critical winter ranges, critical summer, and fawning areas on the Tahoe NF

		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Blue Canyon Deer Herd	Critical Summer	51.0	1.3	0	0.2	1.5	1.5	0.9
	Fawning	0.1	0	0	0	0	0	0
	Critical Winter	22.6	0	0	0	0	0	0
	Winter	112.7	4.6	0	4.1	4.9	4.8	4.5
	All Seasonal Ranges	**186.4**	**5.9**	**0**	**4.3**	**6.4**	**6.3**	**5.4**
Downieville Deer Herd	Critical Summer	0.1	0	0	0	0	0	0
	Fawning	0	0	0	0	0	0	0
	Critical Winter	1.7	0	0	0	0	0	0
	Winter	74.5	0.2	0	0.2	0.2	0.2	0
	All Seasonal Ranges	**76.3**	**0.2**	**0**	**0.2**	**0.2**	**0.2**	**0**

		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Nevada City Deer Herd	Critical Summer	30.3	1.7	0	0.5	1.7	2.3	0.8
	Fawning	9.5	0.3	0	0	0.3	0.3	0.2
	Critical Winter	40.2	0	0	0	0	0	0
	Winter	62.9	1.0	0	0	3	0.1	0
	All Seasonal Ranges	**142.9**	**3.0**	**0**	**0.5**	**5.2**	**2.9**	**1.0**
Loyalton-Truckee Deer Herd	Critical Summer	39.0	0	0	0	0	1.1	0
	Fawning	3.4	0	0	0	0	0	0
	Critical Winter	6.0	0	0	0	0	0	0
	Winter	3.6	0	0	0	0	0	0
	All Seasonal Ranges	**52.0**	**0**	**0**	**0**	**0**	**1.1**	**0**
Total for all herds within all seasonal ranges		**457.6**	**9.1**	**0**	**5**	**11.6**	**10.3**	**6.4**

* Alternative 1 includes miles of unauthorized routes that would remain with continued use

Zone of Influence: As stated above, deer were found to respond to disturbance associated with secondary motorized roads and trails within a 200-meter distance. Analyzing for these variables can be complex because deer may respond differently, depending on the type of motorized route and the type of surrounding vegetation, the intensity of animal use, and the degree to which motorized activities overlap with deer use. The action alternatives consider the addition of motorized routes, and therefore, a Zone of Influence within 200 meters of motorized route additions was used by to compare differences in the direct and indirect impacts between alternatives for each deer herd, within key deer ranges (Table 3.03-18). Although major roads (i.e., paved and surfaced roads used by passenger vehicles which receive higher use levels and rates of speed, including county roads, state highways, etc.) may have a greater influence on deer than secondary motorized routes, a 200-meter Zone of Influence was used to analyze all existing motorized routes consistently because using a greater Zone of Influence may result in excessive overlap in habitat when considering all motorized routes, and therefore, overstate the effects of motorized routes.

Areas that are less influenced by motorized routes are considered “security habitat,” whereas, areas influenced by motorized routes are considered “zones of influence” where deer are less secure. For Alternative comparison purposes, a simple ranking system, such as the one developed by Gaines et al. (2003), is used. For this purpose, less than 25 percent of key habitat affected was ranked as a low level of road or trail influence, 25 to 50 percent of key habitat affected was ranked as a moderate level of influence, and greater than 50 percent of key habitat affected was ranked as a high level of influence. Using this ranking system, Alternative 1 results in a “high” level of motorized route influence on each deer herd’s critical summer and winter ranges combined, where the effectiveness of critical deer range habitat could be reduced. All the action alternatives result in a “low” influence to key summer and winter ranges from the addition of routes, and therefore considerably improves deer habitat security or effectiveness compared to Alternative 1. The sections below describe how the alternatives affect key deer seasonal habitats from the addition of motorized routes.

Blue Canyon Deer Herd: Alternative 1 poses the greatest risk to the Blue Canyon Deer Herd from reduced habitat effectiveness from potential disturbance or avoidance behavior as a result of factors

associated with cross country travel, including continued use of unauthorized routes. Under Alternative 1, approximately 20% of key winter deer ranges are influenced by continued use of existing unauthorized routes. Unauthorized routes influence key summer ranges of the Blue Canyon herd at a relatively low level (2% fawning, 11% critical summer). All the action alternatives result in a low influence (0-1%) on key deer ranges from proposed motorized additions. Motorized route additions for Alternative 5 influences 3% of critical winter ranges compared to the other action alternatives.

Downieville Deer Herd: The Downieville Deer Herd is moderately affected overall by Alternative 1, where 42% of critical summer ranges, 7% critical winter, and 16% winter ranges are within a 200-meter Zone of Influence of existing motorized unauthorized routes. Alternatives 2, 3, 4, 6 and 7 do not directly or indirectly affect key deer habitats. Alternative 5 contributes to a low amount of key habitats affected by adding motorized routes within a 200-meter Zone of Influence where, on average, 1% of key deer habitats are affected.

Nevada City Deer Herd: Alternative 1 poses the greatest risk where a "moderate" amount of key winter deer habitat (27%) is influenced by continued use on unauthorized routes associated with cross country travel within the Nevada City Deer Herd resulting in a moderate reduction of habitat effectiveness on winter ranges when deer are stressed and resources may be low. Critical summer and fawning habitat is influenced by unauthorized routes by 9% and 15%, respectively, which individually contributes to a relatively low level of potential disturbance by motorized use when deer are on key summer ranges. The action alternatives all result in a "low" amount of key deer habitat (0-2%) being influenced by motorized routes added to the NFTS.

Loyalton-Truckee Deer Herd: All the alternatives result in a "low" influence on key deer habitats within the Loyalton-Truckee Deer herd, with Alternative 1 resulting in the greatest amount of key deer habitats influenced by disturbance potential from continued use of unauthorized routes associated with cross country travel. Alternative 1 directly and indirectly affects between 13 to 19% key summer habitats and 11% key winter ranges. The remaining alternatives affect between 0 to 2% of key deer summer and winter habitats, and therefore would not result in a measurable change in habitat effectiveness.

Table 3.03-18. Percent of Key Deer Ranges within a 200-meter "Zone of Influence" of Motorized Route Additions by Herd

	Range Type	Acres	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Blue Canyon Deer Herd	Critical Summer	64,829	11%	<1%	0%	<1%	1%	1%	<1%
	Fawning	730	2%	0%	0%	0%	0%	0%	0%
	Critical Winter	12,115	20%	0%	0%	0%	3%	0%	0%
	Winter	60,533	21%	1%	0%	1%	1%	1%	1%
Downieville Deer Herd	Critical Summer	60	42%	0%	0%	0%	0%	0%	0%
	Fawning	0	0%	0%	0%	0%	0%	0%	0%
	Critical Winter	4,868	7%	0%	0%	0%	0%	0%	0%
	Winter	56,679	16%	0%	0%	0%	0%	0%	0%

	Range Type	Acres	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Nevada City Deer Herd	Critical Summer	60,162	9%	1%	0%	<1%	1%	2%	<1%
	Fawning	8,118	15%	1%	0%	0%	1%	1%	1%
	Critical Winter	14,101	27%	0%	0%	0%	0%	0%	0%
	Winter	37,071	17%	0%	0%	0%	2%	0%	0%
Loyalton-Truckee Deer Herd	Critical Summer	25,748	19%	0%	0%	0%	0%	2%	0%
	Fawning	4,440	13%	0%	0%	0%	0%	0%	0%
	Critical Winter	8,524	11%	0%	0%	0%	0%	0%	0%
	Winter	4,508	11%	0%	0%	0%	0%	1%	0%

*Alternative 1 includes unauthorized routes associated with continued cross country travel.

Changes to the NFTS (Wet Weather Seasonal Restrictions, Reopening Maintenance Level 1 Roads): ***Wet Weather Seasonal Restrictions***: Wet weather seasonal restrictions of native surface motorized roads and trails are analyzed for the action alternatives. Alternatives 4, 5, and 6 provide additional wet weather seasonal restrictions, which may benefit deer that may potentially use areas that are not currently under existing Forest Plan deer seasonal restrictions. In areas outside current Forest Plan deer seasonally restricted areas, the wet weather seasonal closures would provide an additional 3 months wet weather closure (3 months for the Burlington Ridge and Greenhorn area) and would reduce the effects of motorized vehicles upon deer using these areas, as compared to Alternatives 1, 2, 3, and 7, which have no wet weather seasonal closures. Alternatives 4, 5, and 6 could result in shorter or longer wet weather closure periods, but this would vary annually depending upon rainfall and soil conditions.

Reopened Maintenance Level 1 Roads: Reopening Maintenance Level 1 roads (ML 1) has the potential to introduce disturbance to deer from activities associated with motorized vehicles on key deer habitat where deer are most vulnerable. Miles of reopened ML 1 roads and the Zone of Influence within 200 meters were determined for each of the deer herds.

Reopened ML 1 Roads: Alternative 5 potentially affects the most seasonal deer ranges across the Tahoe NF, where approximately 16 miles of ML 1 roads would be reopened to motorized use and could increase disturbance to deer on key summer and winter ranges (Table 3.03-19). Alternatives 2 and 6 would reopen a total of about 1 mile of ML 1 roads, for about ½ mile each within winter range of the Downieville deer herd and critical summer range of the Loyalton-Truckee deer herd. Alternative 4 would reopen a total ½ mile ML 1 road within Blue Canyon critical summer and Nevada City Deer Herd key winter range. The remaining alternatives do not reopen ML 1 roads, and therefore would not increase disturbance to deer on key seasonal habitats.

Table 3.03-19. Miles of Reopened Maintenance Level 1 Roads within Key Deer Habitats

		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Blue Canyon Deer Herd	Critical Summer	0	0	0	0.3	3.7	0	0
	Fawning	0	0	0	0	0.1	0	0
	Critical Winter	0	0	0	0	3.9	0	0
	Winter	0	0	0	0	2.7	0	0
Downieville Deer Herd	Critical Summer	0	0	0	0	0	0	0
	Fawning	0	0	0	0	0	0	0
	Critical Winter	0	0	0	0	0	0	0
	Winter	0	0.5	0	0	0.5	0.5	0
Nevada City Deer Herd	Critical Summer	0	0	0	0	0	0	0
	Fawning	0	0	0	0	0	0	0
	Critical Winter	0	0	0	0.1	2	0	0
	Winter	0	0	0	0.1	2.6	0	0
Loyalton-Truckee Deer Herd	Critical Summer	0	0.6	0	0	0.6	0.6	0
	Fawning	0	0	0	0	0	0	0
	Critical Winter	0	0	0	0	0	0	0
	Winter	0	0	0	0	0	0	0
Total Miles Reopened ML 1 Roads		**0**	**1.1**	**0**	**0.5**	**16.1**	**1.1**	**0**

Zone of Influence: Table 3.03-20 displays the percent of key deer ranges within a 200-meter Zone of Influence of reopened ML 1 roads by alternative for each of the deer herds. Alternative 5 is the only alternative that impacts any of the deer herds from the reopening of ML 1 roads, with the exception of Alternative 2 which only affects less than 1% of critical summer habitat of the Loyalton-Truckee herd. This minor amount of effect from Alternative 2 should not pose a measurable risk to the Loyalton-Truckee herd. The Downieville Deer Herd has no impacts from any alternative

Although Alternative 5 would potentially impact three of the four major deer herds from the reopening of ML 1 roads, implementing Alternative 5 would only influence about 1-2% of any given habitat type. At the herd scale, this proportion of impact should not pose a concern to either the Blue Canyon, Nevada City, or the Loyalton-Truckee herds, and therefore overall habitat security would not be greatly compromised from reopening ML 1 roads. However, there may be localized impacts which may increase disturbance to individual deer. These impacts would vary depending on the amount of disturbance already occurring from existing roads and activities. Areas where checkerboard ownership patterns have already highly fragmented deer winter range, such as the Nevada City and the Blue Canyon herds, deer could experience even more disturbance and harassment.

Table 3.03-20. Percent of Key Deer Ranges within a 200-meter "Zone of Influence" of Reopened Maintenance Level 1 Roads by Herd

	Range Type	Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Blue Canyon Deer Herd	Critical Summer	64,829	0%	0%	0%	0%	1%	0%	0%
	Fawning	730	0%	0%	0%	0%	2%	0%	0%
	Critical Winter	12,115	0%	0%	0%	0%	0%	0%	0%
	Winter	60,533	0%	0%	0%	0%	1%	0%	0%
Downieville Deer Herd	Critical Summer	60	0%	0%	0%	0%	0%	0%	0%
	Fawning	0	0%	0%	0%	0%	0%	0%	0%
	Critical Winter	4,868	0%	0%	0%	0%	0%	0%	0%
	Winter	56,679	0%	0%	0%	0%	0%	0%	0%
Nevada City Deer Herd	Critical Summer	60,162	0%	0%	0%	0%	0%	0%	0%
	Fawning	8,118	0%	0%	0%	0%	0%	0%	0%
	Critical Winter	14,101	0%	0%	0%	0%	1%	0%	0%
	Winter	37,071	0%	0%	0%	0%	1%	0%	0%
Loyalton-Truckee Deer Herd	Critical Summer	25,748	0%	<1%	0%	0%	<1%	0%	0%
	Fawning	4,440	0%	0%	0%	0%	0%	0%	0%
	Critical Winter	8,524	0%	0%	0%	0%	0%	0%	0%
	Winter	4,508	0%	0%	0%	0%	0%	0%	0%

Amendments to the Forest Plan

Key Deer Winter Range for the Blue Canyon Deer Herd: Existing Forest Plan direction for the Humbug-Sailor Management Area (#84) includes the following: "Off-Highway Vehicle Restrictions - On key winter deer winter range, closed November 1 to May 1. This restriction can be amended if weather conditions are such that deer are not on the winter range."

Winter range (winter and critical winter) for the Blue Canyon Deer Herd encompasses a large area (72, 648 acres). Within Blue Canyon Deer Herd winter range, the Forest Plan identified a total of 16,108 acres as key deer winter range located in two separate locations. One key winter range area lies in the northwest portion of the Blue Canyon deer winter range and falls within several management areas, including Casa Loma, North Fork, American, Sugar Pine Point, Macy, Sugar Pine and Humbug-Sailor. The other key winter range area lies near the southern edge of the winter range and overlaps with the Big Oak, Little Oak and Mosquito management areas (Figure 3.03-1). There are currently 79.2 miles of roads and motorized trails within key winter range of the Blue Canyon Deer Herd (See Figure 3.03-1). Alternatives 1, 3, 4, and 7 do not proposed to amend the Forest Plan deer restriction within the Humbug-Sailor MA, and therefore would have no affect to deer.

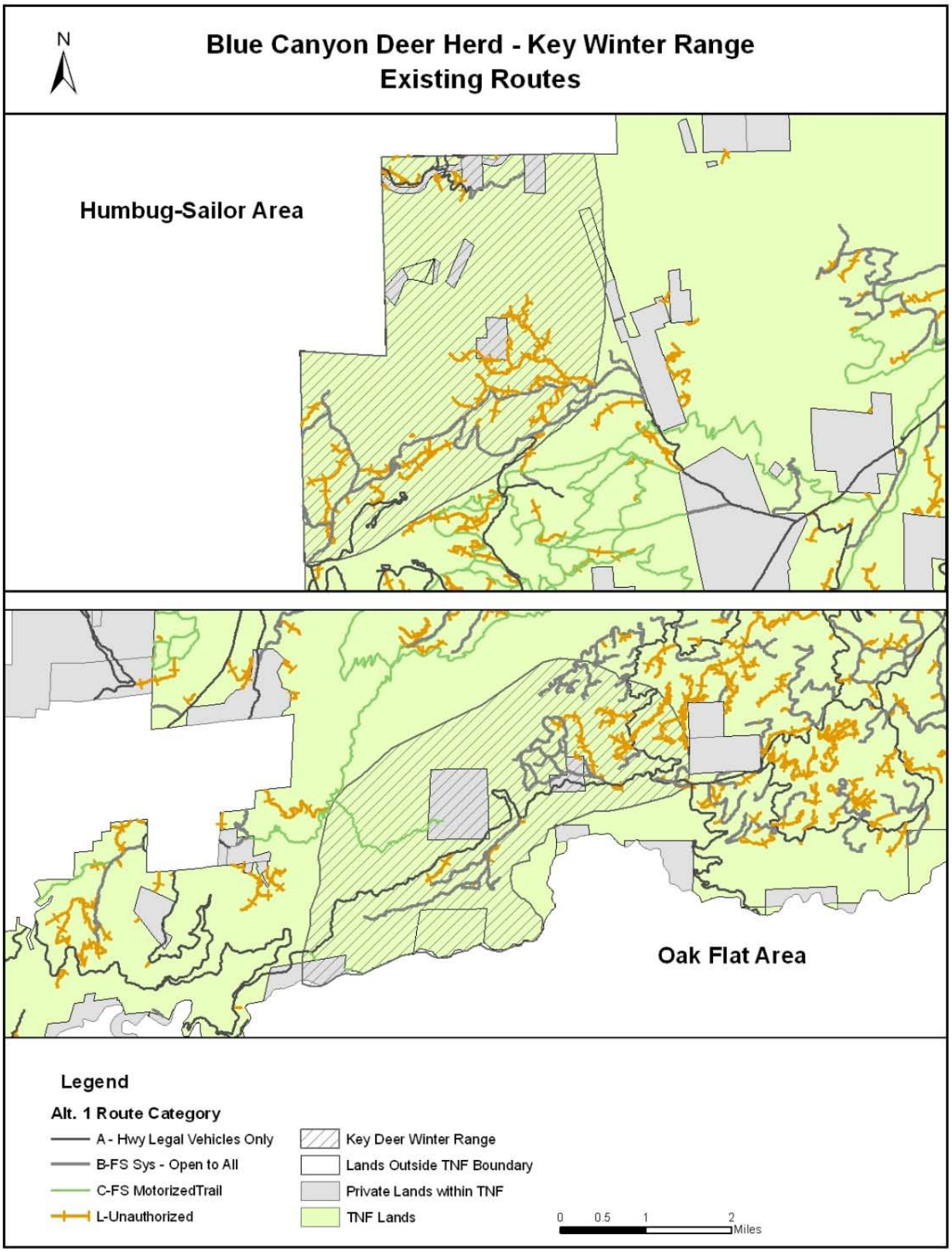

Figure 3.03-1. Blue Canyon Deer Herd Key Winter Range – Existing Motorized Routes

Alternatives 2, 5, and 6 propose to amend the Forest Plan by changing the motorized season of use of May1 to Nov 1 within the Humbug-Sailor Management Area (#84), thereby reducing the seasonal restriction period by a total of 2-3 months along 8.6 miles of existing NFTS (26 Road) as shown in Tables 3.03-21 and 22. This would result in potentially affecting 1,228 acres (200 meters Zone of Influence) or 7.6% of total key deer winter range of the Blue Canyon Deer Herd (Table 3.03-21) (Figure 3.03-2) located at the southern edge of the key deer winter range in the Humbug-Sailor area where deer may potentially be temporarily disturbed from motorized related noise or displaced.

In addition, alternatives 4, 5, and 6 would result in 3.6 - 6.8 fewer miles that are currently open year round to having a wet weather seasonal restriction (Table 3.03-22). Ultimately, the Forest Plan Amendment to alter the current deer seasonal restriction under Alternatives 2, 5, and 6 is not expected to pose a significant risk to the overall condition and trend of the Blue Canyon deer herd especially since annual weather conditions are likely to have a greater influence on deer herd numbers in the area compared to motorized use along existing roads during the months of November, December, and April. Furthermore, motorized use in this area is relatively low during these months, especially in April when the area may still be under snow. Therefore, motorized vehicle and deer interactions are likely to be negligible since motorized use and deer presence along the 26 Road are likely to be minimal, and therefore would have little effect on the Blue Canyon Deer Herd.

Table 3.03-21. Blue Canyon Deer Herd - Key Deer Winter Range Summary for Alternatives 2, 5, and 6

Description	Status
Total Acres Key Deer Winter Range	16,108 acres
Seasonal Restriction within Humbug-Sailor MA	Alts 2 & 6 reduced by 3 months, Alt 5 reduced by 2 months
Miles Affected Within Key Deer Winter Range Affected	8.6 miles
Acres Key Deer Winter Range Affected (200 meter ZOI)	1,228 acres
Percent of Key Deer Winter Range Affected	7.6%

Beneficial Effects to Key Deer Winter Range from Other Actions:

- Prohibition of Cross Country Travel on 16,108 acres Key Deer Winter Range (including 28 miles of unauthorized routes).
- Wet Weather Restrictions within Key Deer Winter Range on an additional 3.7 miles (615 ac or 3.8% of key winter range) that were previously open all year.

Table 3.03-22. Motorized Season of Use within Blue Canyon Herd Key Deer Winter Range

	Season Of Use	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Miles Motorized NFTS Roads and Trails	Year round	15.6	15.6	15.6	12.0	8.8	12.0	15.6
	May 1 - Nov 1 (LMP Deer Key Winter Range)	29.1	20.5	29.1	29.1	25.1	20.5	29.1
	May 1 - Dec 31 (Wet Weather)	0	0	0	3.6	15.5	0	0
	Apr 1 - Dec 31 (Wet Weather)	0	8.7	0	0	0	12.3	0
Miles Unauthorized Routes		28.0	0	0	0	0	0	0
Total		**72.8**	**44.8**	**44.8**	**44.8**	**49.4**	**44.8**	**44.8**

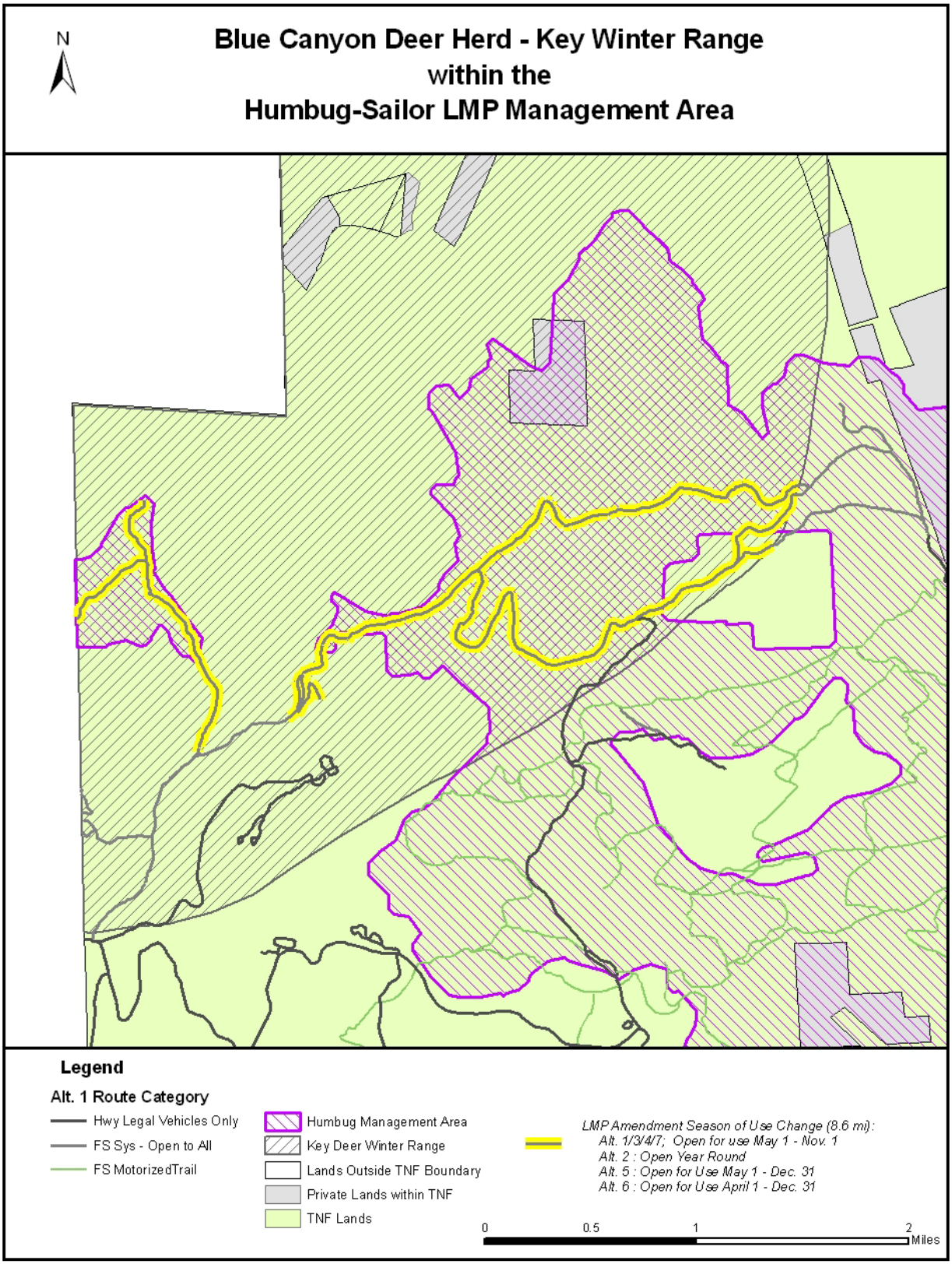

Figure 3.03-2. Blue Canyon Deer Herd - LMP Amendment Proposed Change in Season of Use within the Humbug-Sailor Management Area

Blue Canyon Deer Herd Population Trend

The deer population in Zone D-4 is considered stable to slightly increasing for the period from 1999 to 2008 (Table 3.03-23 and Figure 3.03-3). The Blue Canyon deer herd on the Tahoe NF falls within the larger Deer Hunt Zone D-4 located in portions of Colusa, Nevada, Placer, Sacramento, Sutter, Yolo and Yuba counties. Short-term fluctuations in deer populations are usually attributed to weather events that affect forage production. Table 3.03-23 displays population numbers from 1999 to 2008 from the California Dept. of Fish and Game that are created using a model utilizing harvest data. A major assumption of this model is a correlation between hunter success and population size. Factors that might affect hunter success, such as weather, are not accounted for in the model. Hence, the year to year variation is probably smaller than the population numbers show.

Table 3.03-23. Zone D-4 Deer Population Numbers 1999-2008

Year	Population Numbers
1999	3,340
2000	3,273
2001	6,140
2002	5,000
2003	5,800
2004	3,670
2005	4,870
2006	2,240
2007	4,830
2008	5,590

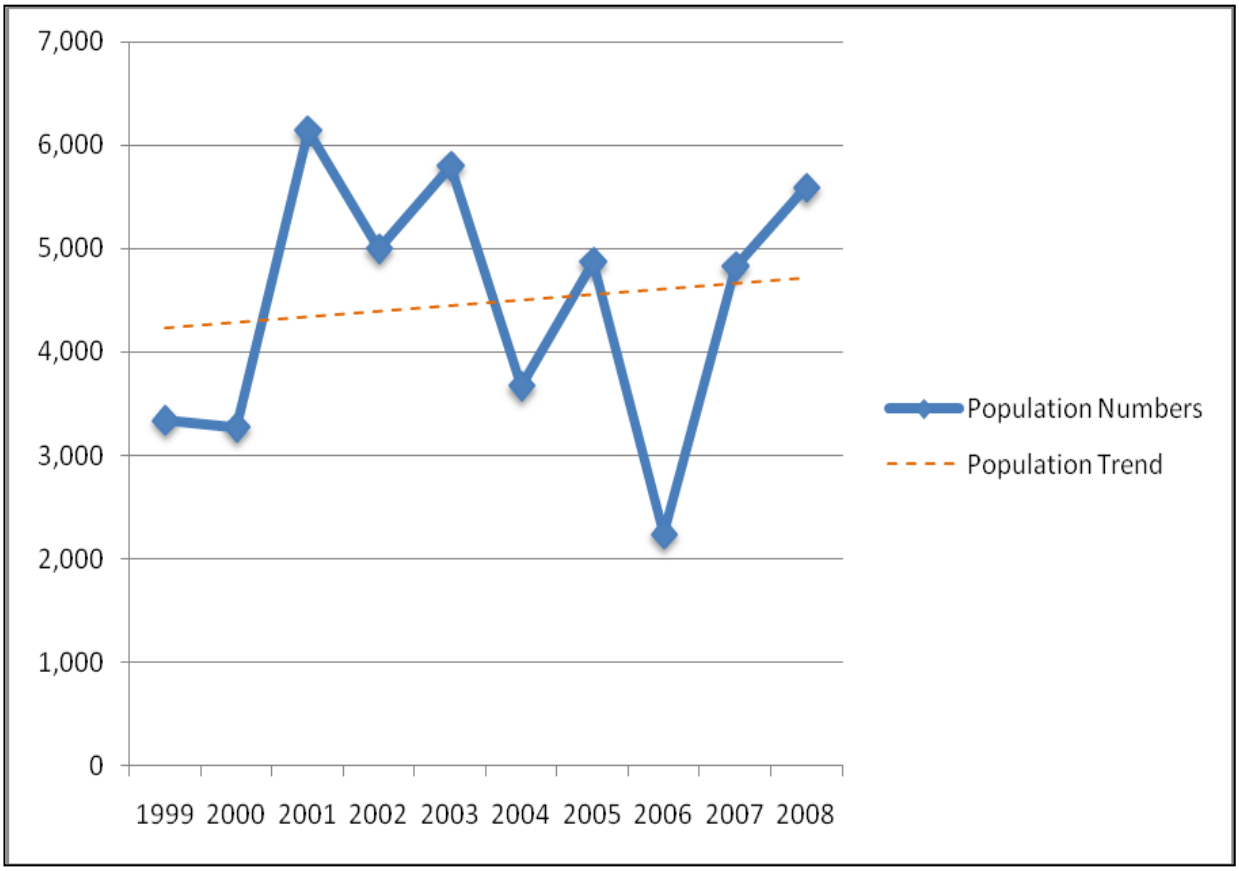

Figure 3.03-3. Blue Canyon Deer Herd Population Trend within the Deer Hunt Zone D-4

Due to the complexity of factors that affect deer population trends within the Deer Hunt Zone D-4 (i.e., urbanization, hunting, long-term habitat condition, annual weather variation, etc.), it is not likely that a shift in changing the season of motorized use under alternatives 5 and 6 by 2-3 months and for Alternative 2 by 6 months, affecting less than 8% of key winter range in the local Humbug-Sailor area would significantly affect deer such that population numbers within D-4 would change. In addition, the overall effects of the prohibition of cross country travel on 16,108 acres of key winter range, including on unauthorized routes and imposing additional motorized wet weather seasonal restrictions within key winter range and surrounding areas would provide an overall net benefit by reducing motorized disturbance within the Blue Canyon Deer Herd under all the action alternatives, and therefore, would meet the intent of Forest Plan S&G to "Limit vehicle access on key deer winter ranges when deer are present."

Mule Deer: Summary of Direct and Indirect Effects

Table 3.03-24 summarizes the overall net effect to the mule deer from the proposed actions from cross country travel, motorized route additions to NFTS, establishment of motorized "Open Areas," changes to the NFTS (Change in season of use, change in class of vehicles, reopening of Maintenance Level 1 roads), and amendments to the Forest Plan by removing motorized seasonal restrictions in the Humbug-Sailor Management Area 84.

Table 3.03-24. Mule Deer - Summary of Overall Net Direct and Indirect Effects*

Indicator		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel								
Trend of Effect		Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres of Habitat Where Travel is Prohibited		70,485	751,981	751,981	751,981	751,981	751,981	751,981
Miles of user created and temporary roads where cross country travel would continue		458	0	0	0	0	0	0
Motorized Route Additions to NFTS								
Trend of Effect		Negative (most impactive alternative)	Negative (3rd most impactive alternative)	No Effect	Negative (shares 5th most impactive alternative with 7)	Negative (2nd most impactive alternative)	Negative (4th most impactive alternative)	Negative (shares 5th most impactive alternative with 4)
Miles of motorized route additions		0	9	0	5	12	10	6
Establishment of Motorized "Open Areas"		No Effect	Increased Localized Disturbance Potential at Greenhorn (60 ac) and at Boca, Prosser and Stampede Reservoirs (2589 acres)	No Effect	No Effect	No Effect	Increased Localized Disturbance Potential at Boca, Prosser and Stampede Reservoirs (244 ac)	No Effect
Changes to the NFTS	**Change in Season of Use (wet weather restrictions)**	No Effect	No Effect	No Effect	Reduces disturbance when deer are on winter and spring ranges	Reduces disturbance when deer are on winter and spring ranges	Reduces disturbance when deer are on winter and spring ranges	No Effect
	Change in Class of Vehicles	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Miles of Maintenance Level 1 (ML 1) Roads Reopened							
	Trend of Effect	No Effect	Negative (2nd most impactive shared with Alt 6)	No Effect	Negative (3rd most impactive)	Negative (most impactive)	Negative (2nd most impactive shared with Alt 2)	No Effect
	Miles of ML 1 Roads Reopened	0	1	0	0.5	16	1	0

Indicator	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Amendments to the Forest Plan	Existing deer seasonal restrictions (Nov 1 to May	Removes Humbug Sailor MA 84 deer seasonal restrictions	Existing deer seasonal restrictions (Nov 1 to May)	Existing deer seasonal restrictions (Nov 1 to May	Removes Humbug Sailor MA 84 deer seasonal restrictions, however wet weather seasonal restrictions apply (Jan 1 to April 30)	Removes Humbug Sailor MA 84 deer seasonal restrictions, however wet weather seasonal restrictions apply (Jan 1 to April 30)	Removes Humbug Sailor MA 84 deer seasonal restrictions
Overall Net Effect of Proposed Actions (compared to Alternative 1)	Negative effects from unauthorized cross country travel; fewer controls on winter and spring ranges.	Beneficial effect from prohibited cross country travel;localized disturbance on winter ranges in Humbug Sailor MA 84; and minor negative effects from route additions and reopened ML 1 roads; overall reduces habitat fragmentation.	Beneficial effect from prohibited cross country travel.	Beneficial effect from prohibited cross country travel; reduced disturbance on winter and spring ranges; although minor negative effects from route additions and reopened ML 1 roads; overall reduces habitat fragmentation.	Beneficial effect from prohibited cross country travel; reduced disturbance on winter and spring ranges; localized disturbance on winter ranges in Humbug Sailor MA 84; and minor negative effects from route additions and reopened ML 1 roads; overall reduces habitat fragmentation.	Beneficial effect from prohibited cross country travel; reduced disturbance on winter and spring ranges; localized disturbance on winter ranges in Humbug Sailor MA 84 and minor negative effects from route additions and reopened ML 1 roads; overall reduces habitat fragmentation.	Beneficial effect from prohibited cross country travel; although minor negative effects from route additions; overall reduces habitat fragmentation.

Mule Deer: *Also see summary of direct and indirect effects to oak associated species

Cumulative Effects

Cumulative Effects from Motorized Routes: The geographic boundary for assessing cumulative effects of motorized and non-motorized routes includes all lands within the Tahoe NF. The Tahoe NF encompasses the majority of the land base within the Blue Canyon, Nevada City, Downieville, and Loyalton-Truckee deer herds. The Tahoe NF is sufficiently large enough to assess cumulative effects of motorized and non-motorized routes since the Tahoe ranges from low elevation to high elevation and includes an array of habitat types used by migratory mule deer. It also covers a variety of deer habitat types including critical summer, summer, fawning, critical winter, winter, holding areas, and migration corridors. The timeframe for assessing past cumulative effects from motorized routes to mule deer takes into consideration the aggregate approach of the existing condition. The current condition and current use of motorized routes is the result of past actions. The timeframe for considering foreseeable future actions is approximately 20 years out. Cumulative effects to deer from motorized routes is assessed by using indicators of cumulative **route density** across the Tahoe NF, cumulative **motorized route miles**, and the **Zone of Influence** of all motorized routes.

Motorized Route Density: Road density has traditionally been used as an indicator for deer habitat effectiveness models (Perry and Overly 1977, Thomas, et al. 1979). These models indicate that as road density increases, deer use declines (Thomas et al. 1979, Witmer et al 1985). Factors such as hunting pressure, poaching, and other human disturbances are also likely to relate to road densities. Critical winter range, critical summer range, and fawning habitats represent key habitats for deer where heavier use and higher quality habitats for wintering and summer use are expected to occur. The average motorized route densities within critical winter range, critical summer range, and fawning habitat for each deer herd within the Tahoe NF was determined.

Table 3.03-25 shows the average road and trail densities within deer herd ranges under each Alternative (calculated by dividing the total road or trail mileage on NFS lands in deer ranges by the square miles of NFS lands in deer ranges).

For all major deer herds occurring within the boundaries of the Tahoe NF, Alternative 1 would have the greatest cumulative route densities compared to all the action alternatives within essential summer (fawning and critical summer) and winter (critical winter and winter) ranges. Alternative 5 would have slightly greater route densities than all the remaining action alternatives. Within critical summer and fawning areas, Alternative 1 poses a somewhat higher risk to all deer herds on the Tahoe NF and may therefore pose a greater risk in the ability for these deer herds to successfully reproduce and rear fawns, as compared to all the action alternatives. The action alternatives are similar in their motorized route densities and therefore, impacts to the Tahoe deer herds within critical summer or critical winter ranges do not vary amongst the action alternatives. Alternative 1 also has the greatest direct and indirect effects to winter ranges, especially on the west side of the Forest, where Alternative 1 motorized route densities exceed the action alternatives by over 1 mile/square mile in some instances, where habitat effectiveness would be reduced.

Blue Canyon Deer Herd: Implementing Alternative 1 would result in route densities that exceed route densities for all the action alternatives by over 1 mile per square mile within winter range for the

Blue Canyon Deer Herd, and would be approximately the same within critical winter range. Within critical summer ranges, Alternative 1 exceeds route densities for the action alternatives by 0.5 miles/mile^2. For all alternatives, route densities within fawning habitat are approximately 2 miles/mile^2, whereas Alternative 1 exceeds action alternative route densities by about 1 mile/mile^2.

Downieville Deer Herd: For the Downieville Deer Herd, only about 60 acres of critical summer range falls within the boundaries of the Tahoe NF. No motorized route miles fall within fawning habitat for this deer herd. In critical summer habitat, Alternative 1 has route densities of 3 miles/miles^2 or 0.3 miles/square miles higher than all other alternatives. Within critical winter range, Alternative 1 route densities are slightly higher than all the action Alternatives (Alternative 1 3 mi/mi^2, action alternatives 2.8 mi/mi^2 Within winter range, Alternative 1 has route densities of 3.5 miles/square mile, which exceed route densities in all the action alternatives by at least 0.8 mile/square mile.

Nevada City Deer Herd: Alternative 1 route densities exceed all the action alternative route densities by about 1/2 mile/square mile within critical summer range, and by nearly 1 mile/square mile within fawning habitat, where increased disturbance could reduce reproductive productivity. Within winter range, Alternative 1 route densities exceed the action alternatives by nearly a mile/square mile and slightly less than that compared to Alternative 5. Critical winter habitat for the action alternatives range from 2.6 to 2.7 miles/square mile, whereas Alternative 1 has route densities at nearly 4 ½ miles/square mile, and poses a considerable increased risk of disturbance to deer while on critical winter ranges when motorized vehicles are present.

Loyalton-Truckee Deer Herd: Route densities for the Loyalton-Truckee deer herd are greatest under Alternative 1, where route densities exceed all the action alternatives approximately ½ to 1 mile/square mile within each of critical summer, fawning, critical winter, and winter ranges. There are no differences in route densities for the action alternatives within all seasonal ranges for the Loyalton-Truckee deer herd.

Table 3.03-25. Average route densities (miles/square mile) on NFS lands within deer herd winter ranges, critical winter ranges, critical summer, and fawning areas on the Tahoe NF

	Range Type	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Blue Canyon Deer Herd	Critical Summer	2.1	1.6	1.6	1.6	1.6	1.6	1.6
	Fawning	0.1	0	0	0	0.1	0	0
	Critical Winter	3.4	2.1	2.1	2.1	2.3	2.1	2.1
	Winter	4.6	3.2	3.2	3.2	3.3	3.2	3.2
Downieville Deer Herd	Critical Summer	0.6	0	0	0	0	0	0
	Fawning	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Critical Winter	3.0	2.8	2.8	2.8	2.8	2.8	2.8
	Winter	3.5	2.7	2.7	2.7	2.7	2.7	2.7

	Range Type	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Nevada City Deer Herd	Critical Summer	2.5	2.1	2.0	2.0	2.1	2.1	2.1
	Fawning	3.9	3.1	3.1	3.1	3.1	3.1	3.1
	Critical Winter	4.4	2.6	2.6	2.6	2.7	2.6	2.6
	Winter	4.3	3.2	3.2	3.2	3.3	3.2	3.2
Loyalton-Truckee Deer Herd	Critical Summer	2.9	2.0	2.0	2.0	2.0	2.0	2.0
	Fawning	4.7	4.1	4.1	4.1	4.1	4.1	4.1
	Critical Winter	1.8	1.2	1.2	1.2	1.2	1.2	1.2
	Winter	2.7	2.2	2.2	2.2	2.2	2.2	2.2

*Alternative 1 includes motorized unauthorized routes associated with continued cross country travel.

Cumulative Motorized Route Miles: The total cumulative motorized route miles (existing routes on the Tahoe NFTS, existing private routes, proposed motorized additions, and reopened of Maintenance Level 1 roads) are shown in Table 3.03-26 and described below for each deer herd.

Blue Canyon Deer Herd: Alternative 1 poses the greatest risk to the Blue Canyon Deer Herd on both critical summer and critical winter/winter ranges, followed next by Alternative 5. Within Critical Summer Range, implementing Alternative 1 would have motorized route miles that exceed Alternative 5 by about 18 miles, and exceed Alternatives 2, 3, 4, 6, by nearly 40 miles for the Blue Canyon Deer Herd. The miles of motorized routes within fawning habitat for the Blue Canyon herd is minor.

Within critical winter ranges, Alternatives 1 has the most motorized route miles at 65 miles, followed by Alternative 5 with 50 miles. Approximately miles of motorized routes in critical winter range for the remaining action alternatives. A similar pattern emerges for winter range.

Downieville Deer Herd: Alternative 1 poses the greatest risk to the Downieville Deer Herd on both critical winter and winter ranges where resources may be scarce and deer may be stressed during the winter months. For the Downieville Deer Herd, only about 60 acres of critical summer and no mapped fawning areas fall within the boundaries of the Tahoe NF. Within critical winter range, Alternative 1 has 17 motorized route miles, and the all the action alternatives have 14 miles of motorized routes each. Within winter range, Alternative 1 has the highest number of motorized route miles (310 miles), where direct and indirect disturbance associated with motorized routes could occur when deer are stressed during the winter. All the action alternatives are similar in their motorized route miles within winter range (242 to 243 miles).

Nevada City Deer Herd: Alternative 1 poses the greatest risk to the Nevada City Deer Herd on all key deer habitat types - critical summer, fawning, critical winter, and winter habitats when deer are most vulnerable to disturbance. When comparing the miles of motorized routes within critical summer and fawning habitat of the Nevada City Deer Herd, Alternative 1 exceeds the action alternatives by at least 30 miles. For critical winter habitat and winter ranges, Alternative 1 exceeds Alternative 5 by about 84 miles; and the remaining action alternatives by an additional 20 miles.

Loyalton-Truckee Deer Herd: Alternative 1 poses the greatest risk than the action alternatives within key ranges, where the Loyalton-Truckee Deer Herd are most vulnerable to factors associated with

motorized vehicles. Motorized route miles for the Loyalton-Truckee Deer Herd are greatest under Alternative 1, where motorized route miles exceed all the action alternatives by at least 18 miles (Alternative 5) within critical summer ranges (Table 3.03-26). Within fawning habitat, route miles are similar for all alternatives, with Alternative 1 exceeding the remaining alternatives by 2-3 miles. Alternative 1 poses the greatest concern to the Truckee-Loyalton Deer Herd on both critical summer ranges and fawning habitat that are important to for reproduction and rearing young during the summer months.

Motorized route miles in critical winter and winter ranges are highest in Alternative 1, exceeding the action alternatives by 6-7 miles. There are relatively no differences in motorized route miles for the action alternatives within winter or critical winter ranges.

Table 3.03-26. Cumulative Motorized Route Miles

Miles of Motorized Routes		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Blue Canyon Deer Herd	Critical Summer	212	162.4	161.1	161.6	166.3	162.6	162.0
	Fawning	0.1	0	0	0	0.1	0	0
	Critical Winter t	61.8	39.2	39.2	39.2	43.1	39.2	39.2
	Winter	414.7	306.6	302	306.1	309.6	306.8	306.5
Downieville River Deer Herd	Critical Summer	0.1	0	0	0	0	0	0
	Fawning	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Critical Winter	23.0	21.3	21.3	21.3	21.3	21.3	21.3
	Winter	310.3	236.5	235.8	236	236.5	236.5	235.8
Nevada City Deer Herd	Critical Summer	222.3	193.7	192	192.5	193.7	194.3	192.8
	Fawning Habitat	48.3	39.1	38.8	38.8	39.1	39.1	39
	Critical Winter	97.2	57.0	57.0	57.1	59.0	57.0	57.0
	Winter Habitat	166.3	103.4	103.4	103.5	109	103.5	103.4
Loyalton-Truckee Deer Herd	Critical Summer	117.8	79.4	78.8	78.8	79.4	80.5	78.8
	Fawning Habitat	31.8	28.4	28.4	28.4	28.4	28.4	28.4
	Critical Winter Habitat	22.2	16.2	16.2	16.2	16.2	16.2	16.2
	Winter	19.3	15.7	15.7	15.7	15.7	15.7	15.7
Total Cumulative motorized miles for all herds		**1747.2**	**1298.9**	**1289.7**	**1295.2**	**1317.4**	**1301.1**	**1296.1**

* Alternative 1 includes miles of unauthorized routes associated with continued cross country travel.

Zone of Influence: Tables 3.03-27 through 3.03-30 display the percent of key deer ranges within a 200-meter Zone of Influence of all motorized routes on both public and private lands within the boundary of the Tahoe National Forest for each of the major deer herds: Blue Canyon, Downieville, Nevada City, and Loyalton-Truckee. The cumulative effects of all motorized and non-motorized routes are discussed for each deer herd for the alternatives.

Blue Canyon Deer Herd: The Blue Canyon Deer Herd has approximately equal amounts of key winter range and key summer range (Table 3.03-15). Overall cumulative effects (Table 3.03-27) within the Blue Canyon Deer Herd (including unauthorized motorized routes (unauthorized routes), existing

system routes, and non-motorized routes on both NFS and non-NFS lands), indicates that critical winter and winter ranges are moderately influenced by existing motorized routes, where habitat effectiveness is reduced by 53% and 64%, respectively. Approximately 20% of the key winter ranges are influenced by cross country travel, including use on existing unauthorized routes. This amount of influence from motorized routes could have significant ramifications to the Blue Canyon Deer Herd when the deer are already stressed during the winter months, especially since unmanaged cross country travel would continue at an unknown rate in the future.

Under all the action alternatives, only a "low" proportion of key deer winter range is influenced by proposed motorized route additions (0% to 3%). Under the action alternatives, between 17% and 20% of key deer winter range would benefit from the prohibition of cross country travel, including motorized use on existing unauthorized routes. However, since these motorized routes would continue to remain in place until they are physically revegetated, non-motorized use on these routes may occur which could still reduce habitat quality, but the effects would likely be less depending on the type of activity.

Overall cumulative effects to key summer ranges result in an overall "moderate" influence from all motorized and non-motorized routes under all the alternatives. Alternative 1 has the highest overall cumulative impacts (critical summer - 44%, fawning - 12%). The remaining action alternatives are similar to the overall cumulative impact to critical summer and fawning habitats, with Alternative 5, followed by Alternative 6 having slightly greater (1-2%) disturbance potential than all the remaining alternatives. Alternative 1 directly and indirectly affects 9-11% of critical summer ranges and 0-2% fawning habitat from cross country motorized travel on existing unauthorized routes.

Alternatives 5 and 6 minimally increase the cumulative impact to critical summer range from the addition of motorized routes (1% in critical summer). Only Alternative 5 increases cumulative impacts from the reopening of ML 1 roads (1% critical summer, 2% fawning). However, the cumulative effects to key summer ranges from both motorized route additions and reopening ML 1 roads would not likely be measurable at the forest-wide scale, but may have localized direct and indirect impacts.

The remaining action alternatives do not contribute cumulative impacts to summer ranges. Between 9% and 11% of key summer range influenced by unauthorized routes would benefit deer due to the prohibition of cross country travel, including use on existing unauthorized routes.

Table 3.03-27. Proportion of Blue Canyon Herd Key Deer Ranges within a 200-meter "Zone of Influence"

Blue Canyon Herd	Range Type	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives								
Motorized routes to be added to NFTS (negative impact)*	Critical Summer	11%	<1%	0%	<1%	1%	1%	<1%
	Fawning	2%	0%	0%	0%	0%	0%	0%
	Critical Winter	20%	0%	0%	0%	3%	0%	0%
	Winter	21%	1%	0%	1%	1%	1%	1%
Changes to the NFTS - Reopened ML 1 Roads	Critical Summer	0%	0%	0%	0%	1%	0%	0%
	Fawning	0%	0%	0%	0%	2%	0%	0%
	Critical Winter	0%	0%	0%	0%	0%	0%	0%
	Winter	0%	0%	0%	0%	0%	0%	0%

Blue Canyon Herd	Range Type	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cumulative effects of past, present, and proposed actions								
Existing motorized and non-motorized routes (NFS and non NFS lands) (negative impact)	Critical Summer	33%	33%	33%	33%	33%	33%	33%
	Fawning	10%	10%	10%	10%	10%	10%	10%
	Critical Winter	33%	33%	33%	33%	33%	33%	33%
	Winter	43%	43%	43%	43%	43%	43%	43%
Routes decommissioned and/or ML 1 closed to motorized use (positive impact)	Critical Summer	1%	11%	11%	11%	10%	11%	11%
	Fawning	0%	2%	2%	2%	0%	2%	2%
	Critical Winter	2%	22%	22%	22%	19%	22%	22%
	Winter	3%	23%	23%	23%	22%	23%	23%
Total Cumulative Effects								
Cumulative Impact (both positive and negative)	**Critical Summer**	**44%**	**33%**	**33%**	**33%**	**35%**	**34%**	**33%**
	Fawning	**12%**	**10%**	**10%**	**10%**	**12%**	**10%**	**10%**
	Critical Winter	**53%**	**33%**	**33%**	**33%**	**36%**	**33%**	**33%**
	Winter	**64%**	**44%**	**43%**	**44%**	**45%**	**44%**	**44%**

* Motorized routes to be added to NFTS: Alternative 1 includes miles of unauthorized routes associated with continued cross country travel.

Downieville Deer Herd: Habitat within the boundary of the Downieville Deer Herd has a higher proportion of key winter range than key summer range (Table 3.03-15). Therefore, the majority of this discussion will focus on cumulative effects to key winter ranges. Only 60 acres of key summer ranges fall within the boundary of the Downieville Deer Herd. However, Alternative 1 results in a “moderate” cumulative impact where 42% of critical summer range is specifically influenced by cross country motorized travel, including use on existing unauthorized routes. The action alternatives do not affect critical summer range.

Overall cumulative effects (Table 3.03-28) from all routes within the Downieville Deer Herd (including proposed motorized route additions, reopening ML 1 roads, existing system routes, and non-motorized routes on both NFS and non-NFS lands), indicates all the alternatives “moderately” reduce habitat effectiveness within key deer winter ranges (critical winter and winter).

Alternative 1 poses the greatest risk cumulative impact of reduced habitat effectiveness within key winter ranges, where 36% (critical winter) and 47% (winter) would be influenced by existing routes and continued cross country motorized travel, including use on existing unauthorized routes. This moderate influence of routes may potentially result in adverse impacts to the Downieville Herd when deer may be stressed during the winter months, especially since unmanaged cross country travel would continue at an unknown rate in the future under this alternative.

Under the action alternatives, approximately 29% (critical winter) to 31% (winter) of key winter ranges are cumulatively impacted by existing motorized and non-motorized routes, resulting in a moderate amount of reduced habitat effectiveness (i.e., increased disturbance) to the Downieville Deer Herd. None of the action alternatives would result in adding direct and indirect impacts to existing cumulative impacts on key deer winter range from either motorized additions or reopening of ML 1 roads.

Under the action alternatives, all existing unauthorized routes within key winter habitat would be prohibited from the ban of cross country travel, ranging from 7% (critical winter) to 16% (winter). However, these unauthorized routes would continue to remain in place until they are re-vegetated. Non-motorized use on these unauthorized routes may occur which could still reduce habitat quality, but the effects would likely be less than motorized use depending on the type and intensity of non motorized use.

Table 3.03-28. Proportion of Downieville Herd Key Deer Ranges within a 200-meter "Zone of Influence"

	Range Type	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives								
Motorized routes to be added to NFTS (negative impact)*	Critical Summer	42%	0%	0%	0%	0%	0%	0%
	Fawning	0%	0%	0%	0%	0%	0%	0%
	Critical Winter	7%	0%	0%	0%	0%	0%	0%
	Winter	16%	0%	0%	0%	0%	0%	0%
Changes to the NFTS - Reopened ML 1 Roads	Critical Summer	0%	0%	0%	0%	0%	0%	0%
	Fawning	0%	0%	0%	0%	0%	0%	0%
	Critical Winter	0%	0%	0%	0%	0%	0%	0%
	Winter	0%	0%	0%	0%	0%	0%	0%
Past, present, and proposed actions								
Existing motorized and non-motorized routes (NFS and non NFS lands) (negative impact)	Critical Summer	0%	0%	0%	0%	0%	0%	0%
	Fawing	0%	0%	0%	0%	0%	0%	0%
	Critical Winter	29%	29%	29%	29%	29%	29%	29%
	Winter	31%	31%	31%	31%	31%	31%	31%
Routes decommissioned and/or ML 1 closed to motorized use (positive impact)	Critical Summer	0%	42%	42%	42%	42%	42%	42%
	Fawning	0%	0%	0%	0%	0%	0%	0%
	Critical Winter	0%	7%	7%	7%	7%	7%	7%
	Winter	2%	17%	17%	17%	17%	17%	17%
Total Cumulative Impacts								
Cumulative Impact (both positive and negative)	**Critical Summer**	**42%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
	Fawning	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
	Critical Winter	**36%**	**29%**	**29%**	**29%**	**29%**	**29%**	**29%**
	Winter	**47%**	**31%**	**31%**	**31%**	**31%**	**31%**	**31%**

*Motorized routes to be added to NFTS: Alternative 1 includes ZOI of motorized routes unauthorized for motorized use associated with continued cross country travel.

Nevada City Deer Herd: The Nevada City Deer Herd has a slightly higher proportion of key summer range (~40%) to key winter ranges (~60%) (Table 3.03-15). Overall cumulative effects (Table 3.03-29) within the Nevada City Deer Herd (including unauthorized routes, reopening ML 1 roads, existing system routes, and non-motorized routes on both NFS and non-NFS lands), indicate Alternative 1 "highly" reduces habitat effectiveness within key deer winter habitats where 62% to 67% are cumulatively affected, followed by Alternative 5 (40-48%), and then by the remaining action alternatives (40-49%). Existing NFTS system and non-NFS routes influences from 40 to 45 percent key winter habitats. Alternative 1 poses the greatest risk to reduced habitat effectiveness within key winter ranges where 17 to

27 percent of key winter range affected is attributed to continued cross country motorized use, including use of existing unauthorized routes, where current existing NFS and non-NFS motorized routes are already influencing key deer winter ranges by at least 40%. This additional reduction in habitat effectiveness could pose a significant cumulative impact to the Nevada City Deer Herd, especially considering habitat fragmentation within the existing checkerboard ownership pattern in this region, including the urban development and encroachment. Increased stress from this amount of motorized use could affect this herd's population numbers, especially since unmanaged cross country travel would continue at an unknown rate in the future.

Under Alternative 5, about 2% of key winter ranges within a 200-meter Zone of Influence of proposed route additions to the NFTS would add to existing cumulative impacts. Another 1% of key winter ranges within a 200-meter Zone of Influence would be impacted by the reopening of ML 1 roads with the implementation of Alternative 5.

The remaining action alternatives would not add to existing cumulative impacts to key winter range as no motorized routes would be added to the NFTS, and no ML 1 roads would be reopened, which would directly or indirectly affect winter range for the Nevada City Deer Herd. Within key winter range, the majority (15-27%) of unauthorized routes would be prohibited from motorized use under the action alternatives where deer would benefit. However, since these unauthorized routes would continue to remain on the ground, and may receive non-motorized use, habitat effectiveness would continue to be reduced, but the effects would likely be less than motorized use, depending on the intensity, duration, and type of activity.

Alternative 1 has the highest overall cumulative impacts (47-63%) to key summer ranges. Alternative 1 directly and indirectly affects between 9 to 15 percent of critical summer and fawning habitat, respectively, from unauthorized routes where cross country travel would continue.

All the action alternatives result in a overall "moderate" cumulative impact to key summer ranges, from all motorized and non-motorized routes. The action alternatives would cumulatively affect between 38% and 49% of key summer ranges (critical summer and fawning) by all motorized and non-motorized routes. The remaining action alternatives contributes a relatively small proportion to existing cumulative impacts, where between 0% and 2% of key summer range is affected by the addition of motorized routes. None of the ML 1 roads would be reopened for the action alternatives. Under the action alternatives, approximately 9-15% of key summer range would be a benefit to the Nevada City Deer Herd, where cross country travel influenced by unauthorized routes would be banned. Finally, the prohibition of cross country travel on 25,418 acres of key summer range (critical summer and fawning) would be an additional benefit to the Nevada City Deer Herd.

Table 3.03-29. Proportion of Nevada City Herd Deer Ranges within a 200-meter "Zone of Influence"

	Range Type	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives								
Motorized routes to be added to NFTS (negative impact)*	Critical Summer	9%	1%	0%	<1%	1%	2%	<1%
	Fawning	15%	1%	0%	0%	1%	1%	1%
	Critical Winter	27%	0%	0%	0%	0%	0%	0%
	Winter	17%	0%	0%	0%	2%	0%	0%
Changes to the NFTS - Reopened ML 1 Roads	Critical Summer	0%	0%	0%	0%	0%	0%	0%
	Fawning	0%	0%	0%	0%	0%	0%	0%
	Critical Winter	0%	0%	0%	0%	1%	0%	0%
	Winter	0%	0%	0%	0%	1%	0%	0%
Cumulative effects of past, present, and proposed actions								
Existing motorized and non-motorized routes (NFS and non NFS lands) (negative impact)	Critical Summer	38%	38%	38%	38%	38%	38%	38%
	Fawning	48%	48%	48%	48%	48%	48%	48%
	Critical Winter	40%	40%	40%	40%	40%	40%	40%
	Winter	45%	45%	45%	45%	45%	45%	45%
Routes decommissioned and/or ML 1 closed to motorized use (positive impact)	Critical Summer	3%	10%	11%	11%	10%	10%	11%
	Fawning	2%	15%	16%	16%	15%	15%	16%
	Critical Winter	2%	3%	3%	3%	3%	3%	3%
	Winter	2%	19%	19%	19%	18%	19%	19%
Total Cumulative Effects								
Cumulative Impact (both positive and negative)	**Critical Summer**	**47**	**39%**	**38%**	**38%**	**39%**	**40%**	**38%**
	Fawning	**63**	**49%**	**48%**	**48%**	**49%**	**49%**	**49%**
	Critical Winter	**67**	**40%**	**40%**	**40%**	**40%**	**40%**	**40%**
	Winter	**62**	**45%**	**45%**	**45%**	**48%**	**45%**	**45%**

* Motorized routes to be added to NFTS: Alternative 1 includes miles of unauthorized routes associated with continued cross country travel.

Loyalton-Truckee Deer Herd: ***Key Summer Ranges***: The Loyalton-Truckee Deer Herd has more than twice the amount of key summer range (~70%) compared to key winter ranges (~30%) (Table 3.03-15). Overall cumulative effects (Table 3.03-30) within the Loyalton-Truckee Deer Herd (including motorized route additions, reopening ML 1 roads, existing system routes, and non-motorized routes on both NFS and non-NFS lands), indicate Alternative 1 has a high risk of negatively influencing habitat effectiveness on key summer ranges, where 52% critical summer and 73% fawning habitats are cumulatively affected. Under Alternative 1, cross country motorized travel, including use of unauthorized routes, would reduce habitat effectiveness by an additional 13% and 19% of fawning and critical summer ranges, respectively, where current existing NFS and non-NFS motorized routes are already moderately to highly influencing key summer ranges. Implementing Alternative 1 could pose considerable cumulative impacts to the Loyalton-Truckee Deer Herd from increased stress and disturbance which may potentially result in altered behavior and/or negatively affect reproductive productivity. Ultimately, total cumulative

effects of Alternative 1 could result in downward population trends, especially since unmanaged cross country travel would continue at an unknown rate in the future.

All the action alternatives reduce habitat effectiveness at a moderate to high proportion within key deer summer habitats where between 33% of fawning and 60% critical summer ranges are cumulatively affected, predominately from existing routes. Alternatives 5 and 6, each negatively influences a small amount of critical summer range (less than 1-2%), where overall habitat effectiveness within critical summer and fawning habitat would not measurably add to existing cumulative effects. The remaining action alternatives do not affect key summer ranges from the addition of motorized routes or the reopening of ML 1 roads.

Alternative 6 adds a small amount of cumulative effects from motorized route additions (2%) and reopening of ML 1 roads (less than 1%) within key summer habitat for the Loyalton-Truckee Deer Herd. The remaining action alternatives would not add to existing cumulative impacts to key summer range since no motorized routes would be added to the NFTS. Alternative 5 affects less than 1 percent of critical summer range from reopening ML 1 roads.

Key Winter Ranges: The vast majority of existing unauthorized routes within key winter habitat would not be added to the NFTS under the action alternatives, where deer would benefit. However, since these motorized routes would continue to remain in place until they are restored, non-motorized use on these routes may occur which could reduce deer habitat quality, but the effects would likely be less depending on the type of activity and the intensity of use.

Alternative 1 directly and indirectly affects an average of 11% of key winter ranges from cross country motorized travel, including use on existing unauthorized routes. Total cumulative effects from all existing routes and continued cross country travel on unauthorized routes influences a moderate proportion (33-48%) of key winter ranges where habitat effectiveness within key winter ranges could be reduced under the No Action Alternative.

Under all the action alternatives, cumulative effects to key winter ranges results in an overall “moderate” influence where between 22% (critical summer) and 37% (fawning) key summer ranges would be affected. Under all the action alternatives, approximately 11% of key winter ranges would benefit from the ban of cross country travel where disturbance from motorized use would be eliminated, including on 2,173 acres.

Table 3.03-30. Proportion of Loyalton-Truckee Herd Key Deer Ranges within a 200-meter "Zone of Influence"

	Range Type	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives								
Motorized routes to be added to NFTS (negative impact)*	Critical Summer	19%	0%	0%	0%	0%	2%	0%
	Fawning	13%	0%	0%	0%	0%	0%	0%
	Critical Winter	11%	0%	0%	0%	0%	0%	0%
	Winter	11%	0%	0%	0%	0%	1%	0%
Changes to the NFTS - Reopened ML 1 Roads	Critical Summer	0%	0%	0%	0%	<1%	<1%	0%
	Fawning	0%	0%	0%	0%	0%	0%	0%
	Critical Winter	0%	0%	0%	0%	0%	0%	0%
	Winter	0%	0%	0%	0%	0%	0%	0%
Cumulative effects of past, present, and proposed actions								
Existing motorized and non-motorized routes (NFS and non NFS lands) (negative impact)	Critical Summer	33%	33%	33%	33%	33%	33%	33%
	Fawing	60%	60%	60%	60%	60%	60%	60%
	Critical Winter	22%	22%	22%	22%	22%	22%	22%
	Winter	37%	37%	37%	37%	37%	37%	37%
Routes decommissioned and/or ML 1 closed to motorized use (positive impact)	Critical Summer	2%	21%	22%	22%	21%	20%	22%
	Fawning	3%	15%	15%	15%	15%	15%	15%
	Critical Winter	3%	13%	13%	13%	13%	13%	13%
	Winter	0%	11%	11%	11%	11%	10%	11%
Total Cumulative Effects								
Cumulative Impact (both positive and negative)	**Critical Summer**	**52%**	**33%**	**33%**	**33%**	**33%**	**33%**	**33%**
	Fawning	**73%**	**60%**	**60%**	**60%**	**60%**	**60%**	**60%**
	Critical Winter	**33%**	**22%**	**22%**	**22%**	**22%**	**22%**	**22%**
	Winter	**48%**	**37%**	**37%**	**37%**	**37%**	**37%**	**37%**

* Motorized routes to be added to NFTS: Alternative 1 includes miles of unauthorized routes associated with continued cross country travel.

Overall Cumulative Effects from Past, Present, and Reasonably Foreseeable Future Actions: Past and current cumulative effects to mule deer include current and historic grazing of mule deer habitat; loss of habitat through catastrophic wildfires; timber and fuels management where cover and forage has been reduced or removed; urban development and expansion within a highly checkerboard land ownership pattern; and recreational activities including hunting, camping, and general recreation activities including all forms of motorized use including 4 wheeled drive vehicles, ATVs, and motorcycles.

The Tahoe NF currently has 31 active livestock grazing allotments including both cattle and sheep. Tahoe LRMP standards and guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands.

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on NFS and private lands within the Tahoe NF boundary. Some, but not all, of these activities will contribute to impacts to the mule deer within the Tahoe NF boundary. Since 1990, more than 130,000 acres of vegetation management activities

have occurred on the Tahoe NF. Some, but not all, have resulted in impacts to mule deer habitats. Between 2001 and 2008, nearly 17,000 acres of forest vegetation and fuels projects were completed, which primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These treatments generally do not increase forage condition for deer because they do not usually result in reducing the canopy cover below 40%, except for group selection harvest treatments on the Sierraville RD. Group selection harvests are expected to increase forage condition and increase forest structural diversity. These thinning treatments may result in the short-term reduction in cover for deer, though it is expected that in the longer term, habitat will be protected by reducing wildfire risk. Many recent, current, and future vegetation and fuels reduction projects are emphasizing habitat improvement for deer by removing competing conifers within oak habitats and aspen habitats which are designed to enhance mule deer foraging condition. Between 1994 and 2008, approximately 95,000 acres burned on the Tahoe NF, some of which have removed mule deer habitat.

Currently, there is a high demand for recreational use on the Tahoe NF due to its close proximity to urban centers. The Tahoe NF provides a wide variety of recreational experiences including developed and dispersed camping, hiking, fishing, hunting, wildlife viewing, winter sports activities (downhill skiing, cross country skiing, snowmobiling), summer OHV use, and a variety of other non-motorized use (equestrian use and mountain biking). Recreational use on the Tahoe NF has significantly increased compared to the past 20 to 30 years. Because of the proximity to urban areas and population growth, increased recreational use on the Tahoe NF is expected to continue to increase in the future including camping, hiking, fishing, wildlife viewing, hunting, and OHV use. Generally, the increase in recreational use on the Tahoe NF has the potential to cause an increase in negative interactions between humans and mule deer. Future increase in recreational use on the Tahoe NF is expected, and therefore, increased disturbance to mule deer would be expected, particularly during the summer months. Two non-motorized routes are being proposed for development in the near future. The development and use of these routes may slightly increase disturbance to mule deer since deer have been shown to demonstrate increased responses to humans when humans are in close proximity to deer, especially when humans are on foot.

Table 3.03-31 summarizes the major reasonably foreseeable future actions, including fuels, vegetation, recreation, range allotment plans, non-motorized trail development, and special use permit reissuance's and a description of the potential impact to mule deer and their habitat.

Table 3.03-31. Direct, Indirect, and Cumulative Impact to Mule Deer from Reasonably Foreseeable Future Projects

Project type	Number of Projects	Mule Deer Direct and Indirect Impact	Overall Cumulative Impact
Vegetation management/ fuels reduction projects – thinning, group select,	~30	Short-term disturbance from harvest activities, changes in cover, foraging habitat enhancement in oak habitats.	• Short-term adverse impacts during harvest. • Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires.
Aspen enhancement	8	Cover and forage habitat enhancement	• Short-term adverse impacts during implemtation • Long-term beneficial cumulative effects through improved forage and cover production
Mastication, site prep and release of small trees, and prescribed burns	~20	Short-term disturbance during project implementation Various site-specific effects.	• Short-term adverse impacts during implementation • Long-term beneficial cumulative beneficial effects depending on site-specific conditions
Hazard tree removal	4	Minimal impact. Short-term disturbance during harvest.	None to minimal cumulative impact
Salvage Fire Burned Trees	2	Minimal impact. Short-term disturbance during harvest.	None to minimal cumulative impact
Fish passage construction project	1	Short-term disturbance during project implementation.	No cumulative impact
Non-motorized Trail development	2	Short-term disturbance during trail construction, some increased public use may increase disturbance.	Slight increase in cumulative impact.
Designate Energy Corridor	1	N/A programmatic administrative action	Unknown, site-specific cumulative impacts may occur depending on location of the corridor.

When considering all the cumulative effects of past, present, and reasonably foreseeable future impacts from grazing, vegetation/fuels projects, wildfires, and recreation, Alternative 1 poses the greatest risk to the 4 major deer herds on the Tahoe NF, where between 12% and 27% of key winter ranges are influenced by unauthorized routes, and between 7% and 41% of key summer ranges are affected, depending on the deer herd. Alternative 5 slightly increases the amount of cumulative effects on key deer habitats over the other action alternatives, where site specific localized effects may occur. The remaining action alternatives are similar and only slightly increase overall cumulative impacts to the 4 major deer herds on the Tahoe NF. Alternative 3 does not add any motorized routes to the NFTS, so does not add to existing cumulative impacts. All the action alternatives will result in a beneficial impact to all deer ranges across the Tahoe NF from the ban on cross country travel, including motorized travel on approximately 1,123 to 1,294 miles of existing unauthorized routes depending on the alternative. It is expected that non-motorized use may occur on these unauthorized routes which would likely result in less disturbance to mule deer. However, some studies indicate that certain non-motorized activities (hiking, mountain bicycling, equestrian, etc.) could actually result in greater disturbance to mule deer. At any rate, the

amount of disturbance caused by non-motorized use will depend on the type, intensity and duration of the use. As existing unauthorized routes become re-vegetated and recover over time, either through active or passive restoration efforts, overall mule deer disturbance from motorized routes is expected to diminish.

In addition, Alternatives 4, 5, and 6 would benefit deer on winter ranges through the implementation of wet weather closures on native surfaced roads and trails.

Mule Deer: Management Direction

Management Indicator Species (MIS) Summary: The Sierra Nevada Forests Bioregional MIS Report and Travel Management MIS Project-Level Report are incorporated by reference. Alternative 1 poses the greatest cumulative effects to mule deer MIS oak-associated hardwood and hardwood/conifer habitat on the Tahoe NF where 13,695 acres out of 99,238 acres of mule deer habitat would be affected within a 200-meter Zone of Influence of existing unauthorized routes. This would add to existing cumulative effects by approximately 14%. Alternative 1 could contribute to a downward trend in mule deer habitat effectiveness within oak-associated and hardwood/conifer habitats on the Tahoe NF.
All the action alternatives would benefit mule deer oak habitats by prohibiting cross-country. All the action alternatives would influence from 0% to 0.6% oak-associated hardwood and hardwood/conifer habitat at the Tahoe NF scale (Alt 3 adds no impacts, Alt 5 adds the most) from addition of motorized routes. In addition Alternative 5 proposes to reopen ML 1 roads which would affect an additional 1% of motorized influence on mule deer oak habitat. None of the action alternatives would alter existing trends in oak-associated hardwood and hardwood/conifer habitat on the Tahoe NF from either motorized route additions or reopening ML 1 roads.

The change in the class of vehicles would have no effect to mule deer habitat, since the change in class of vehicles on existing motorized routes would generally not affect mule deer habitat condition. Wet weather seasonal restrictions under Alternatives 4, 5, and 6 on all native surfaced roads and motorized trails would benefit mule deer habitat effectiveness through the reduced disturbance and avoidance when motorized use on native surfaced routes that are seasonally restricted. Finally, cross country travel would be prohibited on 65,329 acres with the implementation of the action alternatives where disturbance, avoidance, and abandonment by mule deer would be reduced or eliminated. Alternative 1 would have the greatest risk to mule deer habitats, where cross country travel would continue, affecting 65,329 acres of oak-associated hardwood and hardwood/conifer habitat. Refer to Table 3.03-32.

Table 3.03-32 Acres of Cross Country Travel Prohibitions and Proportion of Mule Deer MIS habitat within a 200-meter "Zone of Influence" of Proposed Route Additions to the NFTS

		Alt 1[1]	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Acres of Cross Country Travel Prohibitions Within Oak-Associated Hardwood and Hardwood/Conifer Habitats								
Acres oak-associated and hardwood conifer habitat where cross country travel would be prohibited		0	65,329	65,329	65,329	65,329	65,329	65,329
Proportion of Mule Deer MIS habitat within a 200-meter "Zone of Influence" of Proposed Route Additions								
Acres Oak-associated hardwood and hardwood/conifer habitats		13,695	496	0	99	595	298	199
Proportion of Sierra Nevada Habitat	809,000	1.7%	0.06%	0%	<0.01%	0.01%	0.04%	0.02%
Habitat Security Risk in Sierra Nevada		Low	Low	Low	Low	Low	Low	Low
Proportion of Tahoe NF Habitat[2]	99,238	14%	0.5%	0%	0.1%	0.6%	0.3%	0.2%
Habitat Security Risk in Tahoe NF		Low	Low	Low	Low	Low	Low	Low
Proportion of Mule Deer MIS habitat within a 200-meter "Zone of Influence" of Reopned ML 1 Roads								
Acres Oak-associated hardwood and hardwood/conifer habitats		0	0	0	208.0	812.4	0	0
Proportion of Sierra Nevada Habitat	809,000	0%	0%	0%	<0.01%	0.1%	0%	0%
Habitat Security Risk in Sierra Nevada		Low	Low	Low	Low	Low	Low	Low
Proportion of Tahoe NF Habitat	99,238	0%	0%	0%	0.2%	0.8%	0%	0%
Habitat Security Risk in Tahoe NF		Low	Low	Low	Low	Low	Low	Low
Total acres oak-associated hardwood and hardwood/conifer Habitat Affected		**13,695**	**496**	**0**	**307**	**1,407**	**298**	**199**
Total proportion of Sierra Nevada Habitat Affected		**1.7%**	**0.06%**	**0%**	**0.04%**	**0.11%**	**0.04%**	**0.02%**
Total proportion of Tahoe NF Habitat Affected		**14%**	**0.1%**	**0%**	**0.3%**	**1.4%**	**0.3%**	**0.2%**

[1]Alternative 1 includes existing routes unauthorized to motorized public use that would continue with the continuance of cross country travel.

[2]The Zone of Influence within 200 meters of motorized routes includes both NFS and non-NFS lands within the boundary of the Tahoe NF due to the complex checkerboard pattern. The proportion of habitat affected likely over-represents the actual amount of habitat affected on NFS lands

Summary of Mule Deer Status and Trend at the Bioregional Scale. The Tahoe NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the mule deer; hence, the effects analysis for the Tahoe NF Motorized Travel Management Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the mule deer. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 809,000 acres of oak-associated hardwood and hardwood/mixed conifer habitat on NFS lands in the Sierra Nevada. The trend is slightly increasing (within the last decade, changing from 5% to 7% of the acres on NFS lands).

Population Status and Trend. The mule deer has been monitored in the Sierra Nevada at various sample locations by herd monitoring (spring and fall) and hunter survey and associated modeling (CDFG 2007). California Department of Fish and Game (CDFG) conducts surveys of deer herds in early spring to determine the proportion of fawns that have survived the winter, and conducts fall counts to determine herd composition (CDFG 2007). This information, along with prior year harvest information, is used to estimate overall herd size, sex and age rations, and the predicted number of bucks available to hunt (ibid). These data indicate that mule deer continue to be present across the Sierra Nevada, and current data at the range wide, California, and Sierra Nevada scales indicate that, although there may be localized declines in some herds or Deer Assessment Units, the distribution of mule deer populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Mule Deer Trend. Alternative 1 results the greatest amount of oak-associated hardwood and hardwood/conifer habitat 13,695 acres (1.7% of Sierra Nevada-wide habitat) affected by cross country travel, including use on existing unauthorized routes.

All the action alternatives would result in a benefit to mule deer and oak-associated hardwood and hardwood/conifer habitats, since cross country travel would be banned. Alternative 5 benefits the least where 1,407 acres or 0.1% of Sierra Nevada-wide habitat within oak-associated hardwood and hardwood/conifer habitat types would be reduced in habitat effectiveness from motorized route additions and reopened ML 1 roads. The remaining action alternatives would affect from 0 to less than 0.1% Sierra Nevada wide habitat. Based on the small percentage of habitat affected, implementing the Tahoe NF Motorized Travel Management Project would not alter the existing habitat trend, nor would it lead to a change in the distribution of mule deer across the Sierra Nevada bioregion.

Compliance with the Forest Plan and Other Direction: The Tahoe NF LRMP (1990) provides management direction for deer habitat management in the following Standard and Guideline:

> *Limit vehicle access on key deer winter ranges when deer are present. Also limit vehicle access in key summer range habitats during periods of migration and fawning.*

The Tahoe Travel Management Project provides project design standards for minimizing effects of deer habitat on key deer winter ranges and key summer ranges, including maintaining existing LRMP OHV seasonal restrictions for deer, the prohibition of cross country travel (acres), and wet weather seasonal restrictions. The effects of these actions and the addition of motorized routes to the NFTS and established “Open Areas” were analyzed within key deer habitats for the major deer herds on the Tahoe NF, including Blue Canyon herd, Downieville herd, Nevada City herd, and the Loyalton-Truckee herd. The analysis of effects indicated that Alternative 1 least complies with the Tahoe NF LRMP Standard and Guideline and poses the greatest risk to the four major deer herds, where between 12% and 27% of key winter ranges are influenced by unauthorized routes, and between 7% and 41% of key summer ranges are affected, depending on the deer herd. All of the action alternatives meet this Standard and Guideline by limiting access to varying degrees. Of the action alternatives, Alternative 5 least limits vehicle access, while Alternative 3 most limits access. Alternatives 2, 4, 6, and 7 comply with LRMP deer direction

similarly, somewhat less than Alternative 3, and slightly more than Alternative 5. All the action alternatives would result in a beneficial impact to all deer ranges across the Tahoe NF from the ban on cross country travel, including motorized travel on approximately 1,123 to 1,294 miles of existing unauthorized routes depending on the alternative. In addition, Alternatives 4, 5, and 6 would benefit deer on winter ranges through the implementation of wet weather closures on native surfaced roads and motorized trails.

LRMP Amendment to Change Season of Use in the Humbug-Sailor Management Area: Due to the complexity of factors that affect deer population trends (i.e., urbanization, hunting, long-term habitat condition, annual weather variation, etc.), it is not likely that amending the LRMP to change the season of motorized use within the Humbug-Sailor Management Area under Alternatives 5 and 6 by 2-3 months and for Alternative 2 by 6 months, affecting less than 8% of key winter range, would significantly affect deer such that population numbers of the Blue Canyon deer herd would change. In addition, the overall effects of the prohibition of cross country travel on 16,108 acres of key winter range, including on unauthorized routes and imposing additional motorized wet weather seasonal restrictions within key winter range and surrounding areas would provide an overall net benefit by reducing motorized disturbance within the Blue Canyon Deer Herd under all the action alternatives, and therefore, would meet the intent of Forest Plan S&G to "Limit vehicle access on key deer winter ranges when deer are present."

> *Guidance regarding management indicator species (MIS) set forth in the Tahoe NF LRMP as amended by the 2007 SNF MIS Amendment ROD directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of MIS, as identified in the Tahoe NF LRMP as amended.*

The mule deer was selected as Management Indicator Species for the Tahoe NF as amended by the 2007 SNF MIS Amendment ROD. Project-level effects to mule deer were analyzed for each alternative and disclosed in the sections above under Environmental Consequences in the MIS Summary Section and in the Tahoe NF Motorized Travel Management Project Level MIS report, which is incorporated by reference. In addition, population and habitat trends for mule deer are conducted at the bioregional scale.

Oak Woodland and Oak-Conifer Associated Species: Affected Environment

Introduction: Species within the Oak Woodland and Mixed Oak-Conifer Forest Group include mule deer, wild turkey, band-tailed pigeon, western gray squirrel, and the pallid bat. The mule deer is identified as a Management Indicator Species in the Sierra Nevada Forests (Sierra Nevada Forests Management Indicator Species Amendment Record of Decision 2007). See previous section for mule deer MIS analysis. The pallid bat is designated as a Forest Service Sensitive Species by the Regional Forester.

Species associated with pure oak woodland and mixed oak-conifer forest have the potential to be affected by road and trail-associated factors. The relationship between road and motorized trail associated factors to population trends of these species is unknown.

Mortality from hunting or trapping: In general, roads facilitate access to the hunted species and their habitat in this group. Impacts of road and trail associated factors to wild turkeys varies. Turkeys in Alabama were found to show no apparent impact when approached by vehicles. However, after several years of being hunted and receiving an increase in disturbance, turkeys went for cover when vehicles approached (Wright and Speake 1975 *In:* Joslin and Youmans, coordinators 1999).

Fragmentation, Edge and Microclimate Effects: Roads can also create edge effects which may alter microclimates near roads. This may enhance habitat for these species or may have negligible impacts to their habitat overall.

Disturbance and changes in behavior: Pallid bats may be sensitive to human disturbance. If roost sites are disturbed by route associated factors, local pallid bat populations may be negatively impacted.

Summary of Route associated factors to hardwood associated species:

- Mortality from hunting or trapping as facilitated by road and trail access (wild turkey, western gray squirrel, band-tailed pigeon)
- Changes to habitat microclimate associated with the edge induced by roads or trails
- Changes in behavior that may lead to loss of reproductive success due to trail and road associated factors.

Oak Woodland and Oak-Conifer Associated Species: Environmental Consequences

Indicators to Measure Direct and Indirect Effects

Cross Country Travel: The acres of cross country travel that would be prohibited within oak and oak-conifer habitats are determined for each of the alternatives.

Additions to the NFTS: For motorized additions to the NFTS, the Zone of Influence within oak and oak-conifer habitat is analyzed by alternative under the Management Indicator section for the mule deer.

Establishment of "Open Areas": Establishment of "Open Areas" is discussed under "Effects Common to All Species."

Changes to the NFTS: The Zone of Influence of reopened Maintenance Level 1 roads is determined for each alternative within oak and oak-conifer habitats under the Management Indicator Section of the Deer Environmental Consequences Section. The changes in class of vehicle are analyzed under "Summary of Effects Common to All Species."

Amendments to the Forest Plan: The effects to oak woodland and oak-conifer species are analyzed by their potential to be affected by the Forest Plan amendments of removing seasonal restrictions to deer in the Deer Environmental Consequences Section.

Direct and Indirect Effects common to all oak woodland and oak-conifer species

Prohibition of Cross Country Travel: Alternative 1 poses the greatest risk to oak associated species where cross country travel would not be prohibited on 65,329 acres, where oak associated species could be subjected to disturbance, avoidance, and abandonment. The remaining action alternatives would prohibit cross country travel within oak and oak/conifer woodlands on approximately 65,329 acres.

Changes to the NFTS (Change in wet weather seasonal restrictions): Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and trails, where oak associated species would benefit from the reduction of noise and disturbance associated with motorized use, especially motorized routes that are within oak and oak-conifer associated habitats. Alternatives 1, 2, 3, and 7 do not impose wet weather restrictions on native surfaced motorized routes and therefore, there would be no benefit to oak and oak-conifer associated species from wet weather seasonal restrictions under these alternatives.

Summary of Direct and Indirect Effects

Table 3.03-33 summarizes the overall net effect to oak and oak-conifer habitat from the proposed actions from motorized route additions to the NFTS, prohibition of cross country travel, wet weather restrictions, and seasonal closures.

Table 3.03-33. Oak and Oak/Conifer Habitat - Summary of Overall Net Direct and Indirect Effects*

Indicator			Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel									
Trend of Effect			Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres of Habitat Where Travel is Prohibited			33,909	65,329	65,329	65,329	65,329	65,329	65,329
Motorized Route Additions to NFTS									
Trend of Effect			Negative (most impactive alternative)	Minimal Effect	No Effect	No Effect	Slight Negative (2nd most impactive following Alt 1)	Minimal Effect	No Effect
200-meter Zone of Influence			14%	<1%	0%	0%	1%	<1%	0%
Establishment of Motorized "Open Areas"			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Changes to the NFTS	**Change in Season of Use (wet weather restrictions)**		No Effect	No Effect	No Effect	Beneficial from reduced disturbance	Beneficial from reduced disturbance	Beneficial from reduced disturbance	No Effect
	Change in Class of Vehicles		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Reopened Maintenance Level 1 Roads	**Trend of Effect**	No Effect	No Effect	No Effect	No Effect	Negative (Most impactive)	No Effect	No Effect
		200 meter ZOI	0%	0%	0%	0%	1%	0%	0%
Amendments to the Forest Plan			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Overall Net Effect of Proposed Actions			Most impactive alternative. Negatively effects 14% oak and oak-conifer habitat acres primarily from continued motorized cross country travel.	Benefits 65,329 acres oak and oak-conifer habitat acres where cross country travel is prohibited; motorized route additions affects <1% habitat; overall reduces habitat fragmentation.	Benefits 65,329 acres oak and oak-conifer habitat acres where cross country travel is prohibited	Benefits 65,329 acrs oak and oak-conifer habitat acres where cross country travel is prohibited; overall reduces habitat fragmentation.	Benefits 65,329 acres oak and oak-conifer habitat acres where cross country travel is prohibited, negatively affects approx. 2% habitat from combined motorized additions and reopened ML 1 routes; overall reduces habitat fragmentation.	Benefits 65,329 acres oak and oak-conifer habitat acres where cross country travel is prohibited; motorized route additions affects <1% habitat; overall reduces habitat fragmentation.	Benefits 65,329 acrs oak and oak-conifer habitat acres where cross country travel is prohibited; overall reduces habitat fragmentation.

*Alternative 1 includes existing unauthorized routes that are associated with continued cross country travel.

Oak and Oak-conifer Habitat: Cumulative Effects to Habitat in the Analysis Area

Motorized Route Density: Motorized route density provides a relative index of cumulative impacts to oak associated species. For example, motorized route density levels can provide a relative index of the amount of human access to hunt species, including mule deer, wild turkey, gray squirrel, and the band-tailed pigeon, which can have an impact on population numbers. Roads and motorized trails have the potential to cause adverse impacts to pallid bats through the loss of oak habitat, especially for urban expansion on private lands. Motorized routes within oak habitats may lead to changes in behavior and may ultimately result in reduced reproductive success for oak associated species.

The cumulative effects to oak associated species were determined by assessing the proportion of pure oak and oak-conifer habitats for motorized route densities, including all existing system routes, proposed route additions, and Maintenance Level 1 routes that would be reopened. Motorized route densities were determined between 0 and 6 miles/square mile (Table 3.03-34) across the Tahoe NF. Under Alternative 1, with continued cross country motorized travel, including continued use of existing unauthorized routes, 84% of the Tahoe NF oak habitats (pure oak woodland and mixed oak-conifer types) would have motorized route densities that exceed 2 miles/square mile, where increased access to hunters may potentially have an impact on oak associated species, such as wild turkey, gray squirrels, and band-tailed pigeon. Pallid bats have the greatest potential to be disturbed within oak habitats under Alternative 1 compared to all the action alternatives.

Alternative 5 would result in approximately 75% of oak habitat with motorized route densities exceeding 2 miles/square mile. The remaining alternatives would have similar proportions of oak habitats (71-72%) where motorized route densities would exceed 2 miles/square mile.

Table 3.03-34. Proportion of Oak Habitat (Percent) with Motorized Route Densities between 0 and 6 miles/square mile

Motorized Route Density (miles/square mile)	**Alt 1***	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**	**Alt 7**
0-2 miles/square mile	17%	29%	29%	29%	27%	29%	29%
2-4 miles/square mile	48%	64%	64%	64%	67%	65%	64%
4-6 mile/square mile	35%	7%	7%	7%	8%	7%	7%
6+ miles/square mile	1%	<1%	0%	<1%	<1%	<1%	<1%

*Alternative 1 includes route density of existing unauthorized routes, with continued cross country travel.

Fox Sparrow and Shrubland (West-Slope Chaparral) Habitat: Affected Environment

The fox sparrow was selected as the MIS for shrubland (chaparral) habitat on the west-slope of the Sierra Nevada, comprised of montane chaparral (MCP), mixed chaparral (MCH), and chemise-redshank chaparral (CRC) as defined by the California Wildlife Habitat Relationships System (CWHR) (CDFG 2005). The Sierra Nevada Forests Bioregional MIS Report and Travel Management MIS Project-Level Report are incorporated by reference. Recent empirical data from the Sierra Nevada indicate that, in the

Sierra Nevada, the fox sparrow is dependent on open shrub-dominated habitats for breeding (Burnett and Humple 2003, Burnett et al. 2005, Sierra Nevada Research Center 2007).

The project area, comprised of the Tahoe NF boundary, currently has 62,928 acres of shrubland habitat. Shrubland habitat is comprised of various age classes that range from young shrubs, intermediate age classes, and mature to decadent shrub classes. In this section, where effects to fox sparrow are noted, it is assumed that effects also occur for the shrubland habitat also.

Fox Sparrow: Environmental Consequences

Indicators to Measure Direct and Indirect Effects

Cross Country Travel: The acres of cross country travel that would be prohibited within shrubland habitat (west-slope chaparral) habitats are determined for each of the alternatives.

Additions to the NFTS (Zone of Influence): For the proposed alternatives, the Zone of Influence of disturbance used in this analysis was the amount of shrubland habitat (west-slope chaparral) that fell within a 200 meter Zone of Influence of proposed motorized routes. The No Action Alternative (Alternative 1) was analyzed by determining the amount of shrubland habitat that fell within a 200 meter Zone of Influence of existing unauthorized routes.

Establishment of "Open Areas": Establishment of "Open Areas" is discussed under "Summary of Effects Common to All Species."

Changes to the NFTS: The Zone of Influence of reopened Maintenance Level 1 roads is determined for each alternative within shrubland habitat (west-slope chaparral). The changes in class of vehicle and changes in seasonal restrictions are analyzed under "Summary of Effects Common to All Species."

Fox Sparrow: Direct and Indirect Effects

Cross Country Travel. Under Alternative 1, cross country travel would continue, potentially affecting 39,639 acres of shrubland (west slope chaparral) habitat and potentially causing reduced habitat effectiveness through disturbance, avoidance, and abandonment for the fox sparrow. All action alternatives would prohibit this cross country travel, accordingly reducing or eliminating those existing impacts. Existing LRMP motorized prohibitions would remain in effect.

Additions to the NFTS (Zone of Influence): The direct and indirect effects to fox sparrow shrubland habitat from proposed motorized route additions results in a decrease in habitat quality from disturbance, displacement and/or avoidance of habitat as a result of activities associated with motorized vehicle use. Based on the analysis conducted for fox sparrow shrubland habitat, Alternative 1 would affect the greatest amount of habitat within a 200-meter Zone of Influence (Table 3.03-35). Approximately 10,068 acres or 1% of Sierra Nevada-wide habitat would be affected by continued cross country travel on existing unauthorized routes. Alternative 5 has the next highest direct and indirect effects to fox sparrow habitat, where 1,259 shrubland acres or 0.14% of Sierra Nevada-wide habitat would be affected by proposed motorized route additions to the NFTS. Alternatives 2, 6, and 7 are similar in their affects to shrubland habitat, where 629 acres or 0.07% of Sierra-wide habitat would be affected. Alternatives 3 and 4 do not result in any direct or indirect effects to fox sparrow habitat.

Table 3.03-35. Proportion of Fox Sparrow MIS habitat within a 200-meter "Zone of Influence" of Proposed Route Additions

		Alt 1[1]	Alt 2, 6, 7	Alt 3, 4	Alt 5
Acres Shrubland (west-slope chaparral types) within ZOI	Habitat Acres	10,068	629	0	1,259
Proportion of Habitat in Sierra Nevada	922,000	1%	0.07%	0%	0.14%
Proportion of Habitat in Tahoe NF boundary[2]	62,928	16%	1%	0%	2%

[1] Alternative 1 includes existing unauthorized motorized routes that would continue with cross country travel.
[2] The Zone of Influence within 200 meters of motorized routes includes both NFS and non-NFS lands within the boundary of the Tahoe NF due to the complex checkerboard pattern. The proportion of habitat affected likely over-represents the actual amount of habitat affected on NFS lands.

Changes to the NFTS (Reopened ML 1 Roads): The direct and indirect effects to fox sparrow shrubland habitat from reopened ML 1 roads would result in a decrease in habitat quality from disturbance, displacement and/or avoidance of habitat as a result of activities associated with motorized vehicle use. Based on the analysis conducted for fox sparrow shrubland habitat, Alternative 5 would affect the greatest amount of habitat affected by reopened ML 1 roads within a 200-meter Zone of Influence (Table 3.03-36). Approximately 629 acres or .07% of Sierra Nevada-wide habitat would be affected by reopening ML 1 roads to motorized use. Alternative 6 reopens a very short segment of ML 1 road within fox sparrow habitat, but the amount is so small that the effects to habitat would be negligible. Therefore, Alternatives 1, 2, 3, 4, 6, and 7 do not affect shrubland habitat, and would not result in any direct or indirect effects to fox sparrow habitat.

Table 3.03-36. Proportion of Fox Sparrow MIS habitat within a 200-meter "Zone of Influence" of Reopened ML 1 Roads

		Alt 1, 2,3, 4 6, 7	Alt 5
Acres Shrubland (west-slope chaparral types)	Habitat Acres	0	629
Proportion of Habitat in Sierra Nevada	922,000	0%	.07%
Proportion of Habitat in Tahoe NF boundary[2]	62,928	0%	1%

Fox Sparrow: Summary of Direct and Indirect Effects

Table 3.03-37 summarizes the overall net effect to fox sparrow habitat from the proposed actions from motorized route additions, prohibition of cross country travel, and changes to NFTS.

Table 3.03-37. Fox Sparrow - Summary of Overall Net Direct and Indirect Effects

		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel								
Trend of Effect		Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Habitat affected by Motorized Cross Country Travel		39,639	0	0	0	0	0	0
Proposed Motorized Route Additions to the NFTS								
Trend of Effect		Negative, most impactive	Negative, similar to Alts 6, & 7.	No Effect	No Effect	Negative, next most impactive following Alt 1.	Negatively shares 3rd most impacts with Alts 2 & 7.	Negative, shares 3rd most impacts with Alts 2 & 6.
ZOI		16%	1%	0%	0%	2%	1%	1%
Changes to NFTS								
Wet Weather Restrictions		No Effect	No Effect	No Effect	Beneficial from reduced disturbance	Beneficial from reduced disturbance	Beneficial from reduced disturbance	No Effect
Change in Class of Vehicles		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Reopened ML 1 Roads	**No Effect**	No Effect	No Effect	No Effect	No Effect	Negative, most impactive	Negative, 2nd most impactive	No Effect
	ZOI	0%	0%	0%	0%	1%	<1%	0%
Overall Net Effect of Proposed Actions		Negatively affects fox sparrow habitat primarily from continued cross country travel on existing unauthorized routes within 39,639 acres.	Benefits fox sparrow habitat from the ban of cross country travel on 39,639 acres,; slight habitat impacts (1%) from the addition of motorized routes; overall reduces habitat fragmentation.	Benefits fox sparrow habitat from the ban of cross country travel on 39,639 acres.	Benefits fox sparrow habitat from the ban of cross country travel on 39,639 acres	Benefits fox sparrow habitat from the ban of cross country travel on approx. 39,639 acres, 2nd most impactive following Alt 1 affecting appox. 3% habitat from both motorized additions and reopening ML 1 roads; overall reduces habitat fragmentation..	Benefits fox sparrow habitat from the ban of cross country travel on 39,639 acres; slight habitat impacts (1%) from motorized route additions and reopened ML 1 roads; overall reduces habitat fragmentation..	Benefits fox sparrow habitat from the ban of cross country travel on 39,639 acres,; slight habitat impacts (1%) from the addition of motorized routes; overall reduces habitat fragmentation.

*Alternative 1 includes existing unauthorized routes that would continue with cross country travel, while all the action alternatives include proposed route additions.Fox Sparrow: Cumulative Effects to Habitat in the Analysis Area

Fox Sparrow: Cumulative Effects to Habitat in the Analysis Area

The spatial boundary for analyzing cumulative effects to fox sparrow includes all suitable fox sparrow shrubland on the west slope of the Tahoe NF on the Yuba River Ranger District and the American River Ranger District. Past and current cumulative effects to fox sparrow include current and historic grazing of fox sparrow habitat; loss of habitat through catastrophic wildfires; timber and fuels management where cover and forage has been reduced or removed; urban development and expansion within a highly checkerboard land ownership pattern; and recreational activities including hunting, camping, and general recreation activities including all forms of motorized use including 4-wheel drive vehicles, ATVs, and motorcycles.

The Tahoe NF currently has 22 active livestock grazing allotments on the American River and Yuba River Ranger Districts, including both cattle and sheep. Tahoe LRMP standards and guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands.

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on NFS and private lands within the Tahoe NF boundary. Since 1990, more than 130,000 acres of vegetation management activities have occurred on the Tahoe NF. Some, but not all, have resulted in impacts to fox sparrow habitats. Between 2001 and 2007, over 13,000 acres of forest vegetation and fuels projects were completed, which primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. Thinning, mastication, and under burning treatments may result in some removal of shrubland habitat in the short-term, but may increase fox sparrow shrubland habitat in the long-term. Between 1994 and 2007, approximately 94,000 acres burned on the Tahoe NF, some of which have removed fox sparrow habitat, but over time, a large percentage of the burned areas quickly become re-vegetated by shrubland habitats, especially on highly productive sites on the west slope of the Tahoe NF.

Overall Cumulative Effects: Alternative 1 poses the greatest cumulative effects to fox sparrow MIS shrubland habitat on the Tahoe NF, where 10,068 acres out of 62,928 acres of fox sparrow habitat would be affected within a 200-meter Zone of Influence of existing unauthorized motorized routes. This would add to existing cumulative effects by approximately 16%. Alternative 1 could contribute to a downward trend in fox sparrow habitat effectiveness within shrubland habitat (west slope chaparral) on the Tahoe NF from continued motor vehicle use on existing unauthorized routes. Alternative 5 would cumulatively affect approximately 1,888 acres out of 62,928 acres fox sparrow shrubland habitat or 3% of the Tahoe NF fox sparrow shrubland habitat from both the addition of motorized routes and reopened ML 1 roads combined. Alternative 5 would result in a small downward trend in habitat effectiveness on the Tahoe NF. Alternatives 2, 6, and 7 affect about 629 out of 62,928 acres fox sparrow shrubland habitat or 1% of the fox sparrow habitat on the Tahoe NF, and would not alter overall fox sparrow shrubland habitat. Alternatives 3 and 4 do not directly or indirectly affect fox sparrow MIS habitat, therefore, no cumulative effects would occur from implementation of Alternatives 3 and 4.

Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and motorized trails, where fox sparrow habitat effectiveness would be benefited through the reduced

disturbance and avoidance when motorized use on native surfaced routes that are seasonally restricted during the wet weather season. The change in the class of vehicles would not affect fox sparrow habitat for any of the alternatives. Finally, all the action alternatives would prohibit motorized cross country travel on 39,639 acres of fox sparrow habitat, where habitat effectiveness would be enhanced through reduced disturbance and road-side avoidance.

Fox Sparrow: Management Direction

Management Indicator Species (MIS) Summary: ***Summary of Fox Sparrow Status and Trend at the Bioregional Scale***. The Tahoe NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the fox sparrow; hence, the shrubland effects analysis for the Tahoe NF Motorized Travel Management Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the fox sparrow. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 922,000 acres of west-slope chaparral shrubland habitat on NFS lands in the Sierra Nevada. Within the last decade, the trend is stable.

Population Status and Trend. The fox sparrow has been monitored in the Sierra Nevada at various sample locations by avian point counts and breeding bird survey protocols, including: 1997 to present – Lassen National Forest (Burnett and Humple 2003, Burnett et al. 2005); 2002 to present - Plumas and Lassen National Forests (Sierra Nevada Research Center 2007); on-going monitoring through California Partners in Flight Monitoring Sites (CPIF 2002); 1992 to 2005 – Sierra Nevada Monitoring Avian Productivity and Survivorship (MAPS) stations (Siegel and Kaschube 2007); and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that fox sparrows continue to be present at these sample sites, and current data at the range wide, California, and Sierra Nevada scales indicate that, although there may be localized declines in the population trend, the distribution of fox sparrow populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Fox Sparrow Trend. The Tahoe NF Travel Management Project would directly, indirectly, and cumulatively affect between 10,068 acres (highest) of fox sparrow shrubland habitat under Alternative 1 and 0 acres (lowest) under Alternatives 3 and 4. Based on the acres affected, which range from 0% to 1% of the total Sierra Nevada-wide, the Tahoe NF Motorized Travel Management Project would not change the existing trend in the habitat, nor would it lead to a change in the distribution fox sparrows across the Sierra Nevada bioregion.

Mountain Quail (Early- and Mid-seral Coniferous Forest Associated Species): Affected Environment

The mountain quail was selected as the Management Indicator Species for early- and mid-seral coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat on the Tahoe NF, as amended by in the Sierra Nevada Forests Bioregional EIS. Early-seral coniferous forest habitat is

comprised primarily of seedlings less than 1 inch diameter at breast height (dbh), saplings (1”-5.9” dbh), and pole-sized trees (6”-10.9” dbh). Mid-seral coniferous forest habitat is comprised primarily of small-sized trees (11”-23.9” dbh). The mountain quail is found particularly on steep slopes, in open, brushy stands of conifer and deciduous forest and woodland, and chaparral; it may gather at water sources in the summer, and broods are seldom found more that 0.8 km (0.5 mi) from water (CDFG 2005).

The Tahoe NF Motorized Travel Management project area boundary currently has 89,863 acres of early-seral coniferous forest habitat and 402,539 acres of mid-seral coniferous forest habitat. Habitat is comprised of various age classes ranging from sparse seeding coniferous forest (1S) to pole size trees with dense canopy cover (3D) within the early-seral habitat, and from small tree sizes with sparse cover (4S) to small tree sizes with dense cover (4D) in the mid-seral habitat type. Motorized routes within mountain quail habitat may lead to changes in behavior and may ultimately result in reduced reproductive success for mountain quail.

Mountain quail have the potential to be affected by road and trail-associated factors. The relationship between roads and trails associated factors to population trends of the mountain quail is unknown.

Mortality from hunting or trapping: In general, roads facilitate access to hunting of mountain quail.

Fragmentation, Edge and Microclimate Effects: Roads and motorized trails can also create edge effects which may alter microclimates near roads which may enhance habitat for these species or may have negligible impacts to their habitat overall.

Disturbance and changes in behavior: Mountain quail may be sensitive to human disturbance. If quail roost sites are disturbed by motorized route associated factors, local mountain quail populations may be negatively impacted.

Summary of Route associated impacts to mountain quail:

- Mortality from hunting or trapping as facilitated by road and trail access
- Changes to habitat microclimate associated with the edge induced by roads or motorized trails
- Changes in behavior that may lead to loss of reproductive success due to trail and road associated factors.

Mountain Quail: Environmental Consequences

Mountain Quail: Indicators used to Measure Effects

The habitat factor used in this analysis for the action alternatives was the amount of early- and mid-seral coniferous forest habitat that fell within the 200-meter Zone of Influence of proposed motorized route additions to the NFTS. For Alternative 1, no action, the amount of early- and mid-seral coniferous forest habitat that fell within the 200-meter Zone of Influence of existing unauthorized routes was determined. Each alternative was compared to determine the proportion of habitat directly and indirectly affected in relation to the amount of early- and mid-seral coniferous forest habitat available at the Sierra Nevada-wide scale.

The Tahoe NF Motorized Travel Management project area boundary currently has 89,863 acres of early-seral coniferous forest habitat and 402,539 acres of mid-seral coniferous forest habitat. Habitat is comprised of various age classes ranging from sparse seeding coniferous forest (1S) to pole size trees

with dense canopy cover (3D) within the early-seral habitat, and from small tree sizes with sparse cover (4S) to small tree sizes with dense cover (4D) in the mid-seral habitat type. Motorized routes within mountain quail habitat may lead to changes in behavior and may ultimately result in reduced reproductive success for mountain quail.

Mountain Quail: Direct and Indirect Effects

Cross Country Travel: Under Alternative 1, cross country travel would continue, affecting 344,961 acres of early-seral and mid-seral coniferous forest habitats combined, potentially causing reduced habitat effectiveness through disturbance, avoidance, and abandonment for the mountain quail. For the action alternatives, cross country travel would be prohibited on 344,961 early- and mid-seral coniferous forest acres, where disturbance, avoidance, abandonment would be reduced or eliminated.

Additions to the NFTS: Tables 3.03-38 and 3.03-39 display the proportion of early- and mid-seral coniferous forest affected by the alternatives within a 200-meter Zone of Influence of motorized routes. Based on the amount of early- and mid-seral coniferous forest habitat affected within a 200-meter Zone of Influence of motorized routes, Alternative 1, no action, results in the greatest amount of both early-seral (26,989 acres or about 5% of Sierra Nevada-wide habitat) and mid-seral (76,482 acres or about 3% of Sierra Nevada-wide habitat) coniferous habitat affected. At the scale of the Tahoe NF, Alternative 1 results in a moderate risk (30%) to habitat security within early-seral habitat, and a low risk (19%) to habitat security for the mountain quail within mid-seral habitat.

For the action alternatives, Alternative 5 result in the next greatest amount of both early- and mid-seral habitat affected by proposed motorized route additions, which affects 1,797 acres (0.3% of Sierra Nevada-wide habitat) and 5,325 acres (0.2% of Sierra Nevada-wide habitat), respectively. The remaining action alternatives affect between 0 acres to 1,797 acres of early-seral habitat; and between 0 acres to 5,325 acres of mid-seral conifer habitat. For all the action alternatives, early- and mid-seral habitat affected by motorized routes results in a low risk to habitat security for mountain quail at the Sierra-wide scale and at the Tahoe NF scale.

Table 3.03-38. Proportion of Mountain Quail Early-seral Coniferous Forest MIS habitat within a 200-meter "Zone of Influence" of Proposed Motorized route additions to the NFTS

Mountain Quail MIS Habitat	Total Habitat Acres	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Acres Early-seral Coniferous Forest		26,989	899	0	719	1,797	1,797	0
Proportion of Sierra Nevada Habitat	546,000	5%	0.2%	0%	0.1%	0.3%	0.3%	0%
Habitat Security Risk in Sierra Nevada		**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Proportion of Tahoe NF Habitat[2]	89,863	30%	1%	0%	0.8%	2%	2%	0%
Habitat Security Risk in Tahoe NF		**Moderate**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

*Alternative 1 includes existing unauthorized routes with continued cross country travel.

Table 3.03-39. Proportion of Mountain Quail Mid-seral Coniferous Forest MIS habitat within a 200-meter "Zone of Influence" of Proposed Motorized route Additions to the NFTS

Mountain Quail MIS Habitat	Total Habitat Acres	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Acres Mid-seral Coniferous Forest		76,482	5,325	0	2,662	5,325	0	2,662
Proportion of Sierra Nevada Habitat	2,766,000	2.8%	0.2%	0%	0.1%	0.2%	0%	0.1%
Habitat Security Risk in Sierra Nevada		**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Proportion of Tahoe NF Habitat	402,539	19%	1.3%	0%	0.7%	1.3%	0%	0.7%
Habitat Security Risk in Tahoe NF		**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

*Alternative 1 includes existing unauthorized routes with continued cross country travel.

Changes to the NFTS: Tables 3.03-40 and 3.03-41 displays the proportion of early- and mid-seral coniferous forest affected by the alternatives within a 200-meter Zone of Influence of reopened Maintenance Level 1 (ML 1) roads. Alternative 5 results in the greatest amount of both early-seral (2,696 acres or about 0.5% of Sierra Nevada-wide habitat) and mid-seral (4,025 acres or about 0.1% of Sierra Nevada-wide habitat) coniferous habitat reduced habitat effectiveness from reopened ML 1 roads. Alternative 6 follows Alternative 5, and affects 899 acres (0.2% Sierra-wide habitat) of early-seral habitat and does not affect any mid-seral habitat. Both Alternatives 5 and 6 would result in a low risk to habitat security for mountain quail at the bioregional and at the Forest scale. The remaining alternatives do not propose to reopen any ML 1 roads, and therefore would not affect early- and mid-seral habitat suitable for the mountain quail. The changes in class of vehicle and changes in wet weather seasonal restrictions are analyzed under "Summary of Effects Common to All Species."

Table 3.03-40. Proportion of Mountain Quail Early-seral Coniferous Forest MIS habitat within a 200-meter "Zone of Influence" of Reopened Maintenance Level 1 Roads

Mountain Quail MIS Habitat	Total Habitat Acres	Alternatives 1*, 2, 3, 4, 7	Alt 5	Alt 6
Acres Early-seral Coniferous Forest within ZOI		0	2,696	899
Proportion of Sierra Nevada Habitat	546,000	0%	0.5%	0.2%
Habitat Security Risk in Sierra Nevada		**No Risk**	**Low**	**Low**
Proportion of Tahoe NF Habitat[2]	89,863	0%	3%	1%
Habitat Security Risk in Tahoe NF		**No Risk**	**Low**	**Low**

*Alternative 1 includes existing unauthorized routes with continued cross country travel.

Table 3.03-41. Proportion of Mountain Quail Mid-seral Coniferous Forest MIS habitat within a 200-meter "Zone of Influence" of Reopened Maintenance Level 1 Roads

Mountain Quail MIS Habitat	Total Habitat Acres[2]	Alternatives 1[1], 2 3, 4, 6, 7	Alt 5
Acres Mid-seral Coniferous Forest within ZOI[2]		0	4,025
Proportion of Sierra Nevada Habitat	2,766,000	0%	0.1%
Habitat Security Risk in Sierra Nevada		**No Risk**	**Low**
Proportion of Tahoe NF Habitat	402,539	0%	1%
Habitat Security Risk in Tahoe NF		**No Risk**	**Low**

[1]Alternative 1 includes existing unauthorized routes with continued cross country travel.

[2] The Zone of Influence within 200 meters of motorized routes includes both NFS and non-NFS lands within the boundary of the TNF due to the complex checkerboard pattern. The proportion of habitat affected likley over-represents the actual amount of habitatat affected on NFS lands.

Mountain Quail: Summary of Direct and Indirect Effects

Table 3.03-42 summarizes the overall net effect to mountain quail early- and mid-seral habitat from the proposed actions from cross country travel, motorized route additions to the NFTS, and changes to the NFTS.

Table 3.03-42. Mountain Quail - Summary of Overall Net Direct and Indirect Effects

		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel								
Trend of Effect		Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Habitat affected by Motorized Cross Country Travel		344,961	0	0	0	0	0	0
Proposed Motorized Route Additions to the NFTS								
Trend of Effect		Negative, most impactive	Negative, 3rd most impactive	No Effect	Negative, impacts similar to Alternatives 6 & 7	Negative, next most impactive following Alt 1.	Negative, impacts similar to Alternative 2 & 7.	Negative, impacts similar to Alternatives 4 & 6.
ZOI (early-seral habitat		30%	1%	0%	<1%%	2%	1%	0%
ZOI (mid-seral habitat)		19%	1%	0%	1%	1%	0%	1%
Changes to NFTS								
Wet Weather Restrictions		No Effect	No Effect	No Effect	Beneficial from reduced disturbance	Beneficial from reduced disturbance	Beneficial from reduced disturbance	No Effect
Change in Class of Vehicles		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Reopened ML 1 Roads	**Trend of Effect**	No Effect	No Effect	No Effect	No Effect	Negative, most impactive	Negative, 2nd most impactive	No Effect
	ZOI (early-seral)	**0%**	0%	0%	0%	3%	1%	0%
	ZOI (mid-seral)	**0%**	0%	0%	0%	1%	0%	0%
Overall Net Effect of Proposed Actions		Most impactive of all alternatives. Negatively affects 19 to 30% mountain quail habitat primarily from continued cross country travel on existing unauthorized routes within 344,961 acres.	Benefits mountain quail habitat from the ban of cross country travel on 344,961 acres; slight habitat impacts (1% each early- and mid-seral) from the addition of motorized routes.	Benefits mountain quail habitat from the ban of cross country travel on 344,961 acres.	Benefits mountain quail habitat from the ban of cross country travel on 344,961 acres; slight negative impacts (1%) to mid-seral habitat from motorized route additions.	Benefits mountain quail habitat from the ban of cross country travel on approx. 344,961 acres, 2nd most impactive following Alt 1 affecting between 2 to 5% habitat from both motorized additions and reopening ML 1 roads.	Benefits mountain quail habitat from the ban of cross country travel on 344,961 acres; slight habitat impacts (2%) from motorized route additions and reopened ML 1 roads.	Benefits mountain quail habitat from the ban of cross country travel on 344,961 acres, slight impacts (1%) to mid-seral habitat from motorized route additions.

*Alternative 1 includes existing unauthorized routes with continued cross country travel, while all the action alternatives include proposed route additions.

Mountain Quail: Cumulative Effects to Habitat in the Analysis Area

The spatial boundary for analyzing cumulative effects to mountain quail includes mid and early-seral coniferous forest habitat within the boundary of the Tahoe NF. Past and current cumulative effects to mountain quail include current and historic grazing of mountain quail habitat; loss of early- and mid-seral conifer forest habitat through catastrophic wildfires; timber and fuels management where cover and forage has been reduced or removed; urban development and expansion within a highly checkerboard land ownership pattern; and recreational activities including hunting, camping, and general recreation activities including all forms of motorized use including 4 wheeled drive vehicles, ATVs, and motorcycles.

The Tahoe NF currently has 22 active livestock grazing allotments on the west side of the Tahoe NF, including both cattle and sheep. Tahoe LRMP standards and guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands.

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on NFS and private lands within the Tahoe NF boundary. Some, but not all, of these activities will contribute to impacts to the mountain quail habitat within the Tahoe NF boundary. Since 1990, more than 130,000 acres of vegetation management activities have occurred on the Tahoe NF. Some, but not all, have resulted in impacts to mountain quail habitats. Between 2001 and 2008, approximately 17,000 acres of forest vegetation and fuels projects were completed, which primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These treatments generally do not increase forage conditions for quail because they do not usually result in reducing the canopy cover below 40%, except for group selection harvest treatments on the Sierraville RD. Group selection harvests are expected to increase forage condition and increase forest structural diversity. These thinning treatments may result in the short-term reduction in cover for mountain quail, though it is expected that in the longer term, habitat will be protected by reducing wildfire risk. Between 1994 and 2008, approximately 95,000 acres burned on the Tahoe NF, some of which have removed mountain quail habitat.

Currently, there is a high demand for recreational use on the Tahoe NF due to its close proximity to urban centers. The Tahoe NF provides a wide variety of recreational experiences including developed and dispersed camping, hiking, fishing, hunting, wildlife viewing, winter sports activities (downhill skiing, cross country skiing, snowmobiling), summer OHV use, and a variety of other non-motorized use (equestrian use and mountain biking). Recreational use on the Tahoe NF has significantly increased compared to the past 20 to 30 years. Because of the proximity to urban areas and population growth, increased recreational use on the Tahoe NF is expected to continue to increase in the future including camping, hiking, fishing, wildlife viewing, hunting, and OHV use. Generally, the increase in recreational use on the Tahoe NF has the potential to cause an increase in negative interactions between humans and mountain quail. Future increase in recreational use on the Tahoe NF is expected, and therefore, increased disturbance to mountain quail would be expected, particularly during the summer months. Table 3.03-43

summarizes a list of the reasonably foreseeable future projects and their potential direct, indirect, and cumulative impacts.

Table 3.03-43. Direct, Indirect, and Cumulative Impact of Reasonably Foreseeable Future Projects

Project type	Number of Projects	Direct and Indirect Impact	Overall Cumulative Impact
Vegetation management/fuels reduction projects – thinning, group select,	~30	• Short-term disturbance from harvest activities, • changes in cover, foraging habitat enhancement in oak habitats.	• Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires.
Aspen enhancement	8	• Cover and forage habitat enhancement • Short-term adverse impacts during implemtation	• Long-term beneficial cumulative effects through improved forage and cover production
Hazard tree removal	4	Minimal impact. Short-term disturbance during harvest.	None to minimal cumulative impact
Salvage Fire Burned Trees	2	Minimal impact. Short-term disturbance during harvest.	None to minimal cumulative impact
Fish passage construction project	1	Short-term disturbance during project implementation.	No cumulative impact
Mastication, site prep and release of small trees, and prescribed burns	~20	• Short-term disturbance during project implementation • Various site-specific effects.	• Long-term beneficial cumulative beneficial effects depending on site-specific conditions
Watershed Restoration (Carman II and Perazzo)	2	• Short-term disturbance during implementation. • Improve foraging habitat adjacent to early- and mid-seral coniferous forest habitat.	Beneficial cumulative impact by improving long-term forage quality.
Special Use permit renewal	4	N/A administrative action	None
Non-motorized Trail development	2	Short-term disturbance during trail construction, some increased public use may increase disturbance.	Slight increase in cumulative impact.
Designate Energy Corridor	1	N/A programmatic administrative action	Unknown, site-specific cumulative impacts may occur depending on location of the corridor.

Cumulative Effects Conclusion

Alternative 1 adds the greatest amount to existing cumulative impacts by affecting 30% early-seral coniferous forest habitat (26,989 acres out of 89,863 TNF habitat acres) and 19% mid-seral coniferous forest habitat (76,482 out of 402,539 TNF habitat acres on the Tahoe NF. Alternative 5 follows, by affecting 2% early-seral and 1% mid-seral coniferous forest habitats, from proposed motorized route additions to the NFTS within a 200-meter Zone of Influence. The remaining action alternatives affect between 0 and 1% early- and mid-seral coniferous forest habitat combined. Based on the small percentage of habitat affected by the action alternatives, the Tahoe NF Motorized Travel Management Project would not alter the existing trend in early- and mid-seral coniferous forest habitat important for the mountain

quail. Alternative 1 may cause a downward trend in mountain quail habitat and may affect the distribution of the species on the Tahoe NF.

Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and motorized trails, where mountain quail habitat effectiveness would be benefited through the reduced disturbance and avoidance when motorized use on native surfaced routes that are seasonally restricted during the wet weather season. The change in the class of vehicles would not affect mountain quail habitat for all of the proposed alternatives. Finally, all the action alternatives would prohibit motorized cross country travel on 34,961 acres of early- and mid-seral coniferous forest habitat, where mountain quail habitat effectiveness would be enhanced through reduced disturbance and avoidance.

Summary of Mountain Quail Status and Trend at the Bioregional Scale. The Tahoe NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the mountain quail; hence, the early- and mid-seral coniferous forest effects analysis for the Tahoe NF Motorized Travel Management Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the mountain quail. This information is drawn from the detailed information on habitat and population trends in the SNF Bioregional MIS Report (USDA Forest Service 2008), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 546,000 acres of early-seral and 2,766,000 acres of mid-seral coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat on NFS lands in the Sierra Nevada. Within the last decade, the trend for early-seral is slightly decreasing (from 9% to 5% of the acres on NFS lands) and the trend for mid-seral is slightly increasing (from 21% to 25% of the acres on NFS lands).

Population Status and Trend. The mountain quail has been monitored in the Sierra Nevada at various sample locations by hunter survey, modeling, and breeding bird survey protocols, including California Department of Fish and Game hunter survey, modeling, and hunting regulations assessment (CDFG 2004a, CDFG 2004b) and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that mountain quail continue to be present across the Sierra Nevada, and current data at the range wide, California, and Sierra Nevada scales indicate that the distribution of mountain quail populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Mountain Quail Trend. The Tahoe NF Motorized Travel Management Project would affect 26,989 acres (5% of Sierra Nevada wide habitat) of early-seral coniferous forest and 76,482 acres (3% of Sierra Nevada-wide habitat) of mid-seral coniferous forest habitat important to mountain quail under Alternative 1 from the combined addition of motorized routes and reopened ML 1 roads. The action alternatives would affect between 0 acres and 4,493 acres (Alternatives 3 and 7- lowest to Alternative 5 - highest) of early-seral coniferous habitat, and between 0 acres and 9,350 acres (Alt 3- lowest to Alt 5 – highest) of mid-seral coniferous forest habitat from the total motorized routes added and reopened ML 1 roads. All the action alternatives result in a low percentage of total early- and mid-seral habitat (less than 1 % of Sierra Nevada-wide mid and early-seral habitat) affected by the addition motorized routes and reopened ML 1 roads combined. Alternative 1 does

not prohibit cross country travel, including continued use of unauthorized routes, where approximately 3-5% early- and mid-seral coniferous forest combined would be affected at the Sierra Nevada-wide scale. Based upon the low amount of habitat affected, the Tahoe NF Motorized Travel Management Project would not alter the existing trend in early-seral and mid-seral coniferous habitats, nor would it lead to a change in the distribution of mountain quail across the Sierra Nevada bioregion.

Sooty (Blue) Grouse (Late-Seral Open Canopy Coniferous Forest): Affected Environment

Habitat/Species Relationship

The sooty grouse was selected as the MIS for late-seral open canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures less than 40%. Sooty grouse occurs in open, medium to mature-aged stands of fir, Douglas-fir, and other conifer habitats, interspersed with medium to large openings, and available water, and occupies a mixture of mature habitat types, shrubs, forbs, grasses, and conifer stands (CDFG 2005). Empirical data from the Sierra Nevada indicate that sooty Grouse hooting sites are located in open, mature, fir-dominated forest, where particularly large trees are present (Bland 2006).

Blue grouse have the potential to be affected by road and motorized trail-associated factors. The relationship between road and motorized trail associated factors to population trends of the blue grouse is unknown.

Mortality from hunting or trapping: In general, roads facilitate access to hunting of blue grouse.

Fragmentation, Edge and Microclimate Effects: Roads and motorized trails can also create edge effects which may alter microclimates near roads which may enhance habitat for these species or may have negligible impacts to their habitat overall.

Disturbance and changes in behavior: Blue grouse may be sensitive to human disturbance. If blue grouse roost sites are disturbed by route associated factors, local blue grouse populations may be negatively impacted.

Summary of Route associated factors to blue grouse:

- Mortality from hunting or trapping as facilitated by road and motorized trail access
- Changes to habitat microclimate associated with the edge induced by roads or motorized trails
- Changes in behavior that may lead to loss of reproductive success due to trail and road associated factors.

The project area (Tahoe NF boundary NFS and non-NFS lands) currently has 35,389 acres of late-seral open canopy coniferous forest habitat. This habitat is comprised of size classes 5S (medium/large trees with sparse canopy cover and 5 (medium/large trees with open canopy cover).

Sooty Grouse (Blue Grouse): Environmental Consequences

Indicators used to Measure Effects

Cross Country Travel: The acres of cross country travel that would be prohibited within late-seral open canopy coniferous forest habitats are determined for each of the alternatives.

Additions to the NFTS: For the proposed alternatives, the Zone of Influence of disturbance used in this analysis was the amount of late-seral open canopy coniferous forest that fell within a 200 meter Zone of Influence of proposed motorized routes. The No Action Alternative (Alternative 1) was analyzed by determining the amount of late-seral open canopy coniferous forest that fell within a 200 meter Zone of Influence of existing unauthorized routes. Each alternative was compared to determine the proportion of habitat directly and indirectly affected in relation to the amount of late-seral coniferous open canopy forest habitat available at the Sierra Nevada-wide scale.

Establishment of "Open Areas": Establishment of "Open Areas" is discussed under "Summary of Effects Common to All Species."

Changes to the NFTS: The Zone of Influence of reopened Maintenance Level 1 roads is determined for each alternative within late-seral open canopy coniferous forest. The changes in class of vehicle and changes in seasonal restrictions are analyzed under "Summary of Effects Common to All Species."

Direct and Indirect Effects to Habitat

Cross Country Travel. Under Alternative 1, cross country travel would not be prohibited, potentially affecting 17,178 acres of sooty grouse habitat within late-seral open canopy coniferous forest, potentially causing disturbance and reducing sooty grouse habitat effectiveness. For the action alternatives, cross country travel would be prohibited on 17,178 acres, where disturbance, avoidance, and disruption would be reduced or eliminated for the sooty grouse.

Additions to the NFTS. Alternative 1 affects the greatest amount of late-seral open canopy coniferous forest with a 200-meter Zone of Influence of existing motorized unauthorized routes, which would continue in association with cross country travel. Alternative 1 affects 4,247 acres (6% of Sierra Nevada-wide habitat, 12% Tahoe NF habitat) of sooty grouse habitat (Table 3.03-44) where sooty grouse habitat security risk would be greatest from disturbance or reduced habitat quality from motorized activities. Alternative 5 would result in the next greatest amount of sooty grouse habitat affected by the addition of motorized routes (708 acres or 1% of Sierra-wide habitat, 2% Tahoe NF habitat). Alternatives 2 and 6 would similarly affect 354 acres of sooty grouse habitat (0.5% of Sierra Nevada-wide habitat, 1% Tahoe NF habitat) from additions to the NFTS. Alternatives 4 and 7 would affect approximately 194 suitable sooty grouse habitat acres (0.3% Sierra Nevada habitat, 0.6% Tahoe NF habitat). Alternative 3 does not propose to add any motorized routes to the NFTS, therefore, sooty grouse habitat on the Tahoe NF would not be affected by this project.

Table 3.03-44. Proportion of Sooty (Blue) Grouse Late-seral Open Canopy Coniferous Forest MIS habitat within a 200-meter "Zone of Influence" of Proposed Motorized route Additions to the NFTS

Sooty Grouse MIS Habitat		Alt 1*	Alts 2, 6,	Alt 3	Alt 4, 7	Alt 5
Acres Sooty Grouse Habitat - Late-seral Open Coniferous Forest within ZOI		4,247	354	0	194	708
Proportion of Sierra Nevada Habitat	75,000	6%	0.5%	0%	0.3%	1%
Habitat Security Risk in Sierra Nevada		**Low**	**Low**	**No Risk**	**Low**	
Proportion of Tahoe NF Habitat[2]	35,389	12%	1%	0%	0.6%	2%
Habitat Security Risk in Tahoe NF		**Low**	**Low**	**Low**	**Low**	

* Alternative 1 includes the Zone of Influence within 200 meters of existing motorized unauthorized routes with continued cross country travel, while all the action alternatives include the Zone of Influence of motorized route additions.

Reopened Maintenance Level 1 Roads: Alternative 5 affects the greatest amount of late-seral open canopy coniferous forest with a 200-meter Zone of Influence of reopened Maintenance Level 1 roads. Alternative 5 affects 197 acres (0.3% of Sierra Nevada-wide habitat, 0.6% Tahoe NF habitat) of sooty grouse habitat (Table 3.03-45). The remaining alternatives do not propose to reopen any ML 1 roads and therefore, sooty grouse habitat on the Tahoe NF would not be affected by implementing Alternatives 1, 2, 3, 4, 6, or 7.

Table 3.03-45. Proportion of Sooty (Blue) Grouse Late-seral Open Canopy Coniferous Forest MIS habitat within a 200-meter "Zone of Influence" of Reopened Maintenance Level 1 Roads

Sooty Grouse MIS Habitat		Alternatives 1*, 2, 3, 4, 6, 7	Alt 5
Acres Sooty Grouse Habitat - Late-seral Open Coniferous Forest within ZOI		0	197
Proportion of Sierra Nevada Habitat	75,000	0%	0.3%
Habitat Security Risk in Sierra Nevada		**No Risk**	**Low**
Proportion of Tahoe NF Habitat within ZOI	35,389	0%	0.6%
Habitat Security Risk in Tahoe NF		**No Risk**	**Low**

* Alternative 1 includes the Zone of Influence within 200 meters of existing motorized unauthorized routes with continued cross country travel, while all the action alternatives include the Zone of Influence of reopened ML 1 roads.

Summary of Direct and Indirect Effects

Table 3.03-46 summarizes the overall net effect to sooty grouse habitat from the proposed actions from motorized route additions to the NFTS, prohibition of cross country travel, wet weather restrictions, and seasonal closures.

Table 3.03-46. Sooty Grouse- Summary of Overall Net Direct and Indirect Effects

			Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel	**Trend of Effect**		Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
	Acres Cross Country Travel Prohibited		0	17,178	17,178	17,178	17,178	17,178	17,178
Establishment of "Open Areas"			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Motorized Route Additions to the NFTS	**Trend of Effect**		Negative, most impactive	Negative, 3rd most impactive	No Effect	Negative, impacts similar to Alternative 6 & 7	Negative, next most impactive following Alt 1.	Negative, impacts similar to Alternative 2 & 7.	Negative, impacts similar to Alts 4 & 6.
	Acres Affected in ZOI		4,247	353	0	194	708	353	194
	Percentage Habitat Affected in ZOI		12%	1%	0%	<1%	2%	1%	<1%
Change to the NFTS	**Change in Season of Use**		No Effect	No Effect	No Effect	Beneficial from reduced disturbance	Beneficial from reduced disturbance	Beneficial from reduced disturbance	No Effect
	Change in Class of Vehicle		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Reopened ML 1 Roads	**Trend of Effect**	No Effect	No Effect	No Effect	No Effect	Negative, most impactive	No Effect	No Effect
		ZOI	0%	0%	0%	0%	<1%	0%	0%
Amendment to Forest Plan			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Overall Net Effect of Proposed Actions			Most impactive of all alternatives Negatively affects 12% sooty grouse habitat primarily from continued cross country travel on existing unauthorized routes within 17,178 acres..	Benefits habitat from the ban of cross country travel on 17,178 acres; slight habitat impacts (1%) from motorized route additions; shares 3rd most impacts with Alt 6; overall reduces habitat fragmentation..	Benefits habitat the most from the ban of cross country travel on 17,178 acres; and no motorized additions or reopened ML 1 roads; overall reduces habitat fragmentation..	Benefits habitat from the ban of cross country travel on 17,178 acres; minimal negative impacts (<1%) to sooty grouse habitat from motorized route additions, shares 4th most impacts with Alt 7; overall reduces habitat fragmentation..	Benefits habitat from the ban of cross country travel on approx. 17,178 acres, 2nd most impactive following Alt 1 affecting 2% habitat from motorized additions; overall reduces habitat fragmentation..	Benefits habitat from the ban of cross country travel on 17,178 acres; slight habitat impacts (1%) from motorized route additions, hsares 3rd most impacts with Alt 2; overall reduces habitat fragmentation..	Benefits habitat from the ban of cross country travel on 17,178 acres; minimal negative impacts (<1%) to sooty grouse habitat from motorized route additions, shares 4th most impacts with Alt 4; overall reduces habitat fragmentation..

*Alternative 1 includes existing unauthorized routes with continued cross country travel, while all the action alternatives, while all the action alternatives include the Zone of Influence of motorized route additions.

Cumulative Effects to Sooty Grouse Habitat

The spatial boundary for analyzing cumulative effects to blue grouse includes all late-seral open canopy coniferous forest habitat within the boundary of the Tahoe NF. Past and current cumulative effects to blue grouse include current and historic grazing of sooty grouse habitat; loss of habitat through catastrophic wildfires; timber and fuels management where cover and forage has been reduced or removed; urban development and expansion within a highly checkerboard land ownership pattern; and recreational activities including hunting, camping, and general recreation activities including all forms of motorized use including 4 wheeled drive vehicles, ATVs, and motorcycles.

The Tahoe NF currently has 31 active livestock grazing allotments including both cattle and sheep. Tahoe LRMP standards and guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands.

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on NFS and private lands within the Tahoe NF boundary. Some, but not all, of these activities would contribute to impacts to the sooty grouse within the Tahoe NF boundary. Since 1990, more than 130,000 acres of vegetation management activities have occurred on the Tahoe NF. Some, but not all, have resulted in impacts to blue grouse habitats. Between 2001 and 2008, approximately 17,000 acres of forest vegetation and fuels projects were completed, which primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These treatments may not affect habitat for sooty grouse because they generally retain at least 40% canopy cover, except for group selection harvest treatments for HFQLG projects on the Sierraville RD. Group selection harvests are expected to increase forage condition and increase forest structural diversity. Some thinning treatments may result in the short-term reduction in cover for sooty grouse, though it is expected that in the longer term, habitat will be protected by reducing wildfire risk. Many recent, current, and future vegetation and fuels reduction projects are improving blue grouse habitat within aspen habitats which are designed to enhance wildlife habitat diversity and foraging condition. Aspen habitats are important for sooty grouse. Between 1994 and 2008, approximately 95,000 acres burned on the Tahoe NF, some of which have removed sooty grouse habitat.

Currently, there is a high demand for recreational use on the Tahoe NF due to its close proximity to urban centers. The Tahoe NF provides a wide variety of recreational experiences including developed and dispersed camping, hiking, fishing, hunting, wildlife viewing, winter sports activities (downhill skiing, cross country skiing, snowmobiling), summer OHV use, and a variety of other non-motorized use (equestrian use and mountain biking). Recreational use on the Tahoe NF has significantly increased compared to the past 20 to 30 years. Because of the proximity to urban areas and population growth, increased recreational use on the Tahoe NF is expected to continue to increase in the future including camping, hiking, fishing, wildlife viewing, hunting, and OHV use. Increases in recreational use in the near future are expected, and therefore, increased disturbance, displacement, avoidance, or illegal poaching to sooty grouse could be expected, particularly during the summer months. Table 3.03-47 lists all the reasonably foreseeable future actions, including fuels, vegetation, recreation, range allotment

plans, non-motorized trail development, and special use permit re-issuances, and summarizes cumulative impacts to sooty grouse.

Table 3.03-47. Sooty Grouse Direct, Indirect, and Cumulative Impact of Reasonably Foreseeable Future Projects

Project type	Number of Projects	Direct and Indirect Impacts to Sooty Grouse	Overall Cumulative Impacts
Vegetation management/ fuels reduction – thinning, group select, and aspen enhancement	~30	Short-term disturbance from harvest activities, changes in cover, foraging and reproductive habitat enhancement in aspen and oak habitats.	Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires.
Aspen enhancement	8	Short-term disturbance during implementation. Long-term cover and forage habitat improvement	Long-term beneficial cumulative effects from improved habitat conditions
Mastication, site prep, and release of small trees, and prescribed burning.	~20	Short-term disturbance during implementation. Site-specific effects vary from beneficial to negative.	Cumulative impacts vary from no cumulative impact to slight increase in cumulative impact.
Hazard tree removal	4	Minimal impact. Short-term disturbance during harvest.	None to minimal cumulative impact
Fish passage construction project	1	Short-term disturbance during project implementation.	No cumulative impact
Watershed Restoration (Carman II and Perazzo)	2	Short-term disturbance during implementation. Improve riparian and meadow habitat quality used for forage and reproduction.	Beneficial cumulative impact by improving long-term forage quality.
Special Use permit renewal	4	N/A administrative action	None
Non-motorized Trail development	2	Short-term disturbance during trail construction, some increased public use may increase disturbance.	Slight increase in cumulative impact.
Designate Energy Corridor	1	N/A programmatic administrative action	Unknown, site-specific cumulative impacts may occur depending on location of the corridor.

Cumulative Effects Conclusion

Alternative 1 poses the greatest cumulative effects to sooty grouse MIS late-seral open canopy coniferous habitat on the Tahoe NF where 12% (4,247 acres out of 35,389 Tahoe NF habitat acres) sooty grouse habitat would be affected within a 200-meter Zone of Influence of existing unauthorized motorized routes that would continue with cross country travel. Alternative 5 would cumulatively add impacts on approximately 708 acres out of 35,389 acres sooty grouse habitat or approximately 2% of the Tahoe NF late-seral open canopy coniferous habitat from the addition of motorized routes and from reopened ML 1 roads. Alternatives 2, 4, 6, and 7 would negatively add 1% or less (194 to 353 acres out of 35, 389 acres Tahoe NF habitat) to existing cumulative impacts from the addition of motorized routes. Alternative 3 does not directly or indirectly affect sooty grouse habitat, and therefore no cumulative impacts would be

added under this alternative. None of the action alternatives would alter the existing trend in late-seral open canopy coniferous forest habitat.

The change is the class of vehicles would have no effect to sooty grouse habitat, since the change in class of vehicles on existing motorized routes would generally not alter sooty grouse habitat condition. Wet weather seasonal restrictions under Alternatives 4, 5, and 6 on all native surfaced roads and motorized trails would benefit sooty grouse habitat effectiveness through the reduced disturbance and avoidance when motorized use on native surfaced routes that are seasonally restricted. Finally cross country travel would be prohibited on 17,178 acres of sooty grouse habitat with the implementation of the action alternatives where disturbance, avoidance, and abandonment by sooty grouse would be reduced or eliminated. Alternative 1 would have the greatest cumulative impact to sooty grouse habitats, where cross country travel would continue and increase, affecting 17,178 acres of late-seral open canopy coniferous forest habitat.

Summary of Sooty Grouse Status and Trend at the Bioregional Scale. The Tahoe NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the sooty grouse; hence, the late-seral open canopy coniferous forest effects analysis for the Tahoe NF Motorized Travel Management Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the sooty grouse. This information is drawn from the detailed information on habitat and population trends in the SNF Bioregional MIS Report (USDA Forest Service 2008), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 75,000 acres of late-seral open canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat on NFS lands in the Sierra Nevada. The trend is slightly decreasing (from 3% to 1% within the last decade on NFS lands).

Population Status and Trend. The sooty grouse has been monitored in the Sierra Nevada at various sample locations by hunter survey, modeling, point counts, and breeding bird survey protocols, including California Department of Fish and Game Blue (Sooty) Grouse Surveys (Bland 1993, 1997, 2002, 2006); California Department of Fish and Game hunter survey, modeling, and hunting regulations assessment (CDFG 2004a, CDFG 2004b); Multi-species inventory and monitoring on the Lake Tahoe Basin Management Unit (LTBMU 2007); and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that sooty grouse continue to be present across the Sierra Nevada, except in the area south of the Kern Gap, and current data at the range wide, California, and Sierra Nevada scales indicate that the distribution of sooty grouse populations in the Sierra Nevada north of the Kern Gap is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Sooty Grouse Trend. Under Alternative 1, 4,247 acres (6% of Sierra Nevada habitat) of late-seral open canopy coniferous forest would be directly or indirectly affected, which could substantially disturb, displace, or cause avoidance to sooty grouse from cross country motorized travel, including on existing unauthorized motorized routes. Alternative 1 could result in a downward habitat trend for the sooty grouse.

The action alternatives all result in a low risk to blue grouse security habitat, where between 0 acres and 708 acres (0 to 1% of Sierra Nevada-wide habitat) are influenced by proposed motorized route additions and/or reopened ML 1 roads. The Tahoe NF Motorized Travel Management Project action alternatives would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of sooty grouse across the Sierra Nevada bioregion.

Old Forest Conifer Associated Species: Affected Environment

The old forest conifer associated species group is comprised of the California spotted owl (*Strix occidentalis occidentalis)*, northern goshawk (*Accipiter gentilis*), great gray owl (*Strix nebulosa*), American marten (*Martes americana*), Pacific fisher (*Martes pennanti*), and coniferous forest birds brown creeper (*Certhia americana*). These species are associated with old forests (moderate to closed canopy) that can be impacted by activities associated with motorized trails and roads. Gaines et al. (2003) conducted a literature review where a number of old forest associated wildlife species were identified as being negatively impacted by a variety of road and trail-associated factors. These impacts include habitat loss and fragmentation, road avoidance or displacement, harassment, and others. Growing concern over habitat fragmentation for old forest associated species has been expressed by individuals, environmental groups, and agency biologists. In addition, studies have shown that species within this group are sensitive to disturbance.

According to the Sierra Nevada Forest Plan Amendment (2004), which amends the Tahoe NF Land and Resource Management Plan (1990), habitat types that are important for old coniferous forest associated species (spotted owl, goshawk, marten, and fisher.) are California Wildlife Habitat Relationship (CWHR) 4M, 4D, 5M, 5D, and 6 vegetation types (stands of trees $\geq$11” dbh with >40% canopy cover). In addition, the Sierra Nevada Forest Plan Amendment provides broad management direction for Old Forest Emphasis Areas (OFEAS) where they are “managed to maintain or develop old forest habitat in areas containing the best remaining large blocks or landscape concentrations of old forest and areas that provide old forest functions (such as connectivity of habitat over a range of elevations to allow migration of wide-ranging old-forest-associated species).” Finally, the Tahoe NF developed a Carnivore Network based on suitable and potential suitable habitat for marten and fisher that provides another way of evaluating impacts to late-seral coniferous forest species and their habitats.

Summary of trail and road associated impacts to late-seral coniferous forest species (Gaines, et al. 2003):

- Mortality or injury resulting from a motorized vehicle running over or colliding with an animal;
- Loss and resulting fragmentation of habitat due to the establishment of roads, trails, or networks, and associated human activities;
- Changes to habitat microclimate associated with the edge induced by roads or trails;
- Reduction in density of snags and down logs due to their removal near roads as facilitated by road and motorized trail access;

- Collection of live animals for use as pets (such as amphibians and reptiles) as facilitated by the physical characteristics of roads or trails or by road or motorized trail access;
- A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise;
- Displacement of individual animals from a specific location that is 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.

Old Forest Conifer Associated Species: Environmental Consequences

Effects Common to All Old Forest Conifer Associated Species

Changes to the NFTS

Changes in Class of Vehicles: Although responses to motorized vehicle use varies by species and depends upon the type of vehicle, in addition to the intensity, timing, speeds, and amount motorized vehicle use, the specific species responses are not well understood. For this analysis, it is assumed that all vehicle types result in the same disturbance to all late-seral coniferous forest species. Therefore, changes in the class of vehicles would not vary in their effects to late-seral coniferous forest associated species for all of the proposed alternatives.

Wet weather seasonal restrictions: Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and motorized trails within old coniferous forest species habitats where old forest species would benefit through the reduction of noise and disturbance associated with motorized use. Alternatives 1, 2, 3, and 7 do not impose wet weather restrictions on native surfaced motorized routes and therefore, late-seral closed canopied coniferous forest associated species would not benefit from wet weather seasonal restrictions.

Establishment of "Open Areas": Establishment of "Open Areas" is discussed under "Summary of Effects Common to All Species."

Amendments to the Forest Plan: the effects to old forest-conifer species are analyzed by their potential to be affected by the Forest Plan amendments of removing seasonal restrictions for deer as addressed in the Deer Environmental Consequences Section.

Introduction to Indicators used to Measure Effects for Old Forest Conifer Associated Species

Three primary metrics will be used to evaluate the effects of the alternatives to old forest conifer associated species as follows:

Cross Country Travel: The acres of cross country travel within old forest conifer habitats (CWHR 4M, 4D, 5M, 5 D, 6) are determined for each of the alternatives.

Additions to the NFTS: The Zone of Influence and Disturbance at a Specific Site are analyzed for motorized route additions to the NFTS by each alternative, as described below.

Zone of Influence: For motorized additions to the NFTS, the Zone of Influence within old forest CWHR habitats are analyzed for each alternative to measure habitat fragmentation and other zonal effects

associated with motorized roads and trails including noise disturbance, avoidance, edge effects, mortality, etc. The distance from routes used to calculate the Zone of Influence for selected species in the old forest group was determined from a thorough review of available literature. For all species in this group, a Zone of Influence of 60 meters (length of one tree height of snags) along routes is used to determine the effects of habitat fragmentation from removal of snag and logs along routes for public safety. Delaney et al. (1999) found that late-seral coniferous forest associated species, such as the spotted owl, have shown to be sensitive to noise disturbance generated by helicopters within a distance of 100 meters, therefore a 100-meter Zone of Influence was used to represent habitat effectiveness for late-seral forest associated species. A Zone of Influence within 200 meters of OFEAs encompasses a greater array of potential route associated effects to late-seral forest associated species including edge effects, habitat fragmentation, and habitat effectiveness.

Disturbance at a specific site: Disturbance at a specific site was analyzed for California spotted owl and northern goshawk by the determining the number of motorized route miles added within Protected Activity Centers. Also, miles of routes added within ¼ mile of a reproductive site (nest site or nest grove) were evaluated by alternative under the species discussions for California spotted owl and northern goshawk, since disturbances within ¼ mile of a reproductive site have the potential to disrupt or cause reproductive failure to these species.

Changes to the NFTS: The Zone of Influence of reopened Maintenance Level 1 roads and Disturbance to a specific site within old forest CWHR habitats were determined in similar way as motorized route additions were analyzed, as described above. The changes in class of vehicle and changes in seasonal restrictions are analyzed under “Effects Common to All Old Forest Conifer Species” above.

Introduction to Cumulative Effects for Old Forest Conifer Associated Species

Indicators used to Measure Cumulative Effects of Motorized Routes

Cross Country Travel: The cumulative effects of motorized cross country travel are described for both current LMP motorized restrictions as well as proposed motorized restrictions for the alternatives.

Motorized Route Density: Motorized route density is used as an indicator to measure cumulative effects of all the motorized routes at the Forest-wide scale. The Forest-wide scale gives an approximate coarse measure of habitat effectiveness for old forest associated species represented in this group. Motorized route density is presented at two scales, within mature and late-seral coniferous forest habitats (CWHR vegetation types 4M, 4D, 5M, 5D, and 6) and Old Forest Emphasis Areas (OFEAs). The type of impacts to old forest associated species depends on the type of motorized route, amount and type of use, and season of use. Although motorized route density thresholds for late-seral coniferous forest associated species are not well understood, route densities are presented to compare relative effects between the alternatives.

Zone of Influence of Motorized and Non-motorized Routes: The analysis of cumulative effects for old forest species focuses on the cumulative effects associated with roads and trails, including motorized and non-motorized use, and includes roads and trails on both NFS lands and non-NFS lands (private).

For this analysis, cumulative effects are simply the sum total of direct and indirect effects of the alternatives plus the past, and reasonably foreseeable future impacts of routes. Adverse cumulative impacts includes proposed motorized route additions, reopened ML 1 routes, existing motorized routes on both NFS lands and non-NFS lands (private), and non-motorized routes. Non-motorized routes are considered to have some impact on old forest species, though they may or may not have similar impacts as motorized routes depending upon the intensity and level of use. Although, all motorized routes are not equal, and routes that are Interstate highways have a higher severity of effect than unpaved motorized routes, this analysis assumes all motorized routes have the same negative impact on old forest species. In all cases, existing routes are nearly constant for all the alternatives and would not vary between the alternatives in a significant way. Routes that are either classified as closed or decommissioned are considered positive cumulative effects since disturbance and habitat fragmentation would no longer occur because routes would become overgrown with vegetation over time and noise disturbance from motorized use would not occur. Reasonably foreseeable impacts of motorized routes are considered by assessing the potential for motorized route proliferation for each alternative.

Other cumulative effects to old forest conifer associated species include effects of vegetation management, fuels reduction, catastrophic wildfires, recreation, grazing and others. These cumulative effects are complex and difficult to quantify over space and time, and are qualitatively described.

Cumulative Effects Boundary in Space and Time

The boundary of the Tahoe NF (including NFS lands and non-NFS lands) is the geographic boundary used for analyzing cumulative effects of motorized vehicle routes on old forest associated species. This area is sufficiently large enough to include home ranges for the species occurring within this group and includes an array of forest vegetation types important to old forest species from low elevations to high elevations including mixed conifer types, true fir types, yellow pine types, lodgepole pine, and subalpine conifer types. The temporal scale used for analyzing is all past and present routes which comprise the current motorized route situation and future routes that may develop within the next 20 years out into the future. This timeframe sufficiently analyzes any foreseeable future routes on the Tahoe NF.

Old Forest Conifer Habitat (CWHR types 4M, 4D, 5M, 5D, and 6)

Indicators used to Measure Effects

Additions to the NFTS (Zone of Influence): For each of the proposed alternatives, the Zone of Influence within old forest habitat (CWHR 4M, 4D, 5M, 5D, 6) was determined at three scales - within 60 meters, 100 meters, and 200 meters of motorized route additions. The three different scales were used to represent the array of route-associated factors for various species represented in the group. In general, a 60 meter Zone of Influence represents habitat fragmentation to old forest species as it relates to habitat components, such as snag and down log removal along routes for public fuelwood and public safety hazards. Sixty meters represents the maximum height of a tree potentially removed as a hazard tree. Delaney et al. (1999) found that old forest species, such as the spotted owl, have shown to be sensitive to noise disturbance generated by helicopters within a distance of 100 meters, therefore a 100-meter Zone of

Influence was used to represent habitat effectiveness for old forest species. Gaines et al. (2003) reported that brown creepers and other forest interior bird species avoided an area within 200 meters of motorized routes. Potential impacts within a 200-meter Zone of Influence to old forest conifer associated species includes potential negative impacts including avoidance due to noise disturbance or edge effects, habitat fragmentation, introduction of invasive species (i.e. brown-headed cowbirds), microclimate changes, and others.

The Zone of Influence may vary by species and by species responses to route type, level of use and intensity. Since absolute thresholds of concern thresholds for any given species are difficult to determine due to limited research on effects of routes, various zones of influence were selected that would represent the array of responses that route associated factors might influence fitness or distribution of species in the group. Species-specific discussion in relation to the various zones of influence will be discussed in detail.

The analysis for these three Zones of Influence was calculated for the DEIS and the results showed maximum percentage differences among all alternatives of 2-3%. Further, the largest ZOI, 200 m, incorporates all of the impacts intended to be measured by the results of the other two distances. Therefore, in this analysis, only 200 m ZOI was used.

Changes to the NFTS (Reopened ML 1 Roads - Zone of Influence): The 200 meter Zone of Influence was determined for all reopened ML 1 roads as it was completed for motorized route additions.

Direct and Indirect Effects

Cross Country Travel: Cross country motorized travel would continue on at 268,895 acres of old forest habitat under Alternative 1, and would be prohibited under all the action alternatives. Habitat fragmentation, disturbance, and avoidance associated with cross country travel would benefit old forest species since prohibition of cross country travel on nearly 300,000 acres would be significantly reduced under the action alternatives.

Additions to the NFTS (Zone of Influence): Comparing the Zone of Influence at 200 meters of motorized routes to be added to the NFTS within old forest habitat as classified by CWHR types 4M, 4D, 5M, 5D, and 6, provides a relative indication of how the alternatives affect habitat effectiveness for many old forest associated species, such as forest carnivores (i.e. marten and fisher) and forest coniferous songbird species (i.e. brown creeper). As indicated above, a study by Gaines et al. 2003 indicated that brown creepers and other forest interior bird species avoided an area within 200 meters of motorized routes. Potential impacts within a 200-meter Zone of Influence to late-seral coniferous forest associated species includes potential negative impacts including avoidance due to noise disturbance or edge effects, habitat fragmentation, introduction of invasive species (i.e. brown-headed cowbirds), microclimate changes, and others.

Alternative 1 contributes considerably to the reduction in habitat effectiveness for old forest species where 18% of old forest habitat would be negatively influenced by cross country motorized travel, including use of existing unauthorized motorized routes. Alternatives 2, 5, and 6 contribute to a 1% reduction in habitat effectiveness for old forest associated species, followed by Alternatives 4 and 7 where

less than 1% reduction in habitat effectiveness would occur. Alternative 3 would not contribute to a reduction in habitat effectiveness.

Changes to NFTS (Reopened ML 1 Roads-Zone of Influence): Only Alternative 5 would impact old forest habitat, where 1% old forest CWHR habitat would be influenced by motorized activities associated with the reopening of ML 1 roads. Although Alternatives 4, 6, and 7 would open ML 1 roads, there would be less than 1% impact. None of the remaining alternative proposes to reopen ML 1 roads, and would therefore, not affect old forest habitat. Refer to Table 3.03-48.

Table 3.03-48. Proportion of Old Forest Habitat (CWHR 4M, 4D, 5M, 5D, and 6) within 200 Meters of Motorized Route Additions and Reopened ML 1 Roads

	Alt 1[1]	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Percent of old forest CWHR habitat in ZOI of Motorized Additions	18%	1%	0%	<1%	1%	1%	<1%
Percent of old forest CWHR habitat in ZOI of Reopened ML 1 Roads	0%	0%	0%	0%	1%	0%	0%

[1]Alternative 1 includes unauthorized routes associated with continued cross country travel

Summary of Direct and Indirect Effects

Table 3.03-49 summarizes the overall net effect to old forest CWHR habitat from the proposed actions from motorized route additions to the NFTS, prohibition of cross country travel, and changes to NFTS.

Table 3.03-49. Old Forest CWHR Habitat- Summary of Overall Net Direct and Indirect Effects

Indicator		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel								
Trend of Effect		Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres of Habitat Where Cross Country Travel is Prohibited		0	267,952	267,952	267,952	267,952	267,952	267,952
Motorized Route Additions to NFTS*								
Trend of Effect		Negative (most impactive alternative)	Negative (shares 2nd most impactive alternative with Alts 5 & 6)	No Effect	Negative (shares 3rd most impactive alternative with 7)	Negative (shares 2nd most impactive with alternatives 2 & 6)	Negative (shares 2nd most impactive with alternatives 2 & 5)	Negative (shares 3re most impactive alternative with alternative4)
Percent Habitat Affected in ZOI		18%	1%	0%	<1%	1%	1%	<1%
Establishment of Motorized "Open Areas"		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Changes to the NFTS	**Change in Season of Use (wet weather restrictions)**	No Effect	No Effect	No Effect	Beneficial from reduced disturbance	Beneficial from reduced disturbance	Beneficial from reduced disturbance	No Effect
	Change in Class of Vehicles	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Reopened Maintenance Level 1 (ML 1) Roads							
	Trend of Effect	No Effect	No Effect	No Effect	No Effect	Negative	No Effect	No Effect
	Percent Habitat Affected in ZOI	0%	0%	0%	0%	1%	0%	0%
Amendments to the Forest Plan		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Overall Net Effect of Proposed Actions		Negative effects from unauthorized cross country travel; Increases habitat fragmentation.	Beneficial effect from prohibited cross country travel, reduces habitat fragmentation	Beneficial effect from prohibited cross country travel, reduces habitat fragmentation.	Beneficial effect from prohibited cross country travel; reduces habitat fragmentation.	Beneficial effect from prohibited cross; reduces habitat fragmentation.	Beneficial effect from prohibited cross country travel; reduces habitat fragmentation.	Beneficial effect from prohibited cross country travel; reduces habitat fragmentation.

* Alternative 1 includes existing unauthorized routes that would continue with cross country travel, while all the action alternatives include proposed route additions.

Cumulative Effects

Cumulative Effects of All Motorized Routes

Motorized Route Density in Old Forest Coniferous Habitat (CWHR types 4M, 4D, 5M, 5D, and 6)

The average route density of all motorized routes within old forest CWHR habitat types was determined within 7th field watersheds for each alternative (Table 3.03-50). In general, lower motorized route densities correlate with higher habitat connectivity or conversely, higher motorized route densities equate to greater habitat fragmentation within old forest habitat.

Alternative 1 would contribute to the greatest cumulative effects within old forest CWHR habitat due to the continuance of unmanaged cross country travel, where the lowest proportion of old forest CWHR habitat (14%) is within route densities of less than 2 miles/square mile as compared to the action alternatives (22-25%). Alternatively, Alternative 1 has the greatest amount of old forest CWHR habitat (34%) that have relatively high motorized route densities of 4-6 mi/mi^2, where the least amount of habitat connectivity for old forest associated species is provided compared to all the action alternatives (10-11% habitat with route densities of 4-6 mi/mi^2).

For all the action alternatives, the cumulative motorized route density would be similar since cross country travel would be prohibited, including the majority of existing unauthorized routes. Alternative 5 would have slightly greater cumulative effects compared to alternatives the remaining action alternatives. High motorized route densities, such as would occur under Alternative 1, could be a limiting factor in the distribution and abundance for some old forest conifer associated species. Therefore, Alternative 1 poses the greatest risk to old forest conifer species' abundance and distribution, especially for species that require large patches of undisturbed habitat.

Table 3.03-50. Proportion of Late-seral Coniferous Forest Habitat (CWHR types 4M, 4D, 5M, 5D, and 6) with motorized route densities between 0 and 6 miles/square mile (Average motorized route densities within 7th Field Watersheds)

Motorized Route Density (miles/square mile)	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**	**Alt 7**
0 Miles/Square mile	<1%	<1%	<1%	<1%	<1%	<1%	<1%
0-2 Miles/Square mile	14%	25%	25%	25%	22%	25%	25%
2-4 Miles/Square mile	47%	63%	63%	63%	65%	64%	63%
4-6 Miles/Square mile	34%	10%	10%	10%	11%	10%	10%
>6 Miles/Square mile	4%	2%	1%	2%	2%	2%	2%

Zone of Influence at 200 meters. The cumulative effects to mature/forest forests (CWHR types 4M, 4D, 5M, 5D, 6 within a 200 meter Zone of Influence are compared for the proposed alternatives (Tables 3.03-49). When comparing the relative cumulative effects to late-seral forests within a 200 meter Zone of Influence by adding up all the direct and indirect effects of proposed alternatives plus the cumulative effects of past, present, and future actions, Alternative 1 would have the greatest overall cumulative impact (cumulative impact score = 60%) and poses the greatest risk to habitat connectivity, as well as other negative cumulative impacts associated with motorized activities within old forest habitat as a result

of approximately 18% of old forest habitat that would be directly and indirectly affected by continued cross country motorized travel on 267,952 acres, including continued use of existing unauthorized routes (Table 3.03-51). In addition, Alternative 1 would likely result in uncontrolled proliferation of unauthorized routes since unmanaged cross country travel would likely continue and grow into the future. All the action alternatives are similar in their overall cumulative impact within a 200 meter Zone of Influence that affects between 42 to 44 percent of old forest CWHR habitat. No direct, indirect, or cumulative impacts would occur from implementing Alternatives 3, since no motorized routes would be added to the NFTS or added within old forest CWHR habitat.

Table 3.03-51. Cumulative Effects for Percent of Old Forest Conifer Habitat (CWHR 4M, 4D, 5M, 5D, 6) within 200 meters of All Routes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect Effects of proposed alternatives							
Motorized route additions to the NFTS[1] (negative impact)	18%	1%	0%	<1%	1%	1%	<1%
Reopened ML 1 Roads (negative)	0%	0%	0%	0%	1%	0%	0%
Unauthorized Routes where cross country travel would be prohibited (postive)	0%	17%	18%	17%	16	17%	17%
Cumulative effects of past, present, and proposed actions							
Existing motorized routes- NFS lands (negative impact)	26%	26%	26%	26%	26%	26%	26%
Existing motorized routes on private land - non-NFS lands (negative impact)	12%	12%	12%	12%	12%	12%	12%
Existing non-motorized routes (negative impact)[2]	4%	4%	4%	4%	4%	4%	4%
Decommissioned routes – (positive impact)	1%	1%	1%	1%	1%	1%	1%
Existing Closed ML 1 Roads (positive impact)	1%	1%	1%	1%	1%	1%	1%
Total Cumulative Effects							
Overall Cumulative Effects equals the total of all impacts, both positive and negative	**60%**	**43%**	**42%**	**42%**	**44%**	**43%**	**42%**

[1]Motorized Route additions- Alternative 1 includes unauthorized routes with continued cross country travel, while all the action alternatives includes motorized route additions to the NFTS.

[2]Non-motorized-assumption: non-motorized impact is limited to 60 meters from trail and that no impact occurs beyond 60 meters

Overall Cumulative Effects from Past, Present and Reasonably Foreseeable Future

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on NFS lands and private lands within the Tahoe NF boundary. Some, but not all, of these activities would contribute to impacts to late-seral coniferous forest associated species within the cumulative effects boundary. See overall cumulative effects for spotted owl for a summary of cumulative effects from past, present, and reasonably foreseeable projects for all species.

Old Forest Emphasis Areas (OFEAs)

Indicators used to Measure Direct and Indirect Effects

Motorized Route Density: Motorized route density analysis is conducted at a Forest-wide scale to give an approximate coarse measure of habitat effectiveness for old forest conifer associated species represented in Old Forest Emphasis Areas (OFEAs). The type of impacts to old forest associated species depends on the type of motorized route, amount and type of use, and season of use.

Zone of Influence: The Zone of Influence is analyzed for each alternative to measure habitat fragmentation and other zonal effects associated with motorized routes and trails including noise disturbance, avoidance, edge effects, mortality, etc. The distance from motorized routes used to calculate the Zone of Influence for OFEAs was determined from a thorough review of available literature. A Zone of Influence of 60 meters (length of one tree height of snags) along motorized routes is used to determine the effects of habitat fragmentation from removal of snag and logs along motorized routes for public safety. Zone of Influence within 200 meters of OFEAs provides encompasses a greater array of potential route associated effects to old forest species including edge effects, habitat fragmentation, and habitat effectiveness. The results of the 60-meter ZOI calculation are available in the project record; however, because the results of the 200-meter ZOI display all the impacts also displayed by the 60 m ZOI, this analysis refers only to the 200-meter analysis.

Direct and Indirect Effects

Cross Country Travel. The ban of motorized cross country travel on 394, 847 acres within OFEAs would benefit old forest associated species and reduce disturbance and habitat fragmentation. Under Alternative 1 cross country motorized travel would continue where disturbance to old forest associated species and habitat fragmentation on 394,847 acres within OFEAs would continue.

Additions to the NFTS (Zone of Influence at 200 meters in OFEAs). The zones of influence within OFEAs are analyzed for the proposed alternatives within 200 meters of proposed additions of motorized routes to the NFTS (Table 3.03-52). Comparing the Zone of Influence at 200 meters of proposed unauthorized routes provides a relative indication of how the alternatives affect habitat effectiveness for late-seral coniferous forest associated species within OFEAs. Potential negative impacts within a 200-meter Zone of Influence to late-seral coniferous associated species includes avoidance due to noise disturbance or edge effects, habitat fragmentation, introduction of invasive species (i.e. brown-headed cowbirds), microclimate changes, and others. Alternative 1 contributes considerably to reduced habitat effectiveness for old forest species where 22% of OFEAs would be negatively influenced by continued cross country travel and the associated continued use of existing unauthorized routes. Alternative 5 contributes to 2% reduction in habitat effectiveness for old forest associated species, followed by Alternatives 2 and 6 at 1% reduction in habitat effectiveness. Alternative 7 contributes to less than 1% reduction in habitat effectiveness for old forest associated species. Alternatives 3 and 4 would not affect overall habitat effectiveness for old forest species within OFEAs.

Summary of Direct and Indirect Effects

Table 3.03-52 summarizes the overall net effect to Old Forest Emphasis Areas (OFEAs) from the proposed actions from motorized route additions to the NFTS, prohibition of cross country travel, wet weather restrictions, and seasonal closures.

Table 3.03-52. Old Forest Emphasis Areas (OFEAs) - Summary of Overall Net Direct and Indirect Effects

		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel								
Trend of Effect		Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres prohibited		0	394,847	394,847	394,847	394,847	394,847	394,847
ZOI percent OFEAs prohibited		0%	17%	18%	17%	16%	17%	17%
Establishment of "Open Areas"		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Motorized Route Additions to NFTS								
Trend of Effect		Negative	Slight Negative	No Effect	Slight Negative	Slight Negative	Slight Negative	Slight Negative
ZOI Percent OFEAs Affected		18%	1%	0%	<1%	1%	1%	<1%
Changes to the NFTS	**Wet Weather Restrictions**	No Effect	No Effect	No Effect	Beneficial from reduced disturbance	Beneficial from reduced disturbance	Beneficial from reduced disturbance	No Effect
	Change in Class of Vehicles	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Reopened ML 1 Roads	0%	0%	0%	0%	1%	0%	0%
Amendments to Forest Plan		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Overall Net Effect of Proposed Actions		Negative, continued cross country travel on 394,847 acres. Increases fragmentation within OFEAs.	3rd most beneficial alternative, shared with Alt 6. Reduces fragmentation from cross country travel prohibitions.	Most beneficial alternative-- no motorized route additions. Reduces fragmentationfrom cross country travel prohibitions.	2nd most beneficial alternative shared with Alt 7. Reduces fragmentation from cross country travel prohibitions.	Least beneficial alternative-- 2% ZOI affected from route additions and reopened ML 1 roads. Reduces fragmentation from cross country travel prohibitions.	3rd most beneficial alernative, shared with Alt 2. Reduces fragmentation from cross country travel prohibitions.	2nd most beneficial alternative shared with Alt 4. Reduces fragmentation. from cross country travel prohibitions.

* Alternative 1 includes existing unauthorized routes that would continue with cross country travel, while all the action alternatives include proposed route additions.

Cumulative Effects Old Forest Emphasis Areas (OFEAs)

Cumulative Motorized Route Density in OFEAs

The average motorized route densities (all motorized routes including existing routes, added routes, and reopened ML 1 roads) within the Old Forest Emphasis Areas (OFEAs) land allocation were determined within 7th field watersheds for each alternative (Table 3.03-53). In general, lower motorized route densities correlate with higher habitat connectivity or conversely, higher motorized route densities equate to greater habitat fragmentation of OFEAs.

Alternative 1 provides the least amount of habitat connectivity within OFEAs, where approximately 35% of OFEAs have route densities in the highest route density categories (4-6 mi/mi^2), and the lowest amount of OFEAs in the lowest route density categories (0-2 mi/mi^2).

When comparing the action alternatives, Alternative 5 would result in next greatest proportion of OFEAs (9%) within the 4-6 mi/mi^2 route density category, followed by the remaining action alternatives which have slightly lower route densities within OFEAs. The remaining action alternatives would result in approximately 5-6% of the OFEAs within the 4-6 mi/mi^2 route density category. Therefore, the cumulative route density of motorized routes for action alternatives would similarly result in the least amount of habitat fragmentation within OFEAs as compared to Alternative 1, followed by Alternative.

Table 3.03-53. Proportion of Old Forest Emphasis Areas with motorized route densities between 0 miles per square mile and greater than 6 miles per square mile (average motorized route densities within 7th field watersheds)

Route Density (miles/mi^2)	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**	**Alt 7**
0 Miles/Square Mile	<1%	<1%	<1%	<1%	<1%	<1%	<1%
0-2 Miles/Square Mile	11%	23%	24%	24%	19%	22%	23%
2-4 Miles/Square Mile	53%	71%	71%	71%	72%	72%	71%
4-6 Miles/Square Mile	35%	5%	6%	5%	9%	5%	5%
>6 Miles/Square Mile	1%	1%	0%	1%	1%	1%	1%

Cumulative Effects from All Motorized Routes

200-Meter Zone of Influence. The cumulative effects to OFEAs within a 200-meter Zone of Influence are compared for the proposed alternatives (Table 3.03-54). When comparing the relative cumulative effects to OFEAs within a 200-meter Zone of Influence by summing the direct and indirect effects of proposed alternatives and the cumulative effects of past, present, and future actions, Alternative 1 has the greatest overall cumulative impact (cumulative impact score = 55%) that poses the greatest risk to habitat connectivity and other negative cumulative impacts associated with motorized routes within OFEAs due to approximately 17% of OFEAs that are influenced by motorized cross country travel, including continued use of existing unauthorized routes. In addition, Alternative 1 would contribute significantly to the continued proliferation of unauthorized routes because unmanaged cross country motorized travel would continue into the future and would have a high likelihood of increasing.

The action alternatives would directly and indirectly affect either none or only a very small amount of Tahoe NF OFEAs (0-2%) from the addition of motorized route additions and reopened ML 1 roads. Only Alternative 5 proposes to reopen ML 1 roads. Therefore, habitat fragmentation within OFEAs for the action alternatives would be reduced compared to Alternative 1. Cumulative effects would be slightly increased for Alternatives 2, 5, 6, and 7. Alternatives 3 and 4 would not contribute to cumulative impacts since motorized route additions nor would reopening of ML roads be proposed. Overall cumulative impacts for the action alternatives would be beneficial compared to Alternative 1, where 15-17% of OFEAs would have reduced habitat fragmentation from the prohibition of motorized cross country travel, including on existing unauthorized routes.

Table 3.03-54. Cumulative Effects to Old Forest Emphasis Areas within a 200-meter Zone of Influence of All Routes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect Effects of proposed alternatives							
Proposed Motorized route additions to NFTS (negative impact)[1]	17%	1%	0%	0%	1%	1%	<1%
Reopened ML 1 Roads (negative)	0%	0%	0%	0%	1%	0%	0%
Unauthorized Routes where cross country travel would be prohibited (positive)	0%	16%	17%	17%	16%	16%	17%
Cumulative Effects of past, present, and proposed actions							
Existing motorized routes - NFS lands (negative impact)	24%	24%	24%	24%	24%	24%	24%
Existing routes on non-NFS lands (private) (negative impact)	10%	10%	10%	10%	10%	10%	10%
Existing non-motorized routes (negative impact)[2]	4%	4%	4%	4%	4%	4%	4%
Decommissioned routes (positive impact)	1%	1%	1%	1%	1%	1%	1%
Total Cumulative Effects							
Overall Cumulative Effects equals the total of all impacts, both positive and negative	**55%**	**39%**	**38%**	**38%**	**40%**	**39%**	**38%**

[1]Motorized Route additions- Alternative 1 includes unauthorized routes with continued cross country travel, while all the action alternatives includes motorized route additions to the NFTS.

[2]Non-motorized-assumption: non-motorized impact is limited to 60 meters from trail and that no impact occurs beyond 60 meters

Overall Cumulative Effects from Past, Present and Reasonably Foreseeable Future

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on NFS lands and private lands within the Tahoe NF boundary. Some, but not all, of these activities would contribute to impacts to late-seral coniferous forest associated species within the cumulative effects boundary. See overall cumulative effects for spotted owl for a summary of cumulative effects from past, present, and reasonably foreseeable projects for all late-seral coniferous forest species.

Compliance with the Forest Plan and Other Direction

The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment identified the following standards and guidelines applicable to habitat connectivity for old forest associated species, including the California spotted owl, Northern goshawk, American marten, and Pacific fisher.

1. Minimize old forest habitat fragmentation. Assess potential impacts of fragmentation on old forest-associated species (particularly fisher and marten) in biological evaluations (standard and guideline 27).

   All of the action alternatives reduce fragmentation of old forest habitat. The Biological Evaluation for old forest (late-seral) - associated species, including the California spotted owl, Northern goshawk, American marten, and the Pacific fisher determined that the action alternatives for the Tahoe NF Travel Management Project may affect individual species, but would not lead to a downward trend toward federal listing.

2. Assess the potential impact of projects on the connectivity of habitat for old forest associated species standard and guideline 28).

The analysis conducted as described in the above sections, indicated that the action alternatives all reduce habitat fragmentation for old forest (late-seral) – associated species, by prohibiting motorized cross country travel on 394,847 acres within Old Forest Emphasis Areas, 267,952 acres within CWHR 4M, 4D, 5M, 5D, and 6 habitat types, and 396,602 acres within the Tahoe NF Forest Carnivore Network; all which are important habitats for old forest (late-seral) associated species.

Alternative 1 complies the least with the LRMP direction for minimizing habitat fragmentation, by allowing the continuance of cross country travel within OFEAs, CWHR 4M, 4D, 5M, 5D, and 6 habitat types, and the Tahoe NF Forest Carnivore Network on over 250,000 acres. In addition, Alternative 1 directly, indirectly, and cumulatively affects the greatest amount of habitat for old forest-associated species from the continuance of cross country travel, including on unauthorized routes. Alternative 3 minimizes fragmentation of old forest habitat the most of all the action alternatives since no motorized route additions to the NFTS are proposed within old forest habitats, and therefore minimizes habitat fragmentation the most of all the action alternatives.

Spotted Owl: Affected Environment

The California spotted owl is designated by the Regional Forester as a Sensitive Species and is identified as a Management Indicator Species on the Tahoe NF. The Tahoe NF has 181 designated California spotted owl Protected Activity Centers. Protected Activity Centers (PACs) are delineated around spotted owl territorial pairs or territorial individuals. Within the polygons of PACs are point locations of known nests or roosts called Activity Centers. The Sierra Nevada Forest Plan Amendment (2004) provides direction to designate Protected Activity Centers and Home Range Core Areas (HRCAs) by using CWHR types 6, 5D, 5M, 4D, and 4M. These CWHR types are in essence considered suitable habitat (nesting and foraging) for California spotted owls. Pure eastside pine types are not considered suitable for California

spotted owls. Currently, there are 294,487 acres suitable spotted owl habitat with CWHR types 6, 5D, 5M, 4D, and 4M on the Tahoe NF (excluding pure eastside pine type).

The Tahoe NF has conducted surveys for spotted owl presence and reproductive status across the forest since the early 1980s. Approximately 85% of suitable habitat has been surveyed on the Tahoe National Forest following R-5 USDA Forest Service Protocol. Based on survey results to date, 181 Protected Activity Centers (PACs) and Home Range Core Areas (HRCA) have been designated covering 184,000 acres within the Tahoe NF administrative boundary. PACs and HRCAs are comprised of the best available habitat encompassing approximately 300 and 700 acres, respectively.

Spotted Owl: Environmental Consequences

Introduction

Gaines et al. (2003) reviewed studies on the northern spotted owl and determined that road and trail associated factors that were likely to affect spotted owls were collisions, disturbance at a specific site, physiological response, edge effects, and snag reduction. These same factors are expected to affect the California spotted owl in a similar way based upon available literature (Verner et al. 1992, Seamans 2005, Blakesley 2003). Since the California spotted owl is the same species as the Northern spotted owl and have similar biological and ecological requirements, both subspecies of spotted owls are expected to behave and respond to disturbance similarly.

Collisions: Collisions with vehicles are known to be a source of mortality for spotted owls. The degree to which this occurs on the Tahoe NF is unknown. However, at least one spotted owl was killed by a vehicle collision on a highway on the Eldorado NF.

Disturbance at a Specific Site: The Forest Service considers activities greater than 0.25 miles (~400 meters) from a spotted owl nest site to have little potential to affect spotted owl nesting. In addition, Delaney et al. (1999) found that Mexican spotted owls were found to show an alert response to chainsaws at distances less than 0.25 miles. Preliminary study results on a Northern spotted owl study in northern California indicated that spotted owls did not flush from nest or roost sites when motorcycles were greater than 105 meters away during the post-fledgling period (Delaney and Grubb 2001). In addition, Delaney and Grubb (2003) found that spotted owl responses to motorcycle noise depended upon an array of complex factors, including sound level and frequency distribution, stimulus distance and event duration, motorcycle type and condition, frequency of motorcycle events, number of motorcycles per group, trail slope, topography, road substrate and condition, and microphone position relative to sound source. In general, motorcycle noise did not appear to affect reproductive success. However, this study is ongoing and impacts of motorcycle noise are not conclusive at this point.

Wasser et al. (1997) found that stress hormone levels were significantly higher in male northern spotted owls (but not females) when they were located less than 0.41 km from a major logging road compared to spotted owls in areas greater than 0.41 km from a major logging road. It is not well understood how elevated stress hormones affect spotted populations. However, Marra and Holberton (1998) reported that chronic high levels of stress hormones (corticosterone) may have negative effects on reproduction or physical condition of individual owls. Swarthout and Steidl (2001) found hikers caused

juvenile and adult spotted owls to flush at less than 12meters and less than 24 meters, respectively. Mexican spotted owls did not elicit any response from hikers that exceeded a distance of 55 meters.

Habitat Loss, Fragmentation and Edge Effects: California spotted owls may be affected by edge effects from roads when roads and motorized trails fragment suitable habitat. Several studies indicate the California spotted owl is sensitive to changes in forest canopy closure and habitat fragmentation (Seamans 2005, Blakesley 2003) that could result from a network of roads. Roads and motorized trails can result in a reduction in interior forest patch size which decreases the amount of habitat available and increases the distance between suitable interior forest patches for old forest conifer associated species such as the spotted owl.

Snags and down logs are important habitat components for spotted owls, as well as many other species associated with old forest conditions. Forest system roads and motorized trails can contribute to the fragmentation of old forest habitat components through the reduction of snags and logs. Hazard trees are those trees that pose a risk of falling on a road or facility including recreational facilities such as campgrounds, trailheads, etc. Snags along roads used by the public that are considered to be hazard trees would be expected to be removed for public safety. In addition, the amount of logs and snags along roadsides are expected to be reduced from public fuelwood gathering

Spotted Owl Motorized Impact Factors for Analysis

The effects of the alternatives on spotted owls are analyzed for two road and trail associated factors:

- Effects to spotted owls from disturbance at a specific site (nesting habitat within PACs and nest locations).
- Effects to spotted owls from habitat fragmentation and edge effects within a Zone of Influence of motorized routes.

Assumptions for Determining Effects to Spotted Owl

Although the type and amount of use along the different types of routes may result in different effects to spotted owls, all motorized routes are treated equally in this analysis because the relationship between effects and motorized route type and intensity of use is complex and not well understood. For example, the type of motorized road or trail likely varies in how roads and motorized trails contribute to spotted owl disturbance and habitat fragmentation: high clearance roads generally receive less use than roads used by passenger vehicles, which would equate to less noise disturbance to owls, and single track motorcycle trails would likely fragment habitat less than would a passenger road due to the narrower width of the single track motorcycle routes that would result in removing less habitat. However, noise generated from motorcycles along trails may contribute to greater noise disturbance to spotted owls than would a 4x4 jeep. Since impacts to spotted owls are not well understood, impacts from all motorized routes, regardless of motorized route type and intensity of use, are treated the same.

Spotted Owl: Disturbance at a Specific Site

Indicators used to Measure Effects

Cross Country Travel: The acres of cross country travel within spotted owl Protected Activity Centers (PACs) and within 0.25 mile radius of spotted owl nest sites or nest stands are determined for each of the alternatives.

Additions to the NFTS and Changes to the NFTS--Reopened ML 1 Roads: Motorized route additions to the NFTS and Changes to the NFTS from Reopened ML 1 Roads are analyzed to determine how they would impact spotted owl "disturbance to a specific site. Disturbance to spotted owl PACs and nest sites is analyzed for the alternatives at three scales - within 0.25 miles of spotted owl Activity Centers (nest sites or nest groves), within PACs and, and within HRCAs.

- **Nest or Nest Stand (Within a 0.25 miles radius of spotted owl Activity Centers)**: Activity Centers represent known spotted owl nesting locations that may include most recently known nest site or nest stand. The miles of proposed motorized route additions and the miles of reopened ML 1 roads within a 0.25 mile radius of spotted owl Activity Centers are compared by each of the alternatives to display the potential impact to spotted owl breeding sites from noise disturbance and other factors associated with motorized use.
- **Protected Activity Centers (PACs)**: PACs are delineated surrounding each territorial spotted owl activity center detected since 1986. PACs are delineated to include known and suspected nest stands and encompass the best available 300 acres of habitat (2 or more canopy layers, trees in the dominant and co-dominant crown classes averaging 24" dbh or greater, at least 70 percent tree canopy cover, and in descending order of priority, CWHR classes 6, 5D, 5M, 4D, and 4M and other stands with at least 50% canopy cover). The miles of proposed additions to the NFTS and the miles of reopened ML 1 roads within spotted owl PACs are compared to determine how the various alternatives have the potential to impact nesting spotted owls from noise disturbance and other factors associated with motorized use.
- **Home Range Core Areas (HRCAs)**: Delineated California spotted owl Home Range Core Areas (HRCAs) are comprised of approximately 1,000 acres (including the PAC) of the best available spotted owl habitat (SNFPA 2004). For this analysis, the Home Range Core Area is the approximately 700 acres surrounding the ~300 acre core nest area (PAC). HRCAs are delineated to represent spotted owl foraging habitat, whereas, PACs are delineated as spotted owl nesting habitat. The miles of proposed additions to the NFTS and the miles of reopened ML 1 roads within spotted owl HRCAs are compared to determine how the various alternatives have the potential to impact foraging spotted owls from noise disturbance and other factors associated with motorized use.

Spotted Owl: Direct and Indirect Effects (Disturbance at a Specific Site)

Nest Site or Nest Stand (Within 0.25 Mile Radius Circle of Activity Centers)

Cross Country Travel: Nesting spotted owls would considerably benefit from all the action alternatives where 18,535 acres within a ¼ miles radius of a spotted owl activity center (nest site or nest stand) would

be banned from motorized cross country travel, and would have reduced disturbance from motorized activities associated with unmanaged, cross country travel. Under Alternative 1, cross country travel would be allowed to continue on 18,535 acres (within ¼ mile of spotted owl nest locations), where disturbance to spotted owl nesting could occur, potentially altering behavior, causing nest abandonment, and resulting in reproductive failure.

Additions to the NFTS: Table 3.03-55 displays the miles of motorized route additions to the NFTS within 0.25 of spotted owl activity centers (nest site or nest stand) by spotted owl PAC number and route identification number for the action alternatives. The analysis indicates that when considering motorized route additions within proximity to known spotted owl nest sites or nest stands, there are far fewer actual route miles that would potentially affect nesting owls when compared to looking at motorized route additions within the designated spotted owl PAC boundary. The PAC is an administrative boundary that was delineated based on the best available 300 acres of habitat surrounding a known spotted owl nest site or nest stand.

Alternative 1 clearly poses the greatest risk from noise disturbance to breeding owls by allowing motorized cross country travel to continue, including on approximately 41 miles of existing unauthorized motorized routes. When looking at the immediate area around the actual known nest site, it appears direct impacts of disturbance motorized route additions for all the action alternatives are actually quite low. Alternatives 2, 5, 6, and 7 would result in adding between 0.2 and 0.4 miles motorized routes within 0.25 miles of a known spotted owl nest site location affecting only 3 PACs (PC138, SI060, and SI030). Alternatives 3 and 4 would not add motorized routes near nest sites, and therefore no additional disturbance to spotted owl nest site locations would occur. One route (D_49-27_a) is a short spur that provides access to a dispersed recreation site. Depending upon the type of dispersed recreational activity that occurs in association with this route, increased disturbance to the spotted owl nest site for SI030 has the potential to occur.

Table 3.03-55. Miles of Motorized Route Additions within 0.25 miles of Spotted Owl Activity Centers (Nest Site or Nest Stand) by PAC Number and Route ID

PAC Number	Route ID Number	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Numerous PACs	Existing Unauthorized routes	41.1	0	0	0	0	0	0
PC138	ARM-90	0	0	0	0	0	0.2	0
SI060	YRN-2	0	0.2	0	0	0.2	0.2	0.2
SI030	D_49-27_a	0	0.02	0	0	0.02	0.02	0
	Total Miles	**41.1**	**0.22**	**0**	**0**	**0.22**	**0.42**	**0.20**

Reopened ML 1 Roads: As shown in Table 3.03-56, only Alternative 5 proposes to reopen 2.5 miles of ML 1 roads within 0.25 miles of known spotted owl nest sites or nest stands. Only Alternative 5 has the potential to disrupt or disturb spotted owl nesting from activities associated with motorized use on reopened ML 1 roads. The remaining alternatives would not affect nesting spotted owls since they do not propose to reopen any ML 1 roads near nesting areas. The amount of disturbance to nesting owls would depend on the amount and intensity of use and the type of vehicles used.

Table 3.03-56. Miles of Reopened ML 1 Roads within 0.25 Miles of Spotted Owl Activity Center by PAC Number and Road Number

PAC Number	ML 1 Road Number	Alt 1, 2, 3, 4, 6, 7	Alt 5
NV011	H20-8-5	0	0.1
SI019	N25-18-1	0	0.7
SI032	N33-8	0	0.9
SI033	N39-5	0	0.6
SI033	N39-5-1	0	0.2
	Total Miles	**0**	**2.5**

Protected Activity Centers

Cross Country Travel: Spotted owl PACs would considerably benefit from all the action alternatives where 50,712 acres within PACs would be banned from motorized cross country travel, and thereby would have reduced disturbance to nesting spotted owls from motorized activities associated with unmanaged, cross country travel. Under Alternative 1, cross country travel on 50,712 acres within PACs would continue where disturbance to spotted owl nesting could occur, potentially altering behavior, causing nest abandonment, and resulting in reproductive failure.

Additions to the NFTS: Table 3.03-57 displays the miles of motorized route additions to the NFTS within PACs by route identification number, and miles of route additions for the action alternatives. The proposed additions to the NFTS indicate that Alternatives 2, 5, 6, and 7 would affect between 3 and 6 PACs, ranging from 0.1 mile to nearly 1 mile. Alternatives 3 and 4 would not affect any PACs since no routes within PACs are proposed under these alternatives.

Twelve routes that provide access to dispersed recreation sites potentially affect between 5 and 11 additional PACS (Alternatives 2 and 5 – the least, Alternative 6 – the most). However, the length of these dispersed recreation access routes are generally short spurs that range from less than 0.01 mile to 0.05 mile. In sum, the dispersed recreation access routes total approximately 0.15 mile for Alternatives 2 and 5, and total 0.25 mile for Alternative 6.

Table 3.03-57. Miles of Motorized Route Additions by Spotted Owl PAC and Route ID

PAC Number	Route ID Number	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Primary Routes								
Intersects 140 PACs	Unauthorized routes	98						
NV034	H29-11	0	0	0	0	0.1	0	0
PC116	ARM-2	0	0.3	0	0	0.3	0.3	0.3
PC138	ARM-90	0	0	0	0	0	0.5	0
SI015	YRN-M3b	0	0.3	0	0	0.3	0	0.3
SI019	H25-18	0	0	0	0	0.3	0	0
SI050	YRN-M2	0	0.1	0	0	0.1	0	0
SI060	YRN-2	0	0.9	0	0	0.9	0.9	0.9
	Subtotal	**98.1**	**1.6**	**0**	**0**	**2.0**	**1.7**	**1.5**

PAC Number	Route ID Number	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Routes Used to Access Dispersed Recreation Sites								
NV003	D_20-12_c	0	0	0	0	0	0.02	0
NV009	D_14_e	0	0	0	0	0	0.01	0
NV009	D_18-14e	0	0	0	0	0	0.02	0
NV010	D_CA-20_a	0	0	0	0	0	0.02	0
NV024	D_20-13	0	0	0	0	0	0.01	0
NV057	D_20-12_g	0	0	0	0	0	0.01	0
NV062	D_843-9_a	0	<0.01	0	0	<0.01	<0.01	0
PC026	D_96-54	0	0.02	0	0	0.02	0.02	0
PC029	D_96_b	0	0	0	0	0	0.02	0
PC044	D_P-6001_b	0	0.05	0	0	0.05	0.05	0
SI030	D_49-27_a	0	0.02	0	0	0.02	0.02	0
YU001	D_Y-125_a	0	0.05	0	0	0.05	0.05	0
	Subtotal	**0**	**0.15**	**0**	**0**	**0.15**	**0.25**	**0**
	Total Miles	**98.1**	**1.8**	**0**	**0**	**2.2**	**2.0**	**1.5**

Table 3.03-58 displays the total miles of motorized route additions to the NFTS within spotted owl Protected Activity Centers (PACs), and the number and percentage of PACs affected for each of the alternatives. Alternative 1 is clearly a worst case scenario, where cross country motorized travel, including use on approximately 98 miles of existing unauthorized routes, would continue to contribute to direct and indirect impacts to 140 (77%) spotted owl Protected Activity Centers. Alternative 1 could potentially directly and indirectly disturb nesting spotted owls from motorized use on unauthorized routes.

Alternative 6 would affect the next greatest number of PACs (14 of 181 or 8%) from motorized route additions, followed by Alternative 5. Alternatives 5 and 6 each adds approximately 2 miles of motorized routes to the NFTS that could contribute to direct and indirect adverse effects to nesting spotted owls from disturbance associated with motorized vehicle activities. Alternative 2 proposes approximately 2 miles of motorized route additions to the NFTS within 9 PACs (5%).

Alternative 7 would potentially affect 2% or 3 out of 181 Tahoe NF PACs, where less than 2 miles of motorized routes would be added to the NFTS.

Alternatives 3 and 4 do not propose any motorized route additions to the NFTS within spotted owl PACs, and therefore, no direct or indirect effects to nesting spotted owls would occur with the implementation of Alternatives 3 or 4.

Table 3.03-58. Miles of Proposed Motorized route additions to the NFTS within Spotted Owl Protected Activity Centers on the Tahoe NF

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Miles of Proposed motorized route additions	98.1	1.8	0	0	2.2	2.0	1.5
Number of Spotted Owl PACs Intersected by motorized route additions to the NFTS	140	9	0	0	11	14	3
Percent of PACs Affected by motorized route additions to the NFTS (Total Tahoe NF PACs = 181)	77%	5%	0%	0%	6%	8%	2%

Changes to the NFTS-Reopened ML 1 Roads: The miles of reopened ML 1 roads are shown in Table 3.03-59 by PAC Number and ML 1 Road number for each of the alternatives. Alternative 5 would potentially adversely affect the greatest number of spotted owl PACs (12 of 181 or 7%) from approximately 6 miles of reopened ML 1 roads where disturbance to nesting spotted owls has the potential to alter behavior, disrupt nesting, and result in reproductive failure. Alternatives 2, 6, and 7 would be similar in their impacts to nesting spotted owls from reopened ML 1 roads affecting one spotted owl PAC (PC096), totaling approximately one mile. Alternatives 1, 3, and 4 would not affect any spotted owl PACs, since none of the ML 1 roads are proposed for reopening to motorized use.

Table 3.03-59. Miles of Reopened ML 1 Roads within PACs by Spotted Owl PAC Number and Road Number

PAC Number	ML 1 Road Number	Alt 1, 3, 4	Alt 2	Alt 5	Alt 6	Alt 7
NV007	H20-3-5-2-3	0	0	0.1	0	0
NV011	H20-8-5	0	0	0.37	0	0
NV060	H613-8	0	0	0.1	0	0
NV064	H20-2	0	0	0.3	0	0
PC031	N33-6	0	0	1.0	0	0
PC031	N96-12c	0	0	0.7	0	0
PC091	H38	0	0	0.1	0	0
PC096	ARM-13	0	0.9	0.9	1.3	0.9
PC114	H45-2	0	0	0.5	0	0
SI019	N25-18-1	0	0	0.6	0	0
SI029	N39-5	0	0	0.1	0	0
SI032	N27-3	0	0	0.2	0	0
SI033	N39-5	0	0	1.2	0	0
SI033	N39-5-3	0	0	0.1	0	0
	Totals	**0**	**0.9**	**6.1**	**1.3**	**0.9**

Effects to Individual PACs from Route Additions and Reopened ML 1 Roads. The routes proposed to be added to the NFTS and the reopened ML 1 roads (converted from closed to open) contribute a certain amount of disturbance to the activity center on which each PAC is based. Disturbance could result in flushing from nests, roosts, or perches, in alarm responses, and in increased stress hormone levels in individual spotted owls. In the absence of further research, it is assumed that motorized use

along all routes within 400 meters (0.25 mile) of activity centers would result in some disturbance to nesting owls. Based on that assumption, approximately 2-12% of activity centers would receive some disturbance from routes added to the NFTS and/or routes that would be reopened. Without further research, this analysis assumes that effects within 60 meters (approximately 60 meters) of an activity center will result in negative effects to reproduction over the short term. Therefore, if all the routes proposed to be added to the NFTS or proposed to be reopened are further than 400 meters from the activity center on which a given PAC is based, it is assumed that the routes under this alternative in that PAC would contribute a low level of disturbance to the owls at that activity center. If any of the routes proposed to be added or reopened are between 60 and 400 meters from the activity center on which the PAC is based, it is generally assumed that the routes in that PAC would contribute a moderate level of disturbance to the owls at that activity center. Within certain PACs meeting that criterion, the contribution to disturbance was rated as low for the reasons given below. If any of the routes proposed to be added or reopened are within 60 meters of the activity center, it is assumed that the routes under this alternative in that PAC would contribute a high level of disturbance to the owls at that activity center.

For each of the proposed route additions and reopened ML 1 roads, the relative “LEVEL OF CONTRIBUTION TO DISTURBANCE” to each PACs “activity center” and supporting rationale is shown in Table 3.03-60.

Table 3.03-60 Level of Contribution to Disturbance to Spotted Owl by Specific PAC for Route Additions and Reopened ML 1 Roads

PAC Number	Route	Route Addition	Reopened ML 1 Road	Length (miles)	Alternatives	Level of Contribution to Disturbance	Rationale
PC116	ARM-2	X		0.3	Alts 2, 5, 6, 7	Low	Proposed ATV trail located >400 meters (0.54 miles) from Activity Center, Owls last observed in 2007
PC138	ARM-90	X		0.5	Alts 2, 5, 7	Moderate	Activity Center (2002 pair + fledgling) located <400 meters (0.1 mi) from north end of route ARM-90. 2007 surveys showed pair detection ~ ½ mile north of proposed route.
SI015	YRN-M3b	X		0.3	Alts 2, 5, 7	Low	Proposed motorcycle route addition located >400 meters (0.5 mi) east of 1991 Activity Center (pair detection). No recent surveys. Route parallels eastern boundary of the PAC near the ridge and noise would carry across the canyon where owl detection located. However, vegetation is dense and AC is >400 meters away.
SI019	H25-18	X		0.26 mi	Alt 5	Moderate	Proposed trail located along southwest boundary of PAC, 0.2 mi south of 2007 AC, 2 fledglings in 2007.
SI019	N25-18-1		X		Alt 5	Low	2007 surveys indicated Activity Center (adult + 2 fledglings) located >400 meters (at 0.6 miles) south of southern end of route. Historic 1989 Activity Center <60 meters of route.
SI029	N39-5		X	1.2	Alt 5	High	Route bisects PAC at lower 1/3 and then follows eastern PAC boundary. Majority of route located less than 60 meters from the Activity Center.
SI030	D_49-27_a	X		0.02	Alt 2, 5, 6	Low	Short route (0.02 mi) off of existing NFTS road, located 0.2 mi. west of Activity Center (single male roost site), no documented reproduction.
SI032	N27-3		X	0.2	Alt 5	Low	Route located along western PAC boundary, >400 meters away from Activity Center (Activity Center 0.3 mi from route). Owls last detected in 2007.
SI033	N39-5		X	1.2	Alt 5	Moderate	Route (1 mi) surrounds Activity Center along 3 sides and is less than 400 meters away, with risk of moderate disturbance due to length of route and proximity to Activity Center. Also, increases fragmentation to PAC.

PAC Number	Route	Route Addition	Reopened ML 1 Road	Length (miles)	Alternatives	Level of Contribution to Disturbance	Rationale
SI033	N39-5-3		X	0.1	Alt 5	Low	Short route segment located at southwest edge of PAC is >400 meters from Activity Center.
SI050	YRN-M2	X		0.4 (0.1 mi. within PAC)	Alt 2 & 5	Moderate	Proposed motorcycle trail is located <400 meters (0.2 mi) west of known owl observation. Single male detected in 1990, no recent survey data. Unknown reproductive status and unknown nest location. Route parallels nearly entire western boundary of PAC
SI060	YRN-2	X		0.93	Alt 2, 5, 6, 7	Moderate	~1 mile proposed route located 0.23 miles from known Activity Center, last known reproduction in 1992, surveys conducted in 2008 resulted in finding no owls.
NV003	D-20-12_C	X		0.02	Alt 6	Low	Short route (.02 mi) located >1 mi away from Activity Center and connects 2 existing NFTS roads, nest with young found in 2004.
NV007	H20-3-5-2-3		X	0.1	Alt 5	Moderate	Route located <400 meters (0.2 mi north) from nearest known owl detection
NV009	D_14_e	X		<0.01	Alt 6	Low	Short route (<0.01 mi) off of existing NFTS, located 0.34 mi from known Activity Center.
NV009	D_18-14e	X		0.02	Alt 6	Low	Short route (0.02 mi) off of existing NFTS, 0.7 mi from known Activity Center, successful reproduction documented in 2008
NV010	D_CA-20_a	X		0.02	Alt 6	Low	Short route (0.02 mi) located 0.6 mi. south of Activity Center.
NV011	H20-8-5		X	0.3	Alt 5	Low	Route >400 meters south of Activity Center, however route bisects PAC from one edge of PAC to opposite edge of PAC.
NV024	D_20-13	X		0.01	Alt 6	Low	Short route (0.01 mi) off of existing NFTS road, located >400 meters (0.7 mi north) of AC.
NV034	H29-11	X		0.1	Alt 5	Low	Route located 0.45 mi east of private land Activity Center, owls last observed in 2004
NV057	D_20-12_g	X		0.01	Alt 6	Low	Short route (0.01 mi) located >400 meters of activity center (route is 0.5 mile south of known Activity Center).

PAC Number	Route	Route Addition	Reopened ML 1 Road	Length (miles)	Alternatives	Level of Contribution to Disturbance	Rationale
NV060	H613-8		X	0.06	Alt 5	Low	Over 0.8 mile to south of Activity Center, would not likely increase disturbance, short segment within PAC (0.06 mi).
NV062	D_843-9_a	X		0.002	Alt 2, 5, 6	Low	Short route (0.002 mi) off of existing system road is located 0.4 mi east of Activity Center.
NV064	H20-2		X	0.3	Alt 5	Low	Route > 400 meters (0.5 mile away) from 2008 nest site
PC026	D-96-54	X		0.02	Alt 2, 5, 6	Low	Short route (0.02 mi) off of existing NFTS road located 0.8 mi. east of Activity Center.
PC029	D_96_b	X		0.02	Alt 6	Low	Short route (0.02 mi) located 0.5 mi south of 1992 nest grove (pair w/ fledgling) & 0.7 mi from 1999 nest cavity location).
PC031	N33-6		X	0.1	Alt 5	Low	Route located >400 meters (0.9 mi) from 2007 Activity Center (family group)
PC031	N96-12c		X	0.7	Alt 5	Low	North end of route proposed for reopening located >400 meters (0.36 miles) south of 2007 Activity Center (family group).
PC044	D_P-6001_b	X		0.05	Alt 2, 5, 6	Low	Short route (0.05 mi) comes off of existing NFTS road, located 0.5 miles from Activity Center.
PC091	H38		X	0.1	Alt 5	Low	Route follows southeast edge of PAC boundary, located 0.9 mi from 1991 Activity Center.
PC096	ARM-13		X	0.7	Alt 5, 6, 7	Low	ARM-13 located in portion of PAC that burned in Government Fire of 2008. 2007 pair location is 0.06 mi from route within burned area. Habitat where route and 2007 pair location is no longer suitable.
PC114	H45-2		X	0.4	Alt 5	Moderate	Proposed route (0.4 mi) located at 400 meters away from 1994 Activity Center. Route bisects center of PAC and lies directly parallel to 2 existing system routes. Would increase disturbance in the PAC and increase habitat fragmentation.
YU001	D_Y-125_a	X		0.05	Alt 2, 5, 6	Low	Short route (0.05 mi) comes off of existing NFTS road, located 0.4 mile from Activity Center

Summary of Individual PAC Analysis

Table 3.03-61 summarizes the potential risk of increased disturbance to spotted owl activity centers (181 Total TNF PACS), as a result of motorized route additions and reopened ML 1 roads. Alternatives 3 and 4 would not affect increase disturbance to spotted owls within any PAC, since no routes or reopening of ML 1 road would be proposed. Alternatives 7, 2, 6, and 5 would potentially increase disturbance to spotted owl activity centers within PACs, in increasing order, ranging from approximately 3% to 13%. Only Alternative 5 would add routes or reopen ML 1 roads that would result in a "high" risk of increased disturbance where a route would be added or reopened ML 1 road would occur within 60 meters (200 feet) of a spotted owl activity center. The remaining action alternatives would result in either a low or moderate risk of increased disturbance from the addition of routes or reopening ML 1 roads. In both the low and moderate risk categories, Alternative 5 would result in the most number of PACs (22 of 181 or 12%) potentially affected by increased disturbance (7 of 181 PACs or 3% @moderate risk, 15 of 181 PACs or 8% PACs at low risk), followed by Alternative 6 (1 of 181 PACs or <1% @moderate risk, 14 of 181 PACs or 8% @low risk), Alternative 2 (3 of 181 PACs or 2% @moderate risk, 7 of 181 PACs or 4% @low risk), and Alternative 7 (2 of 181 PACs or 1% @ moderate risk, 3 of 181 PACs or 2% @ low risk).

Table 3.03-61. California spotted owl: summary of risk of increased disturbance to Activity Centers within PACs

		Alt 1		Alt 2		Alt 3, 4		Alt 5		Alt 6		Alt 7	
Risk of increased disturbance effects	**Rationale**	**No. PACs**	**% of Total**	**No. PACs**	**% of Total**	**No. PACs**	**% of Total**	**No. PACs**	**% of Total**	**No. PACs**	**% of Total**	**No. PACs**	**% of Total**
HIGH	Route added or reopened ML 1 road within 60 meters (200 feet) of activity center	0	0	0	0%	0	0%	1	0.6%	0	0%	0	0%
MOD	Routes added or reopened ML 1 roads occurring less than 400 meters (1/4 mi) and more than 200 feet from activity center, and no intervening topography	0	0	3	1.7%	0	0%	7	2.8%	1	0.6%	2	1.1%
LOW	All routes added or reopened ML 1 roads greater than 400 meters from activity center.	0	0	7	3.9%	0	0	15	8.3%	14	7.7%	3	1.7%
HIGH	PACs where cross country travel continued, including on unauthorized routes	175	96.7%	0	0%	0	0%	0	0%	0	0%	0	0%
DECREASE	Total PACs where a decrease in disturbance would occur from the prohibition of cross country travel, including on unauthorized routes	0	0	175	96.7%	175	96.7%	175	96.7%	175	96.7%	175	96.7%
Total PACs in which routes are added and/or being converted from closed ML 1 roads to open		**0**	**0**	**10**	**5.5%**	**0**	**0%**	**23**	**12.7%**	**15**	**8.3%**	**5**	**2.8%**
Total PACs Where cross country travel continued		**175**	**96.7%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**
Total PACs with decreased disturbance from the prohibition of cross country travel, including on unauthorized routes		**0**	**0**	**175**	**96.7%**	**175**	**96.7%**	**175**	**96.7%**	**175**	**96.7%**	**175**	**96.7%**

Home Range Core Areas (HRCAs)

Cross Country Travel: Spotted owl HRCAs would considerably benefit from all the action alternatives where 98,806 acres within HRCAs would be banned from motorized cross country travel, and would reduce disturbance to foraging spotted owls from motorized activities associated with motorized cross country travel. Under Alternative 1, cross country travel on 98,806 acres within HRCAs would continue where disturbance to spotted owl foraging could occur, potentially altering behavior, reducing fitness, and potentially affecting reproductive success.

Additions to the NFTS: Table 3.03-62 displays the miles of motorized route additions and the number and percentage of Tahoe NF HRCAs affected by alternative. Clearly Alternative 1 represents a worst case scenario for spotted owls when looking at the motorized route effects at the HRCA scale. Alternative 1 would potentially affect 164 out of 181 HRCAs (91%) from motorized use on approximately 282 miles of existing unauthorized routes. The No Action Alternative definitively could result in significant direct and indirect disturbance to foraging spotted owls from continued use of unauthorized routes.

All the remaining action alternatives would significantly reduce the impacts of existing unauthorized routes. Alternative 3 would not affect any HRCAs since no routes within HRCAs are proposed, and therefore no effects to foraging owls would occur.

The remaining action alternatives would directly and indirectly affect between 5 and 23% spotted owl HRCAs, from 6 to 15 miles of motorized route additions. Alternative 6 would affect the greatest number and percentage of HRCAs. However, Alternative 5 would result in the next greatest number of miles of motorized routes within HRCAs, followed by Alternatives 2, 6, 7, 4, and 3, in descending order.

Table 3.03-63, which displays the motorized miles added by HRCAs and route ID numbers, helps to disclose the subtle differences between the action alternatives. When looking at the total miles of routes added, Alternative 5 results in adding the greatest number of motorized miles that would potentially affect foraging owls within 34 HRCAs, where a total of 15 miles would be added (14 miles added for general motorized opportunities, 1 mile added to access 34 dispersed recreation sites).

Alternative 2 would add the next greatest motorized miles within 31 HRCAs affecting foraging owls, where a total of 13 miles would be added (12 miles general use, 1 mile for dispersed sites).

Under Alternative 6, the majority of motorized route additions which intersect HRCAs are routes that access dispersed sites (25 out of 41 HRCAs intersected) for a total of about 1 mile. Each of the routes accessing these dispersed recreation areas are short spurs that add up to a total over 1 mile. Alternative 6 would affect 16 HRCAs where increased disturbance to foraging owls would occur from adding about 10 miles for general motorized use.

Table 3.03-62. Miles of Motorized Route Additions to the NFTS within Tahoe NF Spotted Owl HRCAs

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Miles of motorized route additions	281.7	13.3	0	6.2	14.8	11.0	7.6
Number of HRCAs Intersected by motorized route additions to the NFTS	164	31	0	15	34	41	9
Percent of HRCAs Affected by motorized route additions (Total Tahoe NF HRCAs = 181)	91%	17%	0%	8%	19%	23%	5%

*Alternative 1 includes existing unauthorized routes with the continuance of cross country travel.

Table 3.03-63. Miles of Motorized Route Additions by HRCAs and Route ID

HRCA ID Number	Route ID	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
General Routes								
Numerous HRCA s	Unauthorized Routes	281.7	0	0	0	0	0	0
NV012	YRS-SF4	0	0	0	0	0.82	0	0
NV012	H20-16-2-7	0	0	0	0	0.21	0	0
NV015	YRS-B10	0	0.26	0	0	0.26	0	0
NV017	YRS-SF6	0	0	0	0	0.26	0	0
NV017	H29-11	0	0	0	0	0.09	0	0
NV017	YRS-SF6	0	0.32	0	0.32	0.32	0.32	0.32
NV017	YRS-SF6b	0	0.86	0	0.86	0.86		0.86
NV017	YRS-66	0	0.22	0	0	0.22	0.22	0
NV019	YRS-SF4	0	0.82	0	0	0.82	0.82	0
NV019	YRS-SF5	0	0.39	0	0	0.39	0.39	0.39
NV024	YRS-B5	0	2.46	0	0	2.46	2.46	0
NV024	YRS-B10	0	0.26	0	0	0.26	0	0
NV034	YRS-SF5	0	1.82	0	1.82	1.82	1.82	1.82
PC020	ARM-2	0	0.32	0	0	0.30	0.32	0.30
PC082	ARM-3r	0	2.71	0	2.71	2.71	2.19	2.71
SI015	YRN-M3b	0	0.81	0	0	0.81	0	0.81
SI029	491-3-2_p	0	0	0	0	0.05	0.05	0
SI030	H34-8-3	0	0	0	0	0.02	0	0
SI033	491-3-2_p	0	0	0	0	0.05	0.05	0
SI049	YRN-M3b	0	0.20	0	0	0.20	0.20	0
SI050	YRN-M2	0	0.46	0	0	0.46	0	0
SI052	YRN-001	0	0.06	0	0	0.06	0.06	0
SI060	YRN-2	0	0.06	0	0	0.01	0.06	0.06
SI093	YRM-M4	0	0.35	0	0	0.345	0.35	0.35
Subtotal for General Routes		**281.7**	**12.4**	**0**	**5.7**	**13.9**	**9.8**	**7.6**

HRCA ID Number	Route ID	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Routes that Access Dispersed Recreation Sites								
NV057	D_20-9_b	0	0	0	0	0	0.02	0
NV064	D_20-3_b	0	0	0	0	0	0.03	0
NV070	D_41-20-10_a	0	0.02	0	0	0.02	0.02	0
NV070	D_41-20-10_b	0	0.02	0	0	0.02	0.02	0
PC027	D_96-54	0	0.02	0	0	0.03	0.02	0
PC028	D_P88_b	0	<0.01	0	<0.01	<0.01	<0.01	0
PC029	D_96_b	0	0	0	0	0	0.02	0
PC088	D_P88_b	0	<0.01	0	<0.01	<0.01	<0.01	0
PC094	D_96_b	0	0	0			0.03	0
PC096	D_P88_c	0	0.03	0	0.03	0.03	0.03	0
PC097	D_P88_b	0	<0.01	0	<0.01	<0.01	<0.01	0
PC118	D_96_b	0	0	0	0	0	0.03	0
PC0125	D_96_b	0	0	0	0	0	0.03	0
PC141	D_96-54	0	0.02	0	0	0.02	0.02	0
SI001	D_S-300_a	0	0.08	0	0.084	0.08	0.08	0
SI001	D_S-300_b	0	0.01	0	0.012	0.01	0.01	0
SI016	D_11E02_a	0	0.04	0	0	0.04	0.04	0
SI016	D_11E02_b	0	0.08	0	0	0.08	0.08	0
SI021	D_S-514_A	0	0.04	0	0	0.04	0.04	0
SI026	D_S-295_c	0	0.01	0	0.009	0.01	0.01	0
SI026	D_S300_b	0	0.10	0	0.100	0.10	0.10	0
SI031	D_Y-122_a	0	0.02	0	0.022	0.02	0.02	0
SI040	D_9-15_a	0	0	0	0	0	<0.01	0
SI040	D_9-15_b	0	0	0	0	0	0.04	0
SI041	D_5688	0	0	0	0	0	<0.01	0
SI052	D_11E20	0	0	0	0	0	0.01	0
SI056	D_11E02a	0	0.06	0	0	0.06	0.06	0
SI056	D_11E02b	0	0.08	0	0	0.03	0.08	0
SI064	D_S-301_a	0	0.11	0	0.11	0.11	0.11	0
SI089	D_34_b	0	0.01	0	0.008	0.008	0.008	0
SI089	D_34_c	0	0.02	0	0.021	0.021	0.021	0
SI095	D_7-30_b	0		0	0	0	0.016	0
YU018	D_Y-122_a	0	0.02	0	0.022	0.022	0.022	0
YU023	D_Y-122_a	0	<0.01	0	0.003	0.003	0.003	0
YU023	D_Y-122_b	0	0.03	0	0.033	0.033	0.033	0
YU023	D_Y-122_c	0	0.00	0	0.040	0.040	0.040	0
YU023	D_Y-125_a	0	0.054	0	0	0.054	0.054	0

HRCA ID Number	Route ID	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
NV003	D_20-12-1a	0	0	0	0	0	0.011	0
NV003	D_20-12-1b	0	0	0	0	0	0.011	0
NV003	D_20-12_b	0	0	0	0	0	0.012	0
NV003	D_20-12_D	0	0	0	0	0	0.009	0
NV003	D_20-9_b	0	0	0	0	0	0.018	0
NV009	D_18-14_e	0	0	0	0	0	0.010	0
NV010	D_20-9_b	0	0	0	0	0	0.018	0
Subtotal for Routes to Dispersed Sites		**0**	**0.93**	**0**	**0.49**	**0.93**	**1.23**	**0**
Total All Routes		**281.7**	**13.3**	**0**	**6.2**	**14.8**	**11.0**	**7.6**

Changes to the NFTS-Reopened ML 1 Roads: The miles of reopened ML 1 roads are shown in Table 3.03-64 by HRCA ID Number and ML 1 Road Number for each of the alternatives. Alternative 5 would potentially adversely affect the greatest number of spotted owl HRCAs (19 of 181 or 10% of Tahoe NF HRCAs) from approximately 11 miles of reopened ML 1 roads where disturbance to foraging spotted owls has the potential to alter behavior, disrupt foraging, and potential affect reproductive success. Alternatives 6, 2, and 7 would also affect HRCAs used for foraging, from reopened ML 1 roads, but to a much lesser extent than Alternative 5. Alternative 6 would reopen about 1.5 miles of ML 1 roads within HRCAs, followed next by Alternative 2 and 7 with 1 mile and 0.1 mile of ML 1 roads reopened, respectively. Alternatives 1, 3, and 4 would not affect any spotted owl HRCAs used for foraging, since none of the ML 1 roads are proposed for reopening to motorized use under these alternatives.

Table 3.03-64. Miles of Reopened ML 1 Roads within HRCAs by HRCA ID Number and Road Number

HRCA ID Number	ML 1 Road Number	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
NV006	H20-2	0	0	0	0	1.2	0	0
NV006	H20-2-1	0	0	0	0	0.1	0	0
NV010	H20-8-5	0	0	0	0	0.4	0	0
NV015	YRS-B12	0	0.1	0	0	0.1	0.1	0
NV019	H20-16-2-7	0	0	0	0	0.2	0	0
NV024	YRS-B12	0	0.1		0.1	0.1	0.1	0.1
NV064	H20-2	0	0	0	0	0.9	0	0
NV064	H20-2-1	0	0	0	0	0.1	0	0
PC025	N44-22-8-1	0	0	0	0	<0.1	0	0
PC031	N33-8	0	0	0	0	0.3	0	0
PC031	N96-12c	0	0	0	0	0.4	0	0
PC091	H38	0	0	0	0	0.2	0	0
PC096	ARM-13	0	0	0	0	0	0.2	0
SI014	N35-10	0	0	0	0	0.6	0	0
SI014	N25-15-2	0	0	0	0	0.2	0	0
SI019	N25-18-1	0	0	0	0	0.5	0	0
SI019	N27-9	0	0	0	0	0.1	0	0

HRCA ID Number	ML 1 Road Number	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
SI020	N25-19-1	0	0	0	0	0.2	0	0
SI024	N25-2	0	0	0	0	0.1	0	0
SI024	N25-4-2	0	0	0	0	0.4	0	0
SI024	N25-4-2-2	0	0	0	0	<0.1	0	0
SI029	N39-5	0	0	0	0	0.4	0	0
SI029	N39-7	0	0	0	0	0.1	0	0
SI029	491-3_p	0	0	0	0	0.2	0.2	0
SI032	N27-3	0	0	0	0	0.5	0	0
SI032	N27-4	0	0	0	0	<0.1	0	0
SI032	N27-5	0	0	0	0	<0.1		0
SI033	N39-5	0	0	0	0	1.2		0
SI033	N39-5-1	0	0	0	0	0.2		0
SI033	N39-5-2	0	0	0	0	0.4		0
SI033	N39-5-4	0	0	0	0	0.2		0
SI033	N39-6	0	0	0	0	<0.1		0
SI033	N39-7	0	0	0	0	<0.1		0
SI033	491-3_p	0	0	0	0	0.2	0.2	0
SI064	H301-6	0	0	0	0	0.7		0
SI095	SV-005	0	0.6	0	0	0.6	0.6	0
	Total Miles	**0**	**0.8**	**0**	**0**	**10.9**	**1.5**	**0.1**

Cumulative Effects to Nesting Spotted Owl

Cumulative Effects Boundary (space and time)

The cumulative density of motorized routes increases within the larger cumulative effects analysis area that includes private lands within the Forest. The cumulative effects geographic boundary for the California spotted owls includes all spotted owl Protected Activity Centers and their associated Activity Centers (nest site or nest stand) within the boundary of the Tahoe NF. This is an appropriate scale for determining cumulative effects to spotted owls, since the Tahoe NF boundary is sufficiently large which includes 181 spotted owl territories and their home ranges across the Forest. In addition, the Tahoe NF boundary encompasses an array of spotted owl habitat conditions from low elevation to high elevation, including several vegetation types from westside mixed conifer, ponderosa pine, true fir, and eastside mixed conifer. The cumulative effects timeframe is the same as other species: 20 years out into the future and approximately 20 years or more into the past.

General Cumulative Effects of Past and Future Vegetation Management Projects and Wildfires

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on Forest Service system lands and private lands within the Tahoe NF boundary. Some, but not all, of these activities will contribute to impacts to the California spotted owl within the cumulative effects boundary. In its Notice of Finding on a petition to list the

California spotted owl, the U.S. Fish and Wildlife Service indicated that loss of habitat to stand replacing wildfires and habitat modification for fuels reduction were the primary risk factors to California spotted owls occurring on NFS lands (USDI Fish and Wildlife Service 2006).

Between 1994 and 2008, wildfires resulted in burning 7,312 acres of spotted owl habitat (2,643 PAC acres; 4,669 HRCA acres outside PACs) affecting 24 spotted owl territories.

High and moderate severity burn areas generally resulted in a loss of habitat or a reduction in habitat quality. For example, within the 2001 Star Fire at least one spotted owl territory PAC was severely burned and the habitat was rendered unsuitable for nesting. Other spotted owl territories have experienced low severity burns and resulted in maintaining suitable nesting habitat conditions.

Since 1990, more than 130,000 acres of vegetation management activities have occurred on the Tahoe NF. Some, but not all have resulted in impacts to spotted owl habitats. Between 2001 and 2008, about 17,000 acres of forest vegetation and fuels thinning and mastication projects were completed, which were designed to reduce the risk of additional habitat loss to wildfires. These treatments generally do not result in habitat removal, but may result in habitat quality changes. Between 1960 and present, private land harvest within the boundaries of the Tahoe NF has resulted in over 87,000 acres of vegetation treatments including clearcuts, sanitation, shelterwood, and thinning. Much of the private land harvest has resulted in the loss or reduction in spotted owl habitat. These wildfires and vegetation treatment projects have resulted in a reduction in the amount and quality of spotted owl habitat on the Tahoe NF since 1960.

Thinning projects designed to reduce hazardous fuels will continue to be the primary activity affecting spotted owl habitat on the Tahoe (see Appendix H, Reasonably Foreseeable Projects and Cumulative Effects). Although these treatments may reduce habitat quality (i.e. nesting habitat reduced to foraging habitat), it expected that suitable habitat will be maintained, and it is anticipated that these treatments will reduce the amount spotted owl habitat potentially lost from future stand replacing wildfires (USDA Forest Service 2004). The California Department of Forestry and Fire Protection currently lists approximately 12,000 acres of private land within the Tahoe NF administrative boundary for which timber harvest plans have been submitted. Timber harvest on private lands is generally more intensive and does not typically maintain habitat in a suitable condition for spotted owls.

Assessing Cumulative Effects from Motorized Route Additions and Reopened ML 1 Roads

Cumulative effects to breeding spotted owls are assessed by determining the sum total miles of all motorized routes (existing, additions, and reopened) and non-motorized routes on the Tahoe NF including NFS lands and non-NFS lands (private) within spotted owl PACs and within 0.25 mile radius of spotted owl Activity Centers. For each alternative, cumulative effects are calculated by adding the total miles of proposed motorized route additions and reopened ML 1 roads (direct and indirect impacts) to the existing motorized routes (NFS lands and non-NFS lands) and non-motorized routes, then subtracting any routes that are either classified as “unauthorized routes” or “decommissioned.” Unauthorized motorized routes and decommissioned routes are subtracted from the total of all motorized routes because these routes would not receive motorized use, and therefore would not contribute to noise disturbance to breeding spotted owls. Although non-motorized routes are likely to have lesser impacts to spotted owls compared

to motorized routes, non-motorized routes are included in this analysis because non-motorized routes potentially may pose some level of disturbance to nesting owls depending on the level and duration of use during the breeding season.

Nest Site or Nest Stand (Within 0.25 mile Radius of Activity Centers)

When analyzing the cumulative route effects within the 0.25 mile radius circle of spotted owl activity centers (nest site or nest stand), it can be noted that a similar theme emerges as compared to the cumulative effects within spotted owl PACs. Alternative 1 has the most cumulative miles (124 miles) of motorized and non-motorized routes compared to the rest of the alternatives (range 83 to 86 miles) (Table 3.03-65). Of the action alternatives, Alternative 5 has the next highest cumulative route miles of 86 miles, where 0.2 miles are the result of motorized route additions and 2.5 miles are the result of reopened ML 1 roads. The remaining action alternatives each approximately have about 83 cumulative route miles within the 0.25 mile radius analysis circle. However, Alternatives 2, 6, and 7 would result in adding from 0.2 to 0.4 miles of motorized routes within the 0.25 mile radius circle. Alternatives 3 and 4 would not result in adding or reopening motorized routed, and therefore would have no effect on nesting spotted owls within 0.25 miles of the activity centers.

The potential for cumulative route effects to an owl nest site or nest grove site is very low for all the action alternatives; therefore, it can be concluded that implementing any of the action alternatives would have no or only minimal additional cumulative impact to nesting spotted owls across the Tahoe NF compared to Alternative 1. Alternative 1 clearly poses the greatest cumulative risk to nesting spotted owls by allowing continued cross country motorized travel, including motorized travel on approximately 41 miles of existing unauthorized motorized routes, followed by Alternative 5, which proposes to increase motorized route miles by about 3 miles within 0.25 miles of spotted owl activity centers, which may disturb, disrupt and cause nest failure.

All of the action alternatives would prohibit motorized cross country travel on 18,535 acres within a 0.25 mile radius of spotted owl activity centers (nest site or nest stand), where the potential for direct disturbance and habitat fragmentation within close proximity to nesting owls would be reduced.

Table 3.03-65. Cumulative Miles of Routes within a .25 Mile Radius Circle of Spotted Owl Activity Centers (Nest/Roost Sites)

Route Miles	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Motorized Route additions (negative impact)[1]	41.1	0.2	0	0	0.2	0.4	0.2
Reopened ML 1 roads (negative impact)	0	0	0	0	2.5	0	0
Unauthorized routes where cross country travel would be prohibited (positive impact)	0	40.9	41.1	41.1	38.4	40.7	40.9
Cumulative effects of past, present, and proposed actions							
Existing motorized routes - NFS lands (negative impact)	62.4	62.4	62.4	62.4	62.4	62.4	62.4
Existing routes on non-NFS lands (private) (negative impact)	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Existing non-motorized routes (negative impact)	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Existing Closed routes (positive impact)	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Decommissioned routes (positive impact)	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Net Cumulative Effect[2]							
Miles of All Motorized Routes (overall negative impacts)[2]	124.3	83.4	83.2	83.2	85.9	83.6	83.4

[1] Alternative 1 includes existing unauthorized routes associated with the continuance of cross country travel.

[2] Net Cumulative Impact = Sum Total of Impacts both positive and negative

Cumulative Effects to Nesting Owls within Protected Activity Centers

When considering the cumulative effects of all motorized and non-motorized routes on both NFS lands and non-NFS lands, Alternative 1 has the greatest cumulative miles of routes (294 miles) within spotted owl PACs on the Tahoe NF, and therefore poses the greatest overall potential risk and cumulative impacts to breeding spotted owls on the Tahoe NF (Table 3.03-66) (Figure 3.03-4). Alternative 1 exceeds all the action alternatives in the number of cumulative route miles by approximately 80-100 miles. Given the magnitude of potential effects upon spotted owl nest sites and habitat, and considering the projections for future increases in recreation uses and OHV activity, Alternative 1 may, over time, contribute to cumulative effects upon spotted owl distribution and abundance, and ultimately may affect population numbers. Because Alternative 1 does not prohibit motorized cross country travel on 50,712 acres of spotted owl PACs, it is expected that cumulative effects to spotted owl PACs would increase due to unmanaged cross country travel in the future.

Alternative 5 would have the next highest cumulative impacts to breeding spotted owls, resulting in 214 miles within spotted owl PACs. Alternatives 2, 6, and 7 would have similar route miles and slightly fewer miles than Alternative 5. Alternatives 3 and 4 do not add to existing cumulative impacts, since no motorized routes within PACs are proposed to be added to the NFTS. All the action alternatives would benefit from the ban of motorized cross country travel on total of 52,790 acres within spotted owl PACs (2,078 existing prohibitions, 50,712 proposed prohibitions).

Table 3.03-66. Cumulative Miles of Motorized and Non-motorized Routes within Spotted Owl Protected Activity Centers

Cumulative Miles	Alt 1[1]	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Motorized Route Additions (negative impact)[1]	98.1	3.2	0	0	12.5	2.5	2.3
Reopened ML 1 Roads (negative impact)	0	0.9	0	0	6.1	1.3	0.9
Cross Country Travel Prohibition on Unauthorized routes (positive impact)	5.7	101.0	103.8	103.8	95.5	100.5	101.3
Cumulative effects of past, present, and proposed actions							
Existing Routes on NFS lands (negative)	161.4	161.4	161.4	161.4	161.4	161.4	161.4
Existing Routes on non NFS lands (private) (negative)	12.8	12.8	12.8	12.8	12.8	12.8	12.8
Non-motorized routes (negative)	21.2	21.2	21.2	21.2	21.2	21.2	21.2
Decommissioned Routes (positive)	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Net Cumulative Effect[2]							
Total Miles (overall cumulative effect)	**293.5**	**199.5**	**195.4**	**195.4**	**214.0**	**199.2**	**198.6**

[1]Alternative 1 includes existing unauthorized motorized routes associated with the continuance of cross country travel.

[2] Net Cumulative Impact = Sum Total of Impacts both positive and negative

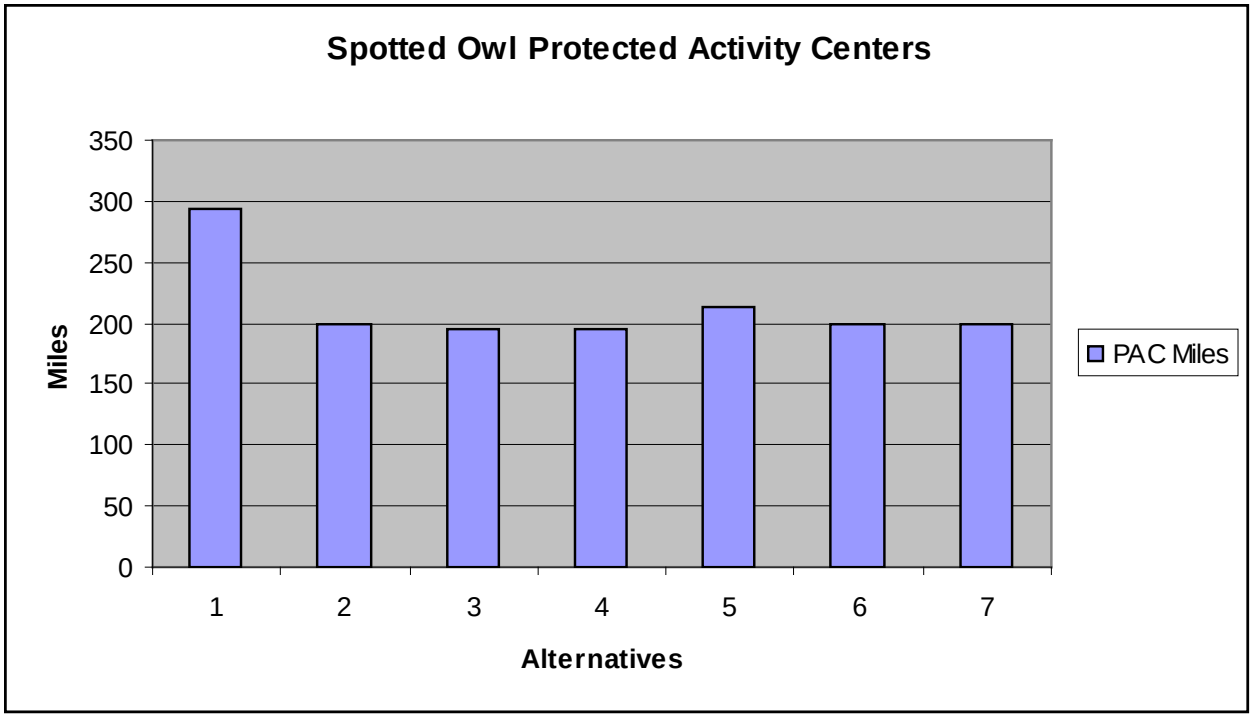

Figure 3.03-4. Cumulative Motorized Miles in Spotted Owl PACs

Cumulative Effects to Foraging Spotted Owls within Home Range Core Areas

Under Alternative 1, the cumulative effects of all motorized and non-motorized routes on both NFS lands and non-NFS lands, has the greatest cumulative miles of routes 761 miles) within spotted owl HRCAs on the Tahoe NF, and therefore poses the greatest overall potential risk and cumulative impacts to foraging

spotted owls on the Tahoe NF (Table 3.03-67) (Figure 3.03-5). Alternative 1 exceeds all the action alternatives in the number of cumulative route miles by approximately 256 to 282 miles. Given the large extent of potential adverse direct and indirect effects to spotted owls and their foraging habitat within HRCAs, and considering the estimates for future increases in recreation uses and OHV activity, Alternative 1 may, over time, contribute to cumulative adverse effects upon spotted owl distribution and abundance, and may ultimately result in downward population numbers. Because Alternative 1 does not prohibit motorized cross country travel on 98,806 acres within spotted owl HRCAs on the Tahoe NF, it is expected that adverse cumulative effects to spotted owl HRCAs would increase due to unmanaged cross country travel in the future, and may affect spotted owls ability to forage successfully and thrive.

Alternative 5 would have the next highest cumulative impacts from disturbance and habitat fragmentation to foraging spotted owls, resulting in 505 cumulative miles within spotted owl HRCAs. In descending order, Alternatives 2, 6, 7, 4, and 3 would result in slightly fewer cumulative miles within HRCAs than Alternative 5, ranging from 493 to 479 miles. All the action alternatives would substantially benefit from the ban of motorized cross country travel on total of 104,365 acres within spotted owl HRCAs (5,559 existing prohibitions, 98,806 proposed prohibitions).

Table 3.03-67. Cumulative Miles of Motorized and Non-motorized Routes within Spotted Owl Home Range Core Areas

Cumulative Miles	Alt 1[1]	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Motorized Route Additions (negative impact)[1]	281.7	13.3	0	6.2	14.8	11.0	7.6
Reopened ML 1 Roads (negative impact)	0	0.8	0	0	10.9	1.5	0.1
Cross Country Travel Prohibition on Unauthorized routes (positive impact)	0	267.6	281.7	275.5	256.0	269.2	274.0
Cumulative effects of past, present, and proposed actions							
Existing Routes on NFS lands (negative)	413.5	413.5	413.5	413.5	413.5	413.5	413.5
Existing Routes on non NFS lands (private) (negative)	18.1	18.1	18.1	18.1	18.1	18.1	18.1
Non-motorized routes (negative)	47.5	47.5	47.5	47.5	47.5	47.5	47.5
Decommissioned Routes and Closed ML 1 Roads (positive)	28.3	28.3	28.3	28.3	28.3	28.3	28.3
Net Cumulative Effect[2]							
Total Miles (overall cumulative effect)	**760.8**	**493.2**	**479.1**	**485.3**	**504.8**	**491.6**	**486.8**

[1]Alternative 1 includes existing unauthorized motorized routes associated with the continuance of cross country travel.

[2] Net Cumulative Impact = Sum Total of Impacts both positive and negative

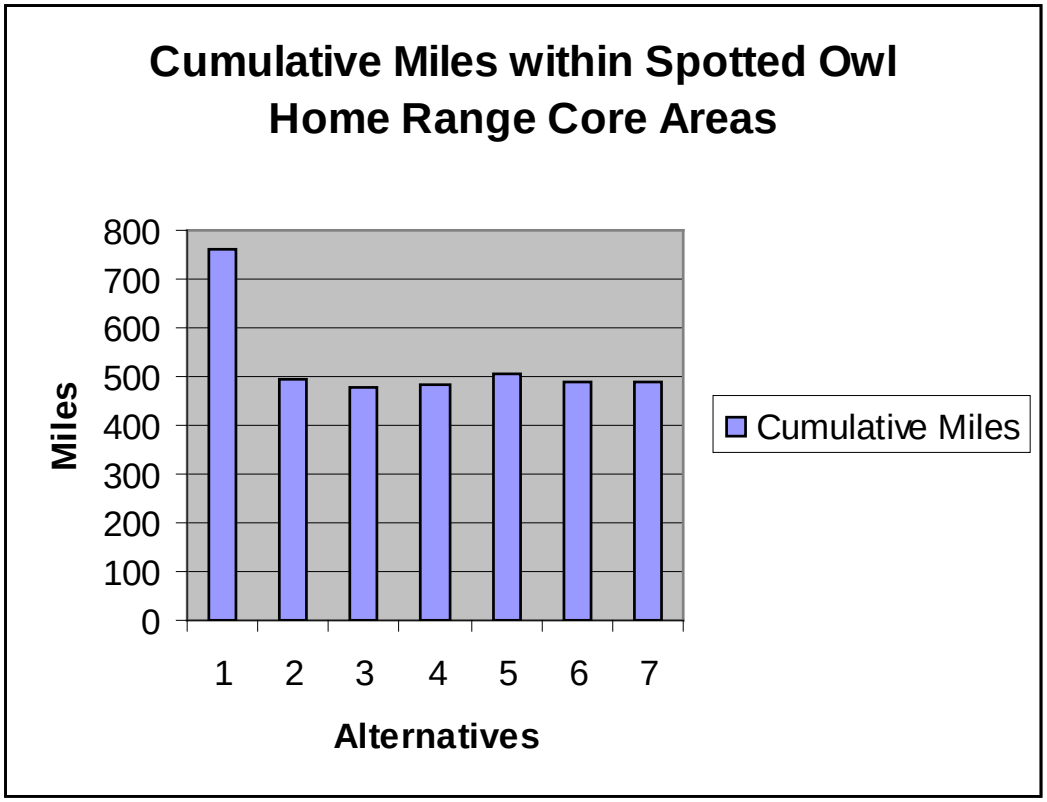

Figure 3.03-5. Cumulative Motorized Miles in Spotted Owl HRCAs

Summary of Cumulative Effects to Nesting and Foraging Spotted Owls from Disturbance at a Specific Site

An analysis of breeding spotted owls on the Tahoe NF at three scales (within 0.25 miles of activity centers, within PACs, and within HRCAs), indicates that cumulative effects are considerably greater in Alternative 1 (No Action) compared to all the other action alternatives. In addition, under Alternative 1, unmanaged cross country motorized travel would continue to occur, and could adversely affect the distribution and abundance of spotted owl populations on the Tahoe NF. Under all of the other alternatives, cross country motorized travel would be prohibited. All the action alternatives affect nesting and foraging spotted owls similarly, where cumulative effects at the forest-wide scale is minimal. When comparing only the action alternatives, Alternative 5 poses slightly greater cumulative effects from the proposed actions, followed by Alternatives 2, 4, 6, 7, 4, and 3 in descending order.

Site-specific cumulative impacts to spotted owls from the action alternatives could adversely affect the distribution and abundance of owls at a local level, particularly where motorized route density is already high, habitat fragmentation has occurred from past timber harvesting, and urban encroachment is a threat. Such is the case in the Burlington Ridge area. The Burlington Ridge area encompasses approximately 24,000 acres and provides habitat either wholly or partially for thirteen spotted owl territories. Spotted owls in this area are densely concentrated and have been subjected to increasing OHV

use in recent years. In addition, the area is in mixed private and federal ownership. Past timber harvest on both private and federal lands has significantly altered spotted owl habitat in the Burlington Ridge area. The Travel Management EIS would generally reduce the effects to spotted owls in the Burlington area by prohibiting cross country travel on approximately 33 to 45 existing unauthorized routes. Routes added to the NFTS under the alternatives include routes accessing dispersed sites to routes used for OHV use and routes for motorcycle use. One route of particular concern (YRS-B5 - Deer Creek Forebay trail) is approximately 4 miles in length and is located in an HRCA and is in an area densely concentrated by spotted owls. Habitat availability in the Burlington Ridge area is a limiting factor since several owl territories overlap. YRS-B5 proposed under Alternatives 4, 5, and 6 would add the most motorized miles potentially increasing noise related disturbance, and could cumulatively affect the long-term productivity and distribution of owls in the vicinity. In addition, the Burlington Area currently has high existing motorized route density, including both existing roads and motorized trails. Use of the Burlington Ridge area is popular with motorcycle users and the close proximity to the town of Nevada City poses a concern to spotted owls from human associated disturbance, since access is easy. Alternative 1 would be the worst case scenario where approximately 45 miles of motorized use would continue on existing unauthorized routes, which equates to approximately 1/3 more routes than the action alternatives. Due to the potential increasing use of the Burlington Ridge area, future cumulative effects under Alternative 1 could be significant.

Spotted Owl Habitat Fragmentation and Edge Effects

Indicators used to Measure Effects

Cross Country Travel: Motorized cross country travel is evaluated for the alternatives to determine the effects on spotted owl habitat fragmentation within PACs and HRCAs.

Zone of Influence within PACs and HRCAs: In addition to determining the habitat fragmentation within CWHR types 4M, 4D, 5M, 5D, and 6, described previously, zones of influence were determined within spotted owl PACs and HRCAs within 200 meters of motorized route additions and reopened ML 1 roads. Three ZOI were analyzed in the DEIS and are available in the project record. However, all effects identified in the 60 m and 100 m ZOI are also identified in the 200 m ZOI and therefore provide little additional information. Thus the analysis presented here is shortened to display only the 200 m ZOI.

Direct and Indirect Effects

Zone of Influence within PACs

Habitat fragmentation and edge effects were described for old forest coniferous associated species within old forest coniferous forest types (CWHR types 4M, 4D, 5M, 5D, and 6) and within Old Forest Emphasis Areas (OFEAs) under the section “Effects Common to All Old Forest Coniferous Associated Species.” Those analyses provided a forest-wide view of how the alternatives affect spotted owl habitat fragmentation within old forest coniferous habitats and OFEAs. This section provides a focused analysis of spotted owl habitat fragmentation and edge effects (including noise disturbance) from motorized routes at the site-specific PAC scale, where known spotted owl nest territories are located.

Spotted owl Protected Activity Centers (PACs) are delineated land allocations (SNFPA 2004), comprised of the best available spotted owl habitat, which are managed specifically for sustaining viable populations of spotted owls. For all spotted owl PACs on the Tahoe NF, the effects of the alternatives are analyzed for the amount of habitat fragmentation and edge effects occurring by considering the Zone of Influence within PACs within 200 meters of motorized additions and reopened ML 1 roads (Table 3.03-68). The 60 meters Zone of Influence represents habitat fragmentation to the spotted owl as it relates to habitat components, such as snag and down log removal along routes for public fuelwood and public safety hazards. Absolute noise disturbance thresholds for California spotted owls have not been established, but the best available science indicates that 100 meters and 200 meters may be important noise disturbance thresholds for spotted owls and other birds of prey (Delaney 1999, Delaney and Grubb 2001, Delaney and Grubb 2003).

Additions to the NFTS and Reopened ML 1 Roads: The Zone of Influence at 200 meters of motorized route additions and reopened ML 1 roads within PACs are shown in Table 3.03-64 for the alternatives. Alternative 1 would reduce habitat effectiveness for spotted owls considerably within 22% of PAC acres on the Tahoe NF. Alternatives 2, 5, 6, and 7 would reduce habitat effectiveness within PACs by 1% or less from motorized route additions. Alternatives 3 and 4 would not affect overall habitat effectiveness of spotted owl PACs since no motorized routes would be added to the NFTS within PACs.

The effect of reopening ML 1 roads is only proposed under Alternative 5 where an additional 1% of spotted owl PACs would be subject to motorized activities, potentially reducing habitat effectiveness for nesting owls. However, the amount of overall reduced habitat effectiveness resulting from reopened ML 1 roads across the Forest is likely to be benign at the Forest scale.

Table 3.03-68. Proportion of Spotted Owl PACs within 200 Meters of Motorized Route Additions and Reopened ML 1 Roads

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Percent of spotted owl PACs within ZOI of Route Additions	22%	1%	0%	0%	1%	1%	1%
Percent of spotted owl PACs within ZOI of Reopened ML 1 Roads	0%	0%	0%	0%	1%	0%	0%

*Alternative 1 includes existing unauthorized routes with the continuance of cross country travel.

Cumulative Effects to Habitat Fragmentation and Edge Effects within California Spotted Owl PACs

Zone of Influence at 200 meters

Cumulative effects of habitat fragmentation within California spotted owl PACs were assessed by determining the amount of spotted owl PACs that are influenced by all routes including both motorized and non-motorized routes on NFS lands and non-NFS lands. The Zone of Influence at 200 meters was used to determine potential habitat fragmentation from the influence of noise, edge effects, and habitat alteration associated with motorized and non-motorized routes.

Table 3.03-69 displays the cumulative effects of the proposed alternatives from all motorized and non-motorized routes on NFS and non-NFS lands. When comparing the cumulative effects of routes to

spotted owl PACs within a 200 meter Zone of Influence (by summing the direct and indirect effects of the alternatives and the cumulative effects of past, present, and future actions), Alternative 1 has the greatest overall cumulative impact (cumulative impact score = 57%) and, therefore, poses the greatest risk to habitat connectivity and other negative cumulative impacts (including noise disturbance) associated with continued motorized cross country travel, including use of existing unauthorized routes within spotted owl PACs. In addition, Alternative 1 would contribute to route proliferation because unmanaged cross country motorized travel would continue into the future. Implementing Alternative 1 poses the greatest concern to habitat fragmentation to spotted owl habitat within PACs.

Alternative 5 has the second greatest contribution to overall cumulative impacts within PACs (cumulative impact score = 37%), due to the percentage of acres (2%) impacted by proposed additions and reopened ML 1 roads. Alternatives 3 and 4 do not add to existing cumulative effects, since no motorized routes within PACs would be added to the NFTS. Alternatives 2, and 6, affect 1% spotted owl habitat within 200 meters of PACs. In addition, cross country travel including use on existing unauthorized routes would be prohibited under all the action alternatives.

Table 3.03-69. Cumulative Effects - Proportion of Spotted Owl Protected Activity Centers within 200 meter Zone of Influence of All Routes

	Alt 1[1]	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Motorized Route Additions (negative impact)[1]	22%	1%	0%	0%	1%	1%	1%
Reopened ML 1 Roads	0%	0%	0%	0%	1%	0%	0%
Unauthorized Routes Where Cross Country Travel would be Prohibited (postive impact)	0%	22%	23%	23%	21%	22%	23%
Cumulative effects of past, present, and proposed actions							
Existing motorized routes - NFS lands (negative impact)	27%	27%	27%	27%	27%	27%	27%
Existing routes on non-NFS lands (private) (negative impact)	5%	5%	5%	5%	5%	5%	5%
Existing non-motorized routes (negative impact)[2]	3%	3%	3%	3%	3%	3%	3%
Decommissioned or Existing Closed routes (positive impact)	2%	2%	2%	2%	2%	2%	2%
Total Cumulative Effects							
Overall Cumulative Effects (total of all impacts, both positive and negative)	**57%**	**36%**	**35%**	**35%**	**37%**	**36%**	**36%**

[1] Alternative 1 includes existing unauthorized routes associated with the continuance of cross country travel.

[2] Non-motorized -assumption made that non-motorized impact is limited to 60 meters from trail and that no impact occurs beyond 60 meters

Direct and Indirect Effects to Fragmentation and Edge Effects within Home Range Core Areas (HRCAs)

Cross Country Travel: Alternative 1 poses the greatest risk to spotted owls within spotted owl Home Range Core Areas (HRCAs), where cross country motorized travel would continue and proliferate on 98,806 acres. The action alternatives would benefit spotted owls from reduced habitat fragmentation and disturbance from the ban of cross country travel on 98,806 acres.

Additions to the NFTS and Reopened ML 1 Roads (Zone of Influence): To evaluate habitat fragmentation, noise disturbance, and edge effects on spotted foraging habitat within HRCAs, the Zone of Influence of motorized route additions and reopened ML 1 roads within spotted owl HRCAs was determined for each alternative within 200 meters (Table 3.03-70).

Alternative 1 reduces habitat effectiveness for spotted owls considerably where the percentage of HRCAs on the Tahoe NF affected is 22% influenced by existing unauthorized routes.

All the action alternatives would enhance habitat effectiveness within HRCAs by prohibiting cross country travel on the majority of existing unauthorized routes. When comparing all the action alternatives, Alternative 5 would contribute to about a 2% reduction in habitat effectiveness within HRCAs from route additions and reopened ML 1 roads combined. Alternatives 2 and 6 reduce habitat effectiveness within HRCAs by 1% from motorized route additions, but would not affect HRCAs from reopening ML 1 roads. Alternatives 4 and 7 only add about 0.5% direct and indirect effects to HRCAs, and would not pose concern to foraging owls at the Forest-wide scale. Alternative 3 would not affect overall habitat effectiveness within spotted owl HRCAs at a 200 meter Zone of Influence. Except for Alternative 3, the remaining action alternatives would only contribute to a very small amount of reduced habitat fragmentation at the Forest-wide scale. However, when specific HRCAs are considered, it becomes apparent that individual spotted owl territories would result in habitat fragmentation from adding routes and reopening ML 1 roads within HRCAs, as shown in Tables 3.03-63 and 64. For example, the HRCA for spotted owl territory NV017 would be affected by 6 different route additions totaling between 0.5 and 1.7 miles. Additions of motorized routes within spotted owl territories, such as NV017 and NV024 in the Burlington Ridge area would result in direct and indirect impacts to spotted owls foraging in the area through increased noise and disturbance, and long-term habitat fragmentation.

Table 3.03-70. Proportion of California Spotted Owl Home Range Core Areas (HRCAs) within 200 Meters influenced by Motorized Route Additions and Reopened ML 1 Roads

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Percent of HRCAs within Zone of Influence of Motorized Route Additions	22%	1.2%	0	0.5%	1.3%	1.2%	0.5%
Percent of HRCAs within Zone of Influence of Reopened ML 1 Roads	0%	0%	0%	0%	1%	0%	0%

Alternative 1 includes existing unauthorized routes associated with the continuance of cross country travel.

Cumulative Effects to HRCAs

Cross Country Travel: Alternative 1 would significantly add to adverse cumulative effects within spotted owl HRCAs, and would potentially disturb nesting and foraging spotted owls and fragment suitable spotted owl habitat since on cross country would continue on 98,806 HRCA acres because unmanaged cross country motorized travel would continue and proliferate into the future. Alternative 1 would limit cross country travel on 5,559 acres that are currently closed to motorized use under the existing LMP standards and guidelines. Whereas all the action alternatives would benefit spotted owls

within HRCAs by prohibiting cross country travel on an additional 98,806 acres, which would greatly reduce habitat fragmentation and disturbance from motorized use.

Additions to the NFTS and Reopened ML 1 Roads (Zone of Influence): The cumulative effects to spotted owl HRCAs within a 200-meter Zone of Influence are compared for the proposed alternatives (Table 3.03-71). As previously discussed, the cumulative effects analysis presented here only provides a relative comparison of cumulative effects to spotted owl foraging habitat from motorized and non-motorized routes.

When comparing the cumulative effects of routes to HRCAs within a 200 meter Zone of Influence (by summing the direct and indirect effects of proposed alternatives and the cumulative effects of past, present, and future actions), Alternative 1 has the greatest overall cumulative impact (cumulative impact score = 58%) and, therefore, poses the greatest risk to habitat connectivity and other negative cumulative impacts (including noise disturbance) associated with routes within spotted owl HRCAs. Overall cumulative effects of the action alternatives are similar (cumulative impact scores range from 36% to 38%). With the exception of Alternative 3, the action alternatives all slightly add to cumulative impacts, where 1-2% of HRCA acres would be influenced by the addition of motorized routes to the NFTS and reopened ML 1 roads (Alt 5 only). Although the action alternatives would only result in adding a small percentage of cumulative impacts to Tahoe NF HRCAs from motorized route additions or reopened ML 1 roads, individual owl territories could receive adverse cumulative impacts, particularly in areas such as Burlington Ridge on the Yuba River Ranger District where cumulative effects to spotted owls are already high from motorized activities associated with the Burlington Ridge trail system, existing motorized routes, and past vegetation management.

Alternative 3 would not add to cumulative effects, since no motorized routes would be added to the NFTS nor would ML 1 roads would be reopened. Finally, all cross country travel would be prohibited on 98,806 HRCA acres, including the use on existing unauthorized motorized routes that affect approximately 11% of HRCAs within Alternatives 2, 3, 4, 5, 6, and 7.

Table 3.03-71. Cumulative Effects - Proportion of California Spotted Owl Home Range Core Areas (HRCAs) within a 200-meter Zone of Influence

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Proposed motorized route additions to NFTS (negative impact)[1]	22%	1.2%	0	0.5%	1.3%	1.2%	0.5%
Reopened ML 1 Roads	0%	0%	0%	0%	1%	0%	0%
Cross country travel prohibited on existing unauthorized routes (positive impact)	0%	21%	22%	21%	20%	21%	21%

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cumulative effects of past, present, and proposed actions							
Existing motorized routes - NFS lands (negative impact)	27%	27%	27%	27%	27%	27%	27%
Existing routes on non-NFS lands (private) (negative impact)	5%	5%	5%	5%	5%	5%	5%
Existing non-motorized routes (negative impact)[1]	4%	4%	4%	4%	4%	4%	4%
Decommissioned routes and Closed ML 1 roads (positive impact)	3%	3%	3%	3%	3%	3%	3%
Total Cumulative Effects							
Overall Cumulative Effects equals the total of all impacts, both positive and negative	**58%**	**37%**	**36%**	**37%**	**38%**	**37%**	**37%**

[1] Motorized route Additions - Alternative 1 includes existing unauthorized routes associated with the continuance of cross country travel.

[2] Non-motorized -assumption made that non-motorized impact is limited to 60 meters from trail and that no impact occurs beyond 60 meters

Cumulative Effects Summary of Habitat Fragmentation and Edge Effects within Spotted Owl HRCAs

The proportion of spotted owl Home Range Core Areas (HRCAs) within a 200-meter Zone of Influence of all motorized and non-motorized within NFS and non-NFS were determined in order to assess the cumulative effects from the proposed alternatives. Alternative 1 poses the greatest cumulative effects within spotted owl HRCAs that would be used for foraging spotted owls from route associated factors including noise, edge effects, and habitat fragmentation. Alternative 1 affects approximately 22% of spotted owl HRCAs within a 200-meter Zone of Influence, respectively. In the future, motorized route proliferation would continue at an unknown rate because unmanaged cross country travel would continue.

Sensitive Species Determinations

The Tahoe NF Biological Evaluation for Birds, Mammals, Amphibians, Reptiles, Fish, and Invertebrates is incorporated by reference in the Project Record. Based on the spotted owl analysis of effects, the Biological Evaluation for the Tahoe NF Travel Management EIS made a determination that implementation of all the actions alternatives may affect spotted owls, but are not likely to lead to a trend toward listing or a loss in population viability.

Although, some habitat fragmentation and edge effects would occur from the action alternatives, none of the action alternatives would likely cause enough fragmentation to be a concern to spotted owl population viability on the Tahoe NF when considering the combined effects of the alternatives and the additional activities occurring within the cumulative effects analysis area. Based on this information and the findings from U.S. Fish and Wildlife Service, the alternatives as proposed are not expected to result in a loss of viability or lead to a trend toward Federal listing for the California spotted. The alternatives would not likely affect Forest-wide spotted owl population trends. In addition, recent studies between off highway vehicles and spotted owls indicate that disturbance associated with off-highway vehicle do not affect reproductive success. However, the uncertainty of long term effects to spotted owls from increasing disturbance from motorized vehicle use poses an unknown risk. Under Alternative 1, cross country travel would continue on 50,712 PAC acres and 98,806 HRCA acres, which could cause long-term chronic

effects to spotted owl from factors associated with motorized routes. In addition, uncontrolled motorized route proliferation over time may contribute to downward spotted owl population trends on the Tahoe NF.

MIS Summary

The California spotted owl was selected as an MIS for late-seral closed canopy coniferous forest (5M, 5D, 6M, 6D within ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat in the Sierra Nevada. The Sierra Nevada Forests Bioregional MIS Report and the Tahoe NF Motorized Travel Management MIS Project-level Report are incorporated by reference.

Based on the MIS analysis conducted, Alternative 1 directly, indirectly, and cumulatively affects the greatest amount of late-seral closed canopy coniferous forest with a 200-meter Zone of Influence of existing unauthorized routes, which would continue without prohibiting cross country travel. Alternative 1 reduces habitat effectiveness by 8% (13,435 acres out of 167,938 Tahoe NF habitat acres), with the potential to disturb, cause avoidance, and abandonment of California spotted owl, American marten, and northern flying squirrel. Considering the checkerboard pattern of land ownership within the Tahoe NF boundary, Alternative 1 could cause a downward trend in habitat effectiveness for these species. In addition, the cross country travel would continue and proliferate on 119,091 acres of late-seral closed canopy coniferous forest habitat.

Alternatives 2, 4, 5, and 6 would affect 1,679 acres of late-seral closed canopy coniferous forest habitat or 1% of Tahoe NF habitat within a 200-meter Zone of Influence of proposed motorized route additions. Alternatives 3 and 7 do not affect late-seral closed canopy coniferous forest habitat within a 200-meter Zone of Influence of proposed motorized route additions to the NFTS. The Tahoe NF Motorized Travel Management Project action alternatives would not result in a direct or indirect change in the amount of late-seral closed canopy coniferous forest habitat affected by motorized routes for all the alternatives. Therefore, habitat effectiveness for these species would be maintained at current levels.

For all the alternatives, the change in the class of vehicles would not directly, indirectly, or cumulatively affect late-seral closed canopy coniferous forest habitats or their habitat effectiveness. Wet weather seasonal restrictions on all native surfaced roads and motorized trails under Alternatives 4, 5, and 6 would not likely affect late-seral closed canopy coniferous forest habitat effectiveness for the California spotted owl, American marten, and the northern flying squirrel, but slight localized reduced disturbance, avoidance, and abandonment may result. Finally, the prohibition of motorized cross country travel on 119,091 acres of late-seral habitats would benefit these species over time, thereby preventing the continued cumulative increase in motorized route proliferation in the future.

Summary of Status and Trend at the Bioregional Scale. The Tahoe NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the California spotted owl; hence, the late-seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat effects analysis for the Tahoe NF Motorized Travel Management Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data. This information

is drawn from the detailed information on habitat and population trends in the SNF Bioregional MIS Report (USDA Forest Service 2008), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 994,000 acres of late-seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat on NFS lands in the Sierra Nevada. The trend is slightly increasing (from 7% to 9% within the last decade on NFS lands).

Population Status and Trend California spotted owl has been monitored in California and throughout the Sierra Nevada through general surveys, monitoring of nests and territorial birds, and demography studies (Verner et al. 1992; USDA Forest Service 2001, 2004, 2006; USFWS 2006; Sierra Nevada Research Center 2007). Current data at the range wide, California, and Sierra Nevada scales indicate that, although there may be localized declines in population trend [e.g., localized decreases in "lambda" (estimated annual rate of population change)], the distribution of California spotted owl populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trends for the species. Based on the small proportion of late-seral closed canopy coniferous forest habitat that is directly, indirectly and cumulatively affected (0% to 1.4% of Sierra Nevada habitat) by the alternatives, the Tahoe NF Motorized Travel Management Project would not alter existing trend in the habitat, nor would it lead to a change is the distribution of California spotted owl across the Sierra Nevada bioregion.

Summary of Direct and Indirect, Impacts to Spotted Owls

Table 3.03-72 summarizes the alternatives for the direct and indirect effects to California spotted owl from cross country travel, motorized route additions to the NFTS, establishment of "Open Areas," changes to the NFTS (wet weather restrictions, changes in class of vehicles and reopened ML 1 roads), and Amendments to the Forest Plan.

Table 3.03-73. California Spotted Owl - Summary of Direct and Indirect Effects (PACs, HRCAs, and 0.25 mile radius of Activity Centers)

		Alt 1[1]	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel								
Trend of Effect		Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Habitat Acres Where Cross Country Travel Prohibited	**¼ mile of Nests site/stand**	0	18,535	18,535	18,535	18,535	18,535	18,535
	PACs	0	50,712	50,712	50,712	50,712	50,712	50,712
	HRCAs	0	98,806	98,806	98,806	98,806	98,806	98,806
Motorized Route Additions								
Trend of Effect		**Negatively affects the greatest proportion of spotted owl habitat within PACs, within 0.25 miles of activity centers, and HRCAs**	4th most negative impacts to a very small proportion of spotted owl habitat within PACs, within 0.25 miles of activity centers, and HRCAs	No Effect	6th most negative impacts to a very small proportion of spotted owl habitat within PACs, within 0.25 miles of activity centers, and HRCAs	2nd most negative impacts to a small proportion of spotted owl habitat within PACs and HRCAs. Sligh	3nd most negative impacts to a very small proportion of spotted owl habitat within PACs and HRCAs. At nest stand scale, has slightly greater impacts than Alts 5 and 6.	5th most negative impacts to a very small proportion of spotted owl habitat within PACs, within 0.25 miles of activity centers, and HRCAs
Nests site/stand (within ¼ mile of Activity Center)	**Miles**	41.1	0.2	0	0	0.2	0.4	0.2
PACS	**ZOI**	22%	0.6%	0%	0%	0.7%	0.7%	0.3%
	Miles	98.1	1.8	0	0	2.2	2.0	1.6
HRCAs	**ZOI**	22%	1.2%	0	0.5%	1.3%	1.2%	0.5%
	Miles	281.7	13.3	0	6.2	14.8	11.0	7.6
Establishment of "Open Areas"		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect

				Alt 1[1]	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Changes to NFTS	**Wet Weather Restrictions**			No Effect	No Effect	No Effect	Beneficial from reduced disturbance	Beneficial from reduced disturbance	Beneficial from reduced disturbance	No Effect
	Change in Class of Vehicles			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Reopened ML 1 Roads	**Trend of Effect**		No Effect	Negative, shares 3rd most impacts with Alt 7	No Effect	Negative, shares 3nd most impacts with Alt 7.	**Negative, most impactive alternative**	Negative, 2nd most impacts	Negative, shares 3nd most impacts with Al t 2.
		¼ mi. of nests site	**Miles**	0	0	0	0	2.5	0	0
		PACs	**ZOI**	0%	<1%	0%	0%	1%	<1%	<1%
			Miles	0	0.9	0	0	6.1	1.3	0.9
		HRCAs	**ZOI**	0%	<1%	0%	<1%	1.5%	0%	0%
			Miles		0.8	0	0.1	10.9	0	0
Overall Effects of Proposed Alternatives				Negative effects primarily due to un-managed cross country travel where most threatens of disturbance and habitat fragmentation.	Benefits PACs, within 0.25 miles of activity centers, and HRCAs, where cross country travel is prohibited; although minor negative impacts from route additions and reopened ML 1 roads; overall Reduces disturbance and habitat fragmentation.	Benefits PACs, within 0.25 miles of activity centers, and HRCAs, where cross country travel is prohibited. Reduces disturbance and habitat fragmentation.	Benefits PACs, within 0.25 miles of activity centers, and HRCAs, where cross country travel is prohibited; although minor negative impacts from route additions and reopened ML 1 roads; overall reduces disturbance and habitat fragmentation..	Benefits PACs, within 0.25 miles of activity centers, and HRCAs, where cross country travel is prohibited; although minor negative impacts from route additions and reopened ML 1 roads; overall Reduces disturbance and habitat fragmentation.	Benefits PACs, within 0.25 miles of activity centers, and HRCAs, where cross country travel is prohibited; although minor negative impacts from route additions and reopened ML 1 roads; overall Reduces disturbance and habitat fragmentation.	Benefits PACs, within 0.25 miles of activity centers, and HRCAs, where cross country travel is prohibited; although minor negative impacts from route additions and reopened ML 1 roads; overall Reduces disturbance and habitat fragmentation.

[1]Alternative 1 includes existing unauthorized routes that would continue with cross country travel, while all the action alternatives include proposed route additions.

[2]Zone of Influence is 200 meters of motorized route additions and reopened ML 1 roads

Compliance with the Forest Plan and Other Direction

The Tahoe NF LRMP, as amended by the SNFPA ROD (2004) provided management standards and guidelines for the California spotted owl as follows:

> *Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb nest sites (Management Standard & Guideline 82).*

Alternatives under the Tahoe NF Travel Motorized Management Project were evaluated for their potential to disturb California spotted owl nest sites at two scales—(1) within spotted owl Protected Activity Centers (PACs) and (2) within a 0.25 mile radius of known nest sites or activity centers. Analysis of the alternatives indicates Alternative 1 disturbs nest sites the most from allowing cross country travel to continue on 50,712 PAC acres, affecting 22% of PAC acres within a 200-meter Zone of Influence of existing unauthorized routes. Compared to Alternative 1, the action alternatives all reduce overall effects to spotted owl PACs by prohibiting cross country travel, including 22% of PAC acres within a 200-meter Zone of Influence of existing unauthorized routes. Analysis of the alternatives within 0.25 mile of activity centers (i.e. nest sites) indicates a similar pattern as found for spotted owl PACs.

Northern Goshawk: Affected Environment

The northern goshawk is designated as a Forest Service Sensitive Species in Region 5. There are currently 285,695 acres of suitable goshawk habitat on NFS lands within the Tahoe NF as defined by CWHR types 4 M, 4D, 5M, 5D, and 6. Northern goshawk territories are managed on the Tahoe National Forest as Protected Activity Centers (PACs) as prescribed by the Sierra Nevada Forest Plan Amendment (2004). To date, the Tahoe National Forest has 97 known northern goshawk PACs.

Collection, habitat loss or 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.

Collection: The Sierra Nevada Forest Plan Amendment (USDA Forest Service 2001) cited that northern goshawk were harassed and shot in areas where human recreation was concentrated. Additionally, the Forest Service identified illegal harvest may pose a risk to local populations in certain areas. Both illegal and legal harvest has the potential to affect local individual territories that receive repeated visits and harvesting. No specific incidence of illegal goshawk harvest is known from the Tahoe NF area, though local falconers have knowledge of specific goshawk territories on the Forest which are likely getting repeated visitation and harvesting.

Disturbance at a Specific Site: Human disturbance has the potential to cause goshawk to abandon nesting during the nesting and post fledging period (February 15 through September 15). Goshawk initiate breeding when the ground is still covered in snow. Sometimes nests are constructed along roads and trails. Additionally, roads and trails provide flight access for goshawk. When the snow melts, these sites can potentially be areas of conflict as these roads and trails are used by people. Joslin and Youmans (1999) recommend maintaining low road densities to minimize disturbance to goshawk. Grubb et al.

(1998) reported that vehicle traffic from roads did not elicit any discernable behavioral response from goshawk at distances exceeding 400 meters (0.25 miles) from nests.

Habitat Loss and Fragmentation and Edge Effects: 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. However, how habitat fragmentation from roads and trails affects goshawk habitat suitability is not well understood. Generally, wider roads that receive higher volumes of traffic result in greater habitat fragmentation. Native surfaced roads and trails probably do not pose as much a risk to habitat fragmentation compared to smooth surfaced roads. For obvious reasons, state and federal highways create the greatest habitat fragmentation due to the width of the road and associated edge effects.

Northern Goshawk: Environmental Consequences

Indicators used to Measure Effects

Disturbance to Nesting Northern Goshawk

The direct and indirect effects to nesting northern goshawk may be measured by the amount of disturbance that may be generated from noise or other motorized trail and road associated factors by the following indicators:

Cross Country Travel: The acres of cross country travel within northern goshawk Protected Activity Centers (PACs) and within 0.25 mile radius of goshawk nest sites or nest stands are determined for each of the alternatives.

Additions to the NFTS and Changes to the NFTS--Reopened ML 1 Roads: Motorized route additions to the NFTS and Changes to the NFTS from Reopened ML 1 Roads are analyzed to determine how they would impact northern goshawk "disturbance to a specific site. Disturbance to goshawk PACs and nest sites is analyzed for the alternatives at two scales-- within 0.25 miles of spotted owl Activity Centers (nest sites or nest groves), within PACs.

- **Nest or Nest Stand (Within a 0.25 miles radius of spotted owl Activity Centers)**: Activity Centers are known nest sites or suspected nest stands. Nest abandonment and failure can result from excessive noise disturbance that may be associated with use of motorized routes. The miles of proposed motorized route additions and the miles of reopened ML 1 roads within a 0.25 mile radius of goshawk Activity Centers are compared by each of the alternatives to display the potential impact to goshawk nesting sites from noise disturbance and other factors associated with motorized use.
- **Protected Activity Centers (PACs)**: Goshawk PACs are delineated surrounding all known and newly discovered nesting territories on NFS lands on the Tahoe NF . PACs are designated to include the latest documented nest site and location of alternate nests (SNFPA 2004). PACs encompass the best available 200 acres of forested habitat which include (1) 2 or more canopy layers, (2) trees in the dominant and co-dominant crown classes averaging 24 inches diameter at breast height or greater; (3) in westside conifer and eastside mixed conifer forest types, stands

have at least 70 percent tree canopy cover; and (4) in eastside pine forest types, stands have at least 60 percent tree canopy cover.

- The miles of proposed additions to the NFTS and the miles of reopened ML 1 roads within goshawk PACs are compared to determine how the various alternatives have the potential impact nesting goshawk from noise disturbance and other factors associated with motorized use.

Northern Goshawk: Direct and Indirect Effects

Disturbance to Nesting Northern Goshawk

Cross Country Travel

Nest Site or Nest Stand (Within 0.25 Mile of Goshawk Activity Centers)

Alternative 1 would significantly add to adverse cumulative effects within goshawk PACs and to nest sites/groves, and would potentially disturb nesting goshawk habitat since on cross country would continue on 10,384 goshawk PAC acres because unmanaged cross country motorized travel would continue and proliferate into the future. Nesting goshawk would benefit from implementation of the action alternatives by prohibiting cross country travel on at least 10,384 PAC acres, which would greatly reduce habitat fragmentation and disturbance to nesting goshawk from motorized use.

Protected Activity Centers

Alternative 1 would significantly add to adverse cumulative effects within goshawk PACs and to nest sites/groves, and would potentially disturb nesting goshawk habitat since on cross country would continue on 20,036 goshawk PAC acres because unmanaged cross country motorized travel would continue and proliferate into the future. Alternative 1 would limit cross country travel on only 644 acres that are currently closed to motorized use under the existing LMP standards and guidelines. Whereas all the action alternatives would benefit goshawk within goshawk PACs by prohibiting cross country travel on an additional 20,036 acres, which would greatly reduce habitat fragmentation and disturbance to nesting goshawk from motorized use.

Additions to the NFTS and Reopened ML 1 Roads

Nest Site or Nest Stand (Within 0.25 Mile of Goshawk Activity Centers)

Table 3.03-74 displays the potential effects of the proposed motorized additions and reopened ML 1 roads on nesting goshawk within a 0.25 mile radius circle of goshawk Activity Centers (nest site or nest stand). Alternative 1 would pose the greatest risk from noise disturbance to nesting goshawk by allowing continued cross country motorized travel, including motorized use on nearly 25 miles of existing unauthorized routes within 0.25 miles of goshawk activity centers. Alternative 1 would not propose to reopen any ML 1 roads, and therefore no effects to nesting goshawk would occur.

All the action alternatives would reduce the amount of disturbance to nesting goshawk by at least 24 miles from the either the addition of motorized routes and reopened ML 1 roads. The action alternatives affect from 0 to 0.3 miles of motorized route additions (Alternative 3 adds none, Alternatives 5 and 6 add 0.3 miles). Reopened ML 1 roads would only affect nesting goshawk under alternatives 2, 4, 5, and 6,

where less than 0.1 to 0.8 miles would be added. Of these alternatives Alternative 5 would reopen the most miles (0.8 miles) and Alternative 4 would reopen the least miles (less than 0.1).

Table 3.03-74. Miles of Proposed Motorized Route Additions and Reopened ML 1 Roads within 0.25 Mile Radius Circle of Northern Goshawk Activity Center (Nest Site or Nest Stand)

Miles	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Route additions to the NFTS	24.8	0.2	0	<0.1	0.3	0.3	0.2
Reopened ML 1 Roads	0	0.4	0	0	0.4	0.8	0
Total	**24.8**	**0.6**	**0**	**<0.1**	**0.7**	**1.1**	**0.2**

*Alternative 1 includes existing unauthorized routes associated with cross country travel, whereas all the action alternatives include route additions or reopened ML 1 roads.

Protected Activity Centers

The miles of proposed motorized routes to be added to the NFTS are compared to determine how the various alternatives have the potential to impact breeding Northern goshawks from noise disturbance and other factors associated with motorized use.

Table 3.03-75 displays the miles of motorized route additions to the NFTS within goshawk PACs by route identification number, and miles of route additions for the alternatives. It also displays the number and percentage of PACs affected by proposed motorized route additions to the NFTS for each alternative. There are a total of 97 goshawk PACs designated on the Tahoe NF.

Alternative 1 contributes significantly to direct and indirect effects to breeding goshawk, where cross country motorized travel would continue, including motorized use of over 42 miles of existing motorized unauthorized routes, where 68% of goshawk PACs (66 PACs) on the Tahoe NF would be subjected to disturbance from continued cross country travel.

All the action alternatives would reduce the miles of motorized routes within goshawk PACs by at least 40 miles compared to Alternative 1. Alternatives 2, 5, 6, and 7 would add approximately 1 motorized route mile affecting between 2 and 5 goshawk PACs, ranging from less than 0.01 mile to about ½ mile in length. Alternatives 3 and 4 do not propose any motorized routes to be added to the NFTS within goshawk PACs, and therefore, would not cause direct or indirect effects to nesting goshawk.

Five goshawk PACs (Frazier Creek, Lacy Creek, Wornmill, and Castle Valley) are intersected by proposed route additions which are short spurs which provide access to dispersed recreation sites. The amount of disturbance resulting from routes accessing dispersed recreation sites depends on the type and amount of dispersed recreation that occurs in association with these routes. The following summary briefly describes how each goshawk PAC is affected by motorized route additions for Alternatives 2, 5, 6, and 7.

Frazier Creek PAC (R05F17D54T07): The Frazier Creek PAC would be affected by the addition of short route (.01 mi) to access a dispersed recreation site under Alternative 6.

Omega PAC (R05F17D55T18): The Omega PAC would be affected by the addition of route H29-11 totaling 0.1 mile under Alternative 5.

Lacy Creek PAC (R05F17D56T08): The Lacy Creek PAC would be affected by the addition of a route to access a dispersed recreation site under Alternative 6.

Wornmill PAC (R05F17D57T11): The Wornmill PAC would be affected by the addition of route TKN-J9 (0.3 mi) under alternatives 2, 5, 6, and 7. In addition, 2-3 routes accessing dispersed recreation sites are proposed under Alternatives 2, 5, and 6. Alternative 6 would result in 1 additional route to a dispersed site compared to Alternatives 2 and 5. However, Alternative 5 also proposes to add a very short segment (N270-8-5) totaling less than 0.01 mile. In sum, the differences between alternatives 2, 5, and 6 would be very little, if any at all. Of the four alternatives affecting the Wornmill PAC, Alternative 7 would result in the least disturbance to nesting goshawk for the Wornmill PAC, since no routes accessing dispersed recreation sites are proposed under this alternative.

Castle Valley PAC (R05F17D57T15): The Castle Valley PAC would be affected by the addition of TKN-J5 under alternatives 2, 5, 6, and 7. TKN-J5 totals about 0.5 miles and is coincidental with the southern boundary of the Castle Valley PAC. Based on the vicinity of TKN-J5, it is likely that this route would have lesser disturbance impacts to nesting goshawk than if the route were to dissect the PAC area. Alternative 6 also proposes to add 5 short routes totaling less than 0.1 mile that come off of TJN-J5. These dispersed recreation assess routes could result in increased disturbance to nesting goshawk within the Castle Valley PAC.

Table 3.03-75. Northern Goshawk PACs - Miles of Motorized Route Additions by PAC ID and Route ID

Goshawk PAC ID	Territory Name	Route ID	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Numerous PACs	Numerous	Unauthorized routes	42.3	0	0	0	0	0	0
R05F17D54T07	Frazier Creek	D_44_c (route to dispersed site)	0	0	0	0	0	0.01	0
R05F17D55T18	Omega	H29-11	0	0	0	0	0.1	0	0
R05F17D56T08	Lacy Creek	D_86-40-30 (route to dispersed site)	0	0	0	0	0	0.02	0
R05F17D57T11	Wornmill	D_72 (route to dispersed site)	0	0	0	0	0	0.04	0
R05F17D57T11	Wornmill	D_72_a & b (routes to dispersed site)	0	0.04	0	0	0.04	0.04	0
R05F17D57T11	Wornmill	N270-8-5	0	0	0	0	<0.01	0	0
R05F17D57T11	**Wornmill**	**TKN-J9**	0	**0.30**	0	0	**0.30**	**0.30**	**0.30**
R05F17D57T15	**Castle Valley**	**TKN-J5**	0	**0.52**	0	0	**0.52**	**0.52**	**0.52**
R05F17D57T15	Castle Valley	D_TKN-J5_a, b, c, d, e (routes to dispersed site)	0	0	0	0	0	0.05	0
Number PACs Intersected			**66**	**2**	**0**	**0**	**5**	**5**	**2**
Percentage PACs Affected (TNF PACs = 97)			**68%**	**2%**	**0%**	**0**	**5%**	**5%**	**2%**
		Total Miles	**42.3**	**0.9**	**0.0**	**0.0**	**0.9**	**1.0**	**0.8**

* Motorized Route Additions - Alternative 1 includes existing unauthorized routes associated with continued cross country travel

Reopened ML 1 Roads

Table 3.03-76 displays how the alternatives are affected by reopened ML 1 roads. Only alternatives 2, 5, and 6 propose to reopen ML 1 roads, potentially affecting 1 to 2 goshawk PACs. The remaining alternatives do not propose to reopen ML 1 roads, and therefore would not affect any goshawk PAC. Alternative 6 would affect two goshawk PACs (Tad Pole PAC and Perazzo Meadow PAC) for a total of about 0.7 miles where nesting goshawk could be disturbed from motorized activities associated with reopened ML 1 roads (ARM-3 and SV-005). Following Alternative 6, Alternative 5 would reopen a total of 0.4 miles of ML 1 roads potentially where nesting goshawk could be disturbed from motorized use within the Perazzo Meadow PAC and the Robinson Flat PAC. Of the three alternatives potentially affecting PACs from reopened ML 1 roads, Alternative 2 would affect the least, where only the Perazzo Meadow PAC would be affected by reopening 0.3 miles of ML 1 road.

Table 3.03-76. Miles of Reopened ML 1 Roads by Northern Goshawk PAC and Route ID

Goshawk PAC ID	Territory Name	Route ID	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
R05F17D54T14	Tad Pole	ARM-13	0	0	0	0	0	0.35	0
R05F17D54T15	Robinson Flat	H88-44	0	0	0	0	0.10	0	0
R05F17D56T04	Perazzo Meadow	SV-005	0	0.31	0	0	0.31	0.31	0
Number PACs Intersected			**0**	**1**	**0**	**0**	**2**	**2**	**0**
Percentage PACs Affected (TNF PACs = 97)			**0**	**1%**	**0%**	**0%**	**2%**	**2%**	**0%**
		Total Miles	**0**	**0.31**	**0**	**0**	**0.41**	**0.66**	**0**

Effects to Individual Northern Goshawk PACs from Route Additions and Reopened ML 1 Roads. The routes proposed to be added to the NFTS and the reopened ML 1 roads (converted from closed to open) contribute a certain amount of disturbance to the activity center on which each PAC is based. Disturbance could result in flushing from nests, roosts, or perches, in alarm responses, and in increased stress hormone levels in individual goshawks. In the absence of further research, it is assumed that motorized use along all routes within 400 meters (0.25 mile) of activity centers would result in some disturbance to nesting goshawk. Based on that assumption, approximately 1-2% of activity centers would receive some disturbance from routes added to the NFTS and/or routes that would be reopened. Without further research, this analysis assumes that effects within 60 meters (approximately 60 meters) of an activity center will result in negative effects to reproduction over the short term. Therefore, if all the routes proposed to be added to the NFTS or proposed to be reopened are further than 400 meters from the activity center on which a given PAC is based, it is assumed that the routes under this alternative in that PAC would contribute a low level of disturbance to the goshawks at that activity center. If any of the routes proposed to be added or reopened are between 60 and 400 meters from the activity center on which the PAC is based, it is generally assumed that the routes in that PAC would contribute a moderate level of disturbance to the owls at that activity center. Within certain PACs meeting that criterion, the contribution to disturbance was rated as low for the reasons given below. If any of the routes proposed to be added or

reopened are within 60 meters of the activity center, it is assumed that the routes under this alternative in that PAC would contribute a high level of disturbance to the owls at that activity center.

For each of the proposed route additions and reopened ML 1 roads, the relative "LEVEL OF CONTRIBUTION TO DISTURBANCE" to each PACs "activity center" and supporting rationale is shown in Table 3.03-77.

Table 3.03-77 Level of Contribution to Disturbance to Northern Goshawk by Specific PAC for Route Additions and Reopened ML 1 Roads

PAC Number	Territory Name	Route ID	Route Addition	Reopened ML 1 Rd	Length (miles)	Alternatives	Level of Contribution to Disturbance	Rationale
D54T07	Frazier Creek	D_44_c	X		0.01	Alt 6	Low to none	Proposed route is short spur <.01 mi, off of existing system route, located >400 meters from nest site. Route located at very extreme northwest boundary of PAC, should not add to disturbance.
D54T14	Tad Pole	ARM-13		X	0.35	Alt 6	Low	Proposed route is 0.3 mi (>400 meters) from known nest site.
D54T15	Robinson Flat	H88-44		X	0.10	Alt 5	Low	Proposed route is 0.4 mi (>400 meters) from known nest site, route is near northern edge of PAC.
D55T18	Omega	H29-11	X		0.1	Alt 5	Moderate	Short route segment within PAC located 0.05 mi (>60 meters, <400 meters) from known nest site.
D56T04	Perazzo	SV-005		X	0.6	Alts 2, 5, 6	Moderate	Reopened route located 0.05 mi (>60 meters and <400 meters) from most recent known nest site.
D56T08	Lacy Creek	D_86-40-30	X		0.02	Alt 6	Low	Short route segment comes off of existing system road, route located at 400 meters (0.25 mi) from known nest site.
D57T11	Wornmill	D_72	X		0.04	Alt 6	Low	Short route comes off of existing system road, route located 0.7 mi (>400 meters) from nest site.
D57T11	Wornmill	D_72_a & b	X		0.04	Alt 6	Low	Two short routes at eastern edge of boundary come off of existing system road, routes located 0.9 mi (>400 meters) from known nest site.
D57T11	Wornmill	N270-8-5	X		<0.01	Alt 5	Low	Very short route comes off of existing system road, located 0.3 mi (> 400 meters) from known nest site.
D57T11	Wornmill	TKN-J9	X		0.30	Alts 2, 5, 6, 7	Moderate	Proposed route is along existing powerline, located within 0.15 mi (< 400 meters) of 1 of 3 alternate nest sites.
D57T15	Castle Valley	TKN-J5	X		0.52	Alts 2, 5, 6, 7	Low	Proposed route borders southern edge of PAC, route located 0.3 mi (>400 meters) from known nest site.
D57T15	Castle Valley	D_TKN-J5_a, b, c, d, e	X		0.05	Alt 6	Low	Short route segments comes off of proposed route TKN-J5 and located >400 meters from known nest site.

Summary of Individual PAC Analysis

Table 3.03-78 summarizes the potential risk of increased disturbance to goshawk activity centers within PACs out of a total of 97 goshawk PACs, as a result of motorized route additions and reopened ML 1 roads. Alternatives 3 and 4 would not increase disturbance to goshawk within any PAC, since no routes or reopening of ML 1 road would be proposed. Overall, Alternative 6 would result in the greatest number of goshawk PACs (9 of 97 PACs or 9%) could be affected either by a low or moderate risk of increased disturbance from activities associated with motorized route additions or reopened roads through temporary displacement, nest failure, or territory abandonment. Alternatives 7, 2, 5, and 6 would potentially increase disturbance to goshawk activity centers within PACs, in increasing order, ranging from 2% to 9%. None of the alternatives would add routes or reopen ML 1 roads that would result in a "high" risk of increased disturbance where a route would be added or reopened ML 1 road would occur within 60 meters (200 feet) of a spotted owl activity center. The remaining action alternatives would result in either a low or moderate risk of increased disturbance from the addition of routes or reopening ML 1 roads. Alternative 5 would result in the most number of PACs (3 of 97 or 3%) potentially affected by a moderate level of increased disturbance, followed by Alternatives 2 and 6 (2 of 97 PACs or <2%, and Alternative 7 would result in the least amount of moderately increased disturbance to PACs (1of 97 PACs or 1%). Alternative 6 would result in the greatest number of PACs with a low risk of increased disturbance (7 of 97 PACs or 75), followed by alternatives 5, 2, and 7 in decreasing order (Table 3.03-78).

Table 3.03-78. Northern goshawk: summary of risk of increased disturbance to Activity Centers within PACs

		Alt 1		Alt 2		Alt 3, 4		Alt 5		Alt 6		Alt 7	
Risk of increased disturbance effects	**Rationale**	**# PACs**	**% PACs**	**# PACs**	**% PACs**	**# PACs**	**% PACs**	**# PACs**	**% PACs**	**# PACs**	**% PACs**	**# PACs**	**% PACs**
HIGH	Route added or reopened ML 1 road within 60 meters (200 feet) of activity center	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
MODERATE	Routes added or reopened ML 1 roads occurring less than 400 meters (1/4 mi) and more than 200 feet from activity center, and no intervening topography	0	0%	2	2%	0	0%	3	3%	2	2%	1	1%
LOW	All routes added or reopened ML 1 roads greater than 400 meters from activity center.	0	0%	2	2%	0	0	3	3%	7	7%	1	1%
HIGH	PACs where cross country travel continued	96	99%	0	0	0	0	0	0	0	0	0	0
DECREASE	PACs where cross country travel prohibited, including on unauthorized routes	0	0%	96	99%	96	99%	96	99%	96	99%	96	99%
Total PACs in which routes are added and/or being converted from closed ML 1 roads to open		**0**	**0%**	**4**	**4%**	**0**	**0%**	**6**	**6%**	**9**	**9%**	**2**	**2%**
Total PACs where cross country travel continued, including on unauthorized routes		**96**	**99%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**
Total PACs where cross country travel would be prohibited, including on unauthorized routes		**0**	**0%**	**96**	**99%**	**96**	**99%**	**96**	**99%**	**96**	**99%**	**96**	**99%**

Summary of Direct and Indirect Impacts to Northern Goshawk

When considering all the direct and indirect impacts to the northern goshawk within PACs and within 0.25 miles of activity centers (nest sites/nest stands), Table 3.03-79 summarizes the overall net effect to the northern goshawk from the proposed actions from cross country travel, motorized route additions to the NFTS, establishment of "Open Areas," changes to the NFTS (change of season of use, change in class of vehicles, reopened ML 1 roads), and amendments to Forest Plan.

Table 3.03-79. Northern Goshawk - Summary of Overall Net Direct and Indirect Effects

			Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel									
Trend of Effect			Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Cross Country Travel Prohibited	**0.25 mile radius of Activity Center**		0	10,384 acres	10,384 acres	10,384 acres	10,384 acres	10,384 acres	10,384 acres
	PACs		0	20,036 acres	20,036 acres	20,036 acres	20,036 acres	20,036 acres	20,036 acres
Motorized Route Additions									
Trend of Effect			Negative, most impactive alternative	Slight Negative, - shares 3rd most impacts with Alt 7	No Effect	No Effect	Slight negative, shares 2nd most impacts with Alt 6.	Slight Negative, - shares 2nd most impacts with Alt 5.	Slight Negative, - shares 3rd most impacts with Alt 2.
Within 0.25 mile radius of Activity Center (Miles)			24.8	0.2	0	0	0.3	0.3	0.2
PACs (Miles)			42.3	0.9	0	0	1.0	1.0	0.8
Percentage of PACs Affected			68%	2%	0%	0%	7%	6%	2%
Establishment of "Open Areas"			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Changes to NFTS	**Wet Weather Restrictions**		No Effect	No Effect	No Effect	Beneficial from reduced disturbance	Beneficial from reduced disturbance	Beneficial from reduced disturbance	No Effect
	Change in Class of Vehicles		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Reopened ML 1 Roads in PACs	**Trend of effect**	No Effect	3rd most impactive alternative	No Effect	No Effect	2nd most impactive alternative	Most impactive alternative	No Effect
		Miles	0	0.3	0	0	0.4	0.7	0
		% PACs Affected	0	1%	0%	0%	2%	2%	0
Amendments to Forest Plan			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Overall Net Effect of Proposed Actions	Most impactive alternative. Increases disturbance and habitat fragmentation primarily from continued cross country travel within 20,036 PAC acres on **42 miles of unauthorized routes.**	4th most impactive alternative from the addition of routes and reopened ML 1 roads totalling **1.2 miles in PACs** Benefits goshawk from the prohibition of cross country travel, and reduces disturbance and habitat fragmentation within 20,036 PAC acres..	Shares least impacts with Alternative 4 (**no routes added or reopened**). Benefits goshawk from the prohibition of cross country travel, and reduces disturbance and habitat fragmentation within 20,036 PAC acres.	Shares least impacts with Alternative 3. (**no routes added or reopened**). Benefits goshawk from the prohibition of cross country travel, and reduces disturbance and habitat fragmentation within 20,036 PAC acres..	3rd most impactive alternative from the addition of routes and reopened ML 1 roads totalling **1.4 miles in PACs.** Benefits goshawk from the prohibition of cross country travel, and reduces disturbance and habitat fragmentation within 20,036 PAC acres.	2nd most impactive alternative from the addition of motrized routes and ML 1 roads, totalling **1.7 miles in PACs.** Benefits goshawk from the prohibition of cross country travel, and reduces disturbance and habitat fragmentation within 20,036 PAC acres..	5th most impactive alternative from the addition of routes totalling **0.8 miles** in PACs. Benefits goshawk from the prohibition of cross country travel, and reduces disturbance and habitat fragmentation within 20,036 PAC acres.

* Alternative 1 includes existing unauthorized routes that would continue with cross country travel, while all the action alternatives include proposed route additions.

Cumulative Effects to Nesting Goshawk

Cumulative Effects Boundary (space and time)

The cumulative effects geographic boundary for nesting goshawks includes all goshawk Protected Activity Centers and their associated Activity Centers (nest site or nest stand) within the boundary of the Tahoe NF. This is an appropriate scale for determining cumulative effects to the goshawk, since the Tahoe NF boundary is sufficiently large which includes 97 goshawk territories and their home range. In addition, the Tahoe NF boundary encompasses an array of goshawk habitat conditions from low elevation to high elevation, including several vegetation types including westside mixed conifer, ponderosa pine, true fir (red fir and white fir), eastside mixed conifer, pure eastside pine, lodgepole pine, and subalpine conifer. The cumulative effects timeframe is the same as other species - 20 years out into the future and approximately 20 years or more into the past. In addition, cumulative effects of all past actions are incorporated into the existing condition (see discussion of cumulative effects).

Assessing Cumulative Effects

Cumulative effects to nesting goshawk are assessed by determining the sum total miles of all motorized routes (proposed and existing) and non-motorized routes on the Tahoe NF including NFS lands and non-NFS lands (private) within goshawk PACs and within 0.25 mile radius of goshawk Activity Centers. For each alternative, cumulative effects are calculated by adding the total miles of proposed motorized routes (direct and indirect impacts) with existing motorized routes (NFS lands and non-NFS lands) and non-motorized routes. Although non-motorized routes may have lesser impacts to goshawk compared to motorized routes, non-motorized routes are included in this analysis because human disturbance potentially may pose some level of disturbance to nesting goshawk depending on the level and duration of use during the breeding season. Non-motorized routes associated with high use non-motorized trails, such as the Pacific Crest Trail, may have considerable impacts to goshawk if nest sites are located nearby. Goshawks are known to exhibit territorial behavior, and have been known to dive bomb hikers during critical breeding periods.

Cross Country Travel

Existing motor vehicle cross country travel is currently banned on 644 goshawk PAC acres for all the alternatives. If Alternative 1 were implemented, cross country travel would only be prohibited on these 644 acres. For all the action alternatives, the prohibition of cross country travel would benefit goshawk on an additional 20,036 PAC acres, where disturbance, avoidance, and abandonment would be reduced. Whereas, Alternative 1 would continue cross country travel within 20,036 PAC acres, including on existing unauthorized routes. The ban of cross country travel on unauthorized routes would benefit goshawk because motorized use would no longer occur on these routes, since disturbance associated with these routes would be eliminated.

Disturbance to Nesting Northern Goshawk

Protected Activity Centers

Considering the cumulative effects of all motorized and non-motorized routes on both NFS lands and non-NFS lands, indicates Alternative 1 would result in the most cumulative miles of routes (120 miles) within goshawk PACs on the Tahoe NF, and therefore poses the greatest overall potential risk and cumulative impacts to nesting goshawk on the Tahoe NF (Table 3.03-80) (Figure 3.03-6), where disturbance to nesting goshawk could result nesting failure and abandonment. All the action alternatives have similar cumulative route miles within PACs ranging from about 78 miles (Alternatives 3 and 4) to about 79 miles (remaining alternatives). Therefore, all the action alternatives would cumulatively benefit northern goshawk nesting where noise and other disturbance associated with motorized and non-motorized use would be reduced by at least 40 miles. Individual goshawk PACs would receive cumulative adverse effects of noise and disturbance from the direct and indirect impacts of motorized route additions to the NFTS and reopened ML 1 roads, however, overall cumulative effects to goshawk Forest-wide would be significantly beneficial.

Table 3.03-80. Cumulative Miles of All Routes within Tahoe NF Goshawk PACs

Miles	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Motorized route additions to NFTS* (negative impact)	42.3	0.9	0	0	1.0	1.0	0.8
Reopened ML 1 Roads	0	0.3	0	0	0.4	0.7	0
Unauthorized routes, where cross country travel would be prohibited (positive impact)	0	41.2	42.3	42.3	41.0	40.7	41.5
Cumulative effects of past, present, and proposed actions							
Existing motorized routes - NFS lands (negative impact)	69.6	69.6	69.6	69.6	69.6	69.6	69.6
Existing motorized routes on private land - non-NFS lands (negative impact)	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Existing non-motorized routes (negative impact)	7.7	7.7	7.7	7.7	7.7	7.7	7.7
Decommissioned routes (positive impact)	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Closed Roads (ML1 roads, closed by previous NEPA, but not implemented) (positive)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Total Cumulative Effects							
Total Cumulative Impact = Sum Total of Negative Impacts both positive and negative	**120.0**	**78.9**	**77.7**	**77.7**	**79.1**	**79.4**	**78.5**

*Motorized route additions - Alternative 1 includes existing unauthorized motorized routes associated with continued cross country travel.

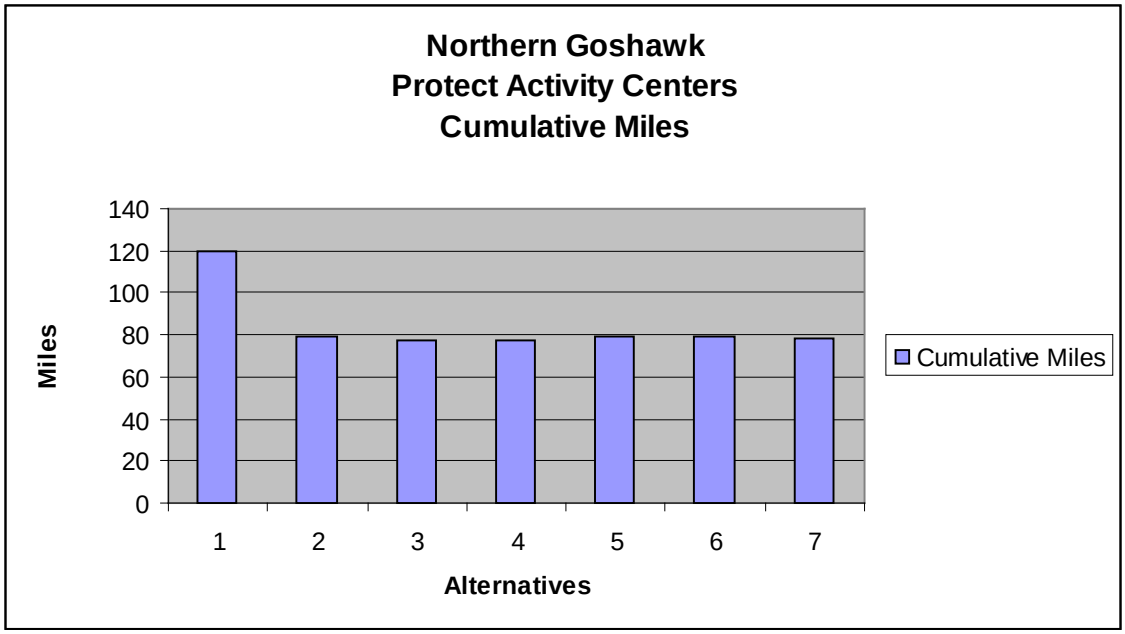

Figure 3.03-6. Cumulative Route Miles in Goshawk PACs

0.25 mile Radius Circle of Activity Centers (Nest Site or Nest Stand)

When analyzing the cumulative effects within the 0.25 mile radius circle of goshawk activity centers (nest site or nest stand), a similar theme emerges as compared to the cumulative effects of the proposed alternatives within PACs. Alternative 1 has the most cumulative route miles (74 miles) (Table 3.03-81) (Figure 3.03-7). The remaining action alternatives would reduce the cumulative miles to around 50 miles compared to Alternative 1. The actual miles of motorized routes additions that would potentially affect goshawk nest sites or nest groves, are very low (approximately range 0 to ~1 mile) across all goshawk territories on the Tahoe NF. Therefore, it can be concluded that implementing the alternatives would have very little additional cumulative impact to nesting goshawks on the Tahoe compared to Alternative 1. Alternative 1 clearly poses the greatest cumulative risk to nesting goshawk, with continued cross country motorized travel on 10,384 acres, including continued use on approximately 25 miles of existing unauthorized routes within 0.25 mile of goshawk activity centers. Of the action alternatives, Alternative 6 has the greatest cumulative motorized and non-motorized route miles (50.4 mi) and alternatives 3 and 4 would share the least cumulative motorized and non-motorized route miles (49.3 mi).

Table 3.03-81. Miles of All Routes within 0.25 mile of Tahoe NF Goshawk Activity Centers (nest site or nest stand)

Miles	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Motorized route additions to NFTS (negative impact)*	24.8	0.24	0	0.01	0.33	0.26	0.23
Reopened ML 1 roads (negative impact)	0	0.4	0	0	0.4	0.8	0
Unauthorized motorized routes prohibited to cross country travel (positive impact)	0	24.0	24.7	24.7	24.0	23.7	24.5
Cumulative effects of past, present, and proposed actions							
Existing motorized routes - NFS lands (negative impact)	41.1	41.1	41.1	41.1	41.1	41.1	41.1
Existing motorized routes on private land - non-NFS lands (negative impact)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Existing non-motorized routes (negative impact)	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Decommissioned routes (positive impact)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Roads Closed with previous NEPA decision, pending implementation (positive impact)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Total Cumulative Effects							
Net Cumulative Impact = Sum Total of Negative Impacts minus positive impacts							
Miles of routes	**74.1**	**49.8**	**49.3**	**49.3**	**50.0**	**50.4**	**49.5**

*Motorized route additions - Alternative 1 includes existing unauthorized motorized routes associated with continued cross country travel.

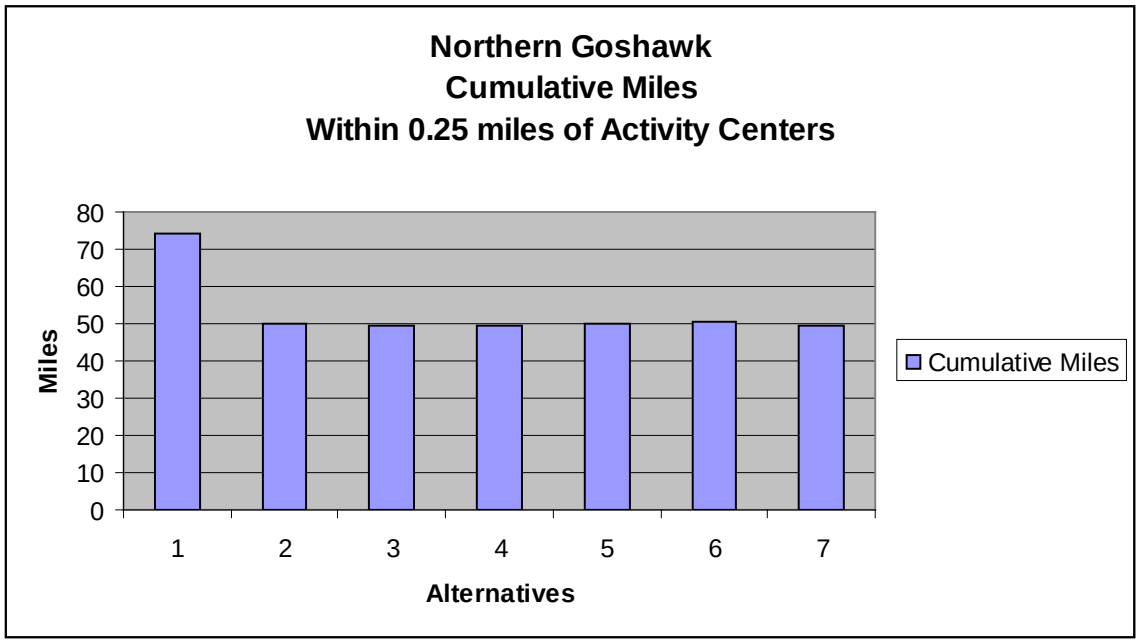

Figure 3.03-7. Cumulative Miles within 0.25 miles of Goshawk Activity Centers (Nest Site/Nest Stand)

Effects to Fragmentation and Edge Effects within Northern Goshawk Protected Activity Centers

Habitat fragmentation and edge effects were described for old forest coniferous associated species within old forest CWHR conifer types (4M, 4D, 5M, 5D, and 6) and within Old Forest Emphasis Areas (OFEAs)

under the section "Effects Common to All Late-seral Coniferous Associated Species." Those analyses provided a forest-wide view of how the alternatives affect spotted owl habitat fragmentation within late-seral coniferous forest habitats and OFEAs. This section provides a focused analysis of goshawk habitat fragmentation and edge effects (including noise disturbance) from motorized routes at the site-specific goshawk PAC scale, where known goshawk nest territories are located.

Indicators used to Measure Effects

Zone of Influence within PACs to assess potential habitat fragmentation and edge effects: In addition to determining the habitat fragmentation potential from zones of influence within suitable goshawk habitat within CWHR types 4M, 4D, 5M, 5D, and 6 (See effects to late-seral coniferous forest habitats in effects common to all late-seral coniferous forest associated species), zones of influence were determined within goshawk PACs at 400 meters (0.25 mile) of proposed motorized routes added to the NFTS and reopened ML 1 roads.

Direct and Indirect Effects of Additions to the NFTS and Reopened ML 1 Roads

400-meter Zone of Influence

Goshawk Protected Activity Centers are delineated land allocations (SNFPA 2004), comprised of the best available goshawk habitat, which are managed specifically for sustaining viable populations of goshawks. For all goshawk PACs on the Tahoe NF, the effects of the alternatives are analyzed for the amount of habitat fragmentation and edge effects are occurring by considering the Zone of Influence within goshawk PACs within 400 meters (0.25 miles) of motorized routes added to the NFTS (Table 3.03-82). Although absolute disturbance thresholds for goshawk are not readily available in the literature, Grubb et al. (1998) reported that goshawk were found to react negatively (flush) when noise associated with logging trucks occurred less than 400 meters (0.25 miles) from nests. Determining the proportion of a goshawk PAC that is influenced by motorized routes within 400- meters (0.25 mile) gives a relative index of habitat fragmentation or habitat effectiveness at the site specific goshawk territory scale.

Comparing the direct and indirect effects to goshawk PACs within a 400-meter Zone of Influence of proposed motorized routes indicates Alternative 1 reduces habitat effectiveness and associated habitat fragmentation (including noise disturbance) within PACs by 34%.

All the action alternatives would enhance overall habitat effectiveness compared to Alternative 1. When comparing the action alternatives, Alternative 5 reduces habitat effectiveness of goshawk PACs by 6%. Alternatives 2 and 6 each reduce habitat effectiveness within goshawk PACs by 2%. Alternative 4 and 7 each reduce habitat effectiveness of goshawk PACs by 1%. Habitat effectiveness within goshawk PACs would be enhanced by implementing Alternative 3 since no additions to the NFTS are proposed and existing unauthorized routes would be prohibited to cross country travel.

Cumulative Effects of Additions to the NFTS and Reopened ML 1 Roads

400-meter Zone of Influence

Table 3.03-82 and Figure 3.03-8 display the cumulative effects of the proposed alternatives in combination with motorized and non-motorized routes on NFS and non-NFS lands. When comparing the cumulative effects of routes within a 400-meter Zone of Influence of goshawk PACs (by summing the direct and indirect effects of proposed alternatives and the cumulative effects of past, present, and future actions), Alternative 1 poses the greatest risk to goshawk PACs, where 83% of PAC acres are cumulatively affected within a 400 meter Zone of Influence of all routes both motorized and non-motorized, and, therefore, adversely impacts habitat connectivity and would result in increased noise disturbance associated with routes within goshawk PACs. In addition, Alternative 1 would contribute to continued route proliferation on 20,036 PAC acres because unmanaged cross country motorized travel would continue into the future.

All the action alternatives would result in beneficial and reduced cumulative impacts compared to Alternative 1, where approximately 51% to 53% of PACs would be cumulatively affected from all routes within the 400-meter Zone of Influence. Of the action alternatives, Alternatives 6 has the greatest cumulative impacts within goshawk PACs, but only slightly more than the remaining action alternatives All action alternatives would result in adding 0-2% increased cumulative impacts from the addition of motorized routes and reopened ML 1 roads, combined. Alternative 3 does not directly or indirectly affect habitat within the 400-meter Zone of Influence within goshawk PACs, and therefore no cumulative impacts would be added to the existing situation. In addition, under the prohibition of cross country travel (including the use on existing unauthorized motorized routes) all action alternatives would benefit from reduced motorized disturbance on 30 to 35% of goshawk PAC acres compared to the No Action Alternative. Over time, existing unauthorized routes would eventually become revegetated and recover. The rate of recovery would depend on the site specific vegetation and soil conditions.

Table 3.03-82. Cumulative Effects - Proportion of Goshawk Protected Activity Centers within a 400-meter (0.25 mile) Zone of Influence of All Routes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Motorized route additions to NFTS (negative impact)[1]	32%	1%	0%	0.3%	1.3%	2.3%	0.7%
Reopened ML 1 Roads	0%	0.2%	0%	0.1%	0.9%	0.5%	0.0%
Motorized routes prohibited to cross country travel (positive impact)	0	31%	35.4%	35.1%	30.4%	30.2%	31.3%
Cumulative effects of past, present, and proposed actions							
Existing motorized routes - NFS lands (negative impact)	36%	36%	36%	36%	36%	36%	36%
Existing motorized routes on private land - non-NFS lands (negative impact)	9.6%	9.6%	9.6%	9.6%	9.6%	9.6%	9.6%
Existing non-motorized routes (negative impact)	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Decommissioned routes (positive impact)	4%	4%	4%	4%	4%	4%	4%
NFTS roads closed with NEPA, pending implementation	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%
Total Cumulative Effects							
Overall Cumulative Effects equals the total of all impacts, both positive and negative	**82.6%**	**51.8%**	**50.6%**	**51.0%**	**52.8%**	**53.4%**	**51.3%**

[1] Alternative 1 includes the existing unauthorized routes, while all action alternatives include motorized route additions to the NFTS .

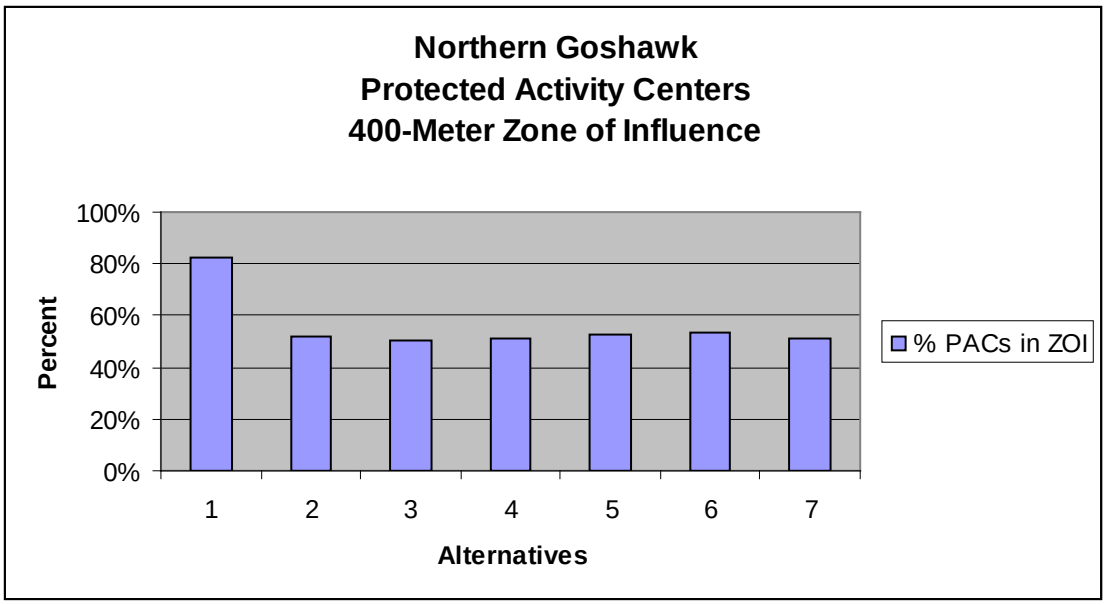

Figure 3.03-8. Cumulative Effects of All Routes within a 400-meter Zone of Influence within Tahoe NF Northern Goshawk PACs

Cumulative Effects from Past, Present and Future Vegetation/Fuels Management Projects and Past Wildfires

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on NFS lands and private lands within the Tahoe NF

boundary. Some, but not all, of these activities would contribute to impacts to the Northern goshawk within the cumulative effects boundary.

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. The following information summarizes recent past cumulative impacts from wildfires and fuels/vegetation projects that have impacted goshawk habitats.

Between 1994 and 2008, several wildfires resulted in burning approximately 11,000 acres of suitable goshawk acres burned affecting 14 goshawk PACs affecting approximately 1,400 acres within goshawk PACs. In some cases, goshawk PACs were rendered unsuitable for nesting, and in other cases low or moderate severity fires retained habitat conditions suitable for nesting. Since 1990, more than 130,000 acres of vegetation management activities have occurred on the Tahoe NF. Some, but not all have resulted in impacts to goshawk habitats. Between 2001 and 2008, approximately 17,000 acres of forest vegetation and fuels thinning and mastication projects were completed, which were designed to reduce the risk of additional habitat loss to wildfires. These treatments generally do not result in habitat removal, but may result in habitat quality changes.

Although the timeframe for assessing cumulative effects is 20 years in the past, it is important to describe past cumulative effects that are still affecting goshawk habitat on the landscape at present from past activities that occurred prior to 20 years ago. Between 1960 and present, private land harvest within the boundaries of the Tahoe NF has resulted in approximately 95,000 acres of vegetation treatments including clearcuts, sanitation, shelterwood, and thinning. Much of the private land harvest has resulted in the loss or reduction in goshawk habitat. These wildfires and vegetation treatment projects have resulted in a reduction in the amount and quality of goshawk habitat on the Tahoe NF since 1960.

Thinning projects designed to reduce hazardous fuels would continue to be the primary activity affecting goshawk habitat on the Tahoe (see Appendix H, Reasonably Foreseeable Projects and Cumulative Effects). Although these treatments may reduce habitat quality (i.e. nesting habitat reduced to foraging habitat), it is expected that suitable habitat would be maintained, and it is anticipated that these treatments would reduce the amount goshawk habitat potentially lost from future stand replacing wildfires (USDA Forest Service 2004). The California Department of Forestry and Fire Protection currently lists approximately 12,000 acres of private land within the Tahoe NF administrative boundary for which timber harvest plans have been submitted. Timber harvest on private lands is generally more intensive and does not typically maintain habitat in a suitable condition for goshawk.

Sensitive Species Determinations

The Tahoe NF Biological Evaluation for Birds, Mammals, Amphibians, Reptiles, Fish, and Invertebrates is incorporated by reference in the Project Record. Based on the northern goshawk analysis of effects, the Biological Evaluation for the Tahoe NF Travel Management EIS made a determination that

implementation of all the actions alternatives may affect northern goshawks, but are not likely to lead to a trend toward listing or a loss in population viability.

Although some habitat fragmentation and edge effects would occur from the action alternatives, none of the action alternatives would likely cause enough fragmentation to be a concern to goshawk population viability on the Tahoe NF when considering the combined effects of the alternatives and the additional activities occurring within the cumulative effects analysis area. Based on this information, the alternatives as proposed are not expected to result in a loss of viability or lead to a trend toward Federal listing for the northern goshawk. The alternatives would not likely affect Forest-wide northern goshawk population trends. However, the uncertainty of long term effects to goshawk from future increases in motorized vehicle use on NFS lands poses an unknown risk. It is expected that recreation and motorized use on NFS lands will increase. Alternative 1 could cause long-term chronic effects to northern goshawk from increased motorized route proliferation over time, and therefore may contribute to downward population trends on the Tahoe NF.

When considering the direct, indirect, and cumulative impacts to goshawk, Alternative 1 poses a considerable risk to nesting goshawk on the Tahoe NF where 32% of the PAC acres within a 400-meter Zone of Influence would be impacted by continued cross country travel, including use on existing unauthorized routes. In addition, continued use on existing unauthorized routes under Alternative 1 would result in directly and indirectly affecting 68% (66 out of 97) total PACs on the Tahoe NF. Cross country travel would continue to increase and proliferate. Goshawk are extremely sensitive to human disturbance during the breeding season where continued motorized route proliferation could impact the productivity of nesting goshawk which could cause chronic impacts which may ultimately affect the abundance and distribution of goshawk on the Tahoe NF.

All the remaining action alternatives would considerably reduce the impacts associated with motorized use of existing unauthorized routes through the prohibition of cross country travel. Alternatives 5 and 6 are similar in their impacts to the goshawk. Under Alternative 6, a total of 1.6 miles of route additions and reopened ML 1 roads would impact 6 goshawk PACs, and Alternative 5 would result in impacts to 7 PACs totaling 1.4 miles of route additions and reopened ML 1 roads. Alternatives 2 and 7 follow with decreasing route miles added to the NFTS, affecting 2-3 PACs totaling approximately 1 mile. Alternatives 3 and 4 do not propose any route additions or reopening ML 1 roads, and therefore would not affect nesting goshawk.

All the action alternatives would influence between 0-3% of PAC acres within a 400-meter Zone of Influence of motorized route additions and reopened ML 1 roads, and therefore would not affect the distribution and abundance of goshawk on the Tahoe NF. Therefore, the action alternatives do not affect habitat or population trends on the Tahoe NF.

Compliance with the Forest Plan and Other Direction

The Tahoe NF LRMP, as amended by the SNFPA ROD (2004) provided management standards and guidelines for the Northern goshawk as follows:

Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb nest sites (Management Standard & Guideline 82).

Alternatives under the Tahoe NF Travel Motorized Management Project were evaluated for their potential to disturb Northern goshawk nest sites at two scales - (1) within goshawk Protected Activity Centers (PACs) and (2) within a 0.25 mile radius of known nest sites or activity centers. Analysis of the alternatives indicates Alternative 1 disturbs nest sites the most from allowing cross country travel to continue on 20,036 PAC acres, affecting 68% of PACs from 42 miles of existing unauthorized routes. Compared to Alternative 1, the action alternatives all reduce overall effects to goshawk PACs by prohibiting cross country travel on 20,036 PAC acres, where disturbance to approximately 30% of PAC acres within a 400-meter Zone of Influence would be substantially reduced, and thereby benefiting nesting goshawk on the Tahoe NF. The analysis of the alternatives within 0.25 mile of activity centers (i.e. nest sites) indicates a similar pattern as found for goshawk PACs. Under the action alternatives, at least 95% of existing unauthorized routes would be prohibited to cross country travel within 0.25 miles of nest sites or nest stands.

Forest Carnivores: American Marten, Pacific Fisher, Sierra Nevada Red Fox and Wolverine

Forest Carnivores include the American marten, Pacific fisher, the Sierra Nevada red fox, and Wolverine. The Sierra Nevada red fox and the wolverine are addressed under the Wide-ranging Carnivore Group. This section will focus on the marten and fisher. Impacts to the marten and fisher will be considered together, since effects to these species are similar. More detailed information for these species can be found in the Biological Evaluation and Management Indicator Species reports, which are hereby incorporated by reference. Limited research or information on road and trail impacts to Forest Carnivores is available in the literature, but some information is available as described below for species considered here.

The Tahoe NF developed a Forest Carnivore Network in 1998 by modeling suitable marten and fisher habitat using a focal mean analysis based on the home ranges of marten and fisher. The purpose of the Forest Carnivore Network is to provide a framework for managing and maintaining linkages and connectivity for Forest Carnivore species including the marten, fisher, Sierra Nevada red fox, and the wolverine. Forest Carnivores are considered to be interior Forest Species where habitat fragmentation is a concern.

American Marten and Pacific Fisher: Affected Environment

Martens 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).

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). As landscapes become fragmented, the combination of increasing isolation and decreasing patch size of suitable habitat compounds the results of simple habitat loss (Andren 1994). For species like marten, this is likely to result in a decrease of greater magnitude than can be explained solely by the loss of suitable habitat. Marten may be a species that demonstrate exponential population declines at relatively low levels of fragmentation (Bissonette et al. 1997, *in* USDA Forest Service 2004).

The Tahoe NF falls within an area considered to be a distribution gap within the range of the fisher (Zielinski et al. 2005). However, roads can impact fisher in ways similar to the marten through direct mortality and habitat fragmentation. Suitable habitat for the fisher occurs primarily on the west side of the Tahoe NF.

Summary of road and trail associated factors to marten and fisher:

- Mortality or injury resulting from a motorized vehicle running over or colliding with an animal
- Loss and resulting fragmentation of habitat due to the establishment of roads or trails and associated human activities
- Changes to habitat microclimate associated with the edge induced by roads or trails
- Reduction in density of snags and down logs due to their removal near roads as facilitated by road access
- Collection of live animals for use as pets as facilitated by the physical characteristics of roads or trails or by road or trail access
- A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise
- Displacement of individual animals from a specific location that is being used for reproduction and rearing of young
- Increase in heart rate or stress hormones when near a road or trail

Based upon a review of the literature, fisher and marten were found likely to be affected by the same road and motorized trail-associated factors: trapping, poaching, collisions, displacement or avoidance, habitat loss or fragmentation, snag reduction, down log reduction, edge effects, movement barrier or filter, and route for competitors (Gaines et al. 2003, Buskirk and Ruggierro In USDA 1994). These factors are discussed below.

Human-caused mortality: Marten are known for their vulnerability to trapping in many parts of their range. In California, however, body-gripping traps have been banned since 1998 and, as a result, the likelihood of incidental capture of marten by legal fur trapping has been dramatically reduced. Illegal harvest threats remain and could increase in relation to greater accessibility. At present, illegal trapping or shooting of marten is not known to be a substantial source of mortality (USDA Forest Service 2001). The increased opportunity for poaching provided by increased public access may represent a substantial risk for fisher, based upon findings in the southern Sierra Nevada. Of nine recently documented fisher

mortalities, two were suspected of being the result of poaching (Truex et al 1998 In USDI Fish and Wildlife Service 2004).

Collision: Highways and roads can result in the direct and indirect mortality of martens and fisher. Road collisions with vehicles have been identified as a source of marten mortality (Buskirk and Ruggerio 1994), including in the Sierra Nevada (Spencer 1981, Martin 1987), and fisher mortality (Heinemeyer 1993 In USDA 2001). Marten and fisher road mortality from highway collisions on the Tahoe NF may be of concern since Interstate-80, and State Highways 89, 49, and 20 bisect their habitat. Approximately 3.4 percent of 147 radio-collared fishers studied in Massachusetts (York 1996) and Maine (Krohn et al. In USDA 1994) were killed by vehicles. The risk of collision mortality increases with road density, but possibly increases with the density of highways and freeways where vehicle speeds are highest. Collisions are much less likely to occur along the slower-speed native surface roads and trails that are being evaluated in this project.

Habitat Loss and Fragmentation, Edge Effects, Movement Barriers, Displacement or Avoidance: Roads and trails can fragment habitat, thus affecting the ability of marten and fisher to use otherwise suitable habitat on either side of the route. Martens are known to be sensitive to changes in overhead cover, such as can result from roads or trails (Hargis and McCullough 1984, USDA 1994). Roads can contribute to habitat fragmentation for fisher as well because fishers generally avoid entering "Open Areas" that have no overstory or shrub cover; roads, and the associated presence of vehicles and humans can cause animals to modify their behavior near roads (USDA Forest Service 2001). Previous studies have reported a negative correlation between detections of fisher and roads (Dark 1997, Golightly et al. 2006). Road construction associated with timber harvest activities could directly and indirectly affect fishers. If fishers avoid areas in proximity of roads, then these areas constitute habitat loss.

The loss and fragmentation of suitable habitat by roads and development is thought to have played a significant role in both the loss of fisher from the central Sierra Nevada and its failure to re-colonize this area (USFWS 2004). Campbell (2004, *in* USFWS 2004) found that sample units within the central and southern Sierra Nevada region occupied by fishers were negatively associated with road density. This relationship was significant at multiple spatial scales (from 494 to 7,413 acres). The USFWS (2004) concluded that, "vehicle traffic during the breeding season in suitable habitat may impact foraging and breeding activity" and that "hiking, biking, off-road vehicle and snowmobile trails, may adversely affect fishers." Dark (1997) found that fishers in the Shasta-Trinity National Forest used landscapes with more contiguous, unfragmented forests and less human activity. These indirect effects on fisher habitat could negatively affect the ability for fishers to be successfully reintroduced to the Tahoe NF.

Robitaille and Aubrey (2000), studied marten in an area of low road density and traffic (primarily logging roads), and found that marten use of habitat within 300 and 400 meters of roads was significantly less than habitat use at 700 or 800 meters distance. Although marten are detected in close proximity to roads, it appears that significantly less marten activity occurs within these zones.

If highways, with their high traffic speeds, jersey barriers, and often steep side-slopes, limit the success and frequency of marten crossings, then effects on marten dispersal may be of concern. Interstate I-80 and State highways 89, 49, and 20 bisect marten habitat. If marten avoid these highways, then marten

populations could become fragmented into small isolated populations. In their assessment of connectivity in the California landscape, Penrod et al. (2001) identified Interstate-80 in particular as a threat to wildlife movement, and roads and highways in general as the most common barriers to movement.

Roads may decrease prey and food availability for marten and fisher (Allen 1987) due to prey population reductions from road kills and/or behavioral avoidance of roads. Occasional one and two lane forest roads with moderate levels of traffic should not limit marten movements.

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/OSV use at the other locations is no greater than reported in their study.

Standards and guidelines in the Sierra Nevada Forest Plan Amendment ROD (2004), provides management direction for habitat connectivity for old forest associated species to “minimize old forest habitat fragmentation” and “assess the potential impacts of projects on the connectivity of habitat for old forest associated species,” particularly marten and fisher.

Snag and Down Log Reduction: 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 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 and fisher habitat (USDA 1994). Hazard tree removal along roads will reduce numbers of snags (future down logs) within a distance of about 60 meters alongside roads. In addition, motorized routes provide access for fuelwood collection, which would also contribute to decreased levels of snag and down wood within roadside corridors. However, snag removal within 60 meters of roads may be incidental compared to the displacement and avoidance factors that seem to influence marten habitat use adjacent to motorized routes.

Disturbance at Meadows (Marten only): Various studies in the Sierra Nevada indicate marten have a strong preference for meadows and forest-meadow edges for foraging (USDA Forest Service 2001). While marten use small openings, and particularly meadows for foraging, these openings must occupy 25 percent or less of the landscape (Hargis and Bissonette 1999; Potvin et al. 2000). Microtine rodents (meadow voles) are important for the marten diet, and therefore, the quality of meadow habitat (especially meadows surrounded by mature lodgepole and red fir forests) influences the quality of marten habitat (Spencer et al. 1983). Routes that are adjacent to and intersect meadows can alter meadow hydrology and vegetation which may have a negative effect on prey abundance. The combination of route use and increased human activity, as well as the potential impacts of routes upon meadow vegetation, may result in loss of these more easily exploitable “prey patches.”

American Marten and Pacific Fisher: Environmental Consequences

Based upon a review of the literature, fisher were found likely to be affected by the same road and motorized trail-associated factors as marten: trapping, poaching, collisions, displacement or avoidance, habitat loss or fragmentation, snag reduction, down log reduction, edge effects, movement barrier or filter, and route for competitors (Gaines et al. 2003, Buskirk and Ruggierro In USDA 1994). The current absence of fisher on the Tahoe NF renders temporal risk factors moot, but this analysis will be conducted to analyze impacts of the alternatives to fisher if populations were to be re-established on the Tahoe NF.

Environmental consequences for marten and fisher are analyzed at three different scales - within old forest coniferous habitat (defined as CWHR types 4M, 4D, 5M, 5D and 6), Old Forest Emphasis Areas (OFEAs), and Tahoe NF Forest Carnivore Network. Old forest coniferous habitat is considered to be suitable for marten (USDA 2004). The OFEAs, as previously described, are land allocations designated to manage for old forest dependent species, including marten. Although no management direction is specifically designated within the Tahoe NF Forest Carnivore Network, the network provides a broad framework for considering habitat connectivity issues for Forest Carnivores, including the marten. These three scales are used for comparison, since habitat connectivity within these habitats are important considerations for marten populations. Although all 3 scales have considerable overlap because older forest types are included in all of them, there are slight differences between them because they were derived in different manners. The old forest coniferous habitat types are comprised of individual patches of habitat types that may not necessarily be connected, whereas both the OFEAs and the Carnivore Network incorporates larger blocks of older forest types.

Indicators used to Measure Effects

Cross Country Travel and Establishment of "Open Areas": Cross country travel and establishment of "Open Areas" are evaluated for the alternatives to determine the impacts to fisher and marten habitats within old forest coniferous CWHR habitat, Old Forest Emphasis Areas (OFEAs), and Tahoe NF Forest Carnivore Network.

Additions to the NFTS and Reopened ML 1 Roads: Motorized route additions to the NFTS and reopened ML 1 roads are evaluated for their potential to directly and indirectly affect marten and fisher habitats by assessing the Zone of Influence within 300 meters and meadow habitats as described below.

Zone of Influence: Studies indicate marten habitat use declines within a distance within exceeding 300 meters from roads. For this analysis, the proportion of marten habitat occurring within a Zone of Influence of 300 meters from motorized routes was determined. Within this zone, some factors would be expected to influence a smaller area (probably about 60 meters) adjacent to motorized routes; thus a second Zone of Influence of 60 meters was analyzed for the DEIS and is available in the Project Record. These factors include changes to habitat such as fragmentation, edge effects, and the reduction of snags and down wood. Thresholds associated with these measures have not been established, but relative changes in habitat effectiveness for marten and fisher can be evaluated and compared.

Meadows Affected by Motorized Routes (Marten only): In the Sierra Nevada, marten are known to have a strong preference for meadows and forest-meadow edges for foraging (USDA Forest Service

2001). The number of meadows that are intersected by miles of motorized route additions and reopened ML 1 roads is used to measure the effects on wet meadow habitat important for the marten.

Changes to the NFTS (Change in Class of Vehicles and Wet Weather Seasonal Restrictions): The effects of Change in class of vehicles and wet weather seasonal restrictions are discussed previously under the section "Effects Common to All Old Forest Conifer Associated Species."

Direct and Indirect Effects: American Marten and Pacific Fisher

Cross Country Travel

Motorized cross country travel is not prohibited under Alternative 1, where habitat for American marten and Pacific fisher habitat would be at risk of habitat fragmentation, disturbance, avoidance, and abandonment from motorized use within 394,847 OFEA acres, 267,952 late-seral habitat (CWHR 4M, 4D, 5M, 5D, and 6) acres, and 396,602 Carnivore Network acres (acres may overlap). All the action alternatives prohibit cross country travel on over 250,000 acres of marten and fisher habitat, where habitat fragmentation, disturbance, avoidance, and abandonment would be reduced.

Establishment of "Open Areas"

Alternative 2 establishes motorized "Open Areas" at Greenhorn (60 acres), and Reservoir Areas at Stampede, Boca, and Prosser Reservoirs (2,589 acres). Alternative 6 establishes 244 acres of "Open Areas" at the reservoirs. In general, suitable habitat for marten and fisher is not available in these areas, and therefore motorized use of these areas would not alter habitat for these species. The Greenhorn area is below the elevation range for the marten. The reservoirs' "Open Areas" are also devoid of vegetation and occur within eastside pine and sagebrush/bitterbrush habitats that are generally not important for these species. If animals are traveling through in the vicinity of these "Open Areas," some direct disturbance could occur, although this is expected to be low.

Zone of Influence

Additions to the NFTS (300-meter Zone of Influence): The proportion of Carnivore Network, OFEAs, and Old Forest CWHR types within a 300-meter Zone of Influence of motorized route additions is displayed in Table 3.03-83.

Within a 300-meter Zone of Influence, Alternative 1 would result in the greatest amount of habitat fragmentation and reduced habitat connectivity within the Carnivore Network, late-seral coniferous forest habitat, and within OFEAs, where marten and fisher habitat suitability may be reduced. Alternative 1 results in contributing to 27% reduction in habitat connectivity within the Carnivore Network, a 22% reduction in habitat connectivity in Old Forest Emphasis Areas, and a 22% reduction in habitat connectivity in Old Forest habitat types

Within a 300-meter Zone of Influence, all the action alternatives would increase habitat connectivity within the Carnivore Network OFEAs, and old forest CWHR habitats compared to Alternative 1. Alternative 3 would improve habitat connectivity the greatest, and Alternatives 5 and 6 would reduce

habitat connectivity the least. The differences between the action alternatives would result in affecting from 0 to 2% within a 300 meter Zone of Influence of motorized route additions.

Table 3.03-83. Percent of Carnivore Network, OFEAs, and Old Forest Habitat (CWHR 4M, 4D, 5M, 5D, 6) within a 300-meter "Zone of Influence" of motorized route additions to the NFTS

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Carnivore Network	27%	2%	0%	1%	2%	2%	1%
Old Forest Emphasis Areas (SNFPA)	22%	1%	0%	<1%	2%	2%	<1%
Old Forest Habitat (CWHR 4M, 4D, 5M, 5D, 6)	22%	1%	0%	1%	2%	2%	1%

* Alternative 1 includes the existing unauthorized routes, while all action alternatives include proposed motorized route additions to the NFTS.

Reopened ML 1 Roads (300-meter Zone of Influence): Alternatives 1 and 3 do not propose to reopen any ML 1 roads within the Carnivore Network, OFEAs, and old forest CWHR habitats, and would not affect habitat effectiveness. Alternative 5 proposes to open the most ML 1 roads where approximately 2% of the Carnivore Network, OFEAs, and old forest CWHR habitats would be directly and indirectly affected. The remaining action alternatives would affect up to 0.2% of the Carnivore Network, OFEAs and old forest CWHR habitat from reopening ML 1 roads as shown in Table 3.03-84. This represents a small influence from reopened ML 1 roads within the Carnivore Network, OFEAs, and old forest CWHR habitat, which would not increase habitat fragmentation and would therefore maintain habitat connectivity for marten and fisher across the Tahoe NF.

Table 3.03-84. Percent of Carnivore Network, OFEAs, and Old Forest Habitat (CWHR 4M, 4D, 5M, 5D, 6) within a 300-meter "Zone of Influence" of reopened ML 1 roads

Alternatives	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Carnivore Network	0%	0.1%	0%	0.2%	2.2%	0.3%	0.1%
Old Forest Emphasis Areas (SNFPA)	0%	0.1%	0%	0.1%	1.7%	0.2%	0%
Old Forest Habitat (CWHR 4M, 4D, 5M, 5D, 6)	0%	0.1%	0%	0.1%	1.8%	0.2%	0%

Wet Meadows (Marten only)

Cross Country Travel: Motorized cross country travel would continue under Alternative 1, no action, where wet meadows providing foraging habitat for marten could receive damage from motorized vehicle use. However, under current policy, it is illegal to cause resource damage in wet meadows. Under all the action alternatives motorized cross country travel would be prohibited on 9,167 acres of wet meadow across the Forest, where marten prey habitat would benefit.

Additions to the NFTS: The number of wet meadows that are intersected by proposed motorized route additions for the alternatives is shown in Table 3.03-85. Out of 518 wet meadows on the Tahoe NF, Alternative 1 would result in 87 meadow sites (17%) intersected by 16 miles of existing unauthorized routes. Motorized use on these existing unauthorized routes could directly disturb marten while foraging within and adjacent to these 87 meadow sites. These 16 miles of routes intersecting marten meadow

habitat could continue to receive cross country travel with the potential to indirectly affect the distribution and abundance of marten and its prey species. Routes through meadows can result in changes in meadow condition, particularly from meadow drying, loss of meadow vegetation, and through soil compaction and/or erosion. Loss of meadow vegetation and drying of meadows can affect the abundance and distribution of prey species available to marten, particularly meadow voles.

All the action alternatives would greatly reduce the impacts to wet meadows compared to Alternative 1. Amongst the action alternatives, Alternative 6 intersects the greatest number of meadows (25) for over 1 mile of motorized route additions. The majority of these additions are routes which access dispersed sites (33 out of 39 routes). The majority of the dispersed routes are short spur routes that total less than 0.10 miles in length. Alternatives 2 and 5 would each result in 9 wet meadows (2%) that are intersected by motorized route additions to the NFTS. Alternatives 4 and 7 result in approximately less than 1% wet meadows intersected by motorized route additions. Alternative 3 does not propose any motorized route additions, and therefore would not affect marten prey species within wet meadows.

Table 3.03-85. Meadows Intersected by Motorized Route Additions to the NFTS

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number of Wet Meadows Intersected by motorized route additions (518 total)	87	9	0	3	9	25	2
Percent Wet Meadows Affected	17%	2%	0%	<1%	2%	5%	<1%
Miles of Route Additions Intersecting Wet Meadows	16.2	0.5	0	0.04	0.5	1.35	0.31

*Alternative 1 includes unauthorized routes associated with continued cross country travel while all the action alternatives include motorized route additions.

Reopened ML 1 Roads: Only Alternative 5 would reopen ML 1 roads with the potential to adversely affect 2 meadows totaling 0.3 miles, which could affect the distribution and abundance of marten and its prey. Although this only represents less than 1% of all wet meadows on the Tahoe NF, there could be site specific impacts where meadow degradation may occur from use on these roads. Refer to Table 3.03-86.

Table 3.03-86. Meadows Intersected by Reopened ML 1 Roads

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number Wet Meadows Intersected by motorized route additions (518 total)	0	0	0	0	2	0	0
Percent Wet Meadows Affected	0%	0%	0%	0%	<1%	0%	0%
Miles of Reopened ML 1 Roads Intersecting Wet Meadows	0	0	0	0	0.3	0	0

Summary of Direct and Indirect, Impacts to American Marten and Pacific Fisher

When considering all the direct, indirect, and cumulative impact to the American marten and the Pacific fisher within American marten and Pacific fisher habitat, Table 3.03-87 summarizes the overall net effect to the American marten and Pacific fisher from the proposed actions from motorized route additions to the NFTS, prohibition of cross country travel, and change in seasonal of use.

Table 3.03-87. American marten and Pacific fisher - Summary of Overall Net Direct and Indirect Effects

				Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel										
Trend of Effect				Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Cross Country Travel Prohibited	**Carnivore Network**			0	401,428	401,428	401,428	401,428	401,428	401,428
	OFEAs			0	398,060	398,060	398,060	398,060	398,060	398,060
	Old Forest CWHR Types			0	268,895	268,895	268,895	268,895	268,895	268,895
Motorized Route Additions to the NFTS										
Trend of Effect				Negative	Minimal Negative Effects	No Effect	Minimal Negative Effects	Minimal Negative Effects	Minimal Negative Effects	Minimal Negative Effects
ZOI	**Carnivore Network**			27%	2%	0%	1%	2%	2%	1%
	OFEAs			22%	1%	0%	<1%	2%	2%	<1%
	Old Forest CWHR types			22%	1%	0%	1%	2%	2%	1%
Routes In Wet Meadows (miles)				16.2	0.5	0	0.04	0.5	1.35	0.31
Establishment of "Open Areas"				No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Changes to the NFTS	**Change in Season of Use**			No Effect	No Effect	No Effect	Beneficial from reduced disturbance	Beneficial from reduced disturbance	Beneficial from reduced disturbance	No Effect
	Change in Class of Vehicles			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Reopened ML 1 Roads	**Trend of Effect**		No Effect	No Effect	No Effect	Negative	Negative	No Effect	No Effect
		ZOI	**Carnivore Network**	0%	0.1%	0%	0.2%	2.2%	0.3%	0.1%
			OFEAs	0%	0.1%	0%	0.1%	1.7%	0.2%	0%
			Old Forest CWHR	0%	0.1%	0%	0.1%	1.8%	0.2%	0%
		In Wet Meadows (miles)		0	0	0	0	0.3	0	0
Amendments to the Forest Plan				No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Overall Net Effect of Proposed Actions	Negatively affects 22-27% habitat in ZOI, and where motorized cross country travel continued on unauthorized routes affecting between 268,895 and 401,428 acres.	3rd most beneficial alternative, route additions affects between 1-2% habitat in ZOI. Benefits from cross country travel prohibited on 268,895 and 401,428 acres.	Most beneficial alternative from since no routes added or reopened. Benefits from cross country travel prohibited on 268,895 and 401,428 acres.	2nd most beneficial alternative shared with Alt 7; about 1% habitat affected in ZOI of route additions. Benefits from motorized cross country travel prohibited on 268,895 and 401,428 habitat acres.	5th most beneficial alternative, approx. 4% habitat affected from ZOI of route additions and reopened ML 1 roads. Benefits from motorized cross country travel prohibited on 268,895 and 401,428 habitat acres.	4th most beneficial alternative; approx. 2% habitat affected in ZOI of route additions. Benefits from motorized cross country travel prohibited on 268,895 and 401,428 habitat acres.	2nd most beneficial altenative shared with Alt 4; about 1% habiat affected in ZOI of route additions. Benefits from motorized cross country travel prohibited on 268,895 and 401,428 habitat acres.

*Alternative 1 includes existing unauthorized routes that would continue with the continuance of cross country travel, while all the action alternatives include proposed route additions.

Cumulative Effects

Indicators to Measure Cumulative Effects

Motorized Route Density: The magnitude of effects caused by habitat loss and fragmentation, displacement or avoidance, routes for competitors will correspond, to some degree, with the density of motorized routes and the associated extent of public access and use. Marten have been found to be less active near motorized routes, and higher densities of motorized routes are therefore likely to result in less marten activity or occurrence in an area. In general, several studies indicate that factors associated with higher route densities are negatively correlated with numbers of marten and fisher. Habitat fragmentation effects also increase in relation to increased route densities. Forest Plan standards and guidelines direct that projects "minimize old forest habitat fragmentation" and emphasize old forest habitat connectivity. Since the "Old Forest Emphasis Area" land allocation and the Tahoe Forest Carnivore Network are intended to provide for structurally complex forests and connectivity of old forest habitat, route densities within this land allocation are evaluated.

Cross Country Travel: Cumulative effects of Motorized cross country travel are compared for the alternatives within Carnivore Network, OFEAs, and Old Forest CWHR habitats.

300 meter Zone of Influence: The cumulative effects within a 300-meter Zone of Influence of motorized and non-motorized routes are evaluated at three scales-- Carnivore Network, OFEAs, and old forest CWHR habitat types. The three scales are similar in attributes and overlap in some locations, but vary slightly in terms of patch size, distribution, and condition across the Tahoe NF landscape. Each of the scales was developed with different criteria. Analyzing the Zone of Influence within the three scales provide a relative comparison of how different types of "old forest" designations may be affected by motorized and non-motorized activities resulting in changes to habitat connectivity for marten and fisher at a large landscape scale.

Cumulative Effects of Motorized Route Density

The proportion of area with moderate to high motorized route densities (greater than 2 miles per square mile) are shown in Table 3.03-88 within old forest CWHR habitat types (4M, 4D, 5M, 5D and 6), Old Forest Emphasis Areas, and the Tahoe Forest Carnivore Network for each of the alternatives. Habitat connectivity for marten within these areas is an important consideration, since higher route densities may affect marten population densities. Alternative 1 would result in 86% to 89% of areas managed for marten (OFEAs-89%, Carnivore Network-87%, and old forest coniferous habitat - 86%) with motorized route densities that are greater than 2 miles per square mile. Since marten may demonstrate population declines at relatively low levels of fragmentation (USDA Forest Service 2001), Alternative 1 could result in population declines, especially since cross country motorized travel would continue and motorized route proliferation would be expected to increase over time.

The action alternatives result in about 10% less of the landscape with moderate to high motorized route densities when compared to Alternative 1. These alternatives result 74-80% of areas managed for marten (OFEAs, Forest Carnivore Network, and late-seral coniferous forest forests) with route densities

exceeding 2 miles per square mile, which is still relatively high. The majority of the areas with higher route densities are comprised of the existing road system. Also, the majority of marten and fisher habitats have route densities of 2-4 mi/mi^2.

As motorized route densities are reduced, habitat connectivity for marten and fisher are likely to be improved (Robitaille and Aubry 2000). The connectivity of higher elevation habitats that are not as affected by motorized routes is improved substantially in the action alternatives as compared to the Alternative 1. On the Tahoe NF, there are 11 Inventoried Roadless Areas (IRAs). These areas include Westside mixed conifer, red fir and lodgepole pine types that are preferred habitat for marten in the Sierra Nevada (USDA Forest Service 2001) and increase the size and connectivity of undisturbed habitat that occurs in the wilderness areas. Since Alternative 3 does not add any motorized routes to the NFTS in IRAs, it provides greater connectivity of marten and fisher habitat as compared to the other alternatives which propose some motorized route additions to the NFTS within these areas.

Table 3.03-88. Proportion of Tahoe NF Lands with Motorized Route Densities greater than 2 miles/square mile within Old Forest CWHR type, Old Forest Emphasis Areas, and Tahoe Carnivore Network

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Old forest CWHR types (4M, 4D, 5M, 5D, & 6)	86%	75%	75%	75%	78%	75%	75%
Old Forest Emphasis Areas	89%	76%	76%	76%	81%	78%	76%
Carnivore Network	87%	74%	74%	74%	78%	75%	74%

*For Alternative 1, route density within mature and old forest coniferous habitat (CWHR 4M, 4D, 5M, 5D & 6), Old Forest Emphasis Areas (OFEAs), and Carnivore Network includes existing motorized unauthorized routes, as well as existing NFTS routes and non-NFTS routes.

Cross Country Travel

Table 3.03-89 shows the acres of cross country travel prohibited to motor vehicle use for the alternatives, including proposed cross country prohibitions and current prohibitions designated under the Tahoe Land Management Plan (LRMP). Cross country travel would continue under Alternative 1on between 268,895 and 401,428 acres where marten and fisher habitat would result in significant habitat fragmentation and disturbance from motorized cross country travel within the Tahoe NF Carnivore Network, OFEAs, and old forest CWHR types, all of which are important landscapes to maintain habitat connectivity and integrity. Under Alternative 1, only existing LRMP motorized cross country prohibitions on 17,892 and 39,428 acres would occur.

All the action alternatives would cumulatively benefit marten and fisher habitat at all three landscape scales where cross country travel would be prohibited, ranging from a total of 286,787 acres to 437,488 acres, including LRMP areas currently prohibited to motor vehicles. Under the action alternatives reduced disturbance and habitat fragmentation would be significantly beneficial to marten and fisher and their habitat where habitat connectivity would be enhanced and maintained

Table 3.03-89. Cross Country Travel Cumulative Effects in Carnivore Network, OFEAs, and Old Forest CWHR habitat

Carnivore Network							
Existing LMP cross country travel prohibition (acres)	34,303	34,303	34,303	34,303	34,303	34,303	34,303
Proposed cross country travel prohibition (acres)	0	401,428	401,428	401,428	401,428	401,428	401,428
Cumulative Total	**34,303**	**435,731**	**435,731**	**435,731**	**435,731**	**435,731**	**435,731**
OFEAs							
Existing LMP cross country travel prohibition (acres)	39,428	39,428	39,428	39,428	39,428	39,428	39,428
Proposed cross country travel prohibition (acres)	0	398,060	398,060	398,060	398,060	398,060	398,060
Cumulative Total	**39,428**	**437,488**	**437,488**	**437,488**	**437,488**	**437,488**	**437,488**
Old Forest CWHR types (4M, 4D, 5M, 5D, & 6)							
Existing LMP cross country travel prohibition (acres)	17,892	17,892	17,892	17,892	17,892	17,892	17,892
Proposed cross country travel prohibition (acres)	0	268,895	268,895	268,895	268,895	268,895	268,895
Cumulative Total	**17,892**	**286,787**	**286,787**	**286,787**	**286,787**	**286,787**	**286,787**

300-meter Zone of Influence

The cumulative proportion of Carnivore Network, OFEAs, and Old Forest CWHR occurring within a 300-meter Zone of Influence of motorized route additions to the NFTS, existing motorized routes on NFS and non-NFS lands, and non-motorized routes for all the alternatives is shown in Tables 3.03-90, -91, and -92. In addition, the zones of influence where positive cumulative impacts are realized where motorized routes are decommissioned or cross country travel is prohibited, including use on unauthorized motorized routes, is also displayed for each of the alternatives.

Within the Carnivore Network, OFEAs and Old Forest habitat types, Alternative 1 would pose the greatest risk to habitat fragmentation where considerable cumulative impacts would be added to existing cumulative effects to marten and fisher. Existing motorized routes in the NFTS influence between 30 and 32% of marten and fisher habitat within the Carnivore Network, OFEAs, and Old Forest CWHR types. Under Alternative 1, continued motorized cross country travel, with continued use on existing unauthorized routes, would influence an additional 22 to 27% (cumulative impact score) of the Carnivore Network, OFEAs, and Old Forest habitat types, further reducing habitat connectivity, where cumulative impacts to marten and fisher habitat would be significant. Future route proliferation due to unmanaged cross country travel would further increase habitat fragmentation which could seriously limit the distribution of marten and the future reestablishment potential of the fisher on the Tahoe NF.

Compared to Alternative 1, all the action alternatives would benefit fisher and marten habitats by reducing habitat fragmentation by at least 20%. In general, Alternative 5 would increase habitat connectivity the least and Alternative 3 would increase habitat connectivity the most at all three landscape scales.

The cumulative impact added to existing conditions for all the action alternatives from motorized route additions and reopened ML 1 roads would not affect the overall distribution and abundance of marten on the Tahoe NF, and would not affect the future reintroduction of fisher on the Tahoe NF. Therefore, population viability for the marten would not be affected by any of the action alternatives.

Under these alternatives cross country motorized travel would be prohibited and future route proliferation should be minimized.

Table 3.03-90. Cumulative Percent of Carnivore Network within a 300-meter Zone of Influence of Routes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect Effects of Proposed Alternatives							
Motorized route additions to the NFTS (negative impact)[1]	27%	2%	0%	1%	2%	2%	1%
Reopened ML 1 roads	0%	0%	0%	0%	2%	0%	0%
Existing Unauthorized routes where cross country travel is prohibited (positive impact)	0%	25%	26%	26%	24%	25%	26%
Cumulative Effects of Past and Present							
Existing motorized routes - NFS lands (negative impact)	31%	31%	31%	31%	31%	31%	31%
Existing motorized routes on private land - non-NFS lands (negative impact)	5%	5%	5%	5%	5%	5%	5%
Existing non-motorized routes (negative impact)[2]	6%	6%	6%	6%	6%	6%	6%
Decommissioned routes (positive impact)	2%	2%	2%	2%	2%	2%	2%
Roads closed by previous NEPA decisions, pending implementation (positive impact)	1%	1%	1%	1%	1%	1%	1%
Total Cumulative Effects							
Overall Cumulative Impact Score = Sum Total of All Routes (Note: Some overlap may occur where route categories intersect)	**69%**	**44%**	**42%**	**43%**	**46%**	**44%**	**43%**

[1]Motorized Additions - Alternative 1 includes use on existing unauthorized routes associated with continued cross country travel

[2]Non-motorized -assumption made that non-motorized impact is limited to 60 meters from trail and that no impact occurs beyond 60

Table 3.03-91. Cumulative Percent of Old Forest Emphasis Areas within a 300-meter Zone of Influence

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect Effects of Proposed Alternatives							
Motorized route additions to the NFTS (negative impact)[1]	22%	1%	0%	<1%	2%	2%	<1%
Reopened ML 1 roads (negative)	0%	0%	0%	0%	2%	0%	0%
Existing unauthorized routes where cross country travel prohibited (positive impact)	0%	21%	22%	21%	20%	21%	21%
Cumulative Effects of Past and Present							
Existing motorized routes - NFS lands (negative impact)	32%	32%	32%	32%	32%	32%	32%
Existing motorized routes on private land - non-NFS lands (negative impact)	12%	12%	12%	12%	12%	12%	12%
Existing non-motorized routes (negative impact)[2]	5%	5%	5%	5%	5%	5%	5%
Decommissioned routes (positive impact)	2%	2%	2%	2%	2%	2%	2%
Roads closed by previous NEPA decisions, pending implementation (positive impact)	1%	1%	1%	1%	1%	1%	1%
Total Cumulative Effects							
Overall Relative Cumulative Impact Score (Percent of Tahoe NF OFEA) = Sum Total of all routes both positive and negative (Note: Some overlap may occur where route categories intersect)	**71%**	**50%**	**49%**	**49%**	**53%**	**51%**	**49%**

[1]Motorized Additions - Alternative 1 includes use on existing unauthorized routes associated with continued cross country travel

[2]Non-motorized -assumption made that non-motorized impact is limited to 60 meters from trail and that no impact occurs beyond 60

Table 3.03-92. Cumulative Percent of Forest-wide Late-seral Forest (CWHR 4, 5, 6) within 300-meter "Zone of Influence" of Routes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and indirect effects of Proposed Alternatives							
Motorized route additions to the NFTS[1] (negative impact)	22%	1%	0%	1%	2%	2%	1%
Reopened ML 1 roads (negative)	0%	0%	0%	0%	1%	0%	0%
Unauthorized routes where cross country travel is prohibited (positive impact)	0%	22%	22%	22%	21%	21%	22%
Cumulative effects of past, present, and proposed actions							
Existing motorized routes - NFS lands (negative impact)	30%	30%	30%	30%	30%	30%	30%
Existing motorized routes - non-NFS lands (private) (negative impact)	15%	15%	15%	15%	15%	15%	15%
Existing non-motorized routes (negative impact)[2]	5%	5%	5%	5%	5%	5%	5%
Decommissioned routes (positive impact)	2%	2%	2%	2%	2%	2%	2%
Roads closed by previous NEPA decisions, pending implementation (positive impact)	1%	1%	1%	1%	1%	1%	1%
Total Cumulative Effects							
Overall Relative Cumulative Impact Score = Sum Total of All Routes (negative impacts) (Note: Overlap occurs where route categories intersect, therefore percentages are only relative to each other and not actual amounts)	**72%**	**51%**	**50%**	**51%**	**53%**	**52%**	**51%**

[1]Motorized Additions - Alternative 1 includes use on existing unauthorized routes associated with continued cross country travel

[2]Non-motorized -assumption made that non-motorized impact is limited to 60 meters from trail and that no impact occurs beyond 60

Cumulative Effects to Meadows from Past, Present and Reasonably Foreseeable Actions

The cumulative effects geographic boundary for marten prey habitat includes 518 wet meadows occurring within the boundary of the Tahoe NF including NFS and non-NFS lands. This scale is sufficiently large to evaluate effects to microtine rodents that are important prey species for the marten. The cumulative effects timeframe is the same as stated for other species.

In some meadows, livestock grazing has reduced the suitability of meadow vegetation for microtine rodents and other marten prey (USDA Forest Service 2001). Livestock grazing occurs on 31 active grazing allotments on the Tahoe NF, totaling 538,431 acres of NFS and private lands. On the Tahoe NF, the impact of livestock grazing on meadows has been steadily decreasing as fewer allotments are grazed and as forage utilization levels are being reduced by stricter standards established by the Sierra Nevada Forest Plan Amendment. These past and present effects contribute to the effects of the alternatives upon meadow habitat and condition.

Cumulative Effects to Meadows

Cumulative effects are evaluated by assessing the number of wet meadows that are intersected by motorized route additions to the NFTS, motorized routes on existing NFS lands and non-NFS lands (private). In

addition, non-motorized routes are also evaluated. Finally, the prohibition of cross country travel, including on existing unauthorized routes or decommissioned routes are also evaluated for their beneficial cumulative impacts where the adverse impacts of motorized routes would be removed are considered.

Direct and indirect effects of adding motorized routes to the NFTS would add to existing cumulative effects to wet meadows which provide habitat for foraging marten and microtine rodents which are preferred marten prey species (Alternative 1 to the greatest extent, followed by Alternatives 5, 2, 3, 6, 4, and 7, in decreasing order). Alternative 1 directly and indirectly affects 81 of 518 meadows (16% of all meadows) that would be impacted by continued cross country motorized use, including use of existing unauthorized routes. Considering existing cumulative effects from existing motorized routes on both public and private lands and non-motorized routes, this additional 16% of meadow impacts is substantial. In addition, since Alternative 1 does not prohibit public motor vehicle cross country travel on 9,167 acres of wet meadow habitat, which would continue and proliferate, and would result in cumulative impacts upon marten.

The remaining action alternatives would result in progressively fewer meadows being cumulatively impacted, with Alternative 5 contributing the most, to Alternative 3, which would not contribute to additional cumulative adverse impacts since no motorized routes are proposed. All the action alternatives benefit from the prohibition of cross country travel on 9,167 acres of wet meadow habitat, including on existing unauthorized routes, affecting between 78 and 81 meadows (15 to 16% of all meadows) where motorized vehicle use would be prohibited, as shown in Table 3.03-93. The overall cumulative effect as a result of cross country prohibitions, motorized route additions, and reopening ML 1 roads ranges from 275 to 370 meadows intersected by routes (Alt 3 - the least, Alt 1 - the most).

Table 3.03-93. Cumulative Number of Wet Meadows Intersected by Routes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Wet Meadows Intersected by motorized route additions to the NFTS (negative impact)[1]	81	7	0	1	9	5	3
Wet Meadows Intersected by reopened ML 1 roads (negative impact)	0	0	0	0	2	0	0
Wet Meadows Intersected by existing unauthorized routes due to the prohibition of cross country travel (positive impact)	1	78	82	81	76	78	80
Cumulative effects of past, present, and proposed actions							
Wet Meadows Intersected by existing motorized routes - NFS lands (negative impact)	150	150	150	150	150	150	150
Wet Meadows Intersected by existing motorized routes on non-NFS lands (private) (negative impact)	96	96	96	96	96	96	96
Wet Meadows Intersected by existing non-motorized routes (negative impact)[2]	39	39	39	39	39	39	39
Wet Meadows Intersected by decommissioned routes (positive impact)	11	11	11	11	11	11	11
Total Cumulative Effects							
Overall Cumulative Effects equals the total of all impacts, both positive and negative	**370**	**296**	**275**	**289**	**300**	**296**	**288**

[1]Motorized Additions - Alternative 1 includes use on existing unauthorized routes associated with continued cross country travel

[2]Non-motorized -assumption made that non-motorized impact is limited to 60 meters from trail and that no impact occurs beyond 60

Overall Cumulative Effects Summary

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable vegetation and fuels management projects on NFS lands and private lands within the Tahoe NF boundary. Some, but not all, of these activities have contributed to effects on marten and have the potential to impact marten in the near future. In 2001 and 2004, the Forest Service amended Sierra Nevada Forest Plans to better address the needs of old forest-associated species (USDA Forest Service 2001 and 2004). In this assessment, the following key risk factors were identified for marten in the Sierra Nevada: (1) habitat alternation, particularly the removal of overhead cover, large diameter trees, or coarse woody material; (2) livestock grazing and other activities that might reduce the availability of prey in meadows; and (3) the use of roads and associated human access.

On the Tahoe NF, several activities have influenced these risk factors for marten. Wildfires occurring between 1990 and 2008 burned over 11,000 acres of suitable marten and fisher habitat (CWHR 4M, 4D, 5M, 5D and 6), some of which was rendered unsuitable, and other areas maintained key habitat components. Past timber harvest and more recent fuels reduction treatments have reduced important habitat components in marten habitats. Between 2001 and 2008, fuels treatments on NFS lands have occurred on approximately 17,000 acres. These vegetation treatments have reduced habitat quality for marten and fisher by reducing canopy cover, structural complexity, and coarse woody material within treated units. At the larger landscape scale, these treatments may affect the size and connectivity of patches of high quality habitat. Over 30,000 acres of fuels and vegetation treatments are planned to occur over the next few years based upon the projects listed in Appendix H. Some, but not all of them would affect marten and fisher habitat. Over time, fuels treatments are expected to alter 20 to 30 percent of the landscape, with a resulting expectation that the amount of habitat removed by stand replacing wildfires would be reduced in response to these treatments (USDA Forest Service 2004).

The California Department of Forestry and Fire Protection currently lists approximately 12,000 acres of private land within the Tahoe NF administrative boundary for which timber harvest plans have been submitted. The portion of these projects occurring within the marten's range has not been determined. Timber harvest on private lands is generally more intensive and does not provide suitable habitat for marten and fisher.

Alternative 1 has the greatest likelihood of contributing to substantial adverse cumulative effects upon marten populations and may affect the ability to reestablish fisher over time. Alternatives 2, 4, 5, 6, and 7, would result cumulative effects to a lesser extent than Alternative 1. Alternative 3 results in the least cumulative effects because no motorized routes are proposed for addition to the NFTS; therefore, motorized route densities in marten habitat remain lowest, and motorized routes would not be added to the NFTS in habitats of particular importance to marten (meadows). The combined effects of the alternatives and other factors affecting marten and fisher habitats do not indicate that the magnitude of these combined effects would result in a loss of viability or lead to a trend toward Federal listing for the American marten under any alternative (see project Biological Evaluation).

These alternatives do not result in a loss of habitat (no route construction), but may add to existing cumulative effects through reduced habitat effectiveness from the sum total of route additions, reopened

ML1 road, and cross country travel prohibitions, where an additional 20 to 25% of marten habitat may be influenced by continued cross country travel, including continued use of existing unauthorized routes under Alternative 1; about 5% under Alternative 5; and from 0 to 2% under the remaining action alternatives. The cumulative effects under Alternative 1, including fuels treatment and livestock grazing effects upon marten habitat, could be considerable. Inventoried Roadless Areas (IRAs) and adjacent wilderness areas may become increasingly important as the cumulative effect of fuels treatment activities expand within other portions of marten and fisher habitat.

Existing unauthorized routes, may receive non-motorized use (hiking, mountain bicycling, equestrian). It is generally considered that non-motorized use would be less impactive to fisher and marten due to reduced noise and other factors. The extent and magnitude of non-motorized use is unknown. However, it is expected that over time, these routes would eventually become revegetated and recover either through active or passive restoration means.

Sensitive Species Determination – American Marten

The Biological Evaluation for the Tahoe NF Motorized Travel Management Project, which is incorporated by reference, made a determination that all the action alternatives may affect individual American martens, but are not likely to result in a loss of viability or lead to a trend toward federal listing. Motorized routes through wet meadows are not proposed to be added to the NFTS in Alternative 6, the Preferred Alternative. Motorized routes within riparian conservation areas, including meadows would be significantly reduced compared to Alternative 1, no action. Habitat fragmentation from motorized routes would be considerably reduced. Future route proliferation would be minimized due to prohibition of unmanaged cross country motorized travel. In addition, wet weather restrictions on native surfaced routes would reduce potential erosion and sedimentation within meadow habitat, important to marten prey species.

MIS Summary – American Marten

The American marten was selected as an MIS for late-seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures above 40% within ponderosa pine, Sierran mixed conifer, white fir, and red fir coniferous forests, and multi-layered trees within ponderosa pine and Sierran mixed conifer forests. Martens 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). Key components for westside and eastside marten habitat can be found in the Sierra Nevada Forest Plan Amendment FEIS (USDA Forest Service 2001), Volume 3, Chapter 3, part 4.4, pages 20-21.

Based on the analysis conducted, Alternative 1 directly, indirectly, and cumulatively affects the greatest amount of late-seral closed canopy coniferous forest with a 200-meter Zone of Influence of existing motorized unauthorized routes, which would continue under continued cross country travel.

Alternative 1 reduces habitat effectiveness by 8% (13,435 acres out of 167,938 Tahoe NF habitat acres), with the potential to disturb, cause avoidance, and abandonment of California spotted owl, American marten, and northern flying squirrel. Considering the checkerboard pattern of land ownership within the Tahoe NF boundary, Alternative 1 could cause a downward trend in habitat effectiveness for these species. In addition, the cross country travel would continue and proliferate on 119,091 acres of late-seral closed canopy coniferous forest habitat.

Alternatives 2, 4, 5, and 6 would affect 1,679 acres of late-seral closed canopy coniferous forest habitat or 0.2% of Tahoe NF habitat within a 200-meter Zone of Influence of motorized route additions to the NFTS. Alternatives 3 and 7 do not affect late-seral closed canopy coniferous forest habitat within a 200-meter Zone of Influence of motorized route additions. The Tahoe NF Motorized Travel Management Project action alternatives would not result in a direct or indirect change in the amount of late-seral closed canopy coniferous forest habitat affected by motorized routes for all the alternatives. Therefore, habitat effectiveness for these species would be maintained at current levels.

For all the alternatives, the change in the class of vehicles would not directly, indirectly, or cumulatively affect late-seral closed canopy coniferous forest habitats or their habitat effectiveness. Wet weather seasonal restrictions on all native surfaced roads and motorized trails under Alternatives 4, 5, and 6 would enhance late-seral closed canopy coniferous forest habitat effectiveness for the California spotted owl, American marten, and the northern flying squirrel through the reduced disturbance, avoidance, and abandonment. Finally, the prohibition of motorized cross country travel on 119,091 acres of late-seral habitats, would benefit these species over time, thereby preventing the continued cumulative increase in motorized route proliferation in the future.

Summary of Status and Trend at the Bioregional Scale. The Tahoe NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the American marten; hence, the late-seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat effects analysis for the Tahoe NF Motorized Travel Management Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data. This information is drawn from the detailed information on habitat and population trends in the SNF Bioregional MIS Report (USDA Forest Service 2008) and the Tahoe NF Motorized Travel Management Project-level MIS Report, which are hereby incorporated by reference.

Habitat Status and Trend. There are currently 994,000 acres of late-seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat on NFS lands in the Sierra Nevada. The trend is slightly increasing (from 7% to 9% within the last decade on NFS lands).

Population Status and Trend. American marten has been monitored throughout the Sierra Nevada as part of general surveys and studies from 1996-2002 (Zielinski et al. 2005). Since 2002, the American marten has been monitored on the Sierra Nevada forests as part of the Sierra Nevada Forest Plan Amendment (SNFPA) monitoring plan (USDA Forest Service 2005, 2006, 2007b). Current data at the range-wide, California, and Sierra Nevada scales indicate that, although marten appear to be distributed throughout their historic range, their distribution has become fragmented in the southern Cascades and

northern Sierra Nevada, particularly in Plumas County. The distribution appears to be continuous across high-elevation forests from Placer County south through the southern end of the Sierra Nevada.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trends. Based on the small proportion of late-seral closed canopy coniferous forest habitat that is directly, indirectly and cumulatively affected (0% to 1.4% of Sierra Nevada habitat) by the alternatives within a 200-meter Zone of Influence of motorized route additions to the NFTS, the Tahoe NF Motorized Travel Management Project would not alter existing trend in the habitat, nor would it lead to a change in the distribution of American marten across the Sierra Nevada bioregion.

Pacific Fisher Sensitive Species Determination

Due to the absence of the Pacific fisher on the Tahoe NF, implementing the Tahoe NF Travel Management Project EIS would not affect the Pacific fisher (The Tahoe NF Biological Evaluation is incorporated by reference). Furthermore, this project as proposed would not likely affect any future reintroduction efforts and the ability for the fisher to become reestablished on the Tahoe NF since habitat fragmentation by the addition of motorized routes is minimized. Cross country motorized use would be prohibited, including use on existing unauthorized routes within suitable fisher habitat.

Compliance with Forest Plan and Other Direction

The Tahoe LRMP, as amended by the 2004 SNFPA ROD, provide the following management direction for meadow and wetland habitat:

- *Locate roads away from meadow edges where alternative routes are available (Tahoe LRMP) (Management Standard and Guideline).*
- *Avoid wetlands or minimize effects to natural flow patterns in wetlands and avoid road construction in meadows.*
- *Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity (RCO#2, Management Standard & Guideline 100).*
- *Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives (RCOs) at the project level and the AMS goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species (Management Standard & Guideline 92).*

Marten foraging habitat within wet meadow were analyzed for the alternatives. Based on the analysis of the alternatives, Alternative 1 least complies with this direction. Alternative 1 negatively affects 81 of 518 meadows (16%) from cross country travel on 14 miles of existing unauthorized routes. The action alternatives all meet the Forest Plan Standards and Guidelines by reducing motorized impacts to meadows by prohibiting cross country travel, including on 13 to 14 miles of existing unauthorized routes. Of the

action alternatives, Alternative 5 reduces the impacts on meadows the least and Alternative 3 reduces the impacts on meadows the most.

The Tahoe LRMP, as amended by the 2004 SNFPA ROD provides management direction for the fisher and marten as follows:

> *Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites (Management Standard & Guidelines 87 and 89).*

Fisher have not been verified to occur on the Tahoe NF, and therefore this standard and guideline does not apply for fisher. However, marten does occur on the Tahoe NF, although known den sites have not been identified. The sections above thoroughly analyzes the alternatives for the potential to disturb suitable fisher and marten denning habitat (as defined by CWHR 4M, 4D, 5M, 5D, and 6 habitat types). The analysis of alternatives also analyzed the potential to disturb marten and fisher habitat within Old Forest Emphasis Areas and the Tahoe NF Carnivore Network, both of which provide important habitat attributes for these species.

Snags in Green Forest Ecosystem Component Associated Species: Affected Environment

Many wildlife species depend on snags or dead trees for nesting, roosting, denning, foraging, resting, or shelter. Snag associated species included in this group include both primary and secondary excavators. The hairy woodpecker is the species chosen to represent this group, although many other species are snag dependent species including other woodpecker species, pallid bat, and small songbirds such as nuthatches and chickadees. In addition, the hairy woodpecker was selected as the MIS on the Tahoe NF, as amended by the Sierra Nevada Forest Bioregion EIS, for the ecosystem component of snags in green forests. Medium to large (diameter breast height between 15 to 30 inches and greater than 30 inches) snags are most important. The hairy woodpecker uses stands of large, mature trees and snags of sparse to intermediate density; cover is also provided by tree cavities (CDFG 2005). Mature timber and dead snags or trees of moderate to large size are apparently more important than tree species (Siegel and DeSante 1999).

Snags are the result of tree mortality that can result from insect outbreaks, diseases, fire, drought, and flooding. Such events maintain the snag resource through time, though snag numbers may fluctuate as forests undergo cycles of drought accompanied by higher tree mortality, followed by lower tree mortality after stands have thinned (Bull et al. 1997).

Habitat for snag associated species (cavity nesting birds and bats) is considered to be forested vegetation types with snags larger than 15 inches diameter. Table 3.03-3 lists the types of road and motorized trail-associated factors likely to affect Tahoe NF terrestrial species; one of these factors is the category listed as edge effects and the reduction of snags and down logs. Snag and log reduction occurs as result of managing roads or trails for public use. Trees posing a potential safety hazard (“hazard trees”) are removed along roads open for public use, as well as along roads receiving concentrated use during

implementation of a specific project. Hazard trees are typically dead or dying trees that occur within a tree-height distance from the road. This safety policy results in a reduction in snags within a zone of about 60 meters from a road's edge. This, in turn, reduces habitat quality and availability for snag associated species (i.e. cavity nesting birds and tree nesting bat species) within these roadside corridors. Studies have shown cavity-nesting birds to decline 53 to 77 percent after snag removal (Scott and Oldemeyer 1983, Raphael and White 1984, Hejl 1997).

The amount of down wood is also influenced within this zone, both by the removal of hazard trees that would become future down wood, and by the access provided for woodcutters. Down wood is important as a foraging substrate, providing insects required by species like the pileated woodpecker.

Nests of cavity nesting birds are typically more secure from nest predation than other forest birds, and recreational disturbance is not known to be a limiting factor as it is for some other forest bird species (Gaines et al. 2003). Roads and trails have the potential to adversely affect bats by facilitating access to bat habitats which may directly or indirectly affect bats.

Snags in Green Forest Ecosystem Component Associated Species: Environmental Consequences

Indicators used to Measure Effects

Zone of Influence within 60 Meters: For the proposed alternatives, the habitat factor used in this analysis to assess effects to medium (15-30 inches dbh) and large (greater than 30 inches dbh) snags within green forest, was the amount of green forest that fell within a 60-meter Zone of Influence of motorized routes added to the NFTS. A 60-meter Zone of Influence represents the proportion of snag habitat along motorized routes that may be affected by fuelwood or hazard tree removal, resulting in a reduction of snag habitat for the hairy woodpecker. This distance represents the maximum height of a snag that could be removed along proposed routes.

The No Action Alternative (Alternative 1) was analyzed by determining the amount of green forest habitat that fell within a 60-meter Zone of Influence of existing unauthorized routes that could be affected by fuelwood.

Current Condition of the Habitat Factor(s) in the Project Area: On the Tahoe NF, snags in green forest ecosystem component vary in density, size, decay class, and distribution, depending upon the forest type, presence of decay factors (insects and diseases), and the amount of management activities that have taken place. Annual precipitation also affects the amount of snags present within green forests. Snag densities are generally higher in mixed conifer forests and true fir forests. Pure eastside pine forests generally have lower snag densities compared to forest types that have higher concentrations of true fir species (red fir and white fir). Snag densities on the Tahoe NF vary from 0 snags per acre to well over 6 snags per acre.

Direct and Indirect Effects to Habitat

Cross Country Travel. Under Alternative 1, cross country travel would not be prohibited, potentially affecting 637,148 acres of green forest habitat, potentially causing reduced habitat effectiveness through

disturbance, avoidance, and abandonment by the hairy woodpecker. For all action alternatives, cross country travel would be prohibited on these acres thus reducing or eliminating disturbance, avoidance, abandonment.

Additions to the NFTS and Reopened ML 1 Roads: Table 3.03-94 displays the alternatives affect hairy woodpecker habitat within a 60-meter Zone of Influence of motorized route additions to the NFTS and reopened ML 1 roads, where snags could be removed for hazard tree removal or public fuelwood gathering. The Tahoe NF Motorized Travel Management Project could potentially directly or indirectly affect 1.5% (64,315 acres out of 4,381,000 Sierra Nevada habitat acres) of hairy woodpecker habitat under Alternative 1, where incidental snags could be lost through public fuelwood removal, though it is not expected that this activity to be significant.

All the action alternatives would reduce affects to hairy woodpecker habitat by banning cross country travel, including on existing unauthorized routes. Alternative 5 would affect 0.2% (7,076 acres of 4,381,000 Sierra Nevada habitat acres) of hairy woodpecker habitat from both motorized route additions and reopened ML 1 roads, where each contributes about equal portion of the impacts.

Alternatives 2, 4, and 7, similarly would affect 0.1% hairy woodpecker habitat (2,637 out of 4,381,000 Sierra Nevada habitat acres), while Alternative 3 does not directly or indirectly affect hairy woodpecker habitat. It is not expected that all snags along motorized routes would be removed, but incidental removal of hazard trees for public safety and access to fuelwood gathering could result in the loss of incidental snags along proposed motorized route additions. The relatively small amount of habitat within a 60-meter Zone of Influence is not likely to result in a measurable change in the snag habitat component at the scale of the Sierra Nevada Bioregion.

Changes to NFTS (Wet Weather Seasonal Restrictions). Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and motorized trails, where hairy woodpecker habitat effectiveness (snags within green forests) would be benefited through the reduced disturbance and avoidance when motorized use on native surfaced routes are restricted during the wet weather season. Alternatives 1, 2, 3, and 7 do not impose wet seasonal weather restrictions on native surfaced motorized routes and therefore, the hairy woodpecker habitat effectiveness would not be enhanced when native surfaced motorized routes are under wet weather seasonal restrictions. Under Alternative 1, continued cross country travel, including on existing unauthorized routes would result in the greatest amount of disturbance (reduced habitat effectiveness) to hairy woodpecker habitat within snags within green forests.

Table 3.03-94. Cross Country Travel and Proportion of Snags in Green Forest Hairy Woodpecker habitat within a 60-meter "Zone of Influence" of Motorized Route Additions and Reopened ML 1 Roads to the NFTS

Hairy Woodpecker (Snags in Green Forest Habitat Ecosystem component)		**Alt 1**[1]	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**	**Alt 7**
Cross Country Travel within Tahoe NF project area								
Acres of Hairy Woodpecker habitat where cross country travel is prohibited		0	637,148	637,148	637,148	637,148	637,148	637,148
Proportion of Snag Ecosystem Component in Green Forest Habitat (Hairy Woodpecker MIS Habitat) within 60-meter "Zone of Influence"								
Acres – Hairy Woodpecker Green Forest Habitat[2]	**Motorized route additions**	64,315	2,512	0	1,214	3,347	2,950	1,335
	Reopened ML Roads	0	0	0	0	3,729	0	0
	Total	**64,315**	**2,512**	**0**	**1,214**	**7,076**	**2,950**	**1,335**
Proportion of Sierra Nevada Habitat (Based on total acres early, mid, late-open canopy, and late-closed canopy coniferous forests in SN bioregion)	4,381,000	1.5%	0.06%	0%	0.03%	0.16%	0.07%	0.03%
Habitat Security Risk in Sierra Nevada		Low	Low	Low	Low	Low	Low	Low
Proportion of Tahoe NF Habitat	990,707	6.5%	0.3%	0%	0.1%	0.7%	0.3%	0.1%
Habitat Security Risk in Tahoe NF		Low	Low	Low	Low	Low	Low	Low

[1] Alternative 1 includes existing unauthorized routes that would continue with the continuance of cross country travel.

[2] The Zone of Influence within 60 meters of motorized routes include both NFS and non-NFS lands within the boundary of the Tahoe NF due to the complex checkerboard ownership pattern. The proportion of habitat affected likely over-represents the actual amount of habitat affected on NFS lands.

Summary of Direct and Indirect Effects

Table 3.03-95 summarizes the overall net direct and indirect effect of the alternatives from motorized route additions, prohibition of cross country travel, wet weather restrictions, and changes in class of vehicles to the hairy woodpecker.

Table 3.03-95. Hairy Woodpecker - Summary of Overall Net Direct and Indirect Effects

			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel									
Trend of Effect			Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Cross Country Travel Prohibited			0	637,148	637,148	637,148	637,148	637,148	637,148
Motorized Route Additions*									
Trend of Effect			Negative	Negative	No Effect	Negative	Negative	Negative	Negative
Percent Habitat Affected within ZOI*			6.5%	0.3%	0%	0.1%	0.3%	0.3%	0.1%
Establishment of "Open Areas"			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Changes to NFTS	**Change in Season of use**		No Effect	No Effect	No Effect	Habitat effectiveness enhanced during seasonal restrictions	Habitat effectiveness enhanced during seasonal restrictions	Habitat effectiveness enhanced during seasonal restrictions	No Effect
	Change in Class of Vehicles		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Reopened ML 1 Roads	**Trend of Effect**	No Effect	No Effect	No Effect	No Effect	Negative	No Effect	No Effect
		Percent Habitat Affected within ZOI	**0%**	0%	0%	0%	0.4%	0%	0%
Amendments to Forest Plan			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Cross Country Travel Prohibited	0	637,148	637,148	637,148	637,148	637,148	637,148
Motorized Route Additions*							
Overall Net Effect of Proposed Actions	Most impactive alternative from continued use on existing unauthorized routes (**6.5% habitat affected in ZOI**) Cross country travel continued on 637,148 acres.	3rd most beneficial alternative, shared with Alt 6 (**0.3% habitat affected in ZOI**). Cross country travel prohibited on 637,148 acres; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.	Benefits the most—**does not add routes or reopen ML 1 roads.** Cross country travel prohibited on 637,148 habitat acres; reduces disturbance and habitat fragmentation.	2nd most beneficial alternative, shared with Alt 7 (**0.1% habitat affected within ZOI**) Cross country travel prohibited on 637,148 habitat acres; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.	Benefits the least (**0.7% habitat affected in ZOI**). Cross country travel prohibited on 637,148 habitat acres; although minor negative impacts from route additions and reopened ML 1 roads; overall reduces disturbance and habitat fragmentation.	3rd most beneficial alternative, shared with Alt 2 (**0.3% habitat affected in ZOI**). Cross country travel prohibited on 637,148 habitat acres. although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.	2nd most beneficial alternative, shared with Alt 4 **(0.1% habitat affected within ZOI**). cross country travel prohibited on 637,148 habitat acres; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.

*Alternative 1 includes existing unauthorized routes that would continue with the continuance of cross country travel, while all the action alternatives include proposed route additions.

Cumulative Effects to Habitat in the Analysis Area

The spatial boundary for analyzing cumulative effects to the hairy woodpecker includes all medium (15 to 30 inch dbh) and large snags (greater than 30 inch dbh) within green forests within the boundary of the Tahoe NF. Past and current cumulative effects to the medium and large snag ecosystem component include loss of snags through catastrophic wildfires; timber and fuels management; urban development and expansion within a highly checkerboard land ownership pattern; and public fuelwood removal. In addition, hazard tree removal along NFTS roads and recreational facilities has had an impact on the snag resource. Snag recruitment and creation from natural levels and unnaturally high levels of tree mortality has also been a factor in the condition of snags on the Tahoe NF.

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on NFS and private lands within the Tahoe NF boundary. Some, but not all, of these activities would contribute to impacts to the late-seral closed canopy coniferous forests within the Tahoe NF boundary. Since 1990, more than 130,000 acres of vegetation management activities have occurred on the Tahoe NF. Some, but not all, have resulted in impacts to snags in green forest habitats. Between 2001 and 2008, approximately 17,000 acres of forest vegetation and fuels projects were completed, which primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. These treatments generally do not result in a reduction of snags in green forest habitat because they generally retain snags throughout the project areas as required by LRMP standards and guidelines. Between 1994 and 2008, approximately 95,000 acres burned on the Tahoe NF, some of which have resulted in the loss of hairy woodpecker habitat. Facilities maintenance through hazard tree removal along roads and near recreational facilities has resulted in a limited loss of snags.

Table 3.03-96 lists reasonably foreseeable future actions, including fuels, vegetation, recreation, non-motorized trail development, and special use permit re-issuances.

Table 3.03-96. Direct, Indirect, and Cumulative Impact of Reasonably Foreseeable Future Projects

Project type	Number of Projects	Direct and Indirect Impact	Overall Cumulative Impact
Vegetation management/fuels reduction – thinning, group select, and aspen enhancement	~30	Loss of incidental snags for public safety and harvest operations.	Incidental loss of snags. Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires.
Salvage harvest of burned forests	2	Short-term disturbance from harvest activities. Loss of nesting and foraging habitat (snags), particularly in low to moderate burn areas.	Short term cumulative impact in localized areas, but overall snag retention requirements should offset any losses in habitat at the landscape scale..
Hazard tree removal	4	Potential loss of snags through hazard tree removal. Short-term disturbance during harvest.	None to minimal cumulative impact
Special Use permit renewal	4	N/A administrative action	None

Cumulative Effects Conclusion

The Tahoe NF Motorized Travel Management Project could potentially add to existing cumulative effects by directly or indirectly affecting approximately 6% (64,315 acres out of 990,707 Tahoe NF acres) of hairy woodpecker habitat, under Alternative 1, where snags could be removed for public safety along existing unauthorized routes. Alternative 5 affects approximately 1% (7,076 acres of 990,707 Tahoe NF acres) of hairy woodpecker habitat from motorized route additions and reopened ML 1 roads, each contributing about 50% of the impacts. Alternatives 2, 4, and 7, similarly affects 0.3% hairy woodpecker habitat, while Alternative 3 does not directly or indirectly affect hairy woodpecker habitat. Based on the small proportion of hairy woodpecker habitat potentially affected by the addition of motorized routes and reopened ML 1 roads, the Tahoe NF Motorized Travel Management Project would not alter the existing trend in the snags in green forest ecosystem component.

The change is the class of vehicles would not affect or alter the condition of snags in green forest ecosystem component for the hairy woodpecker, but may result in higher snag densities along routes that receive different maintenance.

Hairy woodpecker habitat effectiveness may be enhanced under Alternatives 4, 5, and 6 where wet weather seasonal restrictions on all native surfaced roads and motorized trails would be implemented. Alternatives 1, 2, 3, and 7 do not impose wet seasonal weather restrictions on native surfaced motorized routes and therefore, the hairy woodpecker habitat effectiveness would not be enhanced when native surfaced motorized routes are under wet weather seasonal restrictions.

Under Alternative 1, cross country travel would continue, potentially affecting 637,148 acres of snags within green forest habitat, potentially causing reduced habitat effectiveness through disturbance, avoidance, and abandonment by the hairy woodpecker. For the action alternatives, cross country travel would be prohibited on 637,148 acres, where disturbance, avoidance, abandonment would be reduced or eliminated.

Summary of Hairy Woodpecker Status and Trend at the Bioregional Scale. The Tahoe NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the hairy woodpecker; hence, the snag effects analysis for the Tahoe NF Motorized Travel Management Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the hairy woodpecker. This information is drawn from the detailed information on habitat and distribution population trends in the SNF Bioregional MIS Report (USDA Forest Service 2008), which is hereby incorporated by reference.

Ecosystem Component Status and Trend. The current (based on 2001-2004 inventory sources) average number of medium-sized and large-sized snags ($\geq$ 15” dbh, all decay classes) per acre across major coniferous and hardwood forest types (westside mixed conifer, ponderosa pine, white fir, productive hardwoods, red fir, eastside pine) in the Sierra Nevada ranges from 1.4 per acre in eastside pine to 8.3 per acre in white fir. Detailed information by forest type, snag size, and snag decay class can be found in the SNF Bioregional MIS Report (USDA Forest Service 2008).

Data from the mid-to-late 1990s were compared with the current data to calculate the trend in total snags per acre by Regional forest type for the 10 Sierra Nevada national forests and indicate that, during this period, snags per acre increased within westside mixed conifer (+0.80), white fir (+1.98), and red fir (+0.68) and decreased within ponderosa pine (-0.17), productive hardwoods (-0.17), and eastside pine (-0.16).

Population Status and Trend. The hairy woodpecker has been monitored in the Sierra Nevada at various sample locations by avian point counts and breeding bird survey protocols, including 1997 to present – Lassen National Forest (Burnett and Humple 2003, Burnett et al. 2005); 2002 to present - Plumas and Lassen National Forests (Sierra Nevada Research Center 2007); 1992 to 2005 – Sierra Nevada Monitoring Avian Productivity and Survivorship (MAPS) stations (Siegel and Kaschube 2007); and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that the hairy woodpecker continues to be present at these sample sites, and current data at the range wide, California, and Sierra Nevada scales indicate that the distribution of hairy woodpecker populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Hairy Woodpecker Trend. Based on the small proportion of the snag ecosystem component in green forest that is directly, indirectly and cumulatively affected (0 to 1% of Sierra Nevada habitat) by the alternatives, the Tahoe NF Motorized Travel Management Project would not alter existing trend in the habitat, nor would it lead to a change is the distribution of hairy woodpecker across the Sierra Nevada bioregion.

Aquatic and Riparian Associated Species

Introduction: The Aquatic-Riparian group includes either terrestrial and aquatic species that spend a part or their entire life cycle within or adjacent to riparian and/or aquatic habitats. These include a large number of special status species on the Tahoe NF (Tables 3.03-1 and 3.03-2). This section will provide general information on road and trail-associated impacts to bald eagles, willow flycatchers, great gray owls, greater sandhill crane, frogs, fish, aquatic invertebrates, and general aquatic/riparian habitats that may be associated with this group. Species not included in detail here will be addressed in the Biological Evaluation and Management Indicator Species reports, which are hereby incorporated by reference.

The effects of roads and motorized trails on aquatic habitat are considered to be wide-ranging and potentially serious at local levels. The Tahoe NF utilized the Ecosystem Management Decision Support (EMDS) system which utilizes knowledge-based decision support for determining relative risk of motorized travel routes to aquatic species and habitats. EMDS integrated geographic information system (GIS) data with knowledge-based reasoning and decision modeling technologies. Aquatic habitats include Riparian Conservation Areas associated with streams, ponds, lakes, meadows, and other riparian habitat. The analysis consisted of GIS and EMDS modeling outputs which included data on road density, proximity to streams, erosion hazard ratings, and stream crossings at multiple watershed scales (5th field, 6th field, and 7th field). A detailed summary of the aquatic habitat modeling can be found in Chapter 3.02 (Watershed Resources: Geology, Soil, and Hydrology).

The indicators used to measure effects for aquatic and riparian species responds to the desired conditions and the management standards and guidelines for wetland, meadow, and aquatic systems as directed in the Tahoe LRMP, as amended by the SNFPA ROD (2004). See *Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction* at the beginning of this Terrestrial and Aquatic Species section.

Riparian Associated Bird Species

Introduction

Under Executive Order 13186, migratory bird species are identified as a priority for planning efforts and for evaluating environmental effects of projects. In the Sierra Nevada bioregion, 53 species of birds depend critically on or substantially utilize riparian or meadow habitats (Siegel and DeSante 1999). Focal species associated with riparian habitats include the black-headed grosbeak, song sparrow, warbling vireo, Swainson's thrush, tree swallow, Wilson's warbler, and yellow warbler (RHJV 2004). These species are strongly associated with a range of riparian habitats on the Tahoe NF, from lower elevation streamside zones to higher elevation meadows.

Meadows provide some of the most important habitat for neotropical migrants and resident landbirds in the Sierra Nevada, providing important stopover habitat for many species (Siegel and DeSante 1999). Thirty-seven species critically depend on, or are strongly associated with Sierra montane meadows. Of these species, six are stable, 14 are decreasing, and four are increasing (13 are inadequately sampled by the BBS to allow the calculation of a population trend, but among these 13 are two California endangered species (willow flycatcher and great gray owl) and a California Bird Species of Special Concern (Vaux's swift)). The preponderance of decreasing species is statistically significant. Riparian focal species that use meadow habitats include the song sparrow, yellow warbler, and Wilson's warbler (RHJV 2004). Meadows also provide important habitat for the red-breasted sapsucker which is identified as a "Watch List" species in the Partners in Flight North American Landbird Conservation Plan.

Effects Common to All Riparian Bird Species

Changes in Class of Vehicles: Although responses to motorized vehicle use varies by species and depends upon the type of vehicle, in addition to the intensity, timing, speeds, and amount motorized vehicle use, specific species responses are not well understood. For this analysis, it is assumed that all vehicle types result in the same disturbance to riparian associated bird species. Therefore, changes in the class of vehicles would not vary in their direct effects to riparian associated bird species for all of the proposed alternatives. Indirect effects to riparian habitats are discussed under each species, as appropriate.

Wet weather seasonal restrictions: Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and motorized trails where riparian species would benefit from reduced noise disturbance when wet weather restrictions would be implemented.

Bald Eagle: Affected Environment

On July 9, 2007, USDI Fish and Wildlife Service 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. Official delisting of the bald eagle occurred 30 days from the date the Final Rule. The bald eagle will continue 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 Tahoe National Forest, twelve bald eagle breeding territories have been identified within the Tahoe NF boundary including NFS lands and private lands in recent years. Eight bald eagle territories with recent nesting activity are located on NFS lands. Four territories occur on private land at Donner Lake, Fordyce Lake, Spaulding Reservoir, and Milton Reservoir.

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 and may result in nest abandonment and reproductive failure (Stalmaster and Newman 1978, Andrew and Mosher 1982, Fraser 1985, Fraser et al. 1985, Knight and Skagen 1987, Buehler et al. 1991, Grubb and King 1991, Grubb et al. 1992, Chandler et al. 1995, Grubb 1995, Mathisen 1968).

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 motorized 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, in 2005 a bald eagle nest was discovered near a well-used County Road on the Tahoe NF to access a popular reservoir used for recreational activities including fishing and boating. Furthermore, 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, Stalmaster 1987 In Joslin and Youmans 1999, Mathisen 1968). Grubb et al. (1992) found that eagles are disturbed by most activities that occur within 1500 feet (460 m); and they take flight when activities occur within 600 feet (180 m). 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. The USDA Forest Service routinely institutes a Limited Operating Period for ground disturbing projects within 0.25 mile (400 meters) of bald eagle nest sites.

Nest site protection through area closures is one of the primary ways that the Forest Service has implemented measures to prevent the potential for bald eagle nest failure and/or abandonment due to human disturbances (USFWS 1986). There are currently two seasonal area closures for bald eagle nest site protection - one at Boca Reservoir and one at New Bullards Bar Reservoir.

In addition, roads and motorized trails have the potential to indirectly affect bald eagles by degrading water quality which may impact the distribution and abundance of fisheries upon which bald eagles prey.

Bald Eagle: Environmental Consequences

Indicators used to Measure Effects

Cross Country Travel: The proliferation of routes associated with cross country travel can have an adverse impact to nesting bald eagles, and is analyzed for the alternatives at two scales within 400 meters (0.25 mi) and 800 meters (0.5 mi) of known nest sites.

Establishment of "Open Areas": Motorized access across dry soils to shoreline of Boca, Stampede, and Prosser Reservoirs during low water is assessed to determine their impact to nesting bald eagles.

Disturbance at a Specific Site (Additions to the NFTS): Motorized route additions to the NFTS within ¼ mile and ½ mile of known bald eagle nest sites were determined to assess direct, indirect and cumulative effects.

Changes to the NFTS (Reopened ML 1 Roads and Wet Weather Seasonal Restrictions): Changes to the system within ¼ mile and ½ mile of known bald eagle nest sites were determined to assess direct, indirect and cumulative effects.

Direct and Indirect Effects to Nesting Bald Eagles

Cross Country Travel. Cross country travel would be prohibited on 814 acres within 400 meters and on 3,299 acres within 800 meters of bald eagle nest sites, for all the action alternatives. The prohibition of cross country travel would prevent the proliferation of new unauthorized routes and would reduce disturbance associated with motorized use on these routes within foraging and nesting habitat for bald eagles. The prohibition of cross country travel also results in a reduction of the total amount of roads and trails available for motorized use by preventing cross country motorized use, including use of the existing unauthorized routes in all the action alternatives. The prohibition of cross country travel would reduce the potential for disturbance to nesting bald eagles that may be vulnerable to activities associated with motorized cross country travel. Alternative 1 does not prohibit cross country motorized use, and may result in increased disturbance to nesting bald eagles on between 814 acres and 3,299 acres.

Establishment of "Open Areas": Motorized access to Boca, Stampede, and Prosser reservoirs would potentially affect three bald eagle nest territories under Alternatives 2 and 6, where motorized access to the shoreline below the high water mark is allowed when soils are dry. Bald eagle territories potentially affected by motorized access are located at Stampede Reservoir #2 (Sagehen Arm) and Prosser Reservoir. Although motorized access to the shoreline at Boca Reservoir is also proposed, there is currently a

seasonal closure to protect bald eagles during the nesting season at this location. A second territory near Stampede Dam would not be affected by motorized access at Stampede Reservoir, since the nest site is located outside of the area where motorized access to the shoreline would be permitted.

Generally, low water conditions at these reservoirs occur during the latter part of the summer. However, the timing and duration of low water conditions occurring at Stampede Reservoir nest #2 and Prosser Reservoir will vary depending upon the yearly precipitation condition and upon the level of water drawn down. Reservoir water levels are regulated by the Bureau of Reclamation. Considerable water draw down levels can result during very dry years. Depending upon the timing and the actual water levels, overlap between the bald eagle nesting period (January through August) and motorized access may occur at Prosser and Stampede reservoirs. In general, overlap between motorized access and bald eagle nesting would likely occur toward the latter part of the bald eagle nesting season which could potentially cause nest disturbance and/or failure depending upon the timing when the activities overlap. However, the bald eagle nest territory at Prosser Reservoir was recently discovered and is located at the end of a well-used County Road. For Alternative 2, it is uncertain how providing motorized access to the shoreline during low water would impact nesting bald eagles at Stampede Reservoir nest #2 and Prosser Reservoir in the future because the nesting eagles may either become habituated to the motorized or may be subject to nest disturbance from increased use over time. Current levels of motorized use seem to be compatible with bald eagles nesting at Prosser Reservoir. However, if motorized and dispersed use increases in the future, this could potentially cause disturbance and ultimately loss in reproductive productivity for bald eagles at this site.

Table 3.03-97 displays how the alternatives would affect nesting bald eagles. Alternative 2 would result in establishing the most acres of “Open Areas” where disturbance to bald eagle could occur, especially on 12.8 acres within 0-400 meters of the Prosser Reservoir bald eagle nest site. Alternative 6 proposes 5.4 acres of “Open Areas” within 0-400 meters, and therefore would have slightly less area where disturbance to bald eagles nesting at Prosser Reservoir would be likely to occur. Although, “Open Areas” are designated in the outer 400-800 meters from nest sites, the likelihood of motorized use in these “Open Areas” would not likely result in disturbance to eagles at this distance.

Alternatives 1, 3, 4, 5, and 7 would not propose “Open Areas” to access reservoirs, and therefore would have no effect to nesting eagles at Boca, Prosser, or Stampede reservoirs.

Table 3.03-97. Establishment of “Open Areas” to Access Reservoirs

Proposed “Open Areas” to Access Reservoirs		**Alt 1, 3, 4, 5, 7** (acres)	**Alt 2** (acres)	**Alt 6** (acres)
Boca Reservoir Territory				
Boca Reservoir. #7 (East Shore Boca)	0-400 meters	0	0	0
	400-800 meters	0	4.8	4.8
Prosser Reservoir Territory				
Prosser Reservoir	0-400 meters	0	7.4	0
	400-800 meters	0	17.9	0

Proposed "Open Areas" to Access Reservoirs		**Alt 1, 3, 4, 5, 7** (acres)	**Alt 2** (acres)	**Alt 6** (acres)
Prosser Reservoir #1 (Boat Launching)	0-400 meters	0	5.4	5.4
	400-800 meters	0	0	0
Prosser Reservoir #2 (Dam View)	0-400 meters	0	0	0
	400-800 meters	0	1.0	1.0
Prosser Reservoir #12	0-400 meters	0	0	0
	400-800 meters	0	7.8	7.8
Stampede Reservoir Territory				
Stampede Reservoir	0-400 meters	0	0	0
	400-800 meters	0	20.0	0
Stampede Reservoir #8 (South Stampede Cove)	0-400 meters	0	0	0
	400-800 meters	0	17.1	17.1
Total Acres of "Open Areas"				
	0-400 meters	**0**	**12.8**	**5.4**
	400-800 meters	**0**	**68.6**	**30.7**
	Total Acres (0-800 meters)	**0**	**81.4**	**36.1**

Disturbance at a Specific Site (Additions to the NFTS)

Disturbance to bald eagle nest sites from alternatives is analyzed by determining the number of miles of motorized routes added to the NFTS occurring between 0 and 400 meters, and between 400 and 800 meters from each bald eagle territory (Table 3.03-98). Factors associated with motorized routes at a distance between 0 to 400 meters of bald eagle nest sites will likely cause the greatest potential disturbance to nesting bald eagles during the nesting season. Disturbance from motorized routes between 400 and 800 meters away from nest sites will likely have a lesser effect since noise associated with vehicles diminishes at greater distances, but may still modify behavior of nesting eagles, particularly for foraging eagles.

Table 3.03-98 indicates that Alternative 1 poses the greatest risk to nesting bald eagles on the Tahoe NF. Alternative 1 would potentially impact 7 bald eagle territories where continued cross country travel would result in continued use on 3 miles of existing unauthorized routes within 400 meters of bald eagle nest sites. An additional 6 miles would potentially affect bald eagle nest sites between 400 and 800 meters. Territories at Deer Creek, Boca Reservoir, Prosser, and Webber Lake would receive the greatest potential for disturbance associated with motorized use on unauthorized routes totaling between ½ to 1 mile per territory that are located less than 400 meters of a nest site. Roads within close proximity to bald eagle nest sites have the highest likelihood to disturb and disrupt nesting eagles.

All the action alternatives would benefit bald eagle by prohibiting cross country travel on existing unauthorized routes that are in close proximity to nest sites. None of the action alternatives proposes to add any routes to the NFTS within 400 meters of nest sites.

Two of the bald eagle territories (Stampede Dam and Milton) have proposed route additions that are located within the 400 to 800 meter analysis area for bald eagle nest sites. Proposed route TKN-J9

(Alternatives 2, 4, 5, 6, and 7) is located nearly 800 meters from the Stampede Dam nest site. This route should not pose a concern to nesting eagles at Stampede Dam, since the area is forested and the route is not visible from the nest site. Alternative 6 proposes to add route "D_SIE-0301_d," which is a very short spur (0.01 mile) that accesses a dispersed recreation site. Route "D_SIE-0301_d" also is located nearly 800 meters away from the known Milton nest site, and should not pose a concern to nesting eagles at Milton.

Table 3.03-98. Miles of Motorized Routes added to the NFTS within 0 to 400 meters and within 400 to 800 meters of Bald Eagle Nest Site

	Route ID	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Deer Creek Territory								
0 to 400 meters	Unauthorized routes	**0.4**	0	0	0	0	0	0
400 to 800 meters	Unauthorized routes	**1.5**	0	0	0	0	0	0
Stampede Dam Territory								
0 to 400 meters	Unauthorized routes	**0.1**	0	0	0	0	0	0
400 to 800 meters	Unauthorized routes (Alt 1), TKN-J9 (Alt 2, 4, 5, 6, 7)	**1.3**	**0.1**	0	**0.1**	**0.1**	**0.1**	**0.1**
Stampede at Sagehen Arm Territory								
0 to 400 meters	Unauthorized routes	**0.1**	0	0	0	0	0	0
400 to 800 meters	Unauthorized routes	**0.7**	0	0	0	0	0	0
Boca Reservoir Territory								
0 to 400 meters	Unauthorized routes	**0.9**	0	0	0	0	0	0
400 to 800 meters	Unauthorized routes	**0.8**	0	0	0	0	0	0
Prosser Reservoir Territory								
0 to 400 meters	Unauthorized routes	**1.1**	0	0	0	0	0	0
400 to 800 meters	Unauthorized routes	**0.9**	0	0	0	0	0	0
Webber Lake								
0 to 400 meters	Unauthorized routes	**0.4**	0	0	0	0	0	0
400 to 800 meters	Unauthorized routes	**0.8**	0	0	0	0	0	0
Milton Reservoir Territory (private)								
0 to 400 meters	None	0	0	0	0	0	0	0
400 to 800 meters	D_SIE-0301_d	**0.2**	0	0	0	0	**0.01**	0
Total Motorized Route Additions For All Nest Sites								
	0 to 400 meters	**3.1**	**0**	**0**	**0**	**0**	**0**	**0**
	400 to 800 meters	**6.2**	**0.1**	**0**	**0.1**	**0.1**	**.11**	**0.1**
	Total (0 to 800 meters)	**9.3**	**0.1**	**0**	**0.1**	**0.1**	**0.1**	**0.1**

*Alternative 1 includes existing unauthorized routes that would continue under cross country travel

Changes to the NFTS

Wet Weather Seasonal Restrictions. Under Alternatives 4, 5, and 6, when wet weather restrictions on all native surfaced roads and motorized trails overlap with critical bald eagle nesting periods (overlap January – March), bald eagle would benefit from reduced noise disturbance associated with motorized

use. The remaining alternatives do not impose wet weather restrictions, and therefore would not benefit bald eagle during critical nesting periods.

Reopened ML 1 Roads. None of the alternatives proposes to reopen any ML 1 Roads in bald eagle habitat, therefore, no effects to bald eagle would occur from reopening closed ML 1 Roads.

Summary of Direct and Indirect Effects

Table 3.03-99 summarizes the overall net direct and indirect effect of the alternatives from motorized route additions to the NFTS, prohibition of cross country travel, wet weather restrictions, and changes in class of vehicles.

Table 3.03-99. Bald Eagle - Summary of Overall Net Direct and Indirect Effects

		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel								
400 meters of nests	**Trend of Effect**	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
	Acres Cross Country Travel Prohibited	0	814 acres	814 acres	814 acres	814 acres	814 acres	814 acres
800 meters of nests	**Trend of Effect**	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
	Acres Cross Country travel Prohibited	0	3,299 acres	3,299 acres	3,299 acres	3,299 ac	3,299 ac	3,299 acres
Motorized Route Additions to NFTS								
400 meters of nests	**Trend of Effect**	Negative	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Miles	3.1	0	0	0	0	0	0
800 meters of nests	**Trend of Effect**	Negative	Negligible Effect	No Effect	Negligible Effect	Negligible Effect	Negligible Effect	Negligible Effect
	Miles	9.3	0.07	0	0.07	0.07	0.08	0.07
Establishment of "Open Areas"								
Acres	**Trend of Effect**	N/A	Negative, 2nd most impactive	No Effect	No Effect	No Effect	Negative, 3rd most impactive	No Effect
	0-400 meters of nests	N/A	12.8	0	0	0	5.4	0
	400-800 meters of nests	N/A	68.6	0	0	0	30.7	0
Changes to the NFTS	**Wet Weather Restrictions**	No effect	No effect	No effect	Beneficial - reduced disturbance during nesting season.	Beneficial - reduced disturbance during nesting season.	Beneficial - reduced disturbance during nesting season.	No effect
	Change in Class of Vehicles	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Reopened ML 1 Roads	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Amendments to Forest Plan		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Overall Net Effect of Proposed Actions							
Cross Country Travel	Negative impacts primarily from continued cross country travel, on 814 to 3,299 acres	Benefits from reduced nesting disturbance as a result of cross country travel prohibited on 814 to 3,299 acres.	Benefits most from reduced nesting disturbance as a result of cross country prohibited travel on 814 to 3,299 acres.	Benefits from reduced nesting disturbance as a result of cross country prohibited travel on 814 to 3,299	Benefits from reduced nesting disturbance as a result of cross country prohibited travel on 814 to 3,299 acres	Benefits from reduced nesting disturbance as a result of cross country prohibited travel on 814 to 3,299 acres	Benefits from reduced nesting disturbance as a result of cross country prohibited travel on 814 to 3,299 acres
Motorized Route Additions	Adverse effect of continued cross country travel on 3 miles of unauthorized routes within close proximity to nest sites	Negligible effect of 0.1 mile added within outer 800 meter radius of nest affecting 1 nest site.	No routes added	Negligible effect of 0.1 mile added within outer 800 meter radius of nest affecting 1 nest site	Negligible effect of 0.1 mile added within outer 800 meter radius of nest affecting 1 nest site	Negligible effect of 0.1 mile added within outer 800 meter radius of nest affecting 2 nest sites	Negligible effect of 0.1 mile added within outer 800 meter radius of nest affecting 1 nest site
Wet Weather Restrictions	Negative Effects from season long motorized use	Negative Effects from season long motorized use	Negative Effects from season long motorized use	Reduced disturbance from wet weather restrictions	Reduced disturbance from wet weather restrictions	Reduced disturbance from wet weather restrictions	Negative Effects from season long use

*Alternative 1 includes existing unauthorized routes that would continue with the continuance of cross country travel, while all the action alternatives include proposed route additions.

Cumulative Effects to Nesting Bald Eagles

Cumulative effects to the bald eagle include the cumulative effects of all motorized routes occurring on NFS and private lands within the Tahoe NF.

Cumulative Effects Boundary

Bald eagle cumulative effects include all the bald eagle nest territories and surrounding bald eagle habitat that occur within the boundary of the Tahoe NF including both NFS lands and private lands. This geographic boundary is sufficient large enough to analyze cumulative effects to bald eagles since their home ranges lie entirely within the boundary of the Tahoe NF. The spatial timeframe for analyzing cumulative effects goes back approximately 50-100 years into the past and approximately 20 to 50 years into the future.

Cumulative Effects Summary of Past, Present, and Reasonably Foreseeable Actions

The development of reservoirs across the Forest on both NFS and non-NFS lands have created bald eagle foraging habitat. Cumulative effects to the bald eagle habitat around these reservoirs include disturbance from a variety recreational activities including developed and dispersed camping, hiking, fishing, boating, motorized vehicle use, and others. Seasonal closures at Boca and Bullards Bar reservoirs have been instituted to mitigate potential adverse recreational disturbance to nesting bald eagles. Bald eagles appear to be able to adapt to a certain amount of human disturbance and appear to be increasing on the Forest. Historic vegetation management activities have removed a considerable amount of bald eagle nesting habitat particularly on the east side of the Forest around Boca, Stampede and Prosser Reservoirs (i.e. large diameter trees used for nesting). The loss of nesting and foraging habitat from high levels of disease and drought related bark beetle infestations have also affected the quality and quantity of bald eagle habitat. Present and future fuels and vegetation management prescriptions are designed to retain the larger tree component, so that bald eagle nest tree components should be available. In addition, large snags used for roost trees would also be retained. Forest thinning and fuels treatment projects are designed to prevent loss of bald eagle habitat over the long-term.

Miles of Motorized Routes within 0 to 400 Meters of Nest Sites

The direct and indirect effects of the alternatives contribute to two of the four risk factors described above - degradation of wintering or breeding habitat through human development or habitat alteration, and disturbance at nest and roost sites.

Under Alternative 1, cross country travel would continue, including travel on approximately 3 miles of existing unauthorized routes within 400 meters of a bald eagle nest site, which would potentially result in direct disturbance to nesting bald eagles (Table 3.03-100). In addition, under Alternative 1, wet weather closures would not be proposed on native surfaced roads and motorized trail, and could result in decreases in water quality of bald eagle foraging habitat. Because Alternative 1 does not prohibit motor vehicle cross country travel, it is highly likely that future route proliferation and associated cumulative impacts

would likely increase, and therefore the effects of Alternative 1, when combined with the effects of current and future recreation, may result in significant adverse cumulative effects to nesting bald eagles.

None of the action alternatives would result in direct or indirect effects to known nest sites within 400 meters from the addition of routes to the NFTS or reopening of ML 1 roads, and therefore they do not contribute to existing cumulative impacts. In addition, alternatives 4, 5, 6 provide some added benefit to bald eagle foraging habitat from wet weather seasonal closures.

For all the action alternatives, future cross country motorized travel would be prohibited, including motorize use on approximately 3 miles of existing unauthorized routes within 400 meters of nest sites. Cross country travel on 814 acres within 400 meters of bald eagle nest sites would benefit bald eagles by preventing direct disturbance to nesting bald eagles on the Tahoe NF. However, non-motorized use (hiking, mountain bicycling, equestrian, etc.) may occur on these routes. Some impacts to bald eagles may be expected from non-motorized use in the future, but may be less or more than motorized use depending on the type and intensity of disturbance. Bald eagle response to non-motorized disturbance also depends upon any individual bald eagle's ability to become habituated to certain types of disturbance. Furthermore, as these existing unauthorized routes become re-vegetated and recover either through active or passive restoration efforts, overall bald eagle disturbance from human activity is expected to diminish in the future.

Table 3.03-100. Cumulative Effects of Motorized Routes within 0 to 400 meters of Bald Eagle Nest Sites

Miles	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Motorized route additions to the NFTS	0	0	0	0	0	0	0
Unauthorized routes with continued cross country travel (negative impact)[1]	3.1	0	0	0	0	0	0
Reopened ML 1 Roads	0	0	0	0	0	0	0
Existing unauthorized routes prohibited to cross country travel (positive impact)	0	3.1	3.1	3.1	3.1	3.1	3.1
Cumulative effects of past, present, and proposed actions							
Existing motorized routes - NFS lands (negative impact)	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Existing motorized routes on private land - non-NFS lands (negative impact)	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Existing non-motorized routes (negative impact)	0	0	0	0	0	0	0
Decommissioned and Closed ML 1 Roads (positive impact)	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Net Cumulative Effects							
Overall Cumulative Effects equals the total of all impacts, both positive and negative	**5.6**	**1.7**	**1.7**	**1.7**	**1.7**	**1.7**	**1.7**

[1]Alternative 1 includes existing unauthorized routes that would continue with the continuance of cross country travel.

Table 3.03-101 displays the number of route miles which may contribute to disturbance to nesting eagles between 400 and 800 meters, though probably to a lesser extent than routes within closer proximity to nest sites (i.e. routes less than 400 meters). Motorized routes beyond 400 meters of nest sites,

potentially can add to existing cumulative impacts to bald eagle nesting success. As stated earlier, some studies have shown that eagles responded to disturbance at distances less than 800 meters.

Table 3.03-101 Cumulative Effects of Motorized Route miles within 400 to 800 meters of Bald Eagle Nest Sites

Miles	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Motorized Route additions to the NFTS (negative impact)[1]	9.3	0.1	0	0.1	0.1	0.1	0.1
Reopened ML 1 roads	0	0	0	0	0	0	0
Unauthorized routes prohibited to cross country travel (positive impact)	0	9.2	9.3	9.2	9.2	9.2	9.2
Cumulative effects of past, present, and proposed actions							
Existing motorized routes - NFS lands (negative impact)	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Existing motorized routes on private land - non-NFS lands (negative impact)	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Existing non-motorized routes (negative impact)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Decommissioned and closed ML 1 roads (positive impact)	1.8	0.4	0.4	0.4	0.4	0.4	0.4
Total Cumulative Effects							
Overall cumulative effects equals the total of all impacts, both positive and negative	**23.0**	**13.8**	**13.7**	**13.8**	**13.8**	**13.8**	**13.8**

[1]Alternative 1 includes existing unauthorized routes that would continue with the continuance of cross country travel.

Sensitive Species Determination

The Biological Evaluation for the Tahoe NF Motorized Travel Management Project, which is hereby incorporated by reference, made a determination that the action alternatives may affect the bald eagle, but do lead to a trend toward federal listing or loss of viability within the Tahoe NF, since current and future cross country travel by motorized vehicles would be prohibited. The prohibition of cross country travel would reduce the potential for disturbance to nesting bald eagles that may be vulnerable to activities associated with motorized use and cross country travel. Alternative 1, no action, may affect individual bald eagles and may lead to a trend toward federal listing due to the continued route proliferation from cross country motorized travel. Alternative 1 does not prohibit cross country motorized use, and may result in increased disturbance to nesting bald eagles.

Willow Flycatcher: Affected Environment

On the Tahoe NF, the willow flycatcher (*Empidonax traillii* ssp. *trailii* and *E.t. brewsteri*) is designated by the Regional Forester as a Sensitive species. In California, the willow flycatcher is a rare to locally uncommon, summer resident in wet meadow and montane riparian habitats at 600-2500 m (2000-8000 ft) in the Sierra Nevada and Cascade Range (CWHR 2005). Willow flycatcher populations in the Sierra Nevada are considered to be at risk (USDA Forest Service 2001). Historically, willow flycatchers were once common throughout the Sierra Nevada. The current distribution of the willow flycatcher has been drastically reduced compared to historic distributions. A ten year demographic analysis indicates the

Sierra Nevada willow flycatcher populations are continuing to decline. With the exception of a few sites, the majority of areas where willow flycatchers have been located support low numbers of breeding territories, and some as low as 1-2 pairs of breeding individuals.

Willow flycatcher breeding habitat is characterized as montane wetland shrub habitat where there is a prevalence of willows and montane meadows with standing or flowing water, or highly saturated soils throughout the nesting season (Green, et al. 2003). A study by Cain (2001 In Cain et al 2003) indicated that meadow wetness may assist in successful nesting by willow flycatcher by inhibiting potential forest and edge predators from accessing willow flycatcher nests. Meadow wetness may also be important for willow flycatcher insect prey species.

The Willow Flycatcher Conservation Assessment (Green et al. 2003) identified roads as one of the leading contributing factors responsible for the loss and degradation of willow flycatcher habitat. Specifically, roads (dirt-surfaced or paved), intercept surface and subsurface hydrological flow. Meadow desiccation occurs when hydrological flows are intercepted and redirected which may result in long-term habitat loss or degradation. Roads may have a negative impact on meadow hydrology, especially when roads bisect meadows and have associated drainage structures to maintain road conditions. Human disturbance associated with road and trail motorized use may also affect willow flycatcher nesting success. Roads also provide increased access to humans which may directly and indirectly affect willow flycatcher productivity. Roads provide access for livestock grazing and often meadows occupied by willow flycatchers are key forage areas for livestock.

Livestock grazing has long been identified as contributing to the decline in willow flycatcher populations as it relates to grazing impacts on willow and meadow habitat, as well as potential direct impacts from cattle coming in direct contact or destroying nest sites. Furthermore, brown-headed cowbirds are strongly associated with cattle. Cowbirds are known to parasitize willow flycatcher nests and ultimately may reduce overall willow flycatcher nesting success.

At least two willow flycatcher breeding sites have received damage from off road vehicle travel on the Tahoe NF in recent years. Wheel tracks leaving ruts within one willow flycatcher meadow was observed on more than one occasion. Several grazing allotments on the Tahoe NF overlap occupied and emphasis willow flycatcher sites.

Willow Flycatcher: Environmental Consequences

Indicators used to Measure Effects

Cross Country Travel: The prohibition of cross country travel is analyzed for their effects to willow flycatcher occupied and emphasis habitat.

Additions to the NFTS (Number of Occupied and Emphasis Willow Flycatcher Sites): To evaluate the effects of motorized route additions to the NFTS on willow flycatcher habitat, the number of willow flycatcher Occupied and Emphasis meadow sites containing motorized route additions to the NFTS is determined. The Sierra Nevada Framework Plan Amendment ROD (2004) designated Occupied and Emphasis Habitats for willow flycatcher. Occupied habitats are sites where willow flycatcher(s) have been detected during the breeding season (between 15 June and August 1) (See SNFPA ROD 2004 for

more detailed definition). Emphasis habitat is defined as meadows within 5 miles of Occupied willow flycatcher sites that are larger than 15 acres that have standing water on June 1 and a deciduous shrub component.

Establishment of "Open Areas": "Open Areas" are analyzed to assess the effects on willow flycatcher occupied and emphasis meadow habitats.

Changes to the NFTS

Change in Class of Vehicles: The changes in class of vehicle was analyzed for their potential to affect willow flycatcher occupied and emphasis habitat, since this action potentially changes the condition of the existing road surface from smoothed surfaced to rough surfaced; which could potentially alter meadow condition where routes intersect meadows or are within close proximity to motorized routes.

Wet weather seasonal restrictions: Wet weather seasonal restrictions on native surfaced roads and motorized trails are analyzed for their potential to benefit willow flycatcher habitat through the reduction of erosion and sedimentation that could occur from wet season motorized use for each of the alternatives.

Reopened ML 1 road: Reopened ML 1 roads are analyzed to assess the effects on willow flycatcher habitat, similar to how effects are analyzed for motorized route additions.

Direct and Indirect Effects

Cross Country Travel

Alternative 1 would pose the greatest risk to willow flycatcher on 3,075 acres (occupied meadows - 1,747 acres, emphasis meadows - 1,328 acres where willow flycatcher meadows would be subject to continued cross country travel, including on existing unauthorized routes.

Table 3.03-102 indicates the willow flycatcher occupied and emphasis meadows that would be prohibited to cross country travel that are currently intersected by unauthorized routes. Under Alternative 1, cross country travel would continue, potentially causing disturbance to willow flycatcher and habitat degradation.

Under the action alternatives, motorized cross country travel would be prohibited on 1,747 acres willow flycatcher occupied meadows, and on 1,328 acres emphasis meadows, totaling 3,075 acres willow flycatcher meadows, including on approximately 4 miles of existing unauthorized routes within 19 to 22 willow flycatcher meadows. Under the action alternatives, active or passive restoration within these meadow sites would benefit willow flycatchers in terms of nesting, foraging, and future reestablishment opportunities.

Table 3.03-102. Willow flycatcher sites with unauthorized routes, prohibited to cross country travel

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number of Occupied Meadows with unauthorized routes prohibited to cross country travel	0	4	4	4	4	4	4
Miles Unauthorized Routes in Occupied Meadows prohibited to cross country travel	0	1.16	1.16	1.16	1.16	1.16	1.16
Number Emphasis Meadows with unauthorized routes prohibited to cross country travel	0	17	18	16	16	15	18
Miles Unauthorized Routes in Emphasis Meadows prohibited to cross country travel	0	2.70	2.84	2.69	2.57	2.67	2.72
Total Occupied and Emphasis Meadows	**0**	**20**	**22**	**21**	**18**	**17**	**21**
Total Miles in Occupied and Emphasis Meadows Prohibited to Cross Country Travel	**0**	**3.86**	**4.0**	**3.85**	**3.73**	**3.83**	**3.88**

Establish "Open Areas" - Greenhorn and Reservoir Areas

Establishing "Open Areas" at Greenhorn, and at Boca, Stampede, and Prosser reservoirs would have no direct or indirect effect to Occupied and Emphasis meadow habitat for the willow flycatcher. No willow flycatcher habitat occurs within the proposed "Open Areas."

Additions to the NFTS

Direct and indirect effects of the alternatives are evaluated by determining the number of proposed motorized route additions to the NFTS that intersect delineated willow flycatcher meadow meadows on the Tahoe NF.

Number of Occupied and Emphasis Willow Flycatcher Meadows: Table 3.03-103 displays the willow flycatcher Occupied and Emphasis meadow sites on the Tahoe NF that are potentially affected by the alternatives. Under Alternative 1, 22 of 60 (37%) willow flycatcher meadow sites would be intersected by existing unauthorized routes (4.1 miles), which would continue to receive motorized use associated with cross country travel, where direct and indirect disturbance could occur.

Of these sites, 4 out of 19 meadows (21%) identified as Occupied willow flycatcher sites, including approximately 1.2 miles of existing unauthorized routes have the potential to adversely affect breeding willow flycatchers, including both direct disturbance to nesting willow flycatchers and indirect impacts to willow flycatcher habitat through alteration and/or habitat degradation where routes potentially affect meadow vegetation and hydrology.

Alternatives 2, 3, 4, 5, 6, and 7 do not propose motorized route additions to the NFTS within Occupied willow flycatcher habitat where willow flycatchers are known to breed. Therefore, direct and indirect impacts to breeding willow flycatchers under these alternatives are not expected to occur.

Of the action alternatives, Alternative 6 would affect the most Emphasis meadows, totaling just under 0.2 mile, primarily from motorized route additions which access dispersed recreation areas (6 out of 7 routes). Most of these routes which access dispersed sites are very short segments totaling less than 0.01 mile (Table 3.03-103). The ability for willow flycatcher to occupy these emphasis meadows that are potentially affected by the action alternatives is unknown. However, professional judgment would

indicate that these meadows may not actually meet suitability criteria for willow flycatcher occupancy, which is dependent on many factors, including nearby meadows that are occupied by nesting willow flycatchers, capability of the meadow to maintain surface water throughout the breeding season, adequate willow cover, etc. Therefore, although motorized routes may adversely affect meadow vegetation and hydrology, stabilized routes may not necessarily cause meadow degradation at these emphasis meadows.

Following Alternative 6, Alternatives 2, 5, and 7 similarly affect willow flycatcher Emphasis meadow habitat, where 2 meadows (Castle Valley and Loney Meadow) are intersected by about 0.1 mile of proposed route additions (TKN-J5 and D-18-19_b**).** Alternative 4 only proposes to add route D-18-19_b that accesses a dispersed site route which intersects Loney Meadow.

Table 3.03-103. Number of willow flycatcher meadow sites intersected by motorized route additions

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Willow Flycatcher meadow sites intersected by motorized route additions							
Occupied Meadows Intersected by Route Additions (13)	4	0	0	0	0	0	0
Occupied Meadow Miles	1.16	0	0	0	0	0	0
Emphasis Meadows Intersected by Route Additions (30)	18	2	0	1	2	5	1
Emphasis Meadows Miles	2.84	0.13	0	0.02	0.13	0.17	0.12
Total Number Meadows with Route Additions	**22**	**2**	**0**	**1**	**2**	**5**	**1**
Total Miles of Route Additions in Meadows	**4.0**	**0.13**	**0**	**0.02**	**0.13**	**0.17**	**0.12**

*Alternative 1 includes existing unauthorized routes with continued cross country travel.

Table 3.03-104. Miles of Motorized Route Additions with willow flycatcher Emphasis Meadows by Route ID

Meadow Name	Route ID	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Unauthorized routes	N/A	2.84	N/A	N/A	N/A	N/A	N/A	N/A
Castle Valley	TKN-J5	0	0.11	0	0	0.11	0.12	0.12
Castle Valley	D_TKN-J5_b	0	0	0	0	0	0.01	0
Castle Valley	D_TKN-J5_c	0	0	0		0	0.01	0
Loney Meadow	D-18-19_b	0	0.02	0	0.02	0.02	0.02	0
Meathouse Meadow	D-350-10	0	0	0	0	0	0.01	0
Nichols Mill	D_15-20	0	0	0	0	0	0.001	0
Sagehen	D_N886-18c	0	0	0	0	0	0.002	0
	Total Miles	**2.84**	**0.13**	**0**	**0.02**	**0.13**	**0.17**	**0.12**

*Alternative 1 includes existing unauthorized routes with continued cross country travel.

Changes to the NFTS

Change in Class of Vehicles: The change in class of vehicle proposed under Alternatives 2, 4, 5, 6, and 7, on some existing NFTS motorized roads may result in some smoothed surfaced roads becoming rough surfaced roads through changed road maintenance. In addition, some existing motorized NFTS roads may receive different maintenance resulting in increased vegetation density at the road margins which would provide additional cover and/or foraging habitat. The resulting roadway condition would depend upon the

amount and type of vegetation present and the type of maintenance any given road receives. For the willow flycatcher existing habitat conditions will dictate whether or not the change in class of vehicle will result in reduced habitat quality. In general, it is not expected that the change in class of vehicle would result in a significant change to willow flycatcher habitat conditions, unless different road maintenance results in increased meadow habitat degradation. No changes in class of vehicle are proposed under Alternatives 1 and 3, which means that some system routes would remain under their current maintenance management strategy. However, in some cases some existing system roads have already become rough surfaced due to changes in maintenance.

Wet Weather Seasonal Restrictions*:* Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and motorized trails where willow flycatcher occupied and emphasis meadows would be benefited through the reduction of erosion and sedimentation that might otherwise occur during the wet season. Alternative 1, with the greatest miles of motorized routes that intersect the most number of willow flycatcher meadows, which would continue to be impacted by motorized use during the wet weather season, where habitat degradation within willow flycatcher meadows could occur. Roads have often been cited as being the source of resource damage and habitat degradation to meadows including those potentially used by willow flycatchers.

Reopened ML 1 Roads: Only Alternative 5 proposes to reopen ML 1 roads. Alternative 5 proposes to reopen 0.12 miles of ML 1 road (H823-1-1) affecting one willow flycatcher emphasis meadow site at Howard Creek. Alternative 5 does not propose to reopen any ML 1 roads that would affect any willow flycatcher occupied sites, and therefore would not affect any known willow flycatcher nesting sites. Under Alternative 5, reopening ML1 road within one emphasis meadow site at Howard Meadow could adversely affect the meadow vegetation and hydrology that may prevent the reestablishment of willow flycatchers.

Amendments to Forest Plan

The alternatives would not result in affecting willow flycatcher habitat from Amendments to the Forest Plan, since willow flycatcher habitat does not occur in areas where the season of motorized use in deer winter areas would be altered within the Humbug-Sailor Management Area.

Summary of Direct and Indirect Effects

Table 3.03-105 summarizes the overall net direct and indirect effect of the alternatives from cross country travel, establishment of “Open Areas,” motorized route additions to the NFTS, changes to the NFTS, and amendments to the Forest Plan.

Table 3.03-105. Willow Flycatcher - Summary of Overall Net Direct and Indirect Effects

		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel								
Occupied Meadows	**Trend of Effect**	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
	Acres Cross Country Travel Prohibited	**0**	1,747	1,747	1,747	1,747	1,747	1,747
Emphasis Meadows	**Trend of Effect**	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
	Acres Cross Country Travel Prohibited	**0**	1,328	1,328	1,328	1,328	1,328	1,328
Total acres benefited		**0**	**3,075**	**3,075**	**3,075**	**3,075**	**3,075**	**3,075**
Total Occupied and Emphasis Meadows Prohibited to Cross Country Travel		**0**	**20**	**21**	**19**	**19**	**18**	**20**
Total Miles in Occupied and Emphasis Meadows Prohibited to Cross Country Travel		**0**	**3.87**	**4.01**	**3.86**	**3.74**	**3.84**	**3.89**
Establishment of "Open Areas"		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Motorized Route Additions								
Occupied Meadows	**Trend of Effect**	Negative	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	# Meadows Intersected	4	0	0	0	0	0	0
	Miles	1.16	0	0	0	0	0	0
Emphasis Meadows	**Trend of Effect**	Negative	Negative	No Effect	Negative	Negative	Negative	Negative
	# Meadows Intersected	18	2	0	1	2	5	1
	Miles	2.84 Miles	0.13 Miles	0 Miles	0.02 Miles	0.13 Miles	0.17 Miles	0.12 Miles

			Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Changes to the NFTS									
Wet Weather Restrictions			No Effect	No Effect	No Effect	Beneficial	Beneficial	Beneficial	No Effect
Change in Class of Vehicles			No Effect	Localized negative effects.	No Effect	Minor negative effect.	Localized negative effects.	Localized negative effects.	Minor negative effect.
Reopened ML 1 Roads	**Occupied Meadows**	**Trend of Effect**	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
		# Meadows Intersected	0	0	0	0	0	0	0
		Miles	0	0	0	0	0	0	0
	Emphasis Meadows	**Trend of Effect**	No Effect	No Effect	No Effect	Negative	Negative	No Effect	No Effect
		# Meadows Intersected	0	0	0	0	2	0	0
		Miles	0	0	0	0	0.14	0	0
Amendments to Forest Plan			**No Effect**	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Overall Net Effect of Proposed Actions			Negative effects from continued cross country travel on 22 occupied and emphasis meadows on 4 miles of existing unauthorized routes.	Benefits within 20 occupied and emphasis meadows on 3.86 miles of existing unauthorized routes where cross country travel is prohibited; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.	Benefits within 22 meadows on 4.0 miles of existing unauthorized routes where cross country travel is prohibited; overall reduces disturbance and habitat fragmentation.	Benefits within 21 meadows on approx. 3.85 miles of existing unauthorized routes where cross country travel is prohibited;although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.	Benefits within 18 meadows on 3.7 miles of existing unauthorized routes where cross country travel is prohibited; although minor negative impacts from route additions and reopened ML 1 roads; overall reduces disturbance and habitat fragmentatio.	Benefits within 17 meadows on 3.8 miles of existing unauthorized routes where cross country travel is prohibited although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.	Benefits within 21 meadows on 3.9 miles of existing unauthorized routes where cross country travel is prohibited although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation..

*Alternative 1 includes existing unauthorized routes that would continue with cross country travel, while all the action alternatives include proposed route additions.

Cumulative Effects

Cumulative Effects Boundary

The cumulative effects analysis geographic boundary for the willow flycatcher includes all willow flycatcher sites occurring within the Tahoe NF boundary, both within NFS lands and non-NFS lands. See Terrestrial and Aquatic Species Introduction Section for the rationale. The temporal scale for analyzing cumulative effects to willow flycatcher is approximately 20 years into the past and 20 years out into the future.

Overall Cumulative Effects to Willow Flycatcher Meadows

Cumulative impacts to the willow flycatcher include past, present, and future impacts from livestock grazing, roads, and recreational activities. The Forest Service has completed a Conservation Assessment of the Willow Flycatcher in the Sierra Nevada (Green et al. 2003), which identified meadow drying, loss of nesting and foraging substrates (riparian shrubs), increased predator access to meadow interiors, and potential cowbird parasitism as among the key factors likely responsible for the decline of the willow flycatcher. Livestock management, recreation, water developments, and roads are described as causative factors.

Historic livestock grazing has impacted montane meadows and is considered to be a primary factor that has influenced the suitability of willow flycatcher habitat and meadow habitat for birds in the Sierra Nevada (Graber 1996, Green et al. 2003, Menke et al. 1996). Many of the landbird species utilizing these meadows feed upon insects that decline in response to removal of this herbaceous growth (Graber 1996). Poorly managed grazing in riparian areas can impact nesting densities of many bird species, and particularly of habitat specialists such as the willow flycatcher, Lincoln's sparrow, and white-crowned sparrow (RHJV 2004).

Livestock grazing on active allotments currently affects willow flycatcher meadow habitat on the Forest. Trend data from Regional range meadow monitoring was available for 15 willow flycatcher meadow sites on the Tahoe NF. Of the 15 Occupied and Emphasis sites monitored, habitat trend is either up or stable on 73% of sites and trend was down on 27% of the sites.

Non-motorized trails allow for backcountry hiking and camping, which may occur in meadows not accessed by motorized routes, and can adversely affect additional meadow habitat or disturb species. These activities are generally dispersed and of low impact to habitat, particularly in sites most suitable for willow flycatcher, which are typically very wet. Foreseeable future projects listed in the Tahoe Schedule of Proposed Actions do not indicate additional cumulative effects would occur.

Watershed restoration work continues to be a priority on the Tahoe NF. During 2009, watershed restoration at Perazzo Meadows is currently underway, with the intent to increase water storage capabilities and improve vegetation conditions. Perazzo Meadows is an important willow flycatcher breeding site in the Sierra Nevada. Maintaining and improving habitat conditions for the willow flycatcher at Perazzo Meadows and the Little Truckee River meadow system is integral to the long-term

sustainability and viability for this species in the Sierra Nevada. Long-term benefits to the willow flycatcher and its habitat are expected to occur from this watershed restoration effort.

Cumulative Effects from Motorized Routes to Willow Flycatcher Meadows

Factors responsible for the decline of willow flycatcher populations in the Sierra Nevada are primarily thought to be the result of habitat change, particularly the alteration of meadow hydrology, specifically caused by roads (Green et al. 2003).

Table 3.03-106 displays the cumulative impacts of motorized and non-motorized routes within meadows that are designated as either willow flycatcher Occupied or Emphasis habitat. Occupied habitat are sites where willow flycatcher breeding is either known or suspected. Routes intersecting Occupied habitat have the highest potential to impact breeding willow flycatchers. Emphasis habitat are meadows that are currently not occupied by breeding willow flycatcher, but are considered to be suitable willow flycatcher nesting habitat that are within 5 miles of Occupied Sites where dispersing willow flycatchers may nest in the near future. Emphasis habitats are particularly important so that willow flycatchers may have future refugia where their population can be distributed and expand in the future.

Occupied Habitat

Alternatives 1 would contribute to existing cumulative impacts to Occupied willow flycatcher sites. Alternative 1 cumulatively adds, approximately 1.2 miles of existing unauthorized routes, affecting 4 Occupied meadow sites (31% of meadows identified as Occupied) where direct and indirect impacts to meadow vegetation and hydrology could occur. Hydrologic condition is an important habitat component to consider for successful willow flycatcher breeding. Given the uncertainty of future route proliferation under Alternative 1, the future habitat alteration within Occupied meadow sites is potentially at risk, and may ultimately affect willow flycatcher breeding success within Occupied habitats.

The action alternatives (Alternatives 2, 3, 4, 5, 6, and 7) do not add to existing cumulative impacts within occupied willow flycatcher sites, and therefore would not impact breeding willow flycatchers. In addition, all the action alternatives would prohibit the proliferation of new motorized routes through cross country motorized travel that would adversely alter habitat within Occupied sites. Finally, all the action alternatives would benefit willow flycatcher breeding habitat by prohibiting cross country travel, including use on unauthorized routes on approximately 1.2 miles within 3 Occupied meadow sites.

Emphasis Habitat

Emphasis habitats are meadow sites within 5 miles of known breeding sites (Occupied habitat) that are considered to provide suitable nesting habitat for willow flycatcher. Alternative 1 poses the greatest risk to the future colonization by willow flycatcher within Emphasis habitats, since cross country travel would not be prohibited, including use on unauthorized routes that intersect 18 Emphasis sites (60% of all Emphasis sites) for a total of about 2.8 miles.

All the action alternatives would benefit willow flycatcher emphasis habitats by prohibiting cross country travel on existing unauthorized routes. Of the action alternatives, Alternative 5 would benefit

willow flycatcher emphasis sites the least where cross country travel would be prohibited within 17 meadows on 3.7 miles of unauthorized routes. Alternative 5 would add to cumulative impacts within 4 Emphasis sites (13% of all Emphasis sites) from proposed motorized route additions to the NFTS and reopened ML 1 roads, totaling approximately 0.28 miles. Alternatives 6, 4, 2, 7, and 3 benefit willow flycatcher emphasis sites in descending order, ranging from 18-21 meadows where cross country travel would be prohibited on between 3.8 to 4 miles on existing unauthorized routes.

Alternatives 2, 4, 6, and 7 would result in affecting between 1 to 5 Emphasis sites (Alt 7 – the least, Alt 6 – the most) intersected by motorized route additions and/or reopened ML 1 roads, for less than 0.2 mile total for each alternative. Alternative 3 does not add to existing cumulative impacts to Emphasis habitats, since no motorized route additions or reopened ML 1 roads would result in the intersection of any willow flycatcher Emphasis sites.

Summary of Cumulative Effects to Willow Flycatcher Habitat: Occupied and Emphasis Meadows

Alternative 1 poses the greatest overall risk to known nesting sites and potentially suitable nesting sites from all routes including use on existing unauthorized routes associated with cross country travel, existing motorized routes (both NFS and non-NFS), and non-motorized routes. Alternative 1 results in willow flycatcher meadows being intersected 55 times for a total of about 12 miles by routes of any category. Over 30% of meadows identified as Occupied are impacted by existing unauthorized routes, which could substantially alter the meadow vegetation and hydrology and reduce breeding success at known nesting sites of a species that is at risk of extirpation. Therefore, Alternative 1 could contribute to the downward trend of willow flycatcher populations on the Tahoe NF.

Alternative 5 results in the next highest overall cumulative impact where Occupied and Emphasis meadows combined are intersected by a motorized or non-motorized route 39 times totaling about 8.4 miles. The remaining action alternatives do not add to existing cumulative impacts to Occupied habitat, however Alternatives 2, 4, 5, 6, and 7 do contribute to cumulative impacts to 1 to 5 Emphasis meadow sites depending on the alternative where relatively short route segments would intersect a meadow (0.1 to 0.3 mile).

The action alternatives all prohibit cross country travel, including motorized use on between 3.7 miles to 4.0 miles of unauthorized routes (Alt. 5 prohibits the least, Alt. 3 prohibits the most) within suitable willow flycatcher habitats (Occupied and Emphasis meadows). It is expected that non-motorized use (hiking, mountain bicycling, equestrian, etc.) may occur on these routes in the future. In general, benefits to willow flycatcher habitat would be realized as vegetation and soil impacts from non-motorized use recover over time through active and passive restoration efforts. Under Alternative 1, these benefits would not be realized since cross country travel would not be prohibited and use on existing unauthorized routes would continue and likely proliferate.

Foreseeable future projects on the Tahoe NF include undertaking a variety of meadow restoration projects that would result in benefits to willow flycatcher (i.e. Perazzo Meadows) and its habitat.

Table 3.03-106. Cumulative Effects to Willow Flycatcher Meadows - Occupied and Emphasis Meadows Intersected by Routes

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Total Number of Willow Flycatcher Sites Intersected by motorized route additions to the NFTS (negative impact)[1]	**22**	**2**	**0**	**1**	**4**	**5**	**1**
Total Miles	**4.0**	**0.13**	**0**	**0.02**	**0.13**	**0.17**	**0.12**
Number of Occupied Sites	4	0	0	0	0	0	0
Miles within Occupied Sites	1.16	0	0	0	0	0	0
Number of Emphasis Sites	18	2	0	1	2	5	1
Miles within Emphasis	2.68	0.13	0	0.02	0.13	0.13	0.12
Total Number Meadows with Reopened ML 1 Roads (negative impact)	**0**	**0**	**0**	**0**	**2**	**0**	**0**
Total Miles of Reopened ML 1 Roads in Meadows (negative impact)	**0**	**0**	**0**	**0**	**0.14**	**0**	**0**
Number of Occupied Sites	0	0	0	0	0	0	0
Miles within Occupied Sites	0	0	0	0	0	0	0
Number of Emphasis Sites	0	0	0	0	2	0	0
Miles within Emphasis	0	0	0	0	0.14	0	0
Total Number of Willow Flycatcher Sites Intersected by Unauthorized Routes prohibited to cross country travel (positive impact)	**0**	**20**	**22**	**21**	**18**	**17**	**21**
Total Miles	**0**	**3.9**	**4.0**	**3.9**	**3.7**	**3.8**	**3.9**
Number Occupied Sites	0	3	3	3	3	3	3
Miles within Occupied	0	1.17	1.17	1.17	1.17	1.17	1.17
Number Emphasis Sites	0	17	18	16	16	15	18
Miles within Emphasis	0	2.70	2.84	2.69	2.57	2.67	2.72
Cumulative effects							
Total Number of Willow Flycatcher Sites Intersected by Existing NFTS motorized routes - NFS lands (negative impact)	**20**	**20**	**20**	**20**	**20**	**20**	**20**
Total Miles	**2.74**	**2.74**	**2.74**	**2.74**	**2.74**	**2.74**	**2.74**
Number Occupied Sites	7	7	7	7	7	7	7
Miles within Occupied	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Number Emphasis Sites	13	13	13	13	13	13	13
Miles within Emphasis	1.69	1.69	1.69	1.69	1.69	1.69	1.69
Total Number of Willow Flycatcher Sites Intersected by Existing motorized routes on - non-NFS lands (private) (negative impact)	**8**	**8**	**8**	**8**	**8**	**8**	**8**
Total Miles	**4.26**	**4.26**	**4.26**	**4.26**	**4.26**	**4.26**	**4.26**
Number Occupied Sites	2	2	2	2	2	2	2
Miles within Occupied	3.83	3.83	3.83	3.83	3.83	3.83	3.83
Number Emphasis Sites	6	6	6	6	6	6	6
Miles within Emphasis	0.43	0.43	0.43	0.43	0.43	0.43	0.43

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Total Number of Willow Flycatcher Sites Intersected by Existing non-motorized routes (negative impact)	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Total Miles	**1.03**	**1.03**	**1.03**	**1.03**	**1.03**	**1.03**	**1.03**
Number Occupied Sites	1	1	1	1	1	1	1
Miles within Occupied	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Number Emphasis Sites	4	4	4	4	4	4	4
Miles within Emphasis	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Total Number of Willow Flycatcher Sites Intersected by Decommissioned routes (positive impact)	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Total Miles	**0.49**	**0.49**	**0.49**	**0.49**	**0.49**	**0.49**	**0.49**
Number Occupied Sites	1	1	1	1	1	1	1
Miles within Occupied	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Number Emphasis Sites	2	2	2	2	2	2	2
Miles within Emphasis	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Total Number of NFTS Roads Closed by Previous NEPA decisions, pending implementation (positive impact)	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Total Miles	**0.10**	**0.10**	**0.10**	**0.10**	**0.10**	**0.10**	**0.10**
Number Occupied Sites	3	3	3	3	3	3	3
Miles within Occupied	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Number Emphasis Sites	0	0	0	0	0	0	0
Miles within Emphasis	0	0	0	0	0	0	0
Total Cumulative Effects							
Number of Times a Meadow is Intersected by Motorized Routes	**55**	**35**	**33**	**34**	**39**	**38**	**34**
Net Cumulative Impacts = Sum Total Miles of All Routes both positive and negative that Intersect Willow Flycatcher Sites	**11.87**	**8.16**	**8.03**	**8.05**	**8.44**	**8.20**	**8.15**

*Alternative 1 includes the existing unauthorized routes associated with continued with cross country travel, while all action alternatives include motorized route additions.

Sensitive Species Determination

The Biological Evaluation for the Tahoe NF Motorized Travel Management Project (incorporated by reference) made a determination that the proposed action may affect willow flycatchers, but is not likely to lead to a trend toward federally listing or a downward trend in population viability. The action alternatives all prohibit motorized cross country travel, including use of existing unauthorized routes. Furthermore, wet weather seasonal restrictions reduce the likelihood of sedimentation and erosion that may occur from wet weather motorized use for Alternatives 4, 5, and 6.

Compliance with Forest Plan and Other Direction

The Tahoe NF LRMP, as amended by the SNFPA ROD (2004), provides management direction for managing willow flycatcher habitat, including direction for managing meadows, wetlands, and Riparian Conservation Areas that are applicable to willow flycatcher habitat as follows:

- *Locate roads away from meadow edges where alternative routes are available (Tahoe LRMP) (Management Standard & Guideline):*
- *Avoid wetlands or minimize effects to natural flow patterns in wetlands and avoid road construction in meadows.*
- *Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives (RCOs) at the project level and the AMS goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species (Management Standard & Guideline 92).*
- *Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity (RCO#2, Management Standard & Guideline 100).*

In the above sections, the Proposed Action and alternatives for the Tahoe NF Motorized Travel Management Project were analyzed for their potential effects to willow flycatcher meadow and riparian habitats which addresses the above management standard and guidelines as they apply to willow flycatcher habitats. Mitigation measures for the action alternatives to minimize the risk of sediment and streambank alteration from proposed motorized route additions to the NFTS and existing unauthorized routes are addressed in the Riparian Conservation Objective (RCO) analysis and Appendix A (Site Specific Road, Trail and Open Area Information).

Alternative 1 is least consistent with the above standards and guidelines for managing meadows in terms of maintenance and hydrologic connectivity of meadows, avoidance of roads near and within meadows, and minimizing effects to meadow condition and function. Alternative 1 continues cross country travel, including within 22 willow flycatcher meadows on approximately 4 miles of existing unauthorized routes.

All of the action alternatives meet these standards and guidelines by improving willow flycatcher habitat conditions. The action alternatives all prohibit cross country travel on 3,075 willow flycatcher meadow acres, and reduces the impacts of 18 to 21 willow flycatcher meadows where there would be approximately 3.7 miles to 4.0 miles. All the action alternatives considerably improve meadow function and connectivity for the willow flycatcher, since the project design standards were developed to minimize impacts to willow flycatcher meadows and riparian habitat through the implementation of wet weather seasonal restrictions, does not propose motorized route additions within any Occupied willow flycatcher meadow, and bans cross country motorized travel.

Great Gray Owl: Affected Environment

The great gray owl is listed as Sensitive on the Region 5 Forester's Sensitive Species List (USDA Forest Service 1998). In the Sierra Nevada, great gray owls are found in mixed coniferous forest from 2,400 to

9,000 feet elevation where such forests occur in combination with meadows or other vegetated openings. Nesting usually occurs within 600 feet of the forest edge and adjacent open foraging habitat. Most nests are made in broken top snags (generally firs), but platforms such as old hawk nests, mistletoe infected limbs, etc. are also used. Nest trees or snags are generally greater than 21 inches dbh and 20 feet tall.

In the Sierra Nevada, pocket gophers and voles appear to be important prey species (Winter 1982, Reid 1989). Meadows appear to be the most important hunting habitat for great gray owls, where approximately 93% of their prey is taken (Winter 1981).

Recent great gray owl sightings in our area include an adult located three miles north of Nevada City (1/96), an adult on private land near the town of Alleghany (5/2006, 4/2007), a vocalization of an adult detected by CDFG and Sierra Pacific industries on the Sierraville RD in 2005 and 2008), and two adults found in the Feather River Ranger District of the Plumas NF (8/97). In recent years, numerous surveys for great gray owl have been conducted on the Tahoe NF, and have only resulted in a handful of single great gray owl detections, with no confirmation of nesting.

Roads and motorized trails can potentially affect great gray owl habitat by affecting the condition of suitable great gray owl habitat in similar ways that affects willow flycatcher habitat, primarily through changes in meadow hydrology or when damage to meadow vegetation occurs. Compaction and meadow drying can cause changes in vegetation composition which can lead to changes in prey species abundance and distribution. Changes in prey availability and abundance can affect reproduction success of great gray owls.

Great Gray Owl: Environmental Consequences

The Tahoe NF LRMP as amended by the SNFPA ROD (2004) provides management direction to establish and maintain Protected Activity Centers (PACs) to include the forested area and adjacent meadow around all known great gray owl nest stands. The desired condition for meadow vegetation in great gray owl PACs supports a sufficiently large meadow vole population to provide a food source for great gray owls through the reproductive period. Although the Tahoe NF does not currently support known great gray owl nesting pairs, potentially suitable great gray owl meadows were analyzed to determine potential impacts from the Tahoe NF Travel Management Project.

Indicators used to Measure Effects

Cross Country Travel: The prohibition of cross country travel is analyzed for their effects to potential great gray owl breeding habitat.

Additions to the NFTS (Number of Great Gray Owl Meadows Intersected): meadows identified as suitable for great gray owl foraging that are adjacent to suitable breeding habitat were assessed to determine the potential impact from proposed motorized route additions. The number of great gray owl meadows that are intersected by motorized route additions to the NFTS are assessed for the alternatives.

Establishment of "Open Areas": The establishment of "Open Areas" at Greenhorn Creek and Reservoir areas (Prosser, Stampeded and Boca) is evaluated for their potential to affect potential great gray owl habitat.

Changes to the NFTS

Change in Class of Vehicles: The changes in class of vehicle was analyzed for their potential to affect potential great gray owl meadow habitat (no known breeding sites, but potentially suitable breeding habitat exists), since this action potentially changes the condition of the existing road surface from smoothed surfaced to rough surfaced; which could potentially alter meadow condition where routes intersect or are within close proximity to motorized routes.

Wet Weather Seasonal Restrictions: In addition to existing deer seasonal restrictions specified in the Tahoe Forest Plan, wet weather seasonal restrictions would apply to specific alternatives. The benefits to great gray owl with these additional wet weather closures are analyzed for the alternatives.

Reopened ML 1 Roads: Meadows identified as suitable for great gray owl foraging that are adjacent to suitable breeding habitat were assessed to determine the potential impact from proposed reopening of ML 1 Roads. The number of great gray owl meadows that are intersected by reopened ML 1 roads are assessed for the alternatives.

Amendments to the Forest Plan: the proposal to remove deer winter range seasonal closures in the Humbug-Sailor area is evaluated to assess potential effects to suitable great gray owl habitat.

Direct and Indirect Effects

Cross Country Travel: Under Alternative 1, cross country travel would not be prohibited on 3,165 acres of potential great gray owl meadow habitat across the Tahoe NF. All the action alternatives prohibits cross country travel on 3,165 acres of potential great gray owl meadow habitat, including on 5-6 miles of unauthorized routes. Therefore, benefits to great gray owl habitat would occur under all the action alternatives, whereas Alternative 1 would potentially result in habitat degradation of suitable great gray owl habitat on the Tahoe NF, including within 21 suitable great gray owl meadows, on nearly 6 miles of unauthorized routes.

Additions to the NFTS: Potential great gray owl habitat has been identified on the Tahoe NF. A total of 41 meadow sites on the Forest are considered suitable foraging habitat areas for the great gray owl. These potential foraging sites were evaluated to determine the potential indirect effects to meadow vegetation and hydrology which may affect the suitability of potential great gray owl nesting/foraging habitat. Alternative 1 poses the greatest risk to potential great gray owl meadows where 21 meadows (51%) are intersected by existing unauthorized motorized routes, where motorized use could continue associated with cross country travel, totaling approximately 6 miles (Table 3.03-107). This amount of motorized routes could alter meadow vegetation and hydrology that would indirectly affect great gray owl breeding habitat where great gray owls forage and where the future to occupy these areas may be limited. Alternatives 5 and 6, each would result in intersecting 5 (12%) great gray owl meadow sites, where the future establishment of great gray owls could be affected. However, Alternative 5 would affect nearly three times the amount of meadow compared to Alternative 6 (0.3 mile vs. 0.1 mile), which would potentially reduce habitat quality in great gray owl meadows from motorized route additions. The remaining action alternatives either do not impact potential great gray owl meadows (Alternative 3), or minimally impacts great gray owl meadows where less than 0.1 miles of meadows would be affected.

Table 3.03-107. Number of Great Gray Owl Meadows Intersected by Motorized Route Additions

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number of Meadows with Intersections	21	3	0	1	5	5	2
Miles	5.93	0.05	0	0.02	0.27	0.09	0.04

* Alternative 1 includes the existing unauthorized routes associated with cross country travel, while all action alternatives include motorized route additions to the NFTS.

Changes to the NFTS

Change in Class of Vehicles. The change in class of vehicle proposed under Alternatives 2, 4, 5, 6, and 7, on some existing NFTS motorized routes may result in some smoothed surfaced roads becoming rough surfaced roads through reduced road maintenance. In addition, some existing motorized NFTS roads may receive different maintenance resulting in increased vegetation density at the road margins which would provide additional cover and/or foraging habitat. The resulting roadway condition would depend upon the amount and type of vegetation present and the amount of maintenance any given road receives. For the great gray owl, existing habitat conditions will dictate whether or not the change in class of vehicle will result in reduced habitat quality. In general, it is not expected that the change in class of vehicle would result in a significant change to great gray owl habitat conditions, unless different road maintenance results in increased meadow habitat degradation. No changes in class of vehicle are proposed under Alternatives 1 and 3, which means that some system routes would remain under their current maintenance management strategy. However, in some cases some existing system roads have already become rough surfaced due to different of maintenance.

Wet weather seasonal restrictions. Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and motorized trails. Since no suitable great gray owl meadow habitat would be affected by Alternative 3 wet weather seasonal restrictions would not affect great gray owl habitat. Under Alternatives 5 and 6, great gray owl meadows that are intersected by native, surfaced motorized routes would be benefited through the reduction of erosion and sedimentation that could occur during the wet season. Alternative 1 with the greatest miles intersecting the most number of great gray owl meadows, would continue to be impacted by motorized use during the wet weather season, where habitat degradation within these meadows could occur.

Reopened ML 1 Roads: Only Alternative 5 proposes to reopen any ML 1 roads within suitable great gray owl meadows (Table 3.03-108). Alternative 5 potentially affects two suitable great gray owl meadows totaling 0.21 miles, which may potentially adversely affect meadow vegetation and hydrologic condition within Howard Creek Meadow (Road ID - H823-1-1) and Russel Valley/Dry Creek (Road ID - H889-3-18-5.

Table 3.03-108. Number of Great Gray Owl Meadows Intersected by Reopened ML 1 Roads

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number of Meadows with Intersections	0	0	0	0	2	0	0
Miles	0	0	0	0	0.21	0	0

Summary of Direct and Indirect Effects

Table 3.03-109 summarizes the overall net direct and indirect effect of the alternatives from cross country travel, motorized route additions to the NFTS, establishment of "Open Areas," changes to the NFTS (wet weather restrictions, changes in class of vehicles, and reopened ML 1 roads), and amendment to the Forest Plan.

Table 3.03-109. Great Gray Owl - Summary of Overall Net Direct and Indirect Effects of the Alternatives

			Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel									
Trend of Effect			Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Cross Country Travel Prohibited			0	3,165	3,165	3,165	3,165	3,165	3,165
Motorized Route Additions to the NFTS									
Trend of Effect			Negative, most impactive alternative	Negative, 4th most impactive alternative	No Effect	Negative, 6th most impactive alternative	Negative, 2nd most impactive alternative following Alt 1	Negative, 3rd most impactive alternative	Negative, 5th most impactive alternative
Number Meadows Intersected			21	3	0	1	5	5	2
Miles			5.9	0.05	0	0.02	0.27	0.09	0.04
Establishment of "Open Areas"			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Changes to the NFTS	**Wet Weather Restrictions**		No Effect	No Effect	No Effect	Beneficial	Beneficial	Beneficial	No Effect
	Change in Class of Vehicles		No Effect	Localized Negative Effects	No Effect	No Effect	Localized Negative Effects	No Effect	Localized Negative Effects
	Reopened ML 1 Roads	**Trend of Effect**	No Effect	No Effect	No Effect	No Effect	Negative	No Effect	No Effect
		Number Meadows Intersected	0	0	0	0	2	0	0
		Miles	0	0	0	0	0.21	0	0
Amendments to the Forest Plan			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Overall Net Effect of Proposed Actions	Negative effect due to continued cross country travel on 3,165 habitat acres within 21 meadows on 5.9 miles of unauthorized routes.	Beneficial – Cross country travel prohibited on 3,165 habitat acres, including within 17 meadow on 5.8 miles of unauthorized routes; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.	Beneficial – Cross country travel.prohibited on 3,165 habitat acres, including within 20 meadows on 5.9 miles of unauthorized routes of unauthorized routes; overall reduces disturbance and habitat fragmentation.	Beneficial – Cross country travel.prohibited on 3,165 habitat acres, including within 18 meadows on 5.4 miles of unauthorized routes; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation..	Beneficial – Cross country travel.prohibited on 3,165 habitat acres, including within 16 meadows on 5.3 miles of unauthorized routes; although minor negative impacts from route additions and reopened ML 1 roads; overall reduces disturbance and habitat fragmentation.	Beneficial – Cross country travel.prohibited on 3,165 habitat acres, including within 16 meadows on 5.7 miles of unauthorized routes; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.	Beneficial – Cross country travel.prohibited on 3,165 habitat acres, including within 19 meadows on 5.9 miles of unauthorized routes; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.

*Alternative 1 includes existing unauthorized routes that would continue with cross country travel, while all the action alternatives include proposed route additions.

Cumulative Effects

The geographic boundary for analyzing cumulative effects to great gray owls includes 41 suitable great gray owl meadow habitat sites within the boundary of the Tahoe NF. These meadows fall within a broad geographic distributional range from eastside to westside of the Sierra crest, and they occur within a diversity of vegetation types. The adjacent forest types surrounding these great gray owl meadow areas include eastside pine, eastside mixed conifer, true fir types, and, westside mixed conifer forests.

The action alternatives are analyzed for cumulative effects of motorized and non-motorized routes to suitable great gray owl habitat that may affect the ability for great gray owls to occupy these sites. Cumulative effects include routes that are on both public and private lands. Decommissioned routes are considered positive cumulative effects.

Alternative 1 poses the greatest cumulative risk to suitable great gray owl habitat where suitable great gray owl meadows are intersected by a motorized or non-motorized route on both NFS and non-NFS lands 53 times for a total of 14 miles (Table 3.03-110). Currently 21 great gray owl meadows are affected by approximately 6 miles of existing unauthorized routes. The uncertainty of future motorized route proliferation could alter meadow vegetation and hydrology that would impact habitat conditions for great gray owl prey species in the long term. It is expected that OHV use would continue and increase, therefore Alternative 1 could adversely affect the potential for great gray owls to occupy these sites in the near and distant future. In addition, there are no wet weather restrictions for native surfaced roads and trails that intersect suitable great gray owl meadows.

The remaining action alternatives reduces the impacts to great gray owl meadows by prohibiting cross country travel on between 16 and 20 meadows with existing unauthorized routes, totaling 5.3 to 5.9 miles. Alternative 5 would benefit the least, and Alternative 3 would benefit the most from the proposed actions. Alternative 5 proposes to add or reopen approximately ½ mile of motorized routes within 5 meadows, while the remaining action alternatives proposes to affect between 0 and 5 meadows from 0 to 0.1 mile of motorized route addition. This amount of impact to suitable great gray owl habitat should not limit the distribution of great gray owls in the future.

For all the action alternatives, cross country travel would be prohibited on 3,165 great gray owl meadows, including approximately 6 miles on unauthorized routes within great gray owl meadows which would benefit great gray owl habitat. However, non-motorized use (hiking, mountain bicycling, equestrian, etc.) may occur on these routes. Some impacts to great gray owl foraging habitat may be expected from non-motorized use in the future. As these routes become revegetated and recover either through active or passive restoration efforts, overall impacts to great gray owl habitat would be expected to recover and diminish in the future.

Table 3.03-110. Cumulative Effects (Great Gray Owl Suitable Sites)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Direct and Indirect effects of proposed alternatives							
Proposed route additions (negative impact)[1]							
Number of Suitable GGO Meadow Sites Intersected	21	3	0	1	4	5	2
Miles	5.93	0.05	0	0.02	0.27	0.09	0.04
Reopened ML 1 Roads							
Number of Potential GGO Meadow Sites Intersected	0	0	0	0	2	0	0
Miles	0	0	0	0	0.21	0	0
Unauthorized routes prohibited to cross country travel (positive impact)[2]							
Number of Suitable GGO Meadow Sites Intersected	0	17	20	18	16	16	18
Miles	0	5.97	5.93	5.72	5.44	5.83	5.89
Cumulative effects of past and present actions							
Existing motorized routes - NFS lands (negative impact)							
Number of Suitable GGO Meadow Sites Intersected	22	22	22	22	22	22	22
Miles	6.06	6.06	6.06	6.06	6.06	6.06	6.06
Existing routes on private land - non-NFS lands (negative impact)							
Number of Suitable GGO Meadow Sites Intersected	5	5	5	5	5	5	5
Miles	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Existing non-motorized routes (negative impact)							
Number of Suitable GGO Meadow Sites Intersected	5	5	5	5	5	5	5
Miles	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Decommissioned routes (positive impact)							
Number of Suitable GGO Meadow Sites Intersected	2	2	2	2	2	2	2
Miles	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Roads closed by previous NEPA decisions, pending implementation (positive impact)							
Number of Suitable GGO Meadow Sites Intersected	2	2	2	2	2	2	2
Miles	0.36	0.36	0.36	0.36	0.36	0.36	0.36
Total Cumulative Effects							
Number of Times GGO Meadows Intersected by Routes	**53**	**35**	**32**	**33**	**38**	**37**	**34**
Total Miles	**14.0**	**8.1**	**8.08**	**8.10**	**8.56**	**8.17**	**8.12**

[1] Alternative 1 includes the existing unauthorized routes, while all action alternatives include proposed motorized routes.

[2] Includes routes unauthorized to motorized public use (both system and unclassified).

Overall Cumulative Effects from Past, Present, and Reasonably Foreseeable Actions

Cumulative impacts to the great gray owls include past, present, and future impacts from livestock grazing, timber harvest, roads, and recreational activities. Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on private lands within the Tahoe NF boundary. Some, but not all, of these activities would contribute to impacts to the great gray owl within the cumulative effects boundary.

Between 1994 and 2008, several wildfires resulted in burning over 10,000 acres of old forest habitat (CWHR 4M, 4D, 5M, 5D, and 6). Since 1990, more than 130,000 acres of vegetation management activities have occurred on the Tahoe NF. Some, but not all have resulted in impacts to great gray owl nesting habitats. Between 2001 and 2008, about 17,000 acres of forest vegetation and fuels thinning and mastication projects were completed, which were designed to reduce the risk of additional habitat loss to wildfires. These treatments generally do not result in habitat removal, but may result in habitat quality changes. Between 1960 and present, private land harvest within the boundaries of the Tahoe NF has resulted in over 87,000 acres of vegetation treatments including clearcuts, sanitation, shelterwood, and thinning. Much of the private land harvest has resulted in the loss or reduction in spotted owl habitat.

These wildfires and vegetation treatment projects may have resulted in a reduction in some great gray owl nesting habitat on the Tahoe NF since 1960.

Thinning projects designed to reduce hazardous fuels will continue to be the primary activity affecting forested habitat on the Tahoe (see Appendix H, Reasonably Foreseeable Projects and Cumulative Effects). Although these treatments may reduce habitat quality (i.e. nesting habitat reduced to foraging habitat), it expected that suitable habitat would be maintained, and it is anticipated that these treatments would reduce the amount of forested habitat potentially lost from future stand replacing wildfires (USDA Forest Service 2004). The California Department of Forestry and Fire Protection currently lists approximately 12,000 acres of private land within the Tahoe NF administrative boundary for which timber harvest plans have been submitted. Timber harvest on private lands is generally more intensive and does not typically maintain habitat in a suitable condition for great gray owls.

Historic livestock grazing has impacted montane meadows and is considered to be a primary factor that has influenced montane meadow habitat for birds in the Sierra Nevada (Graber 1996, Green et al. 2003, Menke et al. 1996). Many of the landbird species utilizing these meadows feed upon insects that decline in response to removal of this herbaceous growth (Graber 1996). Poorly managed grazing in riparian areas can impact nesting densities of many bird species, and particularly of habitat specialists such as the great gray owl, willow flycatcher, Lincoln's sparrow, and white-crowned sparrow (RHJV 2004).

Current livestock grazing on active allotments may affect a number of suitable great gray owl meadow habitats on the Forest. However, standards and guidelines for grazing in the Sierra Nevada Forest Plan Amendment generally are designed to minimize grazing impacts and maintain montane meadow habitat in a suitable condition for great gray owls. Non-motorized trails allow for backcountry hiking, camping, and equestrian use which may occur in meadows not accessed by motorized routes, and can adversely affect additional meadow habitat or disturb species. These activities are generally dispersed and of low impact to habitat. Foreseeable future projects listed in the Tahoe Schedule of Proposed Actions do not indicate additional effects. Perazzo Meadow on the Sierraville Ranger District, where great gray owl detections have been documented, is currently underway for watershed restoration efforts to improve the hydrologic and vegetation conditions that would benefit great gray owl foraging conditions.

Urban development and encroachment into the Sierra foothills continues to be a concern and could be a cumulative impact to great gray owls, especially considering the checkerboard ownership pattern and

accessibility of the Tahoe NF landscape. Great gray owls are rare and attract the attention of many professional and amateur bird watchers alike. These avid birders hoping to catch a glimpse of the elusive species may unintentionally disturb and cause harm to individual birds which could affect reproductive status and ultimately affect the abundance and distribution of this very rare species.

Alternative 1 poses the greatest cumulative risk to suitable great gray owl foraging habitat where these suitable great gray owl meadows are intersected by a motorized or non-motorized route on both NFS and non-NFS lands 53 times for a total of 14 miles. Continued motorized route proliferation in the future could alter meadow vegetation and hydrology that would impact habitat conditions for great gray owl prey species in the long term, and could adversely affect the potential for great gray owls to occupy these sites in the near and distant future. In addition, there are no wet weather restrictions for native surfaced roads and trails that intersect suitable great gray owl meadows.

Sensitive Species Determination

The Biological Evaluation for the Tahoe NF Motorized Travel Management Project EIS, which is hereby incorporated by reference, determined that the action alternatives may affect great gray owl, but is not likely to result in a trend toward Federal listing or loss of viability for this species within the planning area of the Tahoe National Forest. In the absence of a range wide viability assessment, this viability determination is based on local knowledge of this species as discussed previously in this evaluation, and professional judgment.

Incidental great gray owls have been detected on the Sierraville Ranger District and on private land adjacent to NFS lands within the boundary of the Tahoe NF on the west side of the Forest. The addition of motorized routes to the NFTS would not directly, indirectly or cumulative affect known locations of great gray owls since no motorized route additions are proposed in the vicinity of the documented owl sightings that would potentially disturb them.

Alternative 6, the Preferred Alternative, would result in less than 0.1 mile intersecting suitable great gray owl meadow sites within 5 of 41 suitable great gray owl meadow sites across the Tahoe NF. This amount of habitat affected by motorized routes would pose a relatively low risk to great gray owl breeding habitat.

Compliance with Forest Plan and Other Direction

The Tahoe NF LRMP as amended by the SNFPA ROD (2004) provides management direction to establish and maintain Protected Activity Centers (PACs) to include the forested area and adjacent meadow around all known great gray owl nest stands. The desired condition for meadow vegetation in great gray owl PACs supports a sufficiently large meadow vole population to provide a food source for great gray owls through the reproductive period. Although the Tahoe NF does not currently support known great gray owl nesting pairs, potentially suitable great gray owl meadows were analyzed to determine potential impacts from the Tahoe NF Travel Management Project.

In addition the Tahoe NF LRMP provides management direction for managing meadows, wetlands, and Riparian Conservation Areas that are applicable to suitable great gray owl meadow as follows:

- *Locate roads away from meadow edges where alternative routes are available (Tahoe LRMP) (Management Standard & Guideline).*
- *Avoid wetlands or minimize effects to natural flow patterns in wetlands and avoid road construction in meadows.*
- *Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives (RCOs) at the project level and the AMS goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species (Management Standard & Guideline 92).*
- *Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity (RCO#2, Management Standard & Guideline 100).*

In the above sections, the Proposed Action and alternatives for the Tahoe NF Motorized Travel Management Project were analyzed for their potential effects to great gray owl meadows which address the above management standard and guidelines as they apply to great gray owl habitat. Mitigation measures for the action alternatives to minimize the risk of sediment and streambank alteration from proposed motorized route additions and existing unauthorized routes are addressed in the RCO analysis and Appendix A (Site Specific Road, Trail and Open Area Information).

Alternative 1 is least consistent with the above standards and guidelines for managing meadows in terms of maintenance and hydrologic connectivity of meadows, avoidance of roads near and within meadows, and minimizing effects to meadow condition and function. Alternative 1 continues cross country travel, including within 21 great gray meadows on approximately 6 miles of existing unauthorized routes.

All of the action alternatives are consistent with the Standards and Guidelines since they reduce the potential effects to great gray owl meadows. All the action alternatives would prohibit cross country travel on 3,185 great gray owl meadow acres, and reduces the impacts of 16 to 20 great gray owl meadows (Alternative 5 reduces the least, Alternative 3 reduces the most) from 5.4 miles to 6 miles of existing routes unauthorized to motorized public use. All the action alternatives considerably improve meadow function and connectivity for the great gray owl, since the project design standards were developed to minimize impacts to meadows and riparian habitat through the implementation of wet weather seasonal restrictions, and the prohibition of cross country travel.

Greater Sandhill Crane: Affected Environment

Introduction: The greater sandhill crane is a California State Threatened species and is listed as Sensitive on the Region 5 Forester's Sensitive Species List (USDA Forest Service 1998). California pairs of sandhill cranes generally nest in wet meadow, shallow lacustrine, and fresh emergent wetland habitat,

with nests constructed of large mounds of water plants over shallow water (Zeiner et al. 1990, California Department of Fish and Game 1994). Studies in California during 1988 showed water depths averaging 2.3 inches (California Department of Fish and Game 1994). Open meadow habitats are also used (Littlefield 1989). On dry sites, nests are scooped-out depressions lined with grasses (Zeiner et al. 1990).

In the Tahoe National Forest, a breeding population of approximately 12 pair occurs within Carman Valley, Kyburz Flats, and Perazzo Meadow on the Sierraville Ranger District (Tahoe NF Biological Evaluation). In addition, sandhill cranes are known to breed in the Sardine Valley area on private land north of Stampede Reservoir.

Disturbance and/or Mortality from vehicles: Road and trail-associated factors can disrupt sandhill breeding activities which can ultimately cause a loss in productivity. Motorized activities off of roads and trails during the breeding season can cause direct mortality of young sandhill cranes.

Habitat Degradation: routes across meadow sites can also indirectly affect sandhill cranes by damaging or degrading meadow or wetland habitat required for breeding.

Greater Sandhill Crane: Environmental Consequences

Indicators used to Measure Effects

Cross Country Travel. The prohibition of cross country travel is analyzed for their effects to sandhill crane breeding habitat.

Establishment of "Open Areas": The establishment of the Stampede Reservoir "Open Area" is analyzed for the potential to affect Sandhill cranes. Establishment of "Open Areas" at Boca and Prosser Reservoir and Greenhorn Area would not affect Sandhill crane, since the sandhill crane habitat does not occur there and is not known to nest at these sites.

Additions to the NFTS: Sandhill crane breeding sites were analyzed to determine the number of miles of motorized route additions to the NFTS that intersects sandhill crane breeding sites.

Change in Class of Vehicles: The changes in class of vehicle was analyzed for their potential to affect sandhill crane breeding habitat, since this action potentially changes the condition of the existing road surface from smoothed surfaced to rough surfaced; which could potentially alter meadow condition where routes intersect or are within close proximity to motorized routes.

Wet weather seasonal restrictions: Wet weather seasonal restrictions on native surfaced roads and motorized trails are analyzed for their potential to benefit sandhill cranes for each of the alternatives.

Reopened ML 1 Roads: Reopened ML 1 Roads are analyzed for their potential to benefit sandhill cranes for each of the alternatives.

Direct and Indirect Effects

Cross Country Travel

Cross country travel is not prohibited under Alternative 1, at Kyburz Flat, Carman Valley, and Perazzo Meadow where unmanaged cross country travel may impact breeding sandhill cranes where breeding productivity could be at risk from disturbance of motorized activity. All the action alternatives would

prohibit cross country travel, and therefore, would benefit sandhill cranes at Kyburz Flat, Carman Valley, and Perazzo Meadow.

Breeding Sites Intersected by Motorized Route Additions to the NFTS

On the Tahoe NF, three sandhill crane breeding sites are located at Kyburz Flat, Carman Valley, and Perazzo Meadow on the Sierraville Ranger District. For all the action alternatives, motorized routes added to the NFTS would not intersect known breeding sites at Kyburz Flat or Carman Valley on NFS lands, and therefore, no direct or indirect effects would occur from the addition of motorized routes to the NFTS.

Establishment of "Open Areas"

Stampede Reservoir "Open Areas": Alternatives 2 and 6 propose to establish "Open Areas" for motorized access to the shoreline below the high water mark on dry soils to allow for recreational fishing, water play, etc. Sandhill cranes have been documented to occur on the north shore of Stampede Reservoir, but nesting has not been documented in this area. However, a known breeding population of sandhill cranes occurs at Sardine Valley on private land just north of Stampede Reservoir. Motorized access to the shoreline could potentially disturb sandhill cranes using the area north of Stampede Reservoir. Under Alternative 1 cross country travel would continue, where the potential to disturb sandhill cranes may occur, including the Stampede Reservoir area. The remaining action alternatives do not allow access to these reservoirs, and therefore, sandhill cranes would not be directly disturbed by motorized use adjacent to Stampede Reservoir.

Changes to the NFTS

Change in Class of Vehicle. The change in class of vehicles would potentially affect sandhill crane habitat under Alternatives 2, 5, and 7 within Carman Valley (Knutsen Meadow), where different maintenance standards could result in changes to road surface type and potentially increase erosion and sedimentation risk. In general, it is not expected that the change in class of vehicle would result in a significant change to sandhill crane habitat conditions, since the road through Carman Valley is already rough surfaced. In the long term, road condition could deteriorate and cause localized effects. Since Carman Valley recently underwent major meadow restoration efforts including a culvert improvement project specifically designed to enhance meadow condition, any adverse effects of road maintenance changes would likely be minimal, especially considering that Carman Valley is a large meadow system and the road condition is currently stable. None of the other sandhill crane breeding sites are affected by the change in class of vehicles.

Wet Weather Seasonal Restrictions. Wet weather seasonal restrictions on native surfaced roads and motorized trails would likely benefit sandhill cranes at Kyburz Flat and Carman Valley under Alternatives 4, 5, and 6, since motorized use on native surfaced routes adjacent to Kyburz and Carman Valley breeding sites would be prohibited during the wet weather season. The prohibition of motorized use on these routes during the wet season would prevent the potential for meadow habitat degradation through vegetation and

soil loss at sandhill crane breeding sites. For the remaining alternatives, sandhill crane breeding sites at Carman Valley, Kyburz Flat, and Perazzo Meadow could be subject to an increase in the risk of meadow vegetation degradation through the loss of riparian vegetation and soil erosion from motorized use during the wet weather season, particularly in the spring months after snowmelt (April to early June).

Reopened ML 1 Roads: None of the alternatives proposes to reopen any ML 1 roads within or adjacent to sandhill crane habitats at Kyburz, Carman Valley, or Perazzo Meadow. Therefore sandhill cranes or their nesting habitat would not be directly or indirectly affected by this action.

Summary of Direct and Indirect Effects

Table 3.03-111 summarizes the overall net direct and indirect effect of the proposed actions from motorized route additions to the NFTS, prohibition of cross country travel, wet weather restrictions, and seasonal closures.

Table 3.03-111. Sandhill Crane - Summary of Overall Net Direct and Indirect Effects of the Alternatives

		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel	Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
	Nesting habitat at Kyburz, Carman Valley, and Perazzo Meadow	Cross Country Travel Continued	Cross country travel prohibited	Cross country travel prohibited	Cross country travel prohibited	Cross country travel prohibited	Cross country travel prohibited	Cross country travel prohibited
Establishment of "Open Areas"	**Trend of Effect**	Negative	Negative	No Effect	No Effect	No Effect	No Effect	No Effect
	Stampede Reservoir (no effect at all other "Open Areas")	Unmanaged shoreline access continued	Open motorized access to Stampede on dry soil, including north shore where sandhill cranes observed	No motorized access to shoreline	No motorized access to shoreline	No motorized access to shoreline	No motorized access to Stampede Reservoir at known sandhill crane location at north shore of Stampede	No motorized access to shoreline
Motorized route additions	**Trend of Effect**	Negative	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
	Miles	Unauthorized routes continue	0	0	0	0	0	0
Changes to the NFTS	**Wet Weather Restrictions**	No effect	No effect	No effect	Positive benefit to habitat	Positive benefit to habitat	Positive benefit to habitat	No effect
	Change in Class of Vehicles	No effect	Localized negative effects at Carman Valley due to maintenance level downgrades.	No effect	No Effect	Localized negative effects at Carman Valley due to maintenance level downgrades	No Effect	Localized negative effects at Carman Valley due to maintenance level downgrades.
	Reopened ML 1 Roads	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect.
Amendments to Forest Plan		No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Overall Net Effect of Proposed Actions	Negative effect to habitat where cross country travel continued.	Least beneficial to habitat from adverse effects of "open area" establishment at Stampede Res.	2nd most beneficial to habitat (shared with Alts 5 & 7) due to prohibition of cross country travel.	Most Beneficial to habitat (shared with Alt 6) due to prohibition of cross country travel, with added benefits from wet weather restrictions.	2nd most beneficial to habitat (shared with Alts 2 & 7) due to prohibition of cross country travel, with added benefits from wet weather restrictions.	Most beneficial to habitat (shared with Alt 4) due to prohibition of cross country travel, with added benefits from wet weather restrictions.	2nd most beneficial to habitat (shared with Alts 3 & 5) due to prohibition of cross country travel.

*Alternative 1 includes existing unauthorized routes that would continue with cross country travel, while all the action alternatives include proposed route additions.

Cumulative Effects

Spatial and Temporal Cumulative Effects Boundary

Breeding sandhill cranes are known to breed at three sites on the Tahoe NF, at Kyburz Flat and Carman Valley - all are located on the eastside of the Forest on the Sierraville Ranger District. A fourth breeding site is located on private land in Sardine Valley just to the north of Stampede Reservoir. Therefore, the cumulative effects of the alternatives are analyzed in the vicinity of these four sites because they represent the spatial extent of breeding sandhill cranes on the Tahoe NF. Past and reasonably foreseeable cumulative impacts are analyzed within 20 years in the past and out 20 years into the future. This represents a reasonable timeframe for analyzing cumulative impacts since any longer timeframe for analyzing cumulative project impacts may be uncertain and speculative.

Cumulative Effects of Additions to the NFTS, Establishment of "Open Areas," Prohibition of Cross Country Travel, Wet Weather Restrictions, and Change in Class of Vehicles

For Alternative 1, unmanaged cross country travel in the future may impact breeding sandhill cranes where breeding productivity could be at risk from disturbance of motorized activity. The rate of increased OHV use on the Tahoe NF is expected to increase in the future. All the action alternatives would prohibit unmanaged cross country travel, and therefore, would not likely contribute to existing cumulative impacts in the future and potentially benefit sandhill cranes. However, under both Alternative 1 and 2, cumulative adverse impacts could be added at Stampede Reservoir, adjacent to a known breeding population of sandhill crane on private land at Sardine Valley.

Overall Cumulative Effects to Sandhill Crane from Past, Present and Reasonably Foreseeable Actions

Past cumulative impacts for the four sandhill crane breeding sites at Carman Valley, Kyburz Flat, Perazzo Meadow, and Sardine Valley include historic grazing practices, meadow vegetation and hydrologic function impacts from roads, railroad logging, diversions, past timber harvest practices, and recreational activities. A list of recent past, present, and future projects is provided in Appendix H (Reasonably Foreseeable Projects and Cumulative Effects). Some, but not all of these projects may have impacts to the sandhill crane. Current grazing standards and guidelines as directed in the Sierra Nevada Forest Plan Amendment Record of Decision (2004) are designed to minimize impacts to riparian resources from grazing. Some conifer encroachment into these sites has occurred from the lack of fires in the past 100 years. Recent and future vegetation management and fuels reduction projects are designed to prevent the loss of forested habitat from large-scale, stand replacing catastrophic fire events.

Carman Valley

The Carman Valley area is currently recovering from a recent series of large-scale watershed restoration efforts to restore a highly degraded stream and riparian system using the plug and pond method. Prior to recent restoration efforts, numerous past attempts at improving watershed conditions were made dating back to the early part of the century, but were largely ineffective. The Carman Valley area falls within the

Beckwourth Peak Allotment which is grazed by sheep. Additional and ongoing restoration efforts will continue to improve riparian resources and watershed conditions, which will enhance breeding habitat for the sandhill crane.

Kyburz Flat

Kyburz Flat located east of Highway 89 north of Truckee, CA receives high recreational use from snowmobile use and cross country travel. The Kyburz Flat area was a part of the Boca, Kyburz, Sagehen, and Summit Allotment Management Plan (BKSS) where grazing management planning would reduce grazing impacts from sheep and improve riparian resource condition, and therefore, benefit breeding sandhill crane habitat at Kyburz Flat.

Perazzo Meadow

Perazzo Meadow is located on the Sierraville RD within the Perazzo Meadows Livestock Grazing Allotment. During the last 15 to 20 years, a variety of management efforts have been undertaken to improve riparian conditions and to reduce impacts from livestock grazing at Perazzo Meadows, including reducing livestock numbers, developing interim grazing management strategies, small watershed restoration efforts (structures), and others. Watershed degradation at Perazzo Meadows can be attributed not only to livestock grazing, but also to off-highway activities, loss of a bridge during the 1997 storm event, and other factors. Efforts to improve riparian watershed condition are currently underway, including through partnerships with local watershed groups, development of a grazing allotment management plan, and large-scale, watershed restoration efforts.

Sensitive Species Determination

The Biological Evaluation for the Tahoe NF Motorized Travel Management Plan, which is hereby incorporated by reference, made a determination that the all the action alternatives may impact sandhill cranes, but are not likely to lead to a trend toward federally listing, and do not contribute to a downward trend for sandhill crane population viability.

Compliance with Forest Plan and other Direction

The Tahoe NF LRMP, as amended by the SNFPA ROD (2004), provides management direction for managing meadows, wetlands and riparian habitats, and Riparian Conservation Areas that are applicable to sandhill crane habitat as follows:

- *Locate roads away from meadow edges where alternative routes are available (Tahoe LRMP) (Management Standard & Guideline).*
- *Avoid wetlands or minimize effects to natural flow patterns in wetlands and avoid road construction in meadows.*
- *Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives (RCOs) at the project level and the AMS goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2)*

minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species (Management Standard & Guideline 92).

- *Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity (RCO#2, Management Standard & Guideline 100).*

In the above sections, the Proposed Action and alternatives for the Tahoe NF Motorized Travel Management Project were analyzed for their potential effects to sandhill crane breeding habitat which addresses the above management standard and guidelines as they apply to sandhill crane breeding habitat. Mitigation measures for the action alternatives to minimize the risk of sediment and streambank alteration from proposed motorized routes and existing unauthorized are addressed in the RCO analysis and Appendix A (Site Specific Road, Trail and Open Area Information).

Alternative 1 is least consistent with the above standards and guidelines for managing meadows in terms of maintenance and hydrologic connectivity of meadows, avoidance of roads near and within meadows, and minimizing effects to meadow condition and function. Alternative 1, continues cross country travel, including within Kyburz Flat, Perazzo Meadows, and Carman Valley (Knutsen Meadow) (known sandhill crane breeding sites).

All of the action alternatives are consistent with the above standards and guidelines since they reduce the impacts to sandhill cranes. The action alternatives all prohibit cross country travel on all three sandhill crane breeding sites, and reduces the impacts to these meadows. No motorized route additions to the NFTS are proposed within any sandhill crane breeding areas. Alternative 2 proposes changes in class of vehicles to a road that is adjacent to Knudsen Meadow, where small, localized effects may result from different maintenance standards.

Yellow Warbler: Affected Environment

The yellow warbler was selected as the MIS for riparian habitat in the Sierra Nevada. The Sierra Nevada Forest MIS Report and the Tahoe NF Motorized Project-level MIS Report are incorporated by reference. The yellow warbler is usually found in riparian deciduous habitats in summer (cottonwoods, willows, alders, and other small trees and shrubs typical of low, open-canopy riparian woodland) (CDFG 2005). Yellow warbler is dependent on both meadow and non-meadow riparian habitat in the Sierra Nevada (Siegel and DeSante 1999). On the Tahoe NF, CWHR montane riparian habitat (MRI) provides suitable habitat for the yellow warbler.

Disturbance from Vehicles: road and trail associated factors can disrupt warbler breeding activities, which can ultimately cause a loss in breeding activity.

Habitat Degradation: motorized routes across meadow and riparian habitat can indirectly affect yellow warblers by damaging or degrading or meadow montane riparian habitat required for breeding.

Yellow Warbler: Environmental Consequences

Habitat Factor(s) for the Analysis: The habitat factor used to assess direct and indirect effects of motorized routes for the yellow warbler were montane riparian habitat acres affected by motorized route additions to the NFTS. Habitat acres were determined by the length of the route multiplied by the width of the route. Route width is assumed to be a maximum of 8 feet. In some cases, route width may be less; therefore, impacts may be somewhat over-emphasized.

Current Condition of the Habitat Factor(s) in the Project Area: The Tahoe NF has approximately 5,131 acres CWHR montane riparian habitat (MRI).

Direct and Indirect Effects to Habitat

Cross Country Travel. Under Alternative 1, cross country travel would continue, potentially affecting 3,525 acres of montane riparian habitat (~5 acres directly affected by continued use on existing unauthorized routes), potentially causing reduced habitat effectiveness through disturbance, avoidance, and abandonment for the yellow warbler. For the action alternatives, cross country travel would be prohibited on 3,525 acres, where disturbance, avoidance, abandonment would be reduced or eliminated. Of these 3,525 acres, approximately 5 acres of yellow warbler habitat would directly benefit of the prohibition of cross country travel on existing unauthorized routes.

Additions to the NFTS. Table 3.03-112 displays the acres of montane riparian habitat directly and indirectly affected by the alternatives. Alternative 1 affects the greatest amount of montane riparian habitat, suitable for yellow warbler, where unauthorized routes would result in a loss or reduction in montane riparian habitat within about 5 out of 5,131 acres or 0.1% of Tahoe NF montane riparian habitat. The action alternatives all reduces overall impacts to yellow warbler habitat by eliminating cross country travel on existing unauthorized routes that potentially may degrade yellow warbler habitat. Alternative 6 would benefit yellow warbler habitat the least, where motorized route additions would affect approximately 0.5 acre out of 5131 acres yellow warbler habitat on the Tahoe NF. The majority of proposed route additions (9 of 11) under Alternative 6 are short spur routes which access dispersed recreation areas. Alternatives 2, 4, 5, and 7 would result in minimal local effects to montane riparian habitat, where motorized route additions would result in less than 0.2 acres of 5,131 acres or 0.003% of Tahoe NF yellow warbler habitat. Alternative 3 does not propose motorized additions within or adjacent to yellow warbler habitat, and therefore would not affect any montane riparian habitat.

Table 3.03-112. Proportion of Yellow Warbler MIS habitat affected by Motorized Route Additions

Yellow Warbler MIS Habitat	Yellow Warbler Habitat Acres	Alt1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Acres Montane Riparian Habitat		4.96	0.16	0.00	0.16	0.17	0.49	0.16
Proportion of Sierra Nevada Habitat	29,000	0.017%	0.001%	0%	0.001%	0.001%	0.002%	0.001%
Habitat Security Risk in Sierra Nevada		Low	Low	Low	Low	Low	Low	Low
Proportion of Tahoe NF Habitat	5,131	0.09%	0.003%	0%	0.003%	0.003%	0.01%	0.003%
Habitat Security Risk in Tahoe NF		**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

*Alternative 1 includes existing unauthorized routes associated with cross country travel.

Change in Class of Vehicles. The change in class of vehicle on some existing NFTS motorized roads may result in some smoothed surfaced roads becoming rough surfaced roads through changed road maintenance. In addition, some existing motorized NFTS roads may different maintenance resulting in increased vegetation density at the road margins which would provide additional cover and/or foraging habitat. The resulting roadway condition would depend upon the amount and type of vegetation present and the type of maintenance any given road receives. For the yellow warbler, existing habitat conditions will dictate whether or not the change in class of vehicle will result in reduced habitat quality. In general, it is not expected that the change in class of vehicle would result in a significant change to yellow warbler habitat conditions, unless changed road maintenance results in increased montane riparian habitat degradation.

Wet Weather Seasonal Restrictions. Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and motorized trails, where montane riparian habitats for the yellow warbler would be benefited through the reduction of erosion and sedimentation that could occur from wet season motorized use on routes, especially motorized routes that are within close proximity to yellow warbler habitat. Alternatives 1, 2, 3, and 7 do not impose wet seasonal weather restrictions on native surfaced motorized routes and therefore, yellow warbler habitat would not benefit from wet weather seasonal restrictions. Alternative 1 has the greatest number of stream crossings and highest RCA route densities that could potentially delivery sediment to montane riparian habitats from motorized use on native surfaced routes during the wet weather season.

Reopened ML 1 Roads. Except for Alternative 5, none of the alternatives proposes to reopen any ML 1 roads within yellow warbler habitat, and therefore would have no effect to yellow warbler habitat. Alternative 5 would only affect a very small proportion of yellow warbler habitat (less than 0.1 ac) that would not alter the trend in yellow warbler habitat at either the bioregional or Forest-wide scale (Table 3.03-113).

Table 3.03-113. Proportion of Yellow Warbler MIS habitat affected by Reopened ML 1 Roads

Yellow Warbler MIS Habitat	Yellow Warbler Habitat Acres	Alt 1, 2, 3, 4, 6, 7	Alt 5
Acres Montane Riparian Habitat		0	0.07
Proportion of Sierra Nevada Habitat	29,000	0%	0.0002%
Habitat Security Risk in Sierra Nevada		None	None
Proportion of Tahoe NF Habitat	5,131	0%	0.001%
Habitat Security Risk in Tahoe NF		None	None

Summary of Direct and Indirect Effects

Table 3.03-114 summarizes the overall net effect to the yellow warbler habitat from the motorized route additions to the NFTS, prohibition of cross country travel, wet weather restrictions, and seasonal closures.

Table 3.03-114. Yellow Warbler Montane Riparian Habitat - Summary of Overall Net Direct and Indirect Effects

			Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel									
Trend of Effect			Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Prohibited			0	3,525	3,525	3,525	3,525	3,525	3,525
Motorized Route Additions to the NFTS									
Trend of Effect			Negative	Small localized effects	No Effect	Small localized effects	Small localized effects	Small localized effects, mostly from routes to dispersed recreation areas	Small localized effects
Acres Affected			4.96	0.16	0.00	0.16	0.18	0.49	0.16
Establishment of "Open Areas"			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Changes to the NFTS	**Wet Weather Restrictions**		No Effect	No Effect	No Effect	Positive Benefit to habitat.	Positive Benefit to habitat.	Positive Benefit to habitat.	No effect
	Change in Class of Vehicles		No Effect	Minor, localized negative effect	No Effect	Minor, localized negative effect	Minor, localized negative effect	Minor, localized negative effects	Minor, localized negative effect
	Reopened ML 1 Roads	**Trend of Effect**	No Effect	No Effect	No Effect	No Effect	Negative, small localized effects	No Effect	No Effect
		Acres	0	0	0	0	0.07	0	0
Amendments to the Forest Plan			No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Overall Net Effect of Proposed Actions	Negative – Cross country travel continued on 3,525 acres and within **5.1 acres** directly affected by unauthorized routes.	2nd most beneficial alternative. Cross country travel prohibited on 3,525 acres and within **4.9 acres** directly affected by unauthorized routes; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.	Most benefical alternative. Cross country travel prohibited on 3,525 acres and within **5.1 acres** directly affected by unauthorized routes; overall reduces disturbance and habitat fragmentation..	3nd most beneficial alternative, shared with Alt 7. Cross country travel prohibited on 3,525 acres and within **4.96 acres** directly affected by unauthorized routes; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.	4th most beneficial alternative. Cross country travel prohibited on 3,525 acres and within **4.87 acres** directly affected by unauthorized routes; although minor negative impacts from route additions and reopened ML 1 roads; overall reduces disturbance and habitat fragmentation	Least beneficial alternative. Cross country travel prohibited on 3,525 acres and within **4.6 acres** directly affected by unauthorized routes; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.	3rd most beneficial, shared with Alt 4. Cross country travel prohibited on 3,525 acres and within **4.96 acres** directly affected by unauthorized routes; although minor negative impacts from route additions; overall reduces disturbance and habitat fragmentation.

*Alternative 1 includes existing unauthorized routes that would continue with cross country travel, while all the action alternatives include proposed route additions.

Cumulative Effects to Habitat in the Analysis Area

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on NFS and private lands within the Tahoe NF boundary. Some, but not all, of these activities have or will contribute to impacts to the montane riparian habitat for the yellow warbler within the Tahoe NF boundary. Since 1990, more than 130,000 acres of vegetation management activities have occurred on the Tahoe NF. Generally, vegetation/fuels management projects have not affected habitat within montane riparian habitats. Between 2001 and 2007, over 13,000 acres of forest vegetation and fuels projects were completed, which primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. Many recent, current, and future vegetation and fuels reduction projects are designed to minimize effects to montane riparian habitats by following "riparian conservation objectives" as prescribed in the Sierra Nevada Forest Plan Amendment Record of Decision (2004). Between 1994 and 2008, approximately 94,000 acres burned on the Tahoe NF, some of which have resulted in substantial changes in montane riparian habitat. In many cases, montane riparian habitat that was severely burned during a stand-replacing wildfire resulted in changes to or loss of riparian vegetation, loss of shade, cover, and structural diversity. In some cases, some riparian areas recovered post-fire and were significantly enhanced (i.e. aspen habitats in the Cottonwood Fire of 1994).

Currently, there is a high demand for recreational use on the Tahoe NF due to its close proximity to urban centers. The Tahoe NF provides a wide variety of recreational experiences including developed and dispersed camping, hiking, fishing, hunting, wildlife viewing, winter sports activities (downhill skiing, cross country skiing, snowmobiling), summer OHV use, and a variety of other non-motorized use (equestrian use and mountain biking). Recreational use on the Tahoe NF has significantly increased compared to the past 20 to 30 years. Because of the proximity to urban areas and population growth, increased recreational use on the Tahoe NF is expected to continue to increase in the future including camping, hiking, fishing, wildlife viewing, hunting, and OHV use. Generally, the increase in recreational use on the Tahoe NF has the potential to cause an increased impact to montane riparian habitats because humans are attracted to these areas for their beauty and scenic quality. Future increase in recreational use on the Tahoe NF is expected, and therefore, increased impacts to montane riparian habitat would be expected, particularly during the summer months. Table 3.03-115 lists the reasonably foreseeable future projects and the associated direct, indirect, and cumulative impacts that are planned to occur on the Tahoe NF.

Table 3.03-115. Direct, Indirect, and Cumulative Impact of Reasonably Foreseeable Future Projects

Project type	Number of Projects	Direct and Indirect Impact to Yellow Warbler	Overall Cumulative Impact
Vegetation management/fuels reduction – thinning, group select, mastication	~30	Short-term disturbance from harvest activities only when adjacent to montane riparian yellow warbler habitat.	Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires.
Aspen enhancement	8	Short-term disturbance during implementation. Long-term cover and forage habitat improvement	Long-term beneficial cumulative effects from improved habitat conditions
Hazard tree removal	4	Minimal impact. Short-term disturbance during harvest if adjacent to montane riparian habitats.	None to minimal cumulative impact
Fish passage construction project	1	Short-term disturbance during project implementation.	No cumulative impact
Watershed Restoration (Carman II and Perazzo)	2	Short-term disturbance during implementation. Improve riparian and meadow habitat quality used for forage and reproduction.	Beneficial cumulative impact by improving long-term forage and nesting habitat conditions.
Special Use permit renewal	4	N/A administrative action	None
Non-motorized Trail development	2	None	None
Designate Energy Corridor	1	N/A programmatic administrative action	Unknown, site-specific cumulative impacts may occur depending on location of the corridor.

Cumulative Effects Conclusion

Alternative 1, no action, cumulatively affects the greatest amount of yellow warbler habitat (5 acres out of 5,131 acres or 0.1%) on the Tahoe NF from continued use on unauthorized routes. All the action alternatives reduces overall cumulative effects of existing unauthorized routes within yellow warbler habitat, where cross country travel would be prohibited on between 4 ½ to 5 acres. Alternative 6 would result in a loss or reduction in approximately 0.5 acres yellow warbler habitat, primarily from the addition of motorized routes which accesses dispersed recreation areas. Alternative 3 does not add to existing cumulative effects from motorized route additions.

The remaining action alternatives affect an insignificant amount of yellow warbler habitat from motorized route additions. Alternatives 2, 4, 5, and 7 would alter less than 0.003% of yellow warbler habitat (0.2 acres out of 5,131 acres Tahoe NF habitat). None of the alternatives would be expected to alter the trend in yellow warbler habitat from the addition of motorized routes or from reopening ML 1 roads (Alt 5 only).

In general, it is not expected that the change in class of vehicle would result in a significant change to yellow warbler habitat conditions, unless changed road maintenance results in increased montane riparian habitat degradation for Alternatives 2, 4, 5, 6, and 7.

Wet weather seasonal restrictions on all native surfaced roads and motorized trails under Alternatives 4, 5, and 6 would benefit montane riparian habitat for the yellow warbler through the reduction of erosion and sedimentation. Alternatives 1, 2, 3, and 7 do not impose wet seasonal weather restrictions on native surfaced motorized routes and therefore, montane riparian habitat for the yellow warbler would not benefit from wet weather seasonal restrictions.

Finally, Alternative 1 would pose the greatest risk on 3,525 acres of yellow warbler habitat, where cross country travel would not be prohibited causing reduced habitat effectiveness through disturbance, avoidance, and abandonment for the yellow warbler. For the action alternatives, cross country travel would be prohibited on 3,525 montane riparian acres, where disturbance, avoidance, abandonment would be reduced or eliminated. Overall, none of the alternatives would alter the existing trend in yellow warbler habitat. However, Alternative 1, which allows cross country motorized travel to continue, could alter yellow warbler population trend.

Summary of Yellow Warbler Status and Trend at the Bioregional Scale. The Tahoe NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the yellow warbler; hence, the riparian habitat effects analysis for the Tahoe NF Motorized Travel Management Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the yellow warbler. This information is drawn from the detailed information on habitat and population trends in the SNF Bioregional MIS Report (USDA Forest Service 2008), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 29,000 acres of riparian habitat on NFS lands in the Sierra Nevada. Within the last decade, the trend is stable.

Population Status and Trend. The yellow warbler has been monitored in the Sierra Nevada at various sample locations by avian point counts and breeding bird survey protocols, including Lassen NF (Burnett and Humple 2003, Burnett et al. 2005) and Inyo NF (Heath and Ballard 2003) point counts; on-going California Partners in Flight monitoring and studies (CPIF 2004); 1992 to 2005 – Sierra Nevada Monitoring Avian Productivity and Survivorship (MAPS) stations (Siegel and Kaschube 2007); and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that yellow warblers continue to be present at these sample sites, and current data at the range wide, California, and Sierra Nevada scales indicate that the distribution of yellow warbler populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Yellow Warbler Trend. Alternative 1 would result in the greatest amount of suitable yellow warbler habitat (5 acres of 29,000 acres or 0.02% of Sierra Nevada-wide habitat) affected by cross country travel, including use on existing unauthorized routes. The action alternatives would benefit yellow warbler habitat by prohibiting cross country travel, and result in less than 1 acre out of 29,000 Sierra Nevada yellow warbler habitat acres affected by motorized route additions or reopened ML 1 roads. Based on the insignificant percentage of yellow warbler habitat affected by the proposed alternatives, the Tahoe NF Motorized Travel

Management Project would not alter the existing habitat trend, nor would it lead to a change in the distribution of yellow warbler across the Sierra Nevada bioregion.

Compliance with Forest Plan and Other Direction

The Tahoe NF LRMP, as amended by the SNFPA ROD (2004), provides management direction for managing meadows, wetlands and riparian habitats, and Riparian Conservation Areas that are applicable to yellow warbler habitat as follows:

- *Locate roads away from meadow edges where alternative routes are available (Tahoe LRMP) (Management Standard & Guideline).*
- *Avoid wetlands or minimize effects to natural flow patterns in wetlands and avoid road construction in meadows.*
- *Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives (RCOs) at the project level and the AMS goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species (Management Standard & Guideline 92).*
- *Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity (RCO#2, Management Standard & Guideline 100).*

In the above sections, the Proposed Action and alternatives for the Tahoe NF Motorized Travel Management Project were analyzed for their potential effects to yellow warbler montane riparian habitat which addresses the above management standard and guidelines as they apply to yellow warbler habitat. Mitigation measures for the action alternatives to minimize the risk of sediment and streambank alteration from motorized route additions to the NFTS and existing unauthorized routes are addressed in Appendix I (Riparian Conservation Objectives) and Appendix A (Site Specific Road, Trail and Open Area Information).

Alternative 1 is least consistent with the above standards and guidelines for managing montane riparian habitat in terms of maintenance and hydrologic connectivity of streams, meadows, and wetlands, avoidance of roads near and within meadows, and minimizing effects to montane riparian condition and function. Alternative 1 would continue cross country travel montane riparian habitats important to yellow warblers, including on 10 acres of montane riparian habitat resulting from travel on existing unauthorized routes.

All of the action alternatives are consistent with the above Standards and Guidelines. All the action alternatives would reduce the impacts to these habitats by prohibiting cross country travel on within yellow warbler habitats, including on about 4½ to 5 acres of montane riparian habitat affected by existing unauthorized routes.

Aquatic Species and Habitat

Introduction

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 (Chin and others 2004 In Guldin 2004, Clinton and Vose 2003). Other factors that contribute to in-channel sediment delivery include the number of stream crossings on a channel, the condition of the stream approach, and the road length draining into the stream channel crossing.

Indicators used to Measure Effects

Cross Country Travel: The prohibition of cross country travel is analyzed for the alternatives to estimate the potential effects to aquatic habitat factors from motorized cross country travel.

Additions to the NFTS: Measures or indicators of changes in sedimentation and water surface shade are assessed by analyzing the number of stream crossings additions associated with motorized route additions to the NFTS, and the miles motorized route additions within Riparian Conservation Areas (RCAs) for perennial and intermittent streams, and lakes, ponds, and reservoirs.

Establishment of "Open Areas": The establishment of "Open Areas" at Greenhorn area and at Stampede, Boca, and Prosser reservoirs is analyzed for their effects to aquatic species.

Changes to the NFTS including Change in Class of Vehicles, Change in Season of Use, and Reopened Maintenance Level (ML) 1 Roads.

- **Change in Class of Vehicles***:* Changing the class of vehicle on a particular route potentially changes the impacts to soil and water resource due to changes in the road surface (i.e. from smooth surfaced to rough-surfaced) (see Chapter 3.02, Watershed Resources: Geology, Soil, Hydrology)**.**
- **Change in Season of Use***:* Proposed wet weather seasonal restrictions on native surfaced routes were analyzed for the alternatives in terms of all aquatic species and their habitats. Motorized travel on native surfaced routes during the wet weather season has the potential to cause erosion and deliver sediment to aquatic species habitats.
- **Reopened ML 1 Roads***:* Reopened ML 1 roads are assessed for their potential effects aquatic species as motorized route additions are analyzed above.

Amendments to the Forest Plan: The removal of seasonal restrictions for wintering deer within the Humbug-Sailor Management Area 84 is analyzed for the potential effects to aquatic species.

Effects Common to All Aquatic Species

Establishment of Motorized "Open Areas": Cross country travel would continue under Alternative 1 on at least 2,649 acres at Greenhorn and at Boca, Stampede, and Prosser reservoirs, where effects to aquatic species and their habitats would be adversely affected, including changes in water chemistry, increased temperature, changes to vegetation, and increased sedimentation and erosion. Only Alternatives 2 and 6 propose to establish motorized "Open Areas." The remaining action alternatives would not affect aquatic species.

Alternative 2 proposes to establish 60 acres at Greenhorn and 2,589 acres at Boca, Stampede, and Prosser reservoirs. Alternative 2 would likely adversely affect important aquatic habitat conditions including water chemistry, temperature, and physical habitat at Greenhorn Creek. Since the "Open Areas" at the reservoirs are essentially under water during the wettest part of the year, no vegetation is present. However, sedimentation could increase and affect water quality within the reservoirs, especially considering the entire circumference of the reservoirs would be opened to motorized use.

Alternative 6 does not propose establishing the Greenhorn area as an "Open Area," and therefore, would not affect aquatic species. Alternative 6 proposes to establish 244 acres within discrete areas to provide motorized access on dry soils. Sedimentation and erosion should not be at an accelerated rate on the 244 acres designated "Open Areas" at Stampede, Prosser, and Boca reservoirs, since the proposed areas are stable and armored (Chapter 3.03-2). Generally, Alternative 6 benefits aquatic species habitats and improves existing conditions where currently the reservoirs are not prohibited to cross country motorized travel on at least 2,589 acres at the three reservoir areas.

Wet Weather Seasonal Closures: Proposed wet weather seasonal restrictions on native surfaced routes were analyzed for the alternatives in terms of all aquatic species and their habitats. Motorized travel on native surfaced routes during the wet weather season has the potential to cause erosion and deliver sediment to aquatic species habitats.

Alternatives 4, 5, and 6 would impose wet weather seasonal restrictions on all native surfaced roads and motorized routes, where fish and other aquatic species would be benefited through the reduction of erosion and sedimentation that could occur from wet season wheeled motorized use on routes, especially motorized routes that are within close proximity to or cross streams or other riparian aquatic habitats. Alternatives 1, 2, 3, and 7 do not impose wet weather seasonal restrictions on native surfaced motorized routes and therefore, aquatic riparian dependent species would not benefit from wet weather seasonal restrictions. Alternative 1 has the greatest number of motorized stream crossings and highest RCA route densities that could potentially delivery sediment to aquatic and riparian habitats from wheeled motorized use on native surfaced routes during the wet weather season.

Amendments to the Forest Plan: Changing the season of use by removing deer winter closures in Management Area 84 Humbug-Sailor would not likely affect aquatic species since wet weather seasonal restrictions on native, surfaced roads would offset potential erosion or sedimentation that may otherwise occur from removing the deer seasonal restriction. Therefore, no effects to aquatic species would occur from this action.

Fisheries (trout) and Macroinvertebrates: Affected Environment

Aquatic or Benthic Macroinvertebrates (BMI) were selected as the MIS for riverine and lacustrine habitat in the Sierra Nevada. They have been demonstrated to be very useful as indicators of water quality and aquatic habitat condition (Resh and Price 1984; Karr et al. 1986; Hughes and Larsen 1987; Resh and Rosenberg 1989). They are sensitive to changes in water chemistry, temperature, and physical habitat; aquatic factors of particular importance are: flow, sedimentation, and water surface shade.

Fisheries (trout) and Macroinvertebrates: Environmental Consequences

Direct and Indirect Effects to Fisheries (trout) and Macroinvertebrates

Habitat Factor(s) for the Analysis: Flow; Sedimentation; and Water surface shade

Flow: this habitat factor will be evaluated by assessing changes in the miles of perennial stream flow and intermittent stream flow, and changes in acres of lakes and ponds.

Sedimentation: this habitat factor will be evaluated by assessing miles of stream and acres of lake potentially affected by sediment discharge as a result of native surfaced route crossings on streams and proximity of routes to streams, lakes and ponds. Sedimentation will be measured by route density within RCAs and Stream crossing density within RCAs.

Water surface shade: this habitat factor will be evaluated by assessing changes in water surface shade as a result of motorize route additions to the NFTS and reopened ML 1 roads that cross streams or are adjacent to streams, lakes and ponds. This change will serve to indicate changes in water surface shade to perennial and intermittent streams, and lakes and ponds.

Current Condition of the Habitat Factor(s) in the Project Area

Flow: There are currently 1,398 miles of perennial streams, 941 miles of intermittent streams, and approximately 11,599 acres of lakes, ponds, and reservoirs on Tahoe NF including on National Forest System lands. These miles of perennial and intermittent streams, and acres of lakes, ponds, and reservoirs comprise the habitat for aquatic macroinvertebrates across the Forest.

Sedimentation: Native surfaced, motorized stream crossings and motorized routes within close proximity to riverine and lacustrine habitats can be a considerable source of sediment delivery to aquatic habitats important to macroinvertebrates (See Chapter 3.02, Watershed Resources: Geology, Soil, and Hydrology). There are currently 2,462 native surfaced, stream crossings, and 1,081 miles of roads and trails within RCAs on the Tahoe NF. There are 3 water bodies on the Tahoe NF that are listed as impaired for sediment on the EPAs 303(d) List. These are Truckee River, Humbug Creek, and Squaw Creek.

Water surface shade: Water surface shade varies tremendously on the Tahoe NF depending on the type and amount of vegetation, topographic features, floodplain type, etc. that the watercourse falls within.

Cross Country Travel

Under Alternative 1, no action, motorized cross country travel would continue on approximately 149,277 acres within Riparian Conservation Areas (RCAs), where the potential for adversely affecting aquatic macroinvertebrate habitat factors through increases in sedimentation and alteration of water surface shade. Under the action alternatives, prohibitions on cross country travel on 149,277 acres within RCA's would likely reduce the potential for sedimentation and alteration of water surface shade, and therefore benefit aquatic riverine and lacustrine habitat quality.

Establishment of Motorized "Open Areas"

The establishment of motorized "Open Areas" is analyzed under "Effects Common to All Aquatic Species."

Additions to the NFTS

Number of Native Surfaced, Stream Crossings. The number of native surfaced, stream crossings is assessed for the alternatives, and provides a way to compare changes in sediment into riverine and lacustrine habitats for aquatic macroinvertebrates (Table 3.03-115). Alternative 1 poses the greatest risk of increased sedimentation where 848 stream crossings are affected by the continuance of cross country travel on existing unauthorized motorized routes.

All of the action alternatives would result in significantly reducing the number of native surfaced stream crossings and thereby significantly benefiting riverine and lacustrine habitats for aquatic macroinvertebrates across the Tahoe NF. Of the action alternatives, Alternative 5 results in the greatest number of native surfaced, stream crossings (79 crossings) associated with proposed motorized route additions, followed by Alternatives 2, 6, 7, and 4, in descending order. Alternative 3 does not add motorized routes to the NFTS, and therefore macroinvertebrate habitat factors of sedimentation or water surface shade would not be affected.

Table 3.03-116. Number of Native Surfaced, Stream Crossings Associated with Additions to the NFTS

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Stream crossings associated with proposed additions to the NFTS (negative impact)	0	28	0	14	79	40	15
Stream Crossings that would remain with the continuance of cross country travel on existing unauthorized routes (negative impact)	848	0	0	0	0	0	0
Crossings prohibited to cross country travel (positive impact)	0	820	848	834	769	808	833
Crossings Closed by previous NEPA decisions, pending implementation (positive impact)	54	54	54	54	54	54	54

Miles of Route Additions within RCAs. The miles of proposed motorized route additions to the National Forest Transportation System (NFTS) within RCAs were assessed for the alternatives, and provide additional information to assess the potential for off-site sediment delivery into riverine and lacustrine habitats for aquatic macroinvertebrates (Table 3.03-117). Alternative 1 poses the greatest risk to increased sedimentation potential from 327 miles of unauthorized routes within RCAs that would remain due to not prohibiting cross country travel. Similar to stream crossing numbers, Alternative 5 would also result in the greatest number (31 miles) of motorized routes within RCAs that would be added, followed by Alternatives 6, 2, 7, and 4, in descending order. As stated above, Alternative 3 does not add motorized routes to the NFTS, and therefore changes to macroinvertebrate habitat factors including sedimentation or water surface shade would not occur.

Table 3.03-117. Miles of Route Additions within Riparian Conservation Areas (RCAs)

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
RCA miles of motorized route additions to the NFTS (negative impact)	327.3	12.3	0	5.6	31.0	18.2	6.8
Existing unauthorized RCA route miles prohibited to cross country travel (positive impact)	0	315.0	327.3	321.7	296.3	309.1	320.5
Miles closed by previous NEPA decisions, pending implementation (positive impact)	26.4	26.4	26.4	26.4	26.4	26.4	26.4

*Alternative 1 includes existing native surfaced routes, unauthorized to motorized use, while all the other Alternatives include motorized route additions to NFTS.

Changes to the NFTS

Change in Class of Vehicle. The change in class of vehicle may change the impacts to soil and water resources due to the potential change from smoothed surfaced route to native (rough) surfaced route (See Chapter 3.02, Watershed Resources: Geology, Soil, Hydrology). If the route changes from smoothed surfaced to native surfaced, the change in class of vehicle would potentially result in increased sediment and erosion risk to riverine and lacustrine habitats. The analysis of the change in class of vehicles indicates Alternatives 2, 5, and 6 would result in an increase in the number of high risk crossings (Alternatives 2 and 5 – 103 crossings, Alternative 6 – 78 crossings) and RCA route miles (Alternative 2 – 34.3 mi, Alternative 5 – 25.2 mi, Alternative 6 – 13.9 mi) (Table 3.03-118). No change in class of vehicles would occur in Alternatives 1 and 3, and small increases in high risk routes (4 crossings, 2 RCA miles) would occur in Alternatives 4 and 7.

Table 3.03-118. Change in Class of Vehicle Impacts to Riverine and Lacustrine Habitats

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number of Native Surfaced Crossings	0	103	0	4	103	78	4
RCA Miles of Native Surfaced Routes	0	34.3	0	2.0	25.2	13.9	2.0

Reopened ML 1 Roads. Only Alternatives 5 and 6 would propose to reopen native surfaced, ML 1 roads where the potential to capture and deliver sediment to riverine and lacustrine habitats could occur. Alternative 5 would potentially impact the greatest amount of riverine and lacustrine habitats where 46 crossings and 14.8 miles within RCAs would be reopened. Alternative 6 would affect a much lesser extent of riverine and lacustrine habitats, where 3 crossings and 2.2 RCA miles would be reopened and potentially increasing sediment delivery to streams and lake habitats. The remaining alternatives would not affect riverine and lacustrine habitats (Table 3.03-119).

Table 3.03-119. Riverine and Lacustrine Habitat Effects from Reopened ML 1 Road

	Alt 1*, 2, 3, 4, 7	Alt 5	Alt 6
Number of Native Surfaced Crossings	0	46	3
RCA Miles of Reopened ML 1 Roads	0	14.8	2.2

*Alternative 1 includes existing native surfaced routes, unauthorized to motorized use, while all the other Alternatives include motorized route additions to NFTS.

Summary of Direct and Indirect Effects to Macroinvertebrate Habitat Factors

Tables 3.03-120 and 3.03-121 summarizes the direct and indirect effects of macroinvertebrate habitat factors for the alternatives from proposed motorized route additions to the National Forest Transportation System and cross country travel, including existing unauthorized motorized routes. None of the action alternatives are expected to measurably change the amount of habitat within intermittent, perennial streams, lakes, ponds, and reservoirs. Flows within intermittent and perennial streams are expected to remain in existing conditions. Habitat quality would be affected from changes to sedimentation and to water surface shade. The following actions are assessed for their potential to affect sedimentation, and to a lesser degree to water surface shade. Native surface road and motorized route crossings and within close proximity to watercourses have the potential to alter riparian habitat and therefore change the amount of water surface shade. These factors are measured by assessing the miles of native surface roads and motorized routes within the Riparian Conservation Areas (RCAs) and the number of stream crossings within RCAs. RCAs are defined as the area within 150 feet on each side of intermittent streams and 300 feet of perennial streams. Lakes, ponds, and reservoirs are considered perennial and have a 300-foot RCA. Water surface shade would be generally be reduced or lost by a very limited amount where shade has been removed by the proposed route crossings. Water surface shade alteration will depend upon the width of the crossing and the type of vegetation present at the crossing. Within some watercourses, water surface shade would either not be altered or only minimally reduced, such as, crossings within forested habitats. Crossings through riparian vegetation (herbaceous meadow plants and woody riparian shrubs) have resulted in a reduction of some water surface shade. The amount of water surface shade will depend on the width of the crossings and the number of crossings.

Table 3.03-120. Summary of Effects from Motorized Route Additions to the NFTS, Reopened ML 1 Roads and Changes in Maintenance Levels

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Stream crossings associated with proposed motorized route additions to the NFTS							
Native Surface Crossings	848	28	0	14	79	40	15
RCA Miles	327.3	12.3	0	5.6	31.0	18.2	6.8
Reopened ML 1 Roads							
Number of Native Surfaced Crossings	0	0	0	0	46	3	0
RCA Miles	0	0	0	0	14.8	2.2	0
Change in Maintenance Level from smooth surfaced to rough surfaced							
Number of Native Surfaced Crossings	0	103	0	4	103	78	4
RCA Miles of Native Surfaced Routes	0	34.3	0	2.0	25.2	13.9	2.0

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Stream crossings associated with proposed motorized route additions to the NFTS							
Native Surface Crossings	848	28	0	14	79	40	15
RCA Miles	327.3	12.3	0	5.6	31.0	18.2	6.8
Reopened ML 1 Roads							
Number of Native Surfaced Crossings	0	0	0	0	46	3	0
RCA Miles	0	0	0	0	14.8	2.2	0
Change in Maintenance Level from smooth surfaced to rough surfaced							
Total Native Crossings from proposed alternatives	**848**	**131**	**0**	**18**	**228**	**121**	**19**
Total Native Surface RCA Miles	**327.3**	**46.6**	**0**	**7.6**	**71.0**	**34.3**	**8.8**

*Alternative 1 includes existing native surfaced, stream crossings and unauthorized routes, while all the other Alternatives include additions of motorized routes and crossings and reopened ML 1 roads.

Table 3.03-121. Summary of Effects to Aquatic Macroinvertebrate Habitat Factors for the Alternatives

Alternatives	Changes in habitat quality in miles of Stream and Acres of Lakes/ Ponds/ Reservoirs	Changes in Sediment Levels	Changes in Water Surface Shade
Alt 1*	Low	Increases the greatest (327.3 RCA unauthorized route miles, 848 unauthorized crossings)	Decreases
Alt 2	Low	Decreases more than Alt 5 (46.6 RCA route miles, 131 crossings)	Increases compared to Alt 1
Alt 3	Low	Decreases the most compared to Alt 1 (Adds no RCA miles or crossings)	Increases the most compared to Alt 1
Alt 4	Low	Decreases more than Alt 7 (7.6 RCA miles, 18 crossings)	Increases 2nd most compared to Alt 1
Alt 5	Low	Decreases the least (71.0 RCA miles, 228 crossings)	Increases the least compared to Alt 1
Alt 6	Low	Decreases more than Alt 2 (34.3 RCA miles, 121 crossings)	Increases compared to Alt 1
Alt 7	Low	Decreases more than Alt 6 (8.8 miles, 19 crossings)	Increases compared to Alt 1

*Alternative 1 includes existing native surfaced, stream crossings and unauthorized routes, while all the other Alternatives include additions of motorized routes and crossings and reopened ML 1 roads.

Cumulative Effects to Habitat in the Analysis Area

The spatial boundary for analyzing cumulative effects to aquatic macroinvertebrates include all perennial, intermittent streams, lakes, ponds, and reservoirs located within the boundary of the Tahoe NF. The temporal boundary is approximately 20 years in the past and 20 years into the future.

Past and current cumulative effects to aquatic macroinvertebrate habitat that have affected the habitat factors of flow, sedimentation, and surface shade include current and historic grazing along watercourses; loss of habitat (shade) and increased sedimentation through catastrophic wildfires; timber and fuels management where sedimentation has increased and cover has been reduced or removed; mining and

dredging, urban development and expansion within a highly checkerboard land ownership pattern; and recreational activities including hunting, camping, and general recreation activities including all forms of motorized use including 4 wheeled drive vehicles, ATVs, and motorcycles.

The Tahoe NF currently has 31 active livestock grazing allotments including both cattle and sheep. Tahoe LRMP standards and guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands.

Appendix H (Reasonably Foreseeable Projects and Cumulative Effects) provides a list and description of past, present, and reasonably foreseeable projects on NFS and private lands within the Tahoe NF boundary. Some, but not all, of these activities would contribute to impacts to the aquatic macroinvertebrates within the Tahoe NF boundary. Since 1990, more than 130,000 acres of vegetation management activities have occurred on the Tahoe NF. Some, but not all, have resulted in impacts to aquatic macroinvertebrate habitats. Between 2001 and 2007, over 13,000 acres of forest vegetation and fuels projects were completed, which primarily thinned, masticated, and/or burned vegetation to reduce the potential for catastrophic wildfires. Many recent, current, and future vegetation and fuels reduction projects are designed to minimize affects to stream and riparian habitats by following “riparian conservation objectives” as prescribed in the Sierra Nevada Forest Plan Amendment. Between 1994 and 2007, approximately 94,000 acres burned on the Tahoe NF, some of which may have resulted in changes in flow, increased sedimentation, and loss in surface cover.

Generally, the increase in recreational use on the Tahoe NF has the potential to cause an increased impact to aquatic macroinvertebrate habitats particularly during the summer months because humans are attracted to streams, lakes, ponds, and reservoirs.

Cumulative Effects Conclusion

For the action alternatives, generally, changes in flow and water surface shade would be too small to be measured. When considering all the cumulative effects of past, present, and reasonably foreseeable future impacts from grazing, vegetation/fuels projects, wildfires, mining, and recreation, Alternative 1 poses the greatest risk to the riverine and lacustrine habitats on the Tahoe NF, where cross country travel would continue on 149,277 acres within Riparian Conservation Areas with the highest potential to reduce habitat quality by increasing sediment delivery and alter water surface shade to aquatic macroinvertebrate habitats. Sedimentation of macroinvertebrate habitats would be greatest under Alternative 1, where 848 stream crossings and 327 RCA miles would continue to have use on unauthorized routes since cross country would not prohibited.

For the action alternatives, Alternative 5 would result in the greatest cumulative number of native surfaced, stream crossings and RCA miles, followed by Alternatives 2, 6, 7, 4, and 3, in descending order from the addition of motorized routes, changes in maintenance level, and reopened ML 1 roads. Alternative 3 does not add any stream crossings, reopen any ML 1 roads, or change maintenance levels, and therefore Alternative 3 would not add any cumulative impacts to aquatic macroinvertebrate habitats.

Wet weather seasonal restrictions under Alternatives 4, 5, and 6 on all native surfaced routes would benefit macroinvertebrate habitat through the reduction of erosion and sedimentation that could result

from wet season wheeled motorized use on routes, especially wheeled motorized routes that are within close proximity to macroinvertebrate habitats.

Summary of Direct, Indirect, and Cumulative Effects of Proposed Actions

Tables 3.03-122 and 3.03-123 summarizes the direct, indirect, and cumulative effects of all native surfaced motorized route crossings and miles within RCAs, including existing routes, motorized route additions to the NFTS, changes in class of vehicles, and prohibition of cross country travel. See Chapter 3.02 (Watershed Resources: Geology, Soil, Hydrology) for more detailed information and assumptions.

Table 3.03-122. Net Direct, Indirect, and Cumulative Effects to Number of Native Surfaced, Stream Crossings from Motorized Route Crossing Additions, Cross Country Travel, and Change in Maintenance Level, and Reopened ML 1 Roads

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Crossings Prohibited to Cross Country Travel (positive)	0	820	848	834	769	808	833
Existing NFTS Motorized Crossings (negative)	2,462	2,462	2,462	2,462	2,462	2,462	2,462
Motorized Crossing Additions (negative)	848	28	0	14	79	40	15
Change in maintenance level (smooth to rough surfaced) (negative)	0	103	0	4	103	78	4
Reopened ML 1 Roads (negative)	0	0	0	0	46	3	0
Crossings Closed by Previous NEPA decisions, pending implementation (positive)	54	54	54	54	54	54	54
Net Direct, Indirect, and Cumulative Effect = Total Native Surface Motorized Crossings	**3,310**	**2,593**	**2,462**	**2,480**	**2,644**	**2,580**	**2,481**

*Alternative 1 includes existing native surfaced, stream crossings unauthorized to motorized use, while all the other Alternatives include motorized crossing additions.

Table 3.03-123. Net Direct, Indirect, and Cumulative Effects to Native Surfaced, RCA Miles from Motorized Route Additions to the NFTS, Prohibition of Cross Country Travel, and Change in Class of Vehicles

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Existing RCA Motorized Miles (negative)	472.7	472.7	472.7	472.7	472.7	472.7	472.7
Miles of Native Surfaced Motorized RCA Additions (negative)	327.3	12.3	0	5.6	31.0	18.2	6.8
Miles of Native Surfaced Routes Prohibited to Country Travel (positive)	0	315.0	327.3	321.7	296.3	309.1	320.5
Change in Maintenance Level from smooth surfaced to rough surfaced (negative)	0	34.3	0	2.0	25.2	13.9	2.0
RCA Miles of Reopened ML 1 Roads (negative)	0	0	0	0	14.8	2.2	0
Net Direct, Indirect, and Cumulative Effect = Total Motorized RCA Miles	800.0	519.3	472.7	480.3	543.7	507.0	481.5

*Alternative 1 includes miles of existing native surfaced, unauthorized routes, while all the other alternatives include miles of motorized route additions.

Summary of Aquatic Macroinvertebrate Status and Trend at the Bioregional Scale. The Tahoe NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale Index of Biological Integrity and Habitat monitoring for aquatic macroinvertebrates; hence, the lacustrine and riverine effects

analysis for the Tahoe NF Motorized Travel Management Project must be informed by these monitoring data. The sections below summarize the Biological Integrity and Habitat status and trend data for aquatic macroinvertebrates. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008), which is hereby incorporated by reference.

Habitat and Index of Biological Integrity Status and Trend. Aquatic habitat has been assessed using Stream Condition Inventory (SCI) data collected since 1994 (Frasier et al. 2005) and habitat status information from the Sierra Nevada Ecosystem Project (SNEP) (Moyle and Randall 1996). Index of Biological Integrity is assessed using the River Invertebrate Prediction and Classification System (RIVPACS) and macroinvertebrate data collected since 2000 (see USDA Forest Service 2008). These data indicate that the status and trend in the RIVPACS scores is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Aquatic Macroinvertebrates Habitat Trend. The Tahoe NF Motorized Travel Management Project would affect the greatest amount of macroinvertebrate habitat under Alternative 1, through increased sedimentation and decreased surface shade, where approximately 327 miles of existing unauthorized motorized routes would continue to occur under the continuance of cross country travel within RCAs. These existing unauthorized routes would effectively result in the continued use of 848 native surfaced, stream crossings that could adversely affect the quality of macroinvertebrate habitats through increased sediment delivery and decreased surface water shade.

Of the action alternatives, Alternative 5 would result in the greatest amount impact to macroinvertebrate habitats, though the potential increase in sedimentation and decrease in surface water shade from motorized stream crossings and RCA route miles (71 RCA miles, 228 crossings), followed by Alternatives 2, 6, 7, 4, and 3, in descending order from the motorized additions, reopened ML 1 roads, and changes to maintenance level. Alternative 3 does not add any stream crossings or motorized routes within RCAs because no motorized route additions to the NFTS are proposed under this alternative.

The action alternatives would not alter the existing trend in macroinvertebrate habitat, nor would it lead to a change in the distribution of macroinvertebrates across the Sierra Nevada bioregion. This is based on the relatively low amount of lacustrine and riverine habitat affected, the prohibition of cross country travel within 149,277 RCA acres, including on between 296 and 327 motorized RCA miles, and on between 769 and 848 stream crossings.

Cumulative Effects of Past, Present, and Future Actions

The cumulative effects boundary includes all Forest Service System lands and private lands within the boundary of the Tahoe NF. This includes all major 7th field watersheds, which sufficiently analyzes cumulative effects to all perennial, intermittent, and ephemeral streams within the Forest boundary. Any larger boundary would be cumbersome and potentially dilute any cumulative effects.

Past, present, and future cumulative effects to aquatic organisms on both National Forest System lands and private lands includes a host of activities including timber management and the large network of roads associated with it; fuels projects including prescribed burning; recreation activities including

camping, fishing, hiking, off-highway travel, and sight-seeing; historic and present day mining activities have had significant impacts to fisheries; water diversions including dams and hydroelectric projects; livestock grazing both historic and current have greatly impacted the fisheries resource; and last, but not least urbanization on the Tahoe NF represented by the checkerboard ownership pattern has and continues to affect landscape connectivity of streams on the Tahoe NF.

Alternative 1 would add the greatest cumulative impacts to aquatic resources on the Tahoe NF from highest route densities within Riparian Conservation Areas and the highest proportion of stream crossings. All action alternatives would decrease the potential risk to fisheries and macroinvertebrate populations by decreasing the amount of motorized used on native surface routes. Alternative 5 would decrease the potential effects the least. Alternatives 3 and 4 would decrease the risks the most. Roads on private lands add considerable cumulative effects to the aquatic resources. Unmanaged cross country travel would continue to occur and increase at an unknown rate under Alternative 1 where impacts to aquatic resources are uncertain. Under all the action alternatives, cross-country travel would be prohibited. Over time, benefits to aquatic would be realized once these routes are revegetated and rehabilitated.

Lahontan Cutthroat Trout: Affected Environment

Introduction: The Lahontan cutthroat trout (LCT) was listed by the U.S. Fish and Wildlife Service (USFWS) as an endangered species in 1970 (Federal Register Vol. 35, p. 13520). The listing was reclassified to threatened status in 1975 to facilitate recovery and management efforts and authorize regulated angling (Federal Register Vol. 40, p. 29864). Currently, no Critical Habitat has been designated for the LCT (USFWS 1995).

Historically, LCT was thought to occupy approximately 360 miles of the Truckee River, 300 miles of the Carson River, and 360 miles of the Walker River in northern California and western Nevada (Somer 1998). Lahontan cutthroat trout historically occurred in Tahoe, Cascade, Fallen Leaf, Upper Twin, Lower Twin, Pyramid, Winnemucca, Summit, Donner, Walker, and Independence Lakes (Moyle 1976, Gerstung 1988). Currently, LCT recovery populations on the Tahoe NF occupy one lake and five streams. The Tahoe National Forest has designated the lake (Independence Lake) and the stream flowing into it (Upper Independence Creek) as a Critical Aquatic Refuge (CAR).

The Truckee River Basin Recovery Implementation Team (TRRIT) has established recovery objectives for various reaches of the Truckee River and its tributaries. Important recovery areas that the TRRIT has initially identified as having immediate potential include: Independence Creek, upstream of Independence Lake; Pole Creek; Hunter Creek; Donner Creek; Perazzo Creek; Prosser Creek; and the Truckee River from its confluence with Donner Creek to the State line; Upper Truckee River; Truckee River from Tahoe Dam to Donner Creek; and, Independence Creek downstream from Independence Lake to the Little Truckee River. The TRRIT has identified Macklin and East Fork Creeks and an unnamed tributary to the East Fork Creek in the Yuba River system as necessary for recovery of LCT because they contain remnants of indigenous Truckee River Basin strains.

The LCT currently occupies eleven 7th field watersheds on the Tahoe NF: Middle Truckee River-Pole Creek, Independence Lake, Middle Yuba River-Milton Reservoir, and East Fork. In addition, Lahontan cutthroat trout have been re-introduced into the Truckee River for recreational sport fishing. In 2006, Lahontan cutthroat trout were released into Sagehen Creek as part of research project.

Habitat attributes considered important for Lahontan cutthroat trout include:

- Cool water temperatures
- Stable stream banks
- Sufficient coarse woody debris
- Spawning gravel with low percentages of sand/silt
- Deep pools
- 1:1 pool to riffle ratio

Route Associated Risk Factors: Potential road and trail associated risk factors to the LCT include the immediate loss of individual fish and loss of specific habitat features such as undercut banks used for cover, increases in sedimentation leading to changes in spawning bed capacity, and the loss of riparian vegetation necessary to maintain adequate temperature regime (SNFPA 2001).

Lahontan Cutthroat Trout: Environmental Consequences

In 2006, the U.S. Forest Service entered into programmatic consultation with the U.S. Fish and Wildlife Service for route designation (travel management) for motor vehicles in 14 National Forests in California. The BE for the Tahoe NF Motorized Travel Management Project and this programmatic consultation is incorporated by reference. Project design criteria were developed jointly, which includes measures to avoid impacts to federally listed species, including the Lahontan cutthroat trout. The U.S. Fish and Wildlife Service has agreed that, by using the Project Design Criteria for each of the Threatened and Endangered species and Critical Habitat, route designation will meet “No Effect” or “May Affect, Not Likely to Adversely Affect” determinations and that they would concur with these determinations on a programmatic basis. Forest consultation can tier to the programmatic consultation with no further consultation. However, the FSW states that these criteria are for the Inyo, Sierra, and Stanislaus Nationals Forests only. The Tahoe and Humboldt-Toiyabe National Forests must have local project consultation for Lahontan cutthroat trout, since the Reno Office has responsibility for Section 7 Consultation on this species for these National Forests. Informal consultation for the LCT with the FWS Reno Office and the Sacramento Office occurred on August 22, 2007 regarding the Tahoe NF Motorized Travel Management Project. The FWS agreed that the Project Design Criteria which were developed through the programmatic consultation process should also be used to achieve a “No Effect” or “May Affect, Not Likely to Adversely Affect” determination for the LCT for the Tahoe NF. As such, the following Project Design Standards for LCT are described and how the Tahoe NF Motorized Travel Management Project is consistent with each Project Design Criteria. More specific information on the effects of the alternatives is described in the sections that follow.

Consistency with Project Design Criteria to Achieve "No Effect" and "Not Likely to Adversely Affect" Determinations

Routes and areas do not cross any stream within the occupied range of Lahontan cutthroat trout.

- There are no proposed route additions to the NFTS that cross any stream occupied by Lahontan cutthroat trout.
- The change in class of vehicles on the Pole Creek Road (Road #5708) that would result in changed maintenance levels proposed in Alternatives 2, 5, and 6 are outside the Pole Creek RCA. Therefore, occupied habitat in Pole Creek would not be affected.

Routes and areas are not located on active landslides and do not re-route surface water onto active landslides within watersheds that provide habitat for Lahontan cutthroat trout.

- There are no proposed route additions that cross any stream occupied by Lahontan cutthroat trout, and therefore, no proposed route additions are located on active landslides within watersheds that provide habitat for LCT.

Within watersheds that provide habitat for Lahontan cutthroat trout, routes or areas do not have the potential to capture surface run-off and then deliver sediment into a stream.

- The Travel Management action alternatives do not propose route or area additions that have the potential to capture surface run-off and then deliver sediment into any occupied LCT streams.
- A ½ mile segment of the existing Pole Creek Road (Road #5708) parallels occupied LCT habitat within Pole Creek. This ½ mile road segment is within the Pole Creek RCA and would be maintained at the current Maintenance Level 3 standard, and therefore would not increase sediment delivery to occupied Lahontan cutthroat trout habitat at Pole Creek.
- Established Motorized "Open Areas" are located outside of Riparian Conservation Areas that are within watersheds that provide habitat for Lahontan cutthroat trout.
- The action alternatives do not propose motorized area additions or reopen ML 1 roads that are within watersheds or Riparian Conservation Areas that provide habitat for Lahontan cutthroat trout.

Within watersheds that provide habitat for Lahontan cutthroat trout, "motorized routes" avoid Riparian Conservation Areas.

- The action alternatives do not propose motorized route additions, reopening ML 1 roads, or would result in changed maintenance standards within watersheds or Riparian Conservation Areas that provide habitat for Lahontan cutthroat trout.

Indicators used to Measure Effects

Cross Country Travel: The prohibition of cross country travel is analyzed for the alternatives to estimate the potential benefits and reduction in effects to occupied LCT streams from motorized cross country travel.

Additions to the NFTS (LCT 7th field watersheds): Measures or indicators of changes in sedimentation and water surface shade are assessed by analyzing the number of stream crossings

additions associated with motorized route additions to the National Forest Transportation System, and the miles motorized route additions to the NFTS within Riparian Conservation Areas (RCAs) for occupied LCT streams.

Site-specific Physical Impacts and Disturbance to occupied Lahontan cutthroat trout streams: Proposed motorized route additions to the NFTS were evaluated to determine site-specific impacts to occupied LCT streams for each of the alternatives. Native surfaced routes that cross or intersect LCT streams and lakes have the greatest potential to disturb LCT, kill and crush LCT egg masses (redds) and to alter stream banks and deliver sediment which can degrade LCT habitat condition. In addition, motorized route additions to the NFTS within the Riparian Conservation Areas (RCAs) of occupied LCT streams/lakes were also evaluated by the alternatives.

Wet Weather Seasonal Closures: Proposed wet weather seasonal restrictions on native surfaced route are analyzed under the section "Effects Common to All Aquatic Species."

Change in Class of Vehicles: Changing the class of vehicle on a particular route potentially changes the impacts to soil and water resource due to changes in the road surface (i.e. from smooth surfaced to rough surfaced) (see Chapter 3.02, Watershed Resources: Geology, Soil, and Hydrology). If the route changes from smoothed surfaced to native surfaced, the change in class of vehicle may result in increased sediment and erosion risk to occupied LCT streams. The change in class of vehicle and associated maintenance downgrades is evaluated for their potential to affect occupied LCT streams.

Reopened ML 1 Roads: The alternatives are analyzed for their potential to affect LCT habitat by reopening ML 1 Roads.

Route Density within Riparian Conservation Areas (RCAs): Route densities of native surfaced routes within RCAs were evaluated to compare the overall effects of all motorized routes (including existing routes and routes unauthorized to motorized public use) for the alternatives within each 7th field watershed occupied by LCT. According to Chapter 3.02 (Watershed Resources: Geology, Soil, Hydrology), Level 2 roads and below have the greatest potential for off-site sediment delivery into streams and lakes. Therefore, this effects analysis includes route density of all native surfaced motorized routes (including existing NFTS and unauthorized routes). Route density provides a relative index to measure the potential indirect effects to occupied habitat of LCT from increased sedimentation from routes. Thresholds for route density have not been established, however, route density provides a relative way to compare the effects of the alternatives.

Stream Crossing Density within RCAs: The 7th field watersheds occupied by LCT were evaluated for the crossing density of native surfaced motorized routes within RCAs to compare direct and indirect effects of motorized routes for the alternatives. Route crossing density provides a way to measure the potential direct and indirect effects to LCT and habitat. Direct effects include potential LCT mortality as a result of use of motorized crossings of occupied LCT streams. Indirect effects include changes to channel and streambank characteristics and changes in vegetation structure. Thresholds for motorized crossing route density have not been established, however, route crossing density provides a relative way to compare the effects of the alternatives.

Direct and Indirect Effects

Cross Country Travel

Under Alternative 1, no action, motorized cross country travel would continue on approximately 15,437 acres within Riparian Conservation Areas (RCAs) of occupied LCT streams, where the potential for adversely affecting occupied LCT habitat could occur by increasing sedimentation and altering water surface shade. The prohibition of cross country travel results in reducing motorized use on approximately 50 RCA miles and on 48 crossings for all the action alternatives, and continues under Alternative 1. Under the action alternatives, prohibitions on cross country travel on 15,437 acres within RCA's of occupied LCT streams (50 RCA miles and 48 stream crossings) would likely reduce the potential for sedimentation and alteration of water surface shade, and therefore benefit LCT habitat quality.

NFTS Additions and "Open Areas" – Stream Crossings and Miles of Motorized Route Additions

Number of Native Surfaced, Stream Crossing Additions within LCT 7th Field Watersheds. At the 7th field watershed scale (HUC7), the number of native surfaced, crossing additions are assessed for the alternatives, and provides a way to compare changes in sediment into occupied LCT habitats at the HUC 7 watershed scale where LCT streams are located. Alternative 1 poses the greatest risk of increased sedimentation where 48 stream crossings are affected by the continuance of cross country travel on unauthorized motorized routes. All the action alternatives would result in reducing the number of high risk (native surface) crossings within LCT HUC7 watersheds within the Truckee River or within Macklin Creek.

Alternative 6 would result in adding a total of 4 stream crossings within two HUC7 watersheds (Middle Truckee River-Lower Prosser Creek and Middle Yuba River-Milton Reservoir). None of the crossings would deliver sediment to the Occupied LCT streams (Table 3.03-124).

Alternatives 2, 4, 5, and 7 would result in adding 3 stream crossings within the Stampede Reservoir HUC7 watershed. These 3 crossings are located in the northeastern portion of the HUC7 and would not contribute sediment into Lower Sagehen Creek which drains into Stampede Reservoir at the southern and western edge of the watershed. Therefore, no effects to LCT within Lower Sagehen Creek would occur from these added crossings.

Alternative 3 does not add motorized crossings to the NFTS, and therefore sedimentation or water surface shade would not be affected within any LCT HUC7 watershed, or to any occupied LCT streams.

Table 3.03-124. Lahontan cutthroat trout 7th Field Watersheds - Number of Native Surfaced, Stream Crossings Associated with Motorized Route Additions to the NFTS

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Stream crossings associated with proposed motorized route additions to the NFTS (negative impact)	0	3	0	3	3	4	3
Number existing motorized unauthorized routes not prohibited to cross country travel (negative impact)	48	0	0	0	0	0	0

Miles of Proposed Route Additions within RCAs of LCT 7th Field Watersheds. The miles of proposed motorized route additions to the NFTS within RCAs were assessed for the alternatives, and provide additional information to assess the potential for off-site sediment delivery into streams within LCT HUC 7 watersheds (Table 3.03-125). Alternative 1 poses the greatest risk to increased sedimentation potential from 28.2 RCA miles of unauthorized routes that would remain due to the continuance of cross country travel.

All the action alternatives would reduce the number of RCA miles within LCT HUC7 watersheds. Alternatives 2, 4, 5, 6, and 7 propose to add between 0.9 – 1.6 miles within RCAs of LCT HUC7 watersheds. As stated above, **none of the added RCA miles would directly affect RCAs within occupied LCT streams**. Alternative 3 does not add motorized routes to the NFTS, and therefore changes to sedimentation or water surface shade would not occur within any LCT HUC7 watershed.

Table 3.03-125. Miles of Proposed Route Additions within LCT HUC7 Riparian Conservation Areas (RCAs)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
RCA Miles of motorized route additions (negative impact)	0	1.6	0	1.6	1.6	0.9	1.6
RCA Miles of existing unauthorized routes not prohibited to cross country travel (negative impact)	28.2	0	0	0	0	0	0

Site-specific Physical Impacts and Disturbance to occupied Lahontan cutthroat trout streams

As mentioned above, the LCT occupies eleven 7th field watersheds (HUC7) on the Tahoe NF, as follows:

- Middle Truckee River-Lower Prosser Creek
- Middle Truckee River-Cabin Creek
- Middle Truckee River-Pole Creek
- Middle Truckee River-Silver Creek
- Upper Middle Truckee River
- Independence Lake
- Middle Yuba River-Milton Reservoir
- East Fork
- Upper Sagehen Creek
- Lower Sagehen Creek
- Stampede Reservoir

Alternative 1 poses the greatest risk to LCT where existing unauthorized routes have the potential to adversely affect occupied LCT habitat. All the action alternatives do not directly or indirectly affect occupied LCT streams, since they do not propose motorized route additions that cross or have the potential to delivery sediment to occupied LCT streams. A brief summary of potential direct and indirect effects are described for each 7th field watershed that is occupied by LCT.

Middle Truckee River-Lower Prosser Creek, Middle Truckee River-Cabin Creek, Middle Truckee River-Silver Creek, and Upper Middle Truckee River: Recreational LCT occupy these four

watersheds within the Truckee River. The description of potential impacts of motorized route additions within these watersheds is described below.

Middle Truckee River-Lower Prosser Creek: Two proposed routes fall within the Middle Truckee R.-Lower Prosser Creek watershed (TKN-M1, TKN-PP). Both routes are located near Prosser Creek Reservoir, and are located over 1 mile away from the mainstem of the Truckee River. Sediment from these motorized route additions would not deliver sediment to the Truckee River, and therefore would not affect recreational LCT populations.

Middle Truckee River-Cabin Creek: Proposed route addition TKS-M9 falls within the Middle Truckee River-Cabin Creek watershed, but this motorcycle route is parallel to the Truckee River, and is over ½ mile east of the Truckee River up on the Sawtooth Ridge area. This single track route would not contribute sediment to the mainstem of the Truckee River, and would therefore not affect recreational LCT fisheries.

Middle Truckee River-Silver Creek: Approximately 1 ½ mile of the Truckee River flows through the middle of this watershed. No proposed route additions occur within the Middle Truckee R.-Silver Creek watershed, and therefore no impacts to the LCT fisheries in the Truckee River would occur.

Upper Middle Truckee River: No proposed route additions occur within the Upper Middle Truckee River watershed, and therefore no impacts to the LCT fisheries in the Truckee River would occur.

Middle Truckee River-Pole Creek. Pole Creek is currently occupied by LCT and falls within the Middle Truckee River-Pole Creek watershed. In addition, recreational LCT occupies the mainstem of the Truckee River which bisects the eastern portion of the Pole Creek watershed. No route additions are proposed within this watershed under any of the action alternatives. Two existing routes unauthorized to motorized public travel would remain under cross country travel in Alternative 1. However, these routes do not have the potential to deliver sediment to Pole Creek or to the Truckee River where LCT are located.

Independence Lake 7th field watershed. LCT within Independence Lake and upper Independence Creek has a high risk of being directly and indirectly affected by Alternative 1 and 5 where approximately 3 miles of routes unauthorized to motorized public use borders the north side of Independence Lake. The remaining action alternatives do not propose motorized route additions within the Independence Lake watershed. Existing routes unauthorized to motorized public use bordering the south side of Independence Lake on private land would also increase the risk of to LCT from factors associated with motorized use from potential sediment delivery into Independence Lake.

Middle Yuba River-Milton Reservoir 7th field watershed. In the Middle Yuba River-Milton Reservoir watershed, LCT occupies Macklin Creek. Under Alternative 1, one unauthorized route (~¼ mile) within the watershed does not cross, but parallels the headwaters of Macklin Creek, potentially delivering sediment into the stream. None of the action alternatives would directly affect LCT within Macklin Creek, since they do not propose routes additions within the Middle Yuba River-Milton Reservoir.

East Fork Creek 7th field watershed. Within the East Fork Creek watershed, LCT occupies East Fork Creek. There would be no direct or indirect effects to LCT within East Fork Creek, since no route

additions are proposed under any of the action alternatives. Under Alternative 1, an existing route unauthorized to motorized public use is located outside the Riparian Conservation Area that parallels the north side of East Fork Creek connecting two smooth surfaced roads. Sediment delivery into East Fork Creek from this route is unlikely.

Upper Sagehen Creek, Lower Sagehen Creek, and Stampede Reservoir watersheds: Three small short route segments that provide access to dispersed recreation occurs within the Lower Sagehen Creek watershed. These three route segments are stabilized and would not delivery sediment to Sagehen Creek. No other routes are proposed for addition within these three watersheds, therefore no effects to LCT would occur.

Establishment of Motorized "Open Areas"

The establishment of motorized "Open Areas" would not affect any occupied LCT streams, since none of the proposed motorized "Open Areas" would deliver sediment or are located within the RCA of any occupied LCT streams, including the Greenhorn area and the reservoir areas at Stampede, Boca, and Prosser. One HUC7 watershed, Stampede Reservoir, contains lower Sagehen Creek which is downstream of where LCT individuals were released during a research project at the Sagehen Experimental Research Forest. The proposed established "Open Areas" at Stampede Reservoir are not connected to and would not affect lower Sagehen Creek, and therefore would not affect any LCT that may be in lower Sagehen Creek.

Changes to the NFTS

Change in Class of Vehicles. For each of the alternatives, Table 3.03-126 displays the effects of proposed change in class of vehicles and the associated maintenance changes that have the potential to increase the risk of delivering sediment to occupied LCT streams. Alternatives 2, 5, and 6 would maintain the changes to road maintenance standards resulting in changes from smooth surfaced roads to rough surfaced roads that are likely to occur.

Under Alternatives 2, 5, and 6, this change in road surface type has a higher potential to result in increased sedimentation within the East Fork Creek HUC 7 watersheds with an occupied LCT stream. These are the East Fork Creek HUC7 watershed. The East Fork Creek watershed is affected by the change in road maintenance standard on one motorized intermittent stream crossing on East Fork Creek, and would result in the change from smooth surfaced to native surfaced motorized crossing. The crossing is associated with the Pinoli Ridge Road, located approximately 2/3 mile south of the occupied LCT stream (un-named tributary to East Fork Creek). The potential for delivering sediment to the occupied LCT stream within the un-named to tributary to East Fork Creek is not expected due to streamflow direction.

For Alternatives 2, 5, and 6, the change in class of vehicles would not result in changed maintenance standards on approximately 0.5 RCA miles on the Pole Creek Road (Road 5708) within a watershed with an occupied LCT stream (Pole Creek). Project design standards are required to maintain the Pole Creek Road at a higher maintenance standard (ML 3) within approximately 0.5 miles adjacent to Pole Creek so

that sediment delivery to Pole Creek would be minimized, therefore, current maintenance standards at Pole Creek would not contribute to accelerated erosion or sedimentation.

Table 3.03-126. Effects to LCT 7th Field Watersheds from Change in Class of Vehicles

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number of Native Surfaced crossings resulting from changes in maintenance from smooth surfaced to native surfaced (Pinoli Ridge)	0	1	0	0	1	1	0

Reopened ML 1 Roads: No ML 1 roads are proposed for reopening within any LCT HUC 7 watersheds under all the alternatives, and therefore LCT would not be affected.

Cumulative Effects

Cumulative Effects Boundary in Time and Space

For this analysis, the geographic boundary used to analyze cumulative effects to LCT is the Truckee River and its tributaries. This scale is an appropriate scale to analyze cumulative effects because the Truckee River watershed including all its tributaries is the historic range of the Lahontan cutthroat trout within the Tahoe NF. Any larger scale may dilute the actual effects of motorized routes and other activities that may potential affect occupied LCT streams. Past cumulative effects currently affecting the distribution and abundance of LCT considered here include 50 to 100 years out. Future cumulative impacts timeframe for reasonably foreseeable actions is approximately 20 years out.

Cumulative Effects of Motorized Routes

Route Density within Riparian Conservation Areas (RCAs). Chapter 3.02 (Watershed Resources: Geology, Soil, Hydrology), analyzed Riparian Conservation Area (RCA) route density for each 7th field watershed on the Tahoe NF, and categorized motorized RCA route density (native surfaced) by four route density categories. The route density categories were highest (8.9 - 27.3 miles/square mile), moderately high (6.3 - 8.8miles/square mile), moderately low (4.3 - 6.2 miles/square mile, and lowest (0.2 - 4.2 miles/square mile).

Figure 3.03-9 shows the number of HUC7 watersheds occupied by LCT by RCA motorized route density by density category. Alternative 1 poses the greatest risk to LCT where 6 LCT HUC7 watersheds falls within the highest route density category, 3 in the moderately high, 1 in the moderately low, and 1 in the lowest. All the action alternatives would result in reducing route densities within RCAs. Alternatives 2 and 5 are similar in RCA route densities where 4 HUC7 watersheds are within route density categories of highest, 5 within moderately high, 1 within moderately low, and 1 within lowest. Alternative 6 would further reduce RCA route density where 4 watersheds fall in the highest and moderately high density categories, 1 in the moderately low, and 2 in the lowest. Alternatives 3, 4, and 7 have the least potential for effects from cumulative motorized routes within HUC7 watersheds with occupied LCT streams where 3 watersheds falls within the moderately highest, 4 in the moderately high, 1 in the moderately low, and 3 in the lowest RCA route density category.

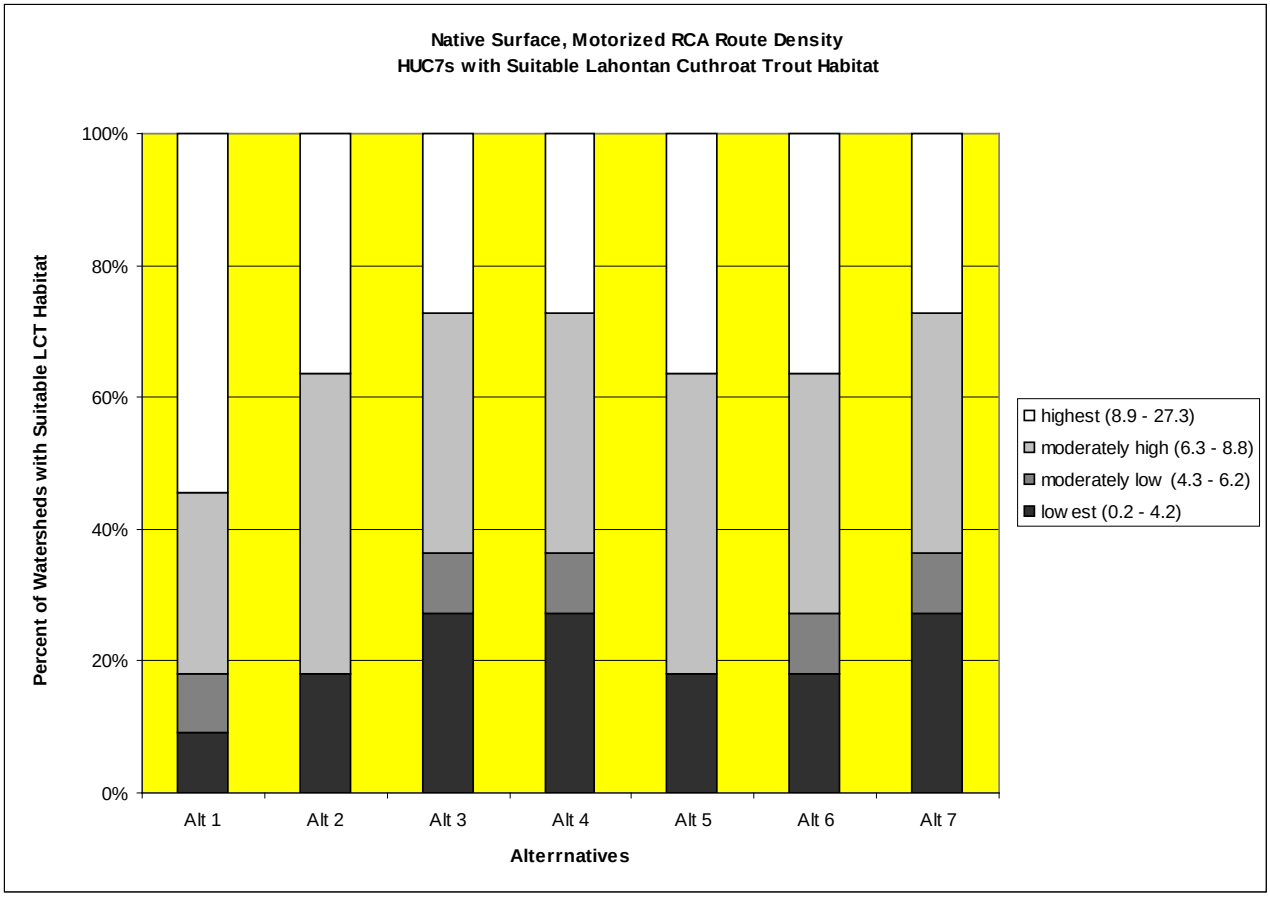

Figure 3.03-9. Number of HUC7 Watersheds with Occupied LCT streams by Route Density Categories of Lowest, Lower, Higher, and Highest

Stream Crossing Density within RCAs

RCA stream crossing density categories (native surfaced routes) were determined for each 7th field watershed with occupied LCT streams on the Tahoe NF by four route density categories. The route density categories were highest (5.1-19.7 crossings/sq. mile), moderately high (3.1-5.0) crossings/sq. mile), moderately low (1.8-3.0 crossings/sq. mi.), and lowest (0-1.7 crossing/sq. mi.). Figure 3.03-10 displays motorized crossing density within HUC7 watersheds with occupied LCT habitat for each of the alternatives.

Alternative 1 poses the greatest risk to LCT streams from potential sediment delivery, since 6 of 11 HUC7 watersheds occupied by LCT would fall within the highest, 4 within the moderately high, and 1 within moderately low categories for route crossing densities.

Alternatives 2 and 5 pose the next greatest risk to LCT from sedimentation from stream crossings where the 4 of 11 HUC7s falls within highest, 4 within moderately high, 2 within moderately low (2), and none in the lowest crossing density category. Alternative 6 would result in stream crossing densities where 4 watersheds would be in the highest, 5 in moderately high, none in moderately low, and 2 in the lowest crossing density categories. Alternative 3 followed by Alternatives 4 and 7 would result in the least risk to

LCT watersheds where the least amount of sediment delivery and stream habitat alteration would likely occur within LCT watersheds compared to all the other alternatives.

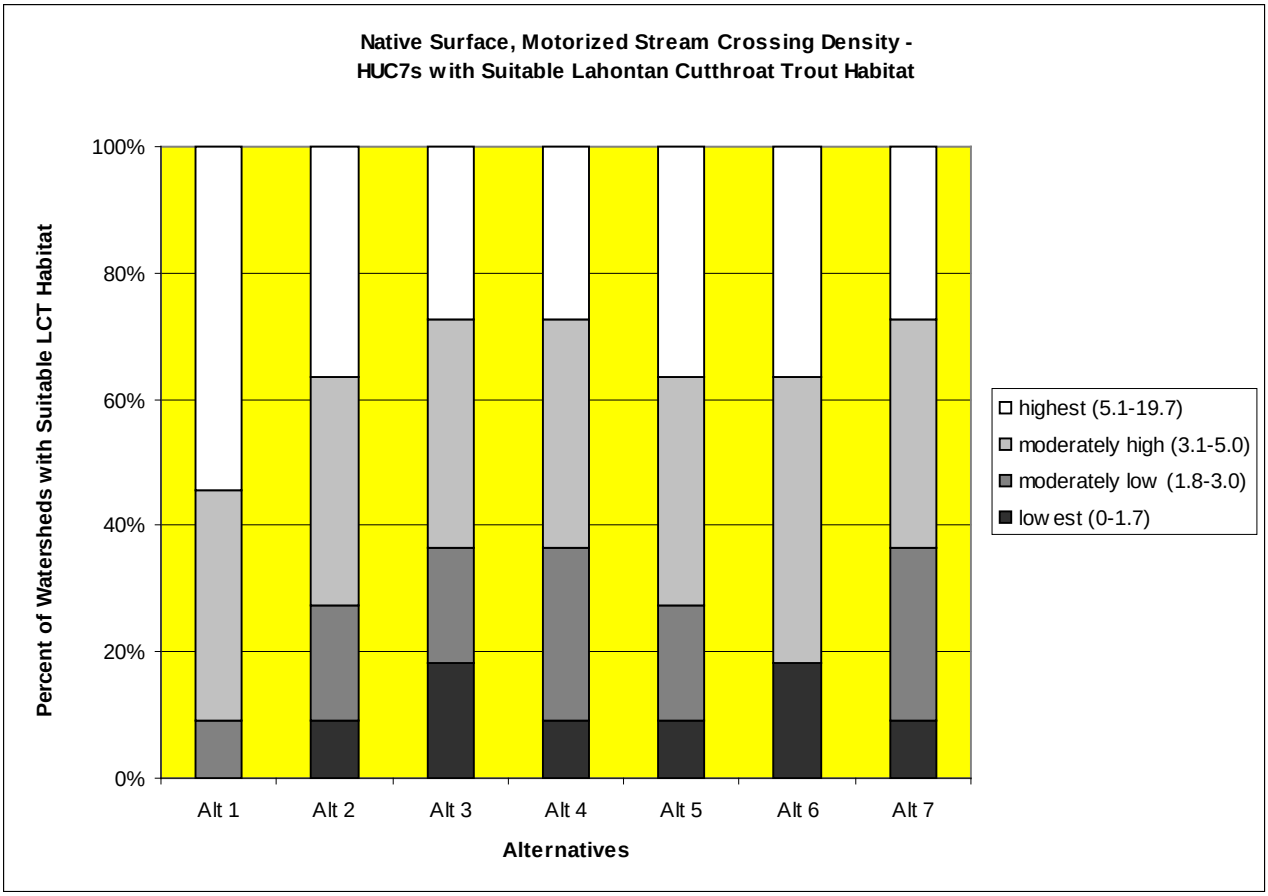

Figure 3.03-10. Number of HUC7 Watersheds with occupied LCT streams by Motorized Crossing Density Categories

Summary of Direct, Indirect, and Cumulative Effects of Proposed Actions

Tables 3.03-127 and 3.03-128 summarize the direct, indirect, and cumulative effects to native surfaced, motorized route crossing within LCT HUC 7 watersheds, from existing motorized routes, motorized route additions, and routes unauthorized to motorized public travel from the proposed actions, including wet weather seasonal restrictions, changes in class of vehicles, prohibition of cross country travel. See Chapter 3.02 (Watershed Resources: Geology, Soil, Hydrology) for more detailed information and assumptions.

Table 3.03-127. LCT 7th Field Watersheds – Summary of Direct, Indirect, and Cumulative Effect of Proposed Actions as Measured by Native Surfaced, Motorized Stream Crossings

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
RCA Acres Prohibited	0	15,437	15,437	15,437	15,437	15,437	15,437
Unauthorized Motorized Stream Crossings Prohibited to cross country travel	1	46	49	46	46	45	46
Motorized Stream Crossings							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Existing NFTS Native Surfaced, Stream Crossings	45	45	45	45	45	45	45
Native Surfaced, Motorized Route Crossing Additions*	0	3	0	3	3	4	3
Unauthorized Crossings that would continue with cross country travel	48	0	0	0	0	0	0
Reopened ML 1 Road Crossings	0	0	0	0	0	0	0
Change in Class of Vehicles resulting in changed maintenance standards resulting in smooth surfaced to native surfaced within occupied RCA stream	0	1	0	0	1	1	0
Net NFTS Native Surfaced, Stream Crossings	93	55	45	48	55	55	48
Wet Weather Seasonal Restrictions on all Native Surfaced Roads and Routes	None	None	None	Beneficial - Wet Weather Restrictions would be implemented on 13 crossings	Beneficial - Wet Weather Restrictions would be implemented on 15 crossings	Beneficial - Wet Weather Restrictions would be implemented on 14 crossings	None

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
NET Cumulative Effect	Negative cumulative effects. Cross country travel prohibited on "0" LCT RCA acres. Motorized travel continued on 48 unauthorized native surfaced, crossings No additional protection to occupied LCT streams from wet weather restrictions.	Least beneficial to LCT—results in 55 crossings in LCT watersheds. Cross country travel prohibited on 15,437 LCT RCA acres. No additional protection to occupied LCT streams from wet weather restrictions.	3rd Most beneficial alternative. Results in the least number of native surfaced crossings (45). Cross country travel prohibited on 15,437 LCT RCA acres. No additional protection to occupied LCT streams from wet weather restrictions.	Most beneficial alternative — results in 48 crossings in LCT watersheds. Cross country travel prohibited on 15,437 LCT RCA acres. Reduced sedimentation risk to occupied LCT streams from wet weather restrictions.	2rd most beneficial alternative, shared with Alt 6—results in 55 crossings in LCT watersheds. Cross country travel prohibited on 15,437 LCT RCA acres. Reduced sedimentation risk to occupied LCT streams from wet weather restrictions.	2rd most beneficial alternative, shared with Alt 5—results in 55 crossings in LCT watersheds. Cross country travel prohibited on 15,437 LCT RCA acres. Reduced sedimentation risk to occupied LCT streams from wet weather restrictions.	4th most beneficial alternative, results in 48 crossings in LCT watersheds. Cross country travel prohibited on 15,437 LCT RCA acres. No additional protection to occupied LCT streams from wet weather restrictions

Table 3.03-128. LCT 7th Field Watersheds – Summary of Direct, Indirect, and Cumulative Effect of Proposed Actions as Measured by Native Surfaced, Motorized RCA Motorized Miles

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
RCA Acres Prohibited	0	15,437	15,437	15,437	15,437	15,437	15,437
Miles Prohibited	1.6	28.3	29.9	28.3	28.3	28.9	28.3
Native Surfaced, Motorized RCA Routes							
Trend of Effect	Negative	Beneficial	Most Beneficial alternative	Beneficial	Beneficial	Beneficial	Beneficial
Existing Native Surfaced RCA Miles	22.8	22.8	22.8	22.8	22.8	22.8	22.8
Native Surfaced RCA Miles Added to NFTS	28.2	1.6	0	1.6	1.6	0.9	1.6
Native Surfaced RCA Miles resulting from changed maintenance levels (outside RCA at Pole Creek)	0	0.5	0	0	0.5	0.5	0
Net NFTS Native Surfaced, RCA motorized route miles	51.0	24.9	22.8	24.4	24.9	24.2	24.4
Wet Weather Seasonal Restrictions on all Native Surfaced Routes	None	None	None	Beneficial - Wet Weather Restrictions would be implemented	Beneficial - Wet Weather Restrictions would be implemented	Beneficial - Wet Weather Restrictions would be implemented	None
NET Cumulative Effect	Most negative alternative. Cross country travel continues on 15,437 LCT RCA acres, including on 51 RCA miles. No additional protection from wet weather restrictions.	6th most beneficial alternative. Cross country travel prohibited on 15,437 LCT RCA acres. 24.9 NFTS RCA miles available. No additional protection from wet weather restrictions.	4th most beneficial alternative. Cross country travel prohibited on 15,437 LCT RCA acres 22.8 NFTS RCA miles available. No additional protection from wet weather restrictions.	2nd Most beneficial alternative. Cross country travel prohibited on 15,437 LCT RCA acres. 24.4 NFTS RCA miles. Reduced sedimentation risk to occupied LCT streams from wet weather restrictions	3rd most beneficial alternative. Cross country travel prohibited on 15,437 LCT RCA acres 24.9 NFTS RCA miles.available. Reduced sedimentation risk to occupied LCT streams from wet weather restrictions	Most beneficial alternative. Cross country travel prohibited on 15,437 LCT RCA acres 24.2 NFTS RCA miles available. Reduced sedimentation risk to occupied LCT streams from wet weather restrictions	5th most beneficial alternative. Cross country travel prohibited on 15,437 LCT RCA acres 24.4 NFTS RCA miles available. No additional protection from wet weather restrictions.

Overall Cumulative Effects of Past, Present, and Reasonably Foreseeable Future Actions

Past management activities have had severe, adverse cumulative effects on LCT distribution and population trends as a result of numerous factors including hybridization and competition with introduced trout species; alteration of stream channels and morphology; loss of spawning habitat due to pollution and sediment inputs from past logging, mining, and historic grazing, and urbanization; and loss of connectivity. LCT was particularly affected within the Truckee River watershed by loss of habitat connectivity from water diversions and dam construction (Gerstung 1986 and 1988 and Coffin 1988, In USFWS 1995). The Truckee River basin has more than 40 potential barriers to fish migration which have impeded LCT migration to historic spawning and rearing habitats. In addition, the resulting reservoirs helped to establish a number of non-native fish species known to be detrimental to LCT through predation and/or competition.

Livestock grazing has the potential to affect most of the important habitat attributes listed above by reducing near-stream vegetation and de-stabilizing stream banks, which can lead to increased stream temperature, fine sediment input, and filling of pools. The current occupied LCT recovery streams on the Tahoe NF fall within two active livestock allotments - the English Allotment (cattle) and the Sierra Crest Allotment (sheep). An Allotment Management Plan for the English Allotment was completed in 1996. The Sierra Crest Allotment Management Plan was recently completed. Grazing within the Sierra Crest Allotment has not occurred since the early 1990s. Therefore, Austin Meadows and Macklin Creek are the only occupied LCT streams that are currently grazed by livestock. Streambank disturbance from livestock monitoring at both Austin and Macklin Creek indicate streambank disturbance by livestock have generally been within the maximum 10% streambank disturbance guideline for most years monitored, with a few exceptions.

The Sierra Nevada Forest Plan Amendment (2004) provides management direction and standards and guidelines for livestock utilization and streambank disturbance. Implementation and monitoring of these standards and guidelines will likely reduce the potential habitat impacts of livestock grazing. In summary, livestock grazing could cumulatively affect LCT habitat and should be limited to Macklin Creek and Austin Meadows Creek, though management requirements specific to these activities should limit these impacts.

Ongoing and planned vegetation and fuels management projects on National Forest land should not add cumulative impacts to effects due implementation of Best Management Practices and Riparian Conservation Objectives for Riparian Conservation Areas.

The continuance of cross country travel, including on existing routes unauthorized motorized public use, under Alternative 1 poses the greatest risk of adding direct and indirect impacts to existing cumulative impacts to streams occupied by LCT within the Independence Lake and the Middle Yuba River-Milton Reservoir HUC7 watersheds . Under Alternative 1, HUC7 watersheds occupied by LCT would have the highest RCA route densities and the highest route crossing densities as a result of unauthorized routes within Riparian Conservation Areas. Under Alternative 1, unauthorized route proliferation would likely continue and increase at an accelerated rate in the future, potentially increasing

sediment delivery and alteration of streambank vegetation and hydrologic condition which may affect the abundance of LCT within localized areas in the future. None of the action alternatives proposes to add motorized routes or areas to the NFTS within watersheds with occupied LCT streams. Cumulative impacts would be added to existing impacts through the change in class of vehicles under Alternatives 2, 5, and 6, where 0.5 RCA miles and 1 stream crossing could contribute to adverse effects from increased sediment delivery. For all the action alternatives, future unmanaged cross country motorized travel would be prohibited. In addition, the prohibition of cross country travel would reduce impacts on routes unauthorized for motorized public use and benefit LCT in the long-term once these routes are rehabilitated through obliteration or other means.

Federally Listed Species Determination

The Biological Assessment, which is incorporated by reference, determined that Alternatives 2, 5, and 6 may affect, but not likely to adversely affect the federally threatened Lahontan cutthroat trout within the Middle Truckee River-Pole Creek 7th field watershed. This determination is based on mitigation requirements associated with the proposed change in class of vehicles on 0.5 RCA miles along the Pole Creek Road (Road 5708) which has the potential to increase the risk of sediment delivery into Pole Creek, an occupied LCT stream. Mitigations measures require that road maintenance standards minimizes sediment delivery to Pole Creek. No motorized route or area additions are proposed within any watersheds with streams occupied by LCT.

Lahontan Lake Tui Chub: Affected Environment

The Lahontan Lake tui chub (*Gila bicolor pectinifer*) is listed as Sensitive on the Region 5 Forester's Sensitive Species List (USDA Forest Service 1998). The Lahontan Lake tui chub are a cyprinid subspecies found in Lake Tahoe and Pyramid Lake (Nevada) which are connected to each other by the Truckee River and in nearby Walker Lake (Nevada).

The Lake Tahoe population is the only confirmed population in the Sierra Nevada, with possible populations in Stampede, Boca and Prosser Reservoirs on the Truckee Ranger District of the Tahoe National Forest. These three reservoirs are connected by the Little Truckee River which feeds into the mainstem of the Truckee River. Little study has occurred on the Lake Tahoe population since Miller (1951). Zooplankton levels have changed over this period. Daphnia, an important prey of adult chubs, have been nearly eliminated (Richards et al. 1975) by the introduced Kokanee salmon (*Oncorhynchus nerka*) and opossum shrimp (*Mysis relicta*), both of which feed on zooplankton. Marshland degradation along the lake may be taking away vital spawning and nursery areas.

Based on occurrence within such widely diverse habitats as Lake Tahoe and Pyramid Lake, it is believed this species can tolerate a wide range of physicochemical water conditions. Lahontan Lake tui chub are known as a mid-water feeder. In Lake Tahoe, larger fish (>16 cm TL) occur in deeper water (>50m) during the day, moving into shallower water areas at night (Miller 1951). Young fish generally occur in shallow water. It has also been noted that a seasonal migration occurs within the water column. Deeper water in often utilized during winter months and summer months show use of upper portions

(Snyder 1917, Miller 1951). Algal beds in shallow inshore areas seem necessary for spawning, egg hatching, and larval survival.

Lahontan Lake tui chub are schooling fish reaching lengths of 35 to 41 cm FL, which inhabit large, deep lakes (Moyle 1976, In USFWS 1995). Lahontan Lake tui chub feed primarily on zooplankton, especially cladocerans and copepods, but also eat benthic insects when available (Miller 1951, Marrin and Erman 1982). Tui chub are predated upon mostly by large trout, and rarely by birds and snakes (Miller 1951).

In Lake Tahoe, nocturnal spawning occurs during May and June, possibly extending into July (Miller 1951). Tui chub may be serial spawners, reproducing several times during the spawning season (Moyle 1976). Reproductive adults spawn near-shore over beds of aquatic vegetation, to which the eggs adhere (Snyder 1917). Young remain near-shore until winter when body size is 1-2 cm, and then migrate into deeper water. Linear growth of tui chubs occurs within about 4 years, then body mass is accumulated rapidly. The largest documented length in Lake Tahoe is 13.7 cm SL, but longer chub (21 cm) have been found in Walker Lake, Nevada (Miller 1951).

Potential risk factors include but are not limited to water quality, specifically alkalinity due to diversions of inflowing water, change in prey base due to introduced species, and reservoir and wetland management.

Lahontan Lake Tui Chub: Environmental Consequences

The actual presence of the Lahontan Lake tui chub on the Tahoe NF has not been confirmed or verified. Although its presence has not been confirmed, this analysis assumes the species is present within Boca, Stampede and Prosser Reservoirs. Therefore, the analysis for this species was conducted within the three 7th field watersheds within the Prosser Creek Reservoir HUC7, Stampede Reservoir HUC7, and Boca Reservoir HUC7, which includes the three reservoirs and the streams and tributaries that drain into and out of them. In addition, to assess a broader and more inclusive analysis of potential indirect effects, RCA route density and stream crossing density were analyzed within twelve 7th field watersheds which include the three reservoirs and the streams and tributaries that flow into these reservoirs.

Indicators used to Measure Effects

Prosser Creek Reservoir HUC7, Stampede Reservoir HUC7, and Boca Reservoir HUC7

Cross Country Travel: The prohibition of cross country travel is analyzed for the alternatives to estimate effects to three tui chub 7th field watersheds from motorized cross country travel.

Additions to the NFTS (tui chub 7th field watersheds): Measures or indicators of changes in sedimentation and water surface shade are assessed by analyzing the number of stream crossings additions associated with motorized route additions to the National Forest Transportation System, and the miles of motorized route additions within Riparian Conservation Areas (RCAs) for tui chub within three 7th field watersheds where the species has a potential to occur—Prosser Creek Reservoir HUC7, Stampede Reservoir HUC7, and Boca Reservoir HUC7.

Establishment of "Open Areas": The establishment of "Open Areas" at Boca, Stampede, and Prosser reservoirs is evaluated under "Effects Common to All Aquatic Species."

Wet Weather Seasonal Closures: Wet weather seasonal closures are evaluated under "Effects Common to All Aquatic Species."

Change in Class of Vehicles: Changing the class of vehicle on a particular route potentially changes the impacts to soil and water resource due to changes in the road surface (i.e. from smooth surfaced to rough surfaced) (see Chapter 3.02, Watershed Resources: Geology, Soil, and Hydrology). If the route changes from smoothed surfaced to native surfaced (rough surfaced), the change in class of vehicle may result in increased sediment and erosion risk to tui chub habitat. The change in class of vehicle and associated maintenance downgrades is evaluated for their potential to affect selected 7th field watersheds that may have suitable habitat for the tui chub.

Twelve HUC7 Watersheds

Route Density within Riparian Conservation Areas (RCAs): Route densities of native surfaced routes within RCAs were evaluated to compare the overall effects of all motorized routes (including existing routes and existing routes unauthorized to motorized public use) for the alternatives within twelve 7th field watersheds with suitable Lahontan Lake tui chub habitat. According to Chapter 3.02 (Watershed Resources: Geology, Soil, Hydrology), native surfaced roads have the greatest potential for off-site sediment delivery into streams and lakes. Therefore, this effects analysis includes route density of all native surfaced motorized routes. Route density provides a relative index to measure the potential indirect effects to suitable tui chub habitat from increased sedimentation from motorized routes. Thresholds for route density have not been established, however, route density provides a relative way to compare the effects of the alternatives.

Stream Crossing Density: Twelve 7th field watersheds with suitable Lahontan Lake tui chub habitat were evaluated for the crossing density of native surfaced motorized routes within RCAs to compare direct and indirect effects of motorized routes for the alternatives. Route crossing density provides a way to measure the potential direct and indirect effects to the tui chub and habitat. Direct effects include potential tui chub mortality as a result of use of motorized crossings that may affect tui chub habitat. Indirect effects include changes to channel and streambank characteristics and changes in vegetation structure. Thresholds for motorized crossing route density have not been established, however, route crossing density provides a relative way to compare the effects of the alternatives.

Direct and Indirect Effects

Cross Country Travel. Under Alternative 1, no action, motorized cross country travel would continue on 9,689 acres within Riparian Conservation Areas (RCAs) of tui chub HUC7 watersheds, where the potential for adversely affecting tui chub habitat could occur by increasing sedimentation and altering streamside vegetation. The prohibition of cross country travel results in prohibiting motorized use on 9,689 RCA acres, including on existing unauthorized routes on between approximately 27.5 to 29 RCA miles and between 44 to 48 crossings (Alternative 3- the most, Alternative 5 – the least) for the action

alternatives. The prohibition of motorized cross country travel would likely reduce the risk of sedimentation and alteration of streamside vegetation, and therefore benefit potential tui chub habitat.

NFTS Additions and "Open Areas" – Stream Crossings and Miles of Motorized Route Additions

Number of Native Surfaced, Stream Crossing Additions within Three Tui Chub7th Field Watersheds. Within the Prosser, Stampede, and Boca Reservoir HUC7 watersheds, the number of native surfaced, stream crossings is assessed for the alternatives, and provides a way to compare relative changes in sediment into riverine and lacustrine habitats at the HUC 7 watershed scale where potentially suitable Lahontan Lake tui chub habitat occurs. Alternative 1 poses the greatest risk of increased sedimentation where 42 stream crossings are affected by the continuance of cross country travel on unauthorized motorized routes (Table 3.03-129).

All the action alternatives would benefit tui chub by reducing the number of native surfaced stream crossings and motorized route miles within RCAs. Alternatives 2, 4, 5, 6, and 7 would result in the addition of between 2-4 motorized native surfaced crossings. Alternative 3 does not add motorized routes to the NFTS, and therefore sedimentation or water surface shade would not be affected within the three tui chub HUC7 watersheds.

Table 3.03-129. Lahontan Lake tui chub 7th Field Watersheds (Prosser, Stampede, Boca Reservoirs) - Number of Native Surfaced, Stream Crossings Associated with Motorized Route Additions

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Stream crossings associated with proposed motorized route additions (negative impact)	48	3	0	3	4	2	3

*Alternative 1 includes existing native surfaced, stream crossings unauthorized to motorized use, while all the other Alternatives include motorized crossing additions.

Miles of Proposed Route Additions within RCAs of Prosser, Stampede, and Boca 7th Field Watersheds. The miles of proposed motorized route additions to the NFTS within RCAs were assessed for the alternatives, and provide additional information to assess the potential for off-site sediment delivery into riverine and lacustrine habitats within tui chub HUC 7 watersheds. Alternative 1 poses the greatest risk to increased sedimentation potential from approximately 29 RCA miles of unauthorized motorized routes that would remain due to the continuance of cross country travel (Table 3.03-130).

Similar to stream crossing numbers, the action alternatives would all benefit tui chub by reducing the number of miles available for motorized use, therefore reducing the potential for adverse habitat effects from erosion and sedimentation. Alternatives 2, 4, 5, 6, and 7 propose to add between 1.0 and 1.7 RCA miles of motorized routes, with Alternative 6 adding the least and Alternatives 2, 5, and 7 adding about the same amount of miles. Alternatives 3 does not add motorized routes, and therefore changes to sedimentation or streamside vegetation would not occur within the three Lahontan Lake tui chub HUC7 watersheds under these alternatives.

Table 3.03-130. Tui Chub - Miles of Proposed Route Additions within Prosser, Stampede, and Boca HUC7 Riparian Conservation Areas (RCAs)

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
RCA Miles of proposed motorized route additions (negative impact)	29.4	1.6	0	1.6	1.7	1.0	1.6

*Alternative 1 includes existing native surfaced, unauthorized routes, while all the action alternatives include motorized route additions.

Changes to the NFTS

Change in Class of Vehicles. For each of the alternatives, Table 3.03-131 displays the effects of proposed changes in class of vehicles and the associated change in maintenance standards that have the potential to increase the risk of delivering sedimentation and erosion to Prosser, Stampede, and Boca Reservoir HUC7 watersheds. Alternatives 2, 5, and 6 would result in the change in road maintenance levels resulting in changes from smooth surfaced roads to rough surfaced roads that are likely to occur in the future with reduced maintenance. This change in road surface type would have a higher potential to result in increased sedimentation to tui chub habitat affected by 3 crossings and 1.1 RCA miles under Alternatives 2 and 5. Alternative 6 would result in less adverse effects to tui chub habitat from 2 native surfaced crossings and 0.1 RCA mile. The remaining alternatives would not affect tui chub habitat from changed maintenance standards.

Table 3.03-131. Lahontan Lake Tui Chub – Effects from Change in Class of Vehicles

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number of Native Surfaced Crossings as a result of changed maintenance standards from smooth surfaced to native surfaced	0	3	0	0	3	2	0
Native surfaced RCA Miles as a result of changed maintenance standards from smooth surfaced to native surfaced	0	1.1	0	0	1.1	0.2	0

Reopened ML 1 Roads: None of the alternatives would reopen any ML 1 roads within the three Lahontan Lake tui chub HUC7 watersheds within the RCA and therefore would not affect the three HUC7 tui chub watersheds.

Tui Chub HUC7 Watersheds

In addition to the motorized routes that can contribute to direct impacts within the three reservoirs, the indirect effects of motorized routes to tui chub habitat are analyzed within twelve HUC7 watersheds that may contribute to water quality within the reservoirs at a broader landscape scale.

Route Density within Riparian Conservation Areas (RCAs): Riparian Conservation Area (RCA) route density for twelve 7th field watersheds on the Tahoe NF are analyzed motorized RCA route density (native surfaced) and categorized by four route density categories. Suitable Lahontan Lake tui chub habitat was identified to occur within twelve 7th field watersheds on the Tahoe National Forest. For each

of the alternatives, Table 3.03-132 and Figure 3.03-11 display the number and percent of 7th field watersheds (HUC7s) with suitable tui chub habitat by RCA route density category of highest (8.9 - 27.3 mi/mi^2), moderately high (6.3 - 8.8 mi/mi^2), moderately low (4.3 - 6.2 mi/mi^2), and lowest (0.2 - 4.2 mi/mi^2).

Alternative 1 poses the greatest direct and indirect effects to suitable tui chub habitat where 67% (8 of 12) tui chub HUC7 watersheds have route densities within the highest, 16% (2 of 12) within moderately high, 17% (2 of 12) within moderately low, and none within the lowest route density categories. All the action alternatives reduce RCA route densities compared to Alternative 1.

Alternatives 2, 5, and 6 would slightly improve route densities compared to Alternative 1, where tui chub HUC7 watersheds would result in 5 watersheds in the highest, 4 in the moderately high, 1 in the moderately low, and 2 in the lowest route density category.

Alternatives 3, 4, and 7 have the lowest route densities of all the action alternatives, where 3 HUC7 watersheds are in the highest route density categories, 5 are in the moderately high, 2 in the moderately low, and 2 are in the lowest density categories.

Table 3.03-132. Number of HUC7 Watersheds with Suitable Lahontan Lake Tui Chub Habitat by RCA Route Density Category

Alternatives	Highest (8.9 - 27.3 mi/mi^2)	Moderately High (6.3 - 8.8 mi/mi^2)	Moderately Low (4.3 - 6.2 mi/mi^2)	Lowest (0.2 - 4.2 mi/mi^2)
Alt 1	8	2	2	0
Alt 2	5	4	1	2
Alt 3	3	5	2	2
Alt 4	3	5	2	2
Alt 5	5	4	1	2
Alt 6	5	4	1	2
Alt 7	3	5	2	2

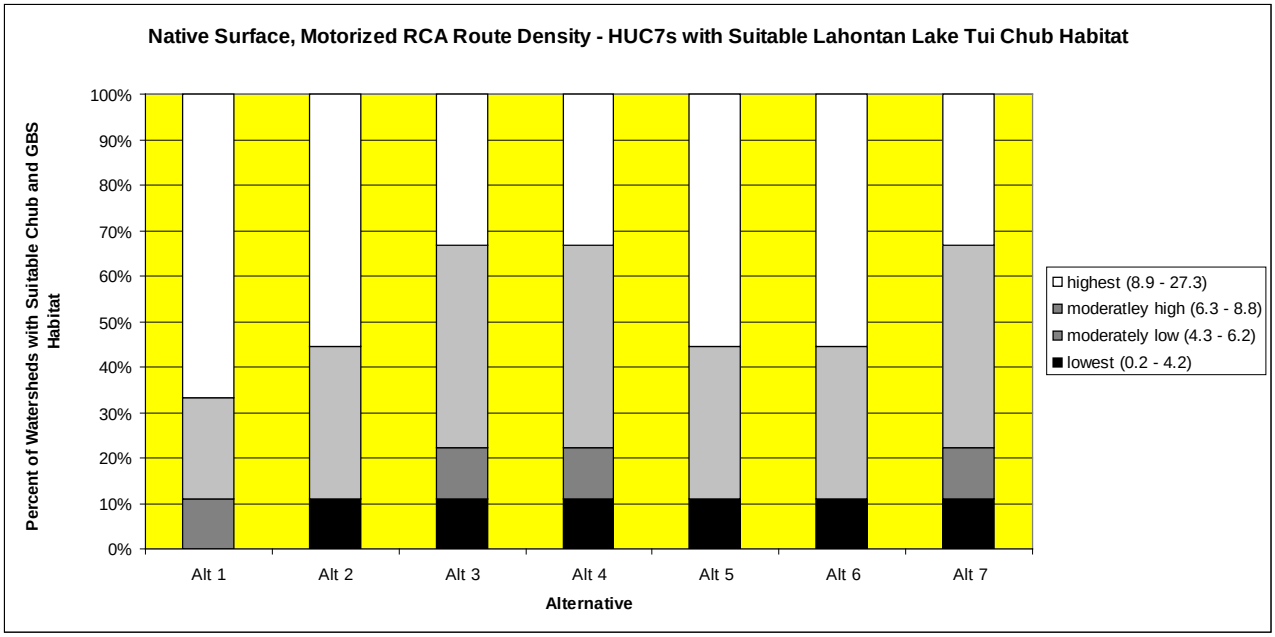

Figure 3.03-11. Proportion of HUC7 Watersheds with Suitable Lahontan Lake Tui Chub Habitat by Motorized RCA Route Density Categories

Stream Crossing Density: Twelve 7th field watersheds (HUC7s) identified as potential habitat for the Lahontan Lake tui chub within the three reservoirs were evaluated by alternative for the number and percentage of HUC7s that are within stream crossing density categories of highest (8.9 – 27.3 crossings/mi^2), moderately high (6.3 - 8.8crossings/mi^2), moderately low (4.3 - 6.2 crossings/mi^2), and lowest (0.2 - 4.2 crossing/mi^2 (Table 3.03-133 and Figure 3.03-12). Alternative 1 poses the greatest risk of direct and indirect effects to Lahontan Lake tui chub habitat through potential sediment delivery from native surfaced, motorized routes. Under Alternative 1, 100% HUC7 watersheds potentially affecting tui chub habitat would have stream crossing densities within the highest and the moderately high route density categories combined.

All the action alternatives would benefit tui chub habitats by reducing the native surfaced crossing densities within the 12 tui chub HUC7 watersheds. Of the action alternatives, Alternative 5 has a higher proportion of tui chub HUC7 watersheds in the highest stream crossing density category (67% or 8 of 12), under Alternative 5, and 2 watersheds each in the moderately high and the moderately low crossing density categories.

The remaining alternatives would further reduce the number of stream crossings within the highest crossing density categories. Alternatives 2 and 7 would have the same proportion of HUC7 watersheds within stream crossing density categories. Alternative 6 follows Alternatives 2 and 7, and Alternative 3 has the lowest stream crossing densities with the highest number of HUC7 watersheds within the moderately low and the lowest crossing density categories compared across all the alternatives.

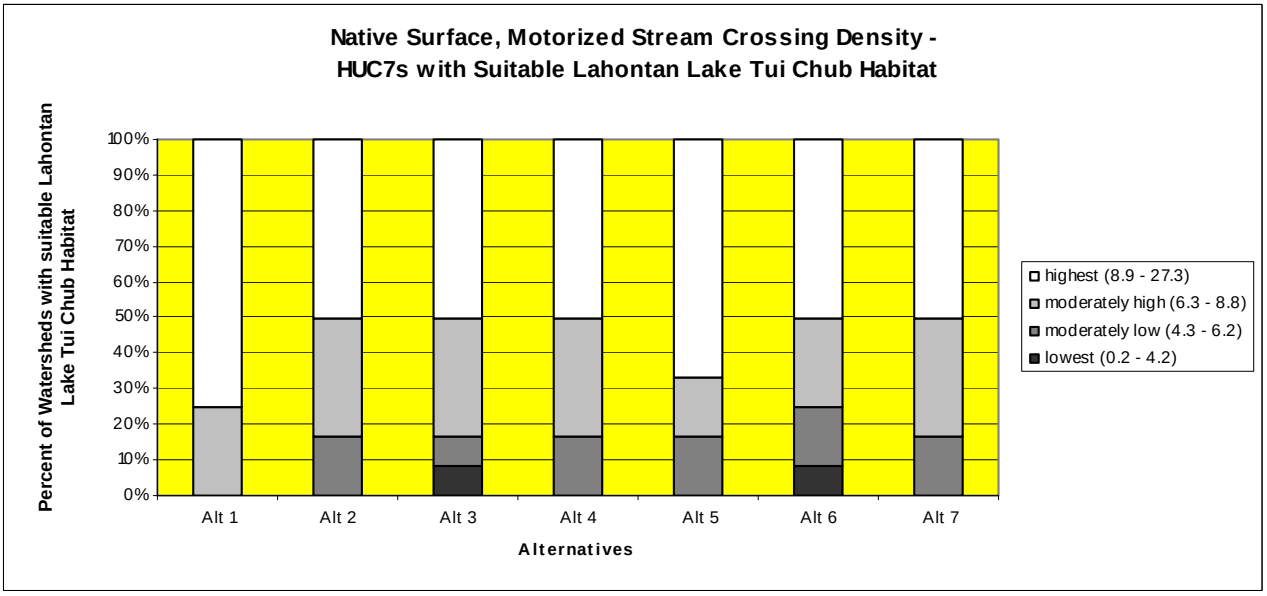

Figure 3.03-12. Number of HUC7 Watersheds with suitable Lahontan Lake Tui Chub Habitat by Motorized Stream Crossing Density Categories

Table 3.03-133. Number and percent of HUC7 Watersheds with Suitable Lahontan Lake Tui Chub Habitat by Native Surfaced, Motorized Stream Crossing Density Category

Alternatives	Highest 8.9 – 27.3 crossings/mi^2)	Moderately High (6.3 - 8.8crossings/mi^2)	Moderately Low (4.3 - 6.2 crossings/mi^2)	Lowest (0.2 - 4.2 crossing/mi^2)
Alt 1	9	3	0	0
Alt 2	6	4	2	0
Alt 3	6	4	1	1
Alt 4	6	4	2	0
Alt 5	8	2	2	0
Alt 6	6	3	2	1
Alt 7	6	4	2	0

Cumulative Effects

Cumulative Effects Boundary in Space and Time

The geographic boundary for assessing cumulative effects to the Lahontan Lake tui chub on the Tahoe NF is within the nine 7th field watersheds that may potentially indirectly impact suitable habitat for the species. Suitable habitat for this species occurs within Stampede, Boca, and Prosser reservoirs and streams that feed or connect to these reservoirs. This cumulative effects boundary is sufficiently large to assess all past, present, and future cumulative impacts to suitable habitat for the Lahontan Lake tui chub. Any larger boundary could dilute the effects of past, present, and future cumulative impacts to this species. The timeframe for assessing cumulative impacts in the past includes activities that occurred within the last 50 to 100 years. Reasonably foreseeable future impacts expand out to approximately 20 years into the future.

Cumulative Effects of Past, Present, and Reasonably Foreseeable Actions

The current knowledge of the species distribution on the Tahoe NF is unknown. Suitable habitat for the Lahontan Lake tui chub on the Tahoe NF is considered to be Stampede, Boca, and Prosser Reservoirs and the streams connecting them (Little Truckee River and tributaries). Potential past cumulative effects to this species includes habitat degradations from water diversions, reduced water quality, urbanization, livestock grazing, recreational activities, and others. The fact that the occurrence of the species on the Tahoe NF is unknown makes assessing cumulative effects extremely difficult. Therefore, there is a great deal of uncertainty surrounding the past cumulative effects to this species from past, present, and reasonably foreseeable future activities. Any attempt to actually describe cumulative impacts would be speculative at best, since it is unknown whether or not this species has a historical distribution on the Tahoe NF.

Under Alternative 1, cumulative effects from continued cross country travel, including on 48 native surfaced crossings and approximately 29 miles of unauthorized routes would be greatest where HUC7 watersheds with suitable tui chub habitat would have the highest RCA route densities and the highest route crossing densities. The indirect impacts of potential sediment delivery from existing motorized unauthorized routes in Alternative 1 would add measurable cumulative impacts to suitable Lake Lahontan tui chub habitat where 83% of HUC7 watersheds route densities are within the highest and moderately high route density categories combined. In addition, native surfaced, motorized stream crossing densities would be greatest under Alternative 1 where 100% of the HUC7 watersheds are within the high and moderately highest stream crossing categories combined. The remaining alternatives improve both route density within Riparian Conservation Areas and stream crossing densities with Alternative 5 reducing the least and Alternatives 2, 3, 4, 6, and 7 reducing the most.

For all the action alternatives, future unmanaged cross country motorized travel would be prohibited on 9,689 acres, including on approximately 27-29 RCA miles of existing unauthorized motorized routes and on 44-48 native surfaced, stream crossings (Alternative 5 prohibits the least, Alternative 3 prohibits the most). These cross country prohibitions would likely benefit suitable tui chub habitat in the long-term once these routes are rehabilitated through active or passive restoration efforts.

Summary of Direct, Indirect, and Cumulative Effects of Proposed Actions

Table 3.03-134 summarizes the direct, indirect, and cumulative effects to native surfaced, motorized route crossings and RCA miles within Lahontan Lake tui chub HUC 7 watersheds, from existing motorized system routes, motorized route additions, and existing unauthorized routes from the proposed alternatives, wet weather seasonal restrictions, changes in class of vehicles, prohibition of cross country travel. See Chapter 3.02 (Watershed Resources: Geology, Soil, Hydrology) for more detailed information and assumptions.

Table 3.03-134. Lahontan Lake Tui Chub 7th Field Watersheds – Summary of Direct, Indirect, and Cumulative Effect of Proposed Actions

		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel Prohibitions (acres)	**Trend of Effect**	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
	Acres	0	7,100	9,689	9,689	9,689	9,689	9,689
	Crossings	0	45	48	45	44	46	45
	RCA Miles	1.0	27.8	29.3	27.8	27.6	28.4	27.5
Existing NFTS Native Surfaced, Motorized Routes	**Crossings**	35	35	35	35	35	35	35
	Miles	21.5	21.5	21.5	21.5	21.5	21.5	21.5
Native Surfaced, Motorized Route Additions to the NFTS*	**Trend of Effect**	Negative	3rd most beneficial alternative, shared with Alts 4 and 7.	Most benefical alternative	3rd most beneficial alternative, shared with Alts 2 and 7.	Least beneficial	2nd most beneficial alternative	3nd most beneficial alternative, shared with Alts 2 and 4.
	Crossings	48	3	0	3	4	2	3
	Miles	29.4	1.6	0	1.6	1.7	1.0	1.6
Change in Class of Vehicles Resulting in Changed Maintenance Standards	**Trend of Effect**	No Effect	Negative	No Effect	No Effect	Negative	Negative	No Effect
	Crossings	0	3	0	0	3	2	0
	RCA Miles	0	1.1	0	0	1.1	0.2	0
Reopened ML 1 Roads		0	0	0	0	0	0	0
Total Native Surfaced, Motorized Routes	**Crossings**	**83**	**38**	**35**	**38**	**39**	**37**	**38**
	RCA Miles	**50.9**	**25.2**	**21.5**	**23.1**	**25.3**	**23.6**	**23.1**
Establishment of "Open Areas" (Prosser, Stampede, and Boca Reservoirs)	**Trend of Effect**	Negative – cross country travel continued	Negative	No Effect	No Effect	No Effect	Slight to none, designation on specific areas that have been stabilized or mitigated	No Effect
	Acres	0	2,589	0	0	0	244	0

		Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Wet Weather Seasonal Restrictions on all Native Surfaced Roads and Routes	**Trend of Effect**	Negative	Negative	Negative	Beneficial	Beneficial	Beneficial	Negative
	Description	No wet weather restrictions on high risk crossings.	No wet weather restrictions on high risk crossings.	No wet weather restrictions on high risk crossings.	Wet Weather Restrictions would be implemented on native surfaced crossings reducing erosion risk	Wet Weather Restrictions would be implemented native surfaced crossings reducing erosion risk	Wet Weather Restrictions would be implemented native surfaced crossings reducing erosion risk	No wet weather restrictions on high risk crossings.
NET Cumulative Effect		Most negative alternative with motorized 83 crossings and 50.9 RCA miles. Cross country travel continues on 9,689 tui chub RCA acres No additional protection to tui chub habitat from wet weather restrictions.	Least beneficial alternative. Cross country travel prohibited on 9,689 tui chub RCA acres Potentially increases sedimentation to habitat within open reservoir areas No additional protection to tui chub habitat from wet weather restrictions.	4th most benefical alternative. Cross country travel prohibited on 9,689 tui chub RCA acres. No additional protection to tui chub habitat from wet weather restrictions	Most beneficial alternative, shared with Alt 7. Cross country travel prohibited on 9,689 tui chub RCA acres Reduced sedimentation risk to tui chub habitat from wet weather restrictions	3rd most beneficial alternative. Cross country travel prohibited on 9,689 tui chub. RCA acres. Reduced sedimentation risk to tui chub habitat from wet weather restrictions	2nd most beneficial alternative. Cross country travel prohibited on 9,689 tui chub. RCA acres. Reduced sedimentation risk to tui chub habitat from wet weather restrictions	Most beneficial alternative, shared with Alt 4. Cross country travel prohibited on 9,689 tui RCA acres Reduced sedimentation risk to tui chub habitat from wet weather restrictions

*Alternative 1 includes existing native surfaced, stream crossings unauthorized to motorized use, while all the other Alternatives include motorized crossing additions.

Frogs

Potential road and trail associated risk factors to the suitable habitat for frogs, particularly California red-legged frogs, foothill yellow-legged frogs, and mountain yellow-legged frogs, can cause the modification or loss of habitat or habitat components, primarily aquatic and adjacent riparian environments used for reproduction, cover, foraging, and aestivation. Egg survival can be impacted by roads and trails through increases in fine sediments. Stream crossings and roads and trails that are within close proximity to streams and ponds have the potential to impact riparian vegetation, emergent vegetation, nutrient loading, and channel morphology and hydrology that are important habitat components for frog species.

The degree to which trails and roads affect frogs and their habitat depends on many factors such as road density, road type, and traffic intensity. Most studies on road and trail associated factors address other amphibians (e.g., Fahrig et al. 1995, Mazerolle 2003, 2004). Several studies have shown that amphibian densities are inversely related to road density and traffic intensity (see Fahrig et al. 1995, Vos and Chardon 1998).

Direct impacts to frog populations from roads potentially include road mortality, direct loss of habitat, or creation of barriers. Mass mortalities of other species of frogs have been documented during dispersal where roads intersect natal/breeding habitat and non-breeding foraging habitat (Hine et al. 1981, Fahrig et al. 1995; see also Trombulak and Frissell 2000). Mortality from vehicles can reduce population size and reduce movement between resources and conspecific populations (Carr and Fahrig 2001). Road mortality is a considerable potential risk factor for foothill yellow-legged frogs because roads are common over the areas encompassing their historical range on the Tahoe NF, many of the roads presently have at least moderate traffic levels; and some observations suggest upslope seasonal movements by frogs likely intersect roads.

Roads can also impact populations of frogs by affecting their riparian or terrestrial habitat. Trombulak and Frissell (2000) identified eight physical characteristics of the environment may be altered by roads: soil density, temperature, soil water content, light, dust, surface-water flow, pattern of run-off, and sedimentation. The presence of roads is highly correlated with changes in the hydrologic and geomorphic processes that affect aquatic and riparian systems (Trombulak and Frissell 2000). Roads can 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). California red-legged frogs, foothill yellow-legged frogs, and mountain-yellow legged frogs breed in streams, which can be affected by fluctuations in the frequency or magnitude of peak and debris flows of adjacent streams. Fluctuations causing reductions or excesses in available water could severely affect recruitment. Hydrologic effects are likely to persist for as long as the road remains a physical feature altering flow routing - often long after abandonment and revegetation of the road surface (Trombulak and Frissell 2000).

Increased sedimentation from roads also impacts riparian habitat used by frogs. 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, Waters 1995). The transfer of sediment to streams and other water bodies at road crossings is also a consequence of roads and trails (Richardson et al. 1975). The surfaces of unpaved roads can route fine sediments to streams, lakes, and wetlands, increasing turbidity of the water (Reid and Dunne 1984). This disrupts stream ecosystems by inhibiting aquatic plants, macro-invertebrates, and fish. High concentrations of suspended sediment may directly kill aquatic organisms and impair aquatic productivity (Newcombe and Jensen 1996). The effects are heightened if the sediments contain toxic materials (Maxell and Hokit 1999, In Joslin and Youmans 1999). 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) and possibly the availability of oviposition sites or larval refugia (Welsh and Ollivier 1998). In addition, the consequences of past sedimentation are long term and cumulative, and cannot be mitigated effectively (Hagans et al. 1986). The only data addressing sedimentation effects on foothill yellow-legged frogs are from Oregon, where sedimentation emerged as one of the variables affecting foothill yellow-legged frog occupancy (Borisenko and Hayes 1999).

The spread of chemicals is another way in which roads may impact frog. 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 Frissell 2000). The change of the chemical environment by roads may affect living organisms in several ways. For example, chemicals found in road de-icers may kill (Dougherty 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. Another example is the historical use of lead as a fuel additive that may have affected foothill yellow-legged frogs because lead has been shown to have sub-lethal effects on growth and behavior of northern leopard frog larvae (Chen et al. 2006). No data exist that specifically addresses the effects of road associated chemicals on California red-legged frogs, foothill yellow-legged frogs, or mountain yellow-legged frogs.

California Red-legged Frog: Affected Environment

The U. S Fish and Wildlife Service listed the California red-legged frog (*Rana aurora draytonii*) (CRLF) as federally threatened in 1996. The western portion of the Tahoe National Forest falls within the Sierra Nevada recovery unit (Recovery Unit #1) (USDI Fish and Wildlife Service 2002). The Plumas and Tahoe National Forests share Core Area #2 Yuba River-South Fork Feather River located in Yuba County (USDI Fish and Wildlife Service 2002). This core area includes a portion of the North Yuba River around New Bullards Bar Reservoir. Recovery actions would be focused within core areas. No critical habitat is designated on the Tahoe National Forest (USDI Fish and Wildlife Service 2001) (Federal Register 66 (49): 14626-14758).

The California red-legged frog is a highly aquatic species typically found in cold water ponds and stream pools with depths exceeding 0.7 meters and with overhanging vegetation such as willows, as well as emergent and submergent vegetation (Hayes and Jennings 1988). It is generally found at elevations below 4,000 feet. Suitable California red-legged frog breeding habitat on the Tahoe NF includes all

ponds, lakes and reservoirs on the west slope of the forest that contain water through July in years with average precipitation, and low gradient stream reaches (< 4 percent) that do not receive peak runoff flows from snowmelt during May or June. Sites need to provide: suitable water depth for breeding (most years), presence of still or slow moving water, good water temperature for egg laying and larval development, presence of emergent aquatic vegetation or woody debris for egg deposition braces.

California red-legged frog are not currently known to occur on the Tahoe NF, though four known populations are located adjacent to the Tahoe NF administered lands. In 2000, red-legged frogs were found in Little Oregon Creek, a tributary to New Bullards Bar Reservoir on the Plumas NF. The Little Oregon Creek population is approximately 1 mile from New Bullards Bar Reservoir. In 2001 a single female was located in Spivey Pond on the Eldorado NF on Ralston Ridge, located 1 mile from the Tahoe NF boundary. A third population was found in 2003 on private land within the Rock Creek watershed near Nevada City, within 1/5 miles of the Tahoe NF boundary. In 2006, a fourth site consisting of approximately 50 individuals was discovered on private land near Michigan Bluff in the Big Gun Diggings area. From 1996 to present, suitable California red-legged frog habitat on the Tahoe NF has been surveyed to U.S. Fish and Wildlife Service protocol at approximately 100 sites. To date, no California red-legged frog sites have been detected on lands administered by the Tahoe NF.

Roads in close proximity to streams also increase the potential for human disturbance of aquatic species and their habitats. In general, such disturbance would be correlated to the type of disturbance (e.g., roadside hazard tree removal, collection of aquatic species, behavioral changes in response to noise, etc.), the intensity of that disturbance, and the distance of the road from the stream.

Roads and trails can increase the risk of modification or loss of red-legged frog habitat or habitat components, primarily aquatic and adjacent riparian environments used for reproduction, cover, foraging, and aestivation. Egg survival can be impacted by road and trail associated factors through increases in fine sediments and changes in channel morphology and hydrology (SNFPA 2001), thus adversely affecting habitat and potentially disrupting amphibian reproduction. Effects of increased sediment delivery to aquatic systems include adverse effects to water quality (e.g., increases in turbidity) and changes in substrate composition morphology that potentially could influence in-stream primary production and macroinvertebrate assemblages. Such changes could alter the prey species presence/absence and/or promote changes in habitat that favor non-native species that have a negative effect on the red-legged frog.

California Red-legged Frog: Environmental Consequences

In 2006, the U.S. Forest Service entered into programmatic consultation with the U.S. Fish and Wildlife Service for route designation (travel management) for motor vehicles in 14 National Forests in California. The BE for the Tahoe NF Motorized Travel Management Project and this programmatic consultation is incorporated by reference. Project design criteria were developed jointly, which includes measures to avoid impacts to federally listed species, including the California red-legged frog. The U.S. Fish and Wildlife Service has agreed that, by using the Project Design Criteria for each of the Threatened and Endangered species and Critical Habitat, route designation will meet “No Effect” or “May Affect Not

Likely to Adversely Affect" determinations and that they would concur with these determinations on a programmatic basis. Forest consultation can tier to the programmatic consultation with no further consultation.

The following project design criteria were developed specifically for the California red-legged frog to achieve a "No Effect" or "May Affect Not Likely to Adversely Affect" determination for routes (motorized road or trail) and area additions to the NFTS:

1. Routes or areas do not have the potential to capture surface run-off and then deliver sediment into a stream associated with California red-legged frog.
2. In suitable California red-legged frog habitat, routes avoid Riparian Conservation Areas except where necessary to cross streams. Crossing approaches get the riders in and out of the stream channel and riparian area in the shortest distance possible while meeting the gradient and approach length standards.
3. Routes or areas that cross any stream or waterbody within 150 m (500 ft) of known occupied sites of California red-legged frog; and route or area is not within a distance of 150 m (500 ft) from wetlands (i.e. springs, wet meadows, ponds, marshes).
4. In habitat occupied by California red-legged frog, routes or areas do not have the potential to capture or divert stream flow. The approaches to stream crossings are downsloped toward the stream on both sides.
5. Routes or areas are located outside of Critical Aquatic Refuges, Riparian Conservation Areas, meadows, and wetlands within California red-legged frog habitat.
6. No route or areas are within Critical Aquatic Refuges for California red-legged frog.

Direct and Indirect Effects

There are no known occupied California red-legged frog sites on lands administered by the Tahoe NF. Proposed motorized route and area additions to the NFTS do not directly, indirectly, or cumulatively impact the California red-legged frog. All the action alternatives would be consistent with the above Project Design Criteria, since none of the proposed route or area additions would adversely affect any occupied California red-legged frog sites adjacent to or within the boundary of the Tahoe NF.

The North Bloomfield (Rock Creek) red-legged frog site occurs several miles outside of the Forest boundary just north of Nevada City, and would not be affected by the proposed route and area additions. Two other known red-legged sites are on the Eldorado and Plumas NFs, and would not be affected by this project. The occupied California red-legged frog site near Michigan Bluff is immediately adjacent to the Forest boundary. No routes would be proposed within proximity to the Michigan Bluff site.

- Routes or areas do not have the potential to capture surface run-off and then deliver sediment into a stream associated with California red-legged frog.

  No routes would be proposed within proximity to any of the CRLF occupied habitats discussed above.

- In suitable California red-legged frog habitat, routes avoid Riparian Conservation Areas except where necessary to cross streams. Crossing approaches get the riders in and out of the stream

channel and riparian area in the shortest distance possible while meeting the gradient and approach length standards.

No routes would be proposed within proximity to any of the CRLF occupied habitat.

- Routes or areas that cross any stream or waterbody within 150 m (500 ft) of known occupied sites of California red-legged frog; and route or area is not within a distance of 150 m (500 ft) from wetlands (i.e. springs, wet meadows, ponds, marshes).

  No routes would be proposed for addition or reopened within proximity to any of the CRLF occupied habitat.

- In habitat occupied by California red-legged frog, routes or areas do not have the potential to capture or divert stream flow. The approaches to stream crossings are downsloped toward the stream on both sides.

  No routes would be proposed for addition or reopened within proximity to any of the CRLF occupied habitat.

- Routes or areas are located outside of Riparian Conservation Areas, meadows, and wetlands within California red-legged frog habitat.

  No routes would be added or reopened within proximity to any of the CRLF occupied habitat.

- No route or areas are within Critical Aquatic Refuges for California red-legged frog.

  The two Critical Aquatic Refuges (CARs) on the Tahoe NF, located at Sierra Buttes and Independence Lake, are outside the range of the California red-legged frog.

Cumulative Effects

Cumulative Effects Boundary in Space and Time

The geographic boundary for assessing cumulative effects to the California red-legged frog (CRLF) is the west side of the Tahoe NF below 4,000 feet within ponds and streams with a gradient $\leq$ 4%, since this is within habitat that is considered suitable on the Tahoe NF. This geographic boundary is sufficiently large to encompass historic and potential CRLF habitat on the Tahoe NF. Any larger boundary could dilute the effects of past, present, and future cumulative impacts to this species. The timeframe for assessing cumulative impacts in the past includes activities that occurred within the last 50 to 100 years. Reasonably foreseeable future impacts expand out to approximately 20 years into the future.

Cumulative Effects of Past, Present, and Reasonably Foreseeable Future Actions

The California red-legged frog was once numerous and widely distributed in California. Initial declines of the California red-legged frog is attributed to over-harvesting (Jennings and Hayes 1985), and then later to the introduction of the bullfrog which have out-competed and predated on the CRLF. A variety of other past cumulative impacts to California red-legged frogs have affected the distribution and abundance of the California red-legged frog on the Tahoe NF, including historic mining and grazing; urban development and mining on private land; road building, water diversions; recreation and non-native species

introduction. All these activities have the potential to alter California red-legged frog habitat through disturbance to vegetation, soils, hydrology, and the potential for introduction of exotic species. Activities on private land that comprise a significant checkerboard pattern on the Tahoe NF will continue to affect the species.

Thirty two of fifty-nine total ponds that have been identified as suitable red-legged frog habitat occur within active livestock allotments on the Tahoe NF. Since occupied CRLF habitat does not currently occur on the Tahoe NF, none of the current active grazing allotments has the potential to contribute to cumulative effects to occupied CRLF habitat. However, suitable California red-legged frog habitat overlaps with 13 active grazing allotments where habitat degradation to suitable habitat could occur.

Although mining activities have the potential to adversely affect this species, suitable habitat has been created for this species (i.e. Michigan Bluff private land historic mine tailing ponds).

The proposed alternatives, including the No Action Alternative, would not directly or indirectly add impacts to any existing cumulative impacts to the California red-legged frog, since no California red-legged frog populations occur on NFS lands within the boundary of the Tahoe NF. The nearest known populations of California red-legged frog occur on private lands adjacent to Forest Service system lands in the vicinity of North Bloomfield, Nevada City, the Michigan Bluff area near the town of Foresthill, and within the Eldorado NF in Spivey Pond.

Foothill Yellow-legged Frog: Affected Environment

Introduction: The foothill yellow-legged frog (*Rana boylii*) (FYLF) is listed as Sensitive on the Region 5 Forester's Sensitive Species List (USDA Forest Service 1998). Foothill yellow-legged frogs are associated with streams in a variety of habitats including riparian, mixed conifer, and wet meadow types (Stebbins 1985). To varying degrees depending on life stage, their habitat requirements are closely linked to seasonal variation in stream habitats and comprise three categories: breeding and rearing habitat, non-breeding active-season habitat; and over wintering habitat. Breeding and rearing habitat is located in gently flowing water. 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 1996a). These frogs prefer partial shade, shallow riffles, and cobble sized or greater substrate (Hayes and Jennings 1988). Occasionally, this species is also found in other riparian habitats, including moderately vegetated backwaters, isolated pools, (Hayes and Jennings 1988, pers. obs.), and slow moving rivers with mud substrates (Fitch 1938). During breeding and summer, FYLF are rarely encountered far from permanent water. During the winter, frogs have been observed in abandoned rodent burrows and under logs as far as 100 meters from a stream (Zeiner et al. 1988).

Private lands comprise the largest fraction (about 50 percent) of historic foothill yellow-legged frog range in the Sierra Nevada. Only about 25 percent of historic FYLF range occurs on NFS lands, they are not documented from Wilderness Areas or National Park lands in the Sierra Nevada, where roads are few. The remaining 25 percent of FYLF habitat lies on state lands, other federal lands (e.g., Bureau of Land Management [BLM], Bureau of Reclamation [BOR]), or tribal lands. On the Tahoe NF suitable habitat

for FYLF is considered to be streams occurring below 6,000 feet elevation on the westside of the Tahoe NF.

Risk factors to the FYLF include disease, introduced fish and other exotic (bullfrog) and native predators, airborne contaminants (including pesticides), livestock grazing, recreational activities (including activities associated with motorized routes), water development and diversion, vegetation and fuels management projects, and habitat loss and fragmentation.

Motorized Route Associated Risk Factors: As indicated above, recreational activities associated with motorized routes has the potential to adversely affect FYLF and their habitat. Roads and trails have the potential to directly affect FYLF populations by road or trail mortality, direct habitat loss, and/or the creation of barriers. Mortality from vehicles can reduce FYLF population size and reduce movement between breeding and over wintering sites. Route associated mortality is a considerable potential risk factor for FYLF because roads are common over the areas encompassing their historical range on the Tahoe NF; and many of the roads presently have at least moderate traffic levels; and some observations suggest upslope seasonal movements by FYLF likely intersect roads.

Foothill Yellow-legged Frog: Environmental Consequences

Indicators used to Measure Effects

Cross Country Travel: The prohibition of cross country travel is analyzed for the alternatives to estimate the potential benefits and reduction in effects to FYLF 7th field watersheds from motorized cross country travel.

NFTS Additions and Establishment of "Open Areas" (FYLF 7th field watersheds): Measures or indicators of changes in sedimentation and water surface shade are assessed by analyzing the number of stream crossings additions associated with motorized route additions to the NFTS and the miles of motorized route additions within Riparian Conservation Areas (RCAs) for FYLF 7th field watersheds. The establishment of motorized "open areas" is also analyzed.

Site-specific Physical Impacts and Disturbance to known foothill yellow-legged frog locations: Proposed motorized route additions were evaluated to determine site-specific impacts to known FYLF locations for each of the alternatives. Native surfaced routes that cross or intersect FYLF streams and ponds have the greatest potential to disturb FYLF, kill and crush FYLF egg masses and to alter stream banks and deliver sediment which can degrade FYLF habitat condition. In addition, any proposed motorized route additions that are within RCAs or has the potential to delivery sediment to known FYLF locations were also evaluated by the alternatives.

Changes to the NFTS

Change in Class of Vehicles: Changing the class of vehicle on a particular route potentially changes the impacts to soil and water resource due to changes in the road surface (i.e. from smooth surfaced to rough surfaced) (see Chapter 3.02, Watershed Resources: Geology, Soil, and Hydrology). If the route changes from smoothed surfaced to native surfaced (rough surfaced), the change in class of vehicle may result in increased sediment and erosion risk to FYLF habitat. The change in class of vehicle and associated

changed maintenance standards is evaluated for their potential to affect selected 7th field watersheds that may have suitable habitat for the FYLF.

Wet Weather Seasonal Closures: Proposed wet weather seasonal restrictions on native surfaced roads and trails are analyzed in the section "Effects Common to All Aquatic Species."

Reopened ML 1 Roads: No ML 1 roads are proposed for reopening within FYLF watersheds that would affect RCAs or would cross any FYLF streams. Therefore, effects to FYLF would not occur from reopening ML 1 roads.

Route Density within Riparian Conservation Areas (RCAs): Route densities of native surfaced routes within RCAs were evaluated to compare the overall effects of all motorized routes (including existing NFTS routes and existing unauthorized routes) for the alternatives within each 7th field watershed occupied by foothill yellow-legged frog (FYLF). According to Chapter 3.02 (Watershed Resources: Geology, Soil, Hydrology), native surfaced motorized routes have the greatest potential for off-site sediment delivery into streams and lakes. Therefore, this effects analysis includes route density of all native surfaced motorized routes maintained for high clearance vehicles. Route density provides a relative index to measure the potential indirect effects to occupied habitat of FYLF from increased sedimentation from routes. Thresholds for route density have not been established, however, route density provides a relative way to compare the effects of the alternatives.

Stream Crossing Density within Riparian Conservation Areas (RCAs): The 7th field watersheds occupied by FYLF were evaluated for the crossing density of native surfaced motorized routes within RCAs to compare direct and indirect effects of motorized routes for the alternatives. Route crossing density provides a way to measure the potential direct and indirect effects to FYLF and habitat. Direct effects include potential FYLF mortality as a result of use of motorized crossings of occupied FYLF streams. Indirect effects include changes to channel and streambank characteristics and changes in vegetation structure. Thresholds for motorized crossing route density have not been established, however, route crossing density provides a relative way to compare the effects of the alternatives.

Direct and Indirect Effects

Cross Country Travel. Under Alternative 1, no action, motorized cross country travel would continue on 34,092 Riparian Conservation Areas (RCAs) acres within FYLF HUC7 watersheds, where the potential for adversely affecting FYLF habitat could occur by increasing sedimentation and altering streamside vegetation. Alternative 1 would prohibit 8 RCA miles and 19 crossings that were closed from previous NEPA decisions (Table 3.03-135).

The action alternatives would all benefit FYLF habitats from the prohibition of cross country travel and would result in prohibiting motorized use on 34,092 RCA acres. The action alternatives also prohibits motorized use on the 8 RCA miles and 19 crossing that were closed from previous NEPA decisions, but also prohibits cross country travel on existing unauthorized routes for a combined total of 57.0 to 71.2 RCA miles and 186 to 228 motorized crossings (Alternative 5 prohibits the least, Alternative 3 prohibits the most). Cross country travel prohibitions would likely reduce the potential for sedimentation and alteration of streamside vegetation, and therefore benefit FYLF habitat.

Table 3.03-135. RCA miles and Stream Crossings Prohibited to Cross Country Travel

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Road miles closed from previous NEPA decisions, pending implementation	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Crossings closed from previous NEPA decisions, pending implementation	19	19	19	19	19	19	19
RCA Miles prohibited to motorized public use with the prohibition of cross country travel (positive impact)	0	68.1	71.2	69.1	57.0	65.8	69.9
Crossings prohibited to cross country travel	0	218	228	220	186	214	224
Total miles of cross country travel prohibited to motorized use	**8.0**	**76.1**	**79.2**	**77.1**	**65.0**	**73.8**	**77.9**
Total crossings prohibited to motorized use	**19**	**237**	**247**	**239**	**205**	**233**	**243**

NFTS Additions and Establishment of "Open Areas" – Motorized Stream Crossings and RCA Miles

Number of Native Surfaced, Motorized Stream Crossing Additions within FYLF 7th Field Watersheds. The number of native surfaced, motorized stream crossings, proposed for addition to the NFTS, are assessed for the alternatives, and provides a useful way to compare potential changes in sediment delivery within FYLF HUC7 watersheds. Alternative 1 poses the greatest risk of increased sedimentation where 228 motorized stream crossings are associated with the continuance of cross country travel on existing unauthorized routes (Table 3.03-136**)**. The action alternatives all would result in reducing the number of crossings potentially contributing to sedimentation within FYLF HUC7 watersheds. In decreasing order, Alternatives 5, 2, 6, 4, and 7 would result in the addition of 42 to 4 native surfaced, motorized route crossings. Alternative 3 does not add motorized route crossings to the NFTS, and therefore sedimentation or streamside vegetation would not be affected within any FYLF HUC7 watersheds.

Table 3.03-136. Foothill Yellow-legged Frog 7th Field Watersheds - Number of Native Surfaced, Stream Crossings Associated with Motorized Route Additions

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Stream crossings associated with proposed motorized route additions (negative impact)	228	10	0	8	42	14	4

*Alternative 1 includes motorized stream crossings that would remain with the continuance of cross country travel on existing unauthorized routes, while all the action alternatives include motorized crossing additions.

Additions to the NFTS within FYLF 7th Field Watersheds. The miles of proposed motorized route additions to the NFTS within RCAs were assessed for the alternatives, and provide additional information to assess the potential for off-site sediment delivery into FYLF habitats at the HUC7 level. Alternative 1 poses the greatest risk to increased sedimentation potential from 71.3 RCA miles of existing unauthorized motorized routes that would remain due to continued cross country travel (Table 3.03-137**)**. Similar to stream crossing numbers, Alternatives 2, 4, 5, 6, and 7 would add between 1.3 and 14.2 RCA miles (Alternative 5 adds the most, Alternative 7 adds the least) of motorized routes. Alternative 3 does not add

motorized routes to the NFTS, and therefore changes to sedimentation or streamside vegetation would not occur within any FYLF HUC7 watershed.

Table 3.03-137. RCA Miles of Proposed Route Additions within FYLF HUC7 Watersheds

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Miles of proposed motorized route additions within RCAs* (negative impact)	71.3	3.1	0	2.2	14.2	5.4	1.3

*Alternative 1 includes existing unauthorized routes, while all the action alternatives include motorized route additions.

Establishment of "Open Areas" Alternative 2 would establish 60 acres of motorized open area at Greenhorn Creek where FYLF would potentially be adversely affected through increased erosion and sedimentation. In addition, FYLF could be directly affected from vehicle related mortality, since FYLF are known to occur within Greenhorn Creek. None of the other alternatives would propose establishment of an open area at Greenhorn Creek, and therefore, FYLF would not be affected. Continued cross country travel would continue at Greenhorn Creek, and could adversely affect FYLF in the long-term.

Open Area establishments at Boca, Stampede, and Prosser reservoirs would not affect FYLF, since these reservoirs are outside the known geographic range of FYLF.

Changes to the NFTS

Change in Class of Vehicles. For each of the alternatives, Table 3.03-138 displays the effects of proposed changes in class of vehicles and the associated maintenance changes that have potential to increase the risk of delivering sedimentation and erosion to FYLF HUC7 watersheds. Alternatives 2, 5, and 6 result in the change in road maintenance levels resulting in changes from smooth surfaced roads to rough surfaced roads are likely to occur in the future with reduced maintenance. This change in road surface type has a higher potential to result in increased sedimentation to FYLF habitat affected by 1-2 crossings and from 0.3-0.6 RCA miles motorized routes.

Table 3.03-138. Foothill Yellow Legged Frog – Effects from Change in Class of Vehicles

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number of Native Surfaced Crossings as a result changed maintenance standards	0	2	0	0	2	1	0
RCA Miles of changed maintenance standards from smooth surfaced to rough or native surfaced	0	0.6	0	0	0.6	0.3	0

Reopened ML 1 Roads. Alternative 5 proposes to reopen numerous closed ML1 roads (Cal Ida Network). A few of the ML 1 roads have the potential to directly and indirectly affect FYLF sites within the Cherokee Creek and Fiddle Creek HUC7 watersheds. None of the other action alternatives would affect FYLF habitat.

Cherokee Creek HUC7. ML1 road #N39-7, intersects Young's Ravine, and therefore reopening N39-7 would potentially directly and indirectly affect FYLF within Young's Ravine, an intermittent

stream. Reopening other ML1 roads within the watershed may contribute to sediment, but would likely have a lesser direct and indirect impact to the known FYLF site in Young's Ravine.

Fiddle Creek HUC 7. Reopening ML1 roads on the north side of Fiddle Creek has a small potential to impact the FYLF site in Fiddle Creek from ML1 roads that cross tributaries to Fiddle Creek (e.g., N25-2, N25-2-1, N25-4-2, N25-4-2).

Site-specific Physical Impacts and Disturbance to Known Foothill Yellow-Legged Frog Locations. On the Tahoe NF, FYLF locations occur within forty-two 7th field watersheds. Table 3.03-139 displays the FYLF 7th field watersheds (HUC7) where motorized route additions are located and shows the relationship to known FYLF locations. Potential site-specific adverse and beneficial impacts at the HUC7 watershed scale are described.

Table 3.03-139. Direct and indirect effects of proposed motorized route additions and prohibition of cross country travel in relation to known FYLF locations by 7th field watershed

Watershed Name	Motorized Additions/Route ID	Reopened ML1 Road ID	Direct and Indirect Impacts of motorized additions and reopening ML 1 roads	Prohibition of Cross Country Travel
Bullards Bar Reservoir-Bridger Creek	D_Y-125_a (Alt 2,5,6)	None	Low risk that D_Y-125_a would impact FYLF habitat.	Proposed action alternatives prohibit cross country travel on 3 of 8 intermittent/perennial NFS crossings.
Cherokee Creek	YRN-008 (Alt 2, 5, 6); 491-3-1_p (Alt 5,6), 491-3-2_p (Alt 5,6); N39-6 (Alt 5), D_35_a-b (Alt 2,4,5,6); D_491-6_a-b (Alt 2,4,5,6).	0025-009, 0491-003, 25-9-3_p, 25-9_p, 35-3_p, 35-4-1_p, 35-4_p, 39-9_p, 491-3_p (Alt 5 & 6); H39-12, N25-1-1, N25-3, N25-5, N25-6-1, N25-7, N25-9-1, N25-9-2, N35-1, N35-2, N35-3-1, N35-3-2, N35-6, N35-7, N39-4, N39-5, N39-5-1, N39-5-2, N39-7, N39-8-1, N491-1, N491-3-1, N55-2 (Alt 5).	YRN-008 near the FYLF site and may impact FYLF. D_35_a-b and D_491-6_a-b, not connected and not likely to impact FYLF. Alt 5 may have a cumulative effect to Cherokee Ck. HUC 7 watershed due to the reopening of numerous ML 1 roads. Some of the ML 1 roads proposed for reopening are within the RCA of FYLF habitat and may directly and indirectly affect FYLF.	Proposed action alternatives prohibit cross country travel on up to 18 of 25 intermittent/perennial NFS crossings.
Fall Creek	D_14_b,d (Alt 2,4,5,6); D_14_e,f,h (Alt 6); D_17-6 (Alt 6); D_17_b,c,e (Alt 6); D_18-14_c,d (Alt 2,4,5,6); D_18-14_e,f (Alt 6); D_18_a (Alt 2,4,5,6).	None	Three short routes to dispersed recreation, low risk to FYLF site in mainstem of So. Yuba Rv. These routes are along Fall Creek >2 mi north of FYLF site. 3 routes to dispersed sites are not connected and would not affect FYLF.	Proposed action alternatives prohibit cross country travel on up to 4 of 12 existing intermittent/perennial NFS crossings.

Watershed Name	Motorized Additions/Route ID	Reopened ML1 Road ID	Direct and Indirect Impacts of motorized additions and reopening ML 1 roads	Prohibition of Cross Country Travel
Fiddle Creek	N25-4-10, N27 (Alt 5); D_25-4_a,b,c,d (Alt 6).	0025-009, 25-9_p (Alt 5,6); N25-2, N25-2-1, N25-2-3, N25-4-2, N25-4-2-2, N25-4-3, N25-4-4, N25-4-4-1, N25-4-6, N25-5, N25-8-1-1, N25-8-2, N25-8-4, N25-8-6. N25-8-8, N25-8-9, N25-8-10, N27-1, N27-2, N27-3, N27-4, N35-1, N55-1 (Alt 5).	FYLF site in lower portion of HUC7, N25-4-10; N27.and D_25-4_a,b,c,d in upper HUC7 do not impact FYLF. Reopening over 20 miles of ML 1 roads on the north side of Fiddle Ck has a small potential to impact the FYLF site in Fiddle Ck.	Proposed action alternatives prohibit cross country travel on up to 23 of 36 existing intermittent/perennial NFS crossings.
Fulda Creek	None	None	One FYLF site not affected.	All action alternatives prohibit cross country travel on 2 of 8 existing intermittent/perennial NFS crossings.
Goodyears Creek	H25-18, N27-6-2 (Alt 5).	N25-18-1, N25-19-1, N27-9, N27-10 (Alt 5).	Proposed Alt 5 proposed routes above Snow Creek have small potential to affect FYLF sites in Goodyear's Creek and North Yuba River.	Proposed action alternatives prohibit cross country travel onup to 8 of 20 existing intermittent/perennial NFS crossings.
Greenhorn Creek-South Fork Greenhorn Creek	Greenhorn Creek "Open Area" (Alt 2)	None	Greenhorn "Open Area" could impact FYLF sites in Greenhorn Creek.	Proposed action alternatives prohibit cross country travel on up to 14 of 21 existing intermittent/perennial NFS crossings.
Grizzly Creek	None	H613-8 (Alt 5).	H613-8 on ridge, crosses upper end of intermittant trib. to Grizzly Ck, would not affect FYLF sites in Grizzly Creek.	All action alternatives prohibit cross country travel on 6 of 11 existing intermittent/perennial NFS crossings.
Headwaters Oregon Creek	D_S-300_a,b, D_S-304_a (Alt 2,4,5,6).	None	Two short routes to dispersed recreation areas are on opposite side of ridge from FYLF sites, FYLF sites would not be affected. A third route to dispersed recreation would have no to low potential 3-4 miles away.	Proposed action alternatives prohibit cross country travel on 8 of 10 existing intermittent/perennial NFS crossings.
Humbug Canyon	ARM-7, ARM-5 (Alt 2, 4, 5, 6, 7); D-66, D_66-18 (Alt 2,4,5,6).	None	ARM-5, ARM-7 & D-66, D_66-18 not likely to impact FYLF, ARM-5 up on ridge w/ no connection to frog site.	Proposed action alternative prohibit cross country travel on 2 of 13 existing intermittent/perennial NFS crossings, that were closed from previous NEPA decisions.
Indian Creek	None	None	No effect to one FYLF site.	None
Lower Downie River	D_10E02_a (Alt 2,5,6).	YRN-509 (Alt 2,5,6).	D_10E02_a has low potential to affect FYLF site. YRN-509 is not likely to impact FYLF.	All action alternatives prohibit cross country travel on 1 of 19 existing intermittent/perennial NFS crossings.
Lower Kanaka Creek	None	None	No effects to multiple FYLF sites	All action alternatives prohibit cross country travel on 9 of 24 existing intermittent/perennial NFS crossings.

Watershed Name	Motorized Additions/Route ID	Reopened ML1 Road ID	Direct and Indirect Impacts of motorized additions and reopening ML 1 roads	Prohibition of Cross Country Travel
Lower Middle Yuba River	None	None	One FYLF site, not affected.	All action alternatives prohibit cross country travel on 2 of 6 existing intermittent/perennial NFS crossings.
Lower North Shirttail Canyon	ARM-3r (Alt 2,4,5,6,7).	None	89% FS; RCA ws-1 mi 7.3 (6.7 FS); ARM-3 & ARM-3a are above FYLF sites are not likely impact FYLF; all action alternatives prohibits cross country travel on routes nearest to FYLF streams.	All action alternatives prohibit cross country travel on 13 of 26 existing intermittent/perennial NFS crossings.
Lower Oregon Creek	None	None	Multiple FYLF sites. No effect – no additions or reopened ML 1 roads in HUC7.	All action alternatives prohibit cross country travel on 1of 15 existing intermittent/perennial NFS crossings.
Lower Poorman Creek	None	None	None	All action alternatives prohibit cross country travel on 4 of 34 existing intermittent/perennial NFS crossings.
Middle Yuba River-Indian Creek	None	None	Multiple FYLF sites, no proposals, therefore no impacts.	All action alternatives prohibit cross country travel on 3 of 26 existing intermittent/perennial NFS crossings.
Middle Yuba River-Moores Flat Creek	YRM-M4 (Alt 2,5,6,7), D_10E18_a (Alt 2,5,6).	None	Multiple FYLF sites. YRM-M4 is isolated and not likely to impact FYLF D_10E18_a, short spur to dispersed recreation site is on the mainstem of the Middle Yuba, not likely to affect FYLF sites in tribs.	All action alternatives prohibit cross country travel on 7of 26 existing intermittent/perennial NFS crossings.
Middle Yuba River-National Gulch	None	None	None	All action alternatives prohibit cross country travel on 5 of 24 existing intermittent/perennial NFS crossings.
Middle Yuba River-Studhorse Canyon	None	H613-8 (Alt 5).	Multiple FYLF sites. Reopening ML 1 road H613-8 would not impact FYLF sites in Grizzly Creek.	All action alternatives prohibit cross country travel on 2 of 7 existing intermittent/perennial NFS crossings.
North Fork American River-Giant Gap Gulch	None	None	No impact to single FYLF site	All action alternatives prohibit cross country travel on 0 of 13 existing intermittent/perennial NFS crossings.
North Fork Middle Fork American River -El Dorado Canyon	None	None	Multiple FYLF sites. No route additions or reopened ML 1 proposed.	All action alternatives prohibit cross country travel on 2 of 9 existing intermittnet/perennial NFS crossings.

Watershed Name	Motorized Additions/Route ID	Reopened ML1 Road ID	Direct and Indirect Impacts of motorized additions and reopening ML 1 roads	Prohibition of Cross Country Travel
North Yuba River-Humbug Creek	D_34_a,b,c (Alt 2,4,5,6), N27-6-2 (Alt 5).	H293-19, N27-5 (Alt 5).	Multiple FYLF sites in Humbug Creek Proposed Alt 5 route H293-19 in upper parts of watershed above FYLF sites, very slight potential of impact FYLF.	Proposed action alternatives prohibit cross country travel up to 4 of 15 existing intermittent/perennial NFS crossings.
North Yuba River-Indian Creek	YRM-M3 (Alt 2, 5,6), H34-8-3 (Alt 5), D_49-27_a (Alt 2,5,6).	H34-4, N-39-5, N39-5-3, N39-5-4 (Alt 5).	Multiple FYLF sites. YRN-M3, H34-8-3 and several Alt 5 proposed reopening of ML 1 roads (H34-4, N-39-5, N39-5-3, N39-5-4) are outside of the RCA and would not likely deliver sediment to FYLF sites in Indian Ck. D_49-27_a, short spur accesses dispersed recreation is adjacent to Indian Ck and may impact FYLF habitat.	Proposed action alternatives prohibit cross country travel on 5 (Alts 3,4,6,7) or adds 8 (Alts 2,5) to 19 existing intermittent/perennial NFS crossings.
North Yuba River-New York Ravine	None	None	None	All action alternatives prohibit cross country travel on 3 of 20 existing intermittent/perennial NFS crossings.
North Yuba River-Slug Canyon	None	YRN-509 (Alt 2,5,6).	YRN-509 on ridge above not connected to FYLF site, not likely to directly or indirectly affect FYLF site	All action alternatives prohibit cross country travel on 5 of 12 existing intermittent/perennial NFS crossings.
Oregon Creek-Marion Creek	None	None	None	All action alternatives prohibit cross country travel on 4 of 13 existing intermittent/perennial NFS crossings.
Oregon Creek-Miller Creek	D_S-295_a,b,c (Alt 2,4,5,6), H293-4-18 (Alt 5).	None	H293-4-18 not connected to stream, not likely to impact FYLF. Three short spurs to dispersed recreation sites have low potential to impact FYLF in Oregon Creek. Routes are stable and not eroding.	Proposed action alternatives prohibit cross country travel on 9 (Alts 2,4,5,6) to 10 (Alts 3,7) of 31 existing intermittent/perennial NFS crossings.
Rock Creek-North Yuba River	D_S300_b (Alt 2,4,5,6).	None	D_S300_b not connected to stream, not likely to impact FYLF	All action alternatives prohibit cross country travel on 4 of 11 existing intermittent/perennial NFS crossings.

Watershed Name	Motorized Additions/Route ID	Reopened ML1 Road ID	Direct and Indirect Impacts of motorized additions and reopening ML 1 roads	Prohibition of Cross Country Travel
South Yuba River-Diamond Creek	YRS-SF4 (Alt 2, 5, 6); H29-11, D_18-14_a,b (Alt 5); D_20-16_a (Alt 2,4,5,6); D_738-4_a,b,c,d,e,f,g (Alt 2,5,6).	H20-16-2-7	H29-11 is short route that is not likely to affect FYLF site in Diamond Ck. D_18-14_a,b; D_20-16_a; D_738-4_a,b,c,d,e,f,g has potential to impact So. Yuba River sites. YRS-SF4 may affect FYLF downstream near Diamond Ck. may be affected by sediment into spring near the north end of route YRS-SF4. H20-16-2-7 is a ML 1 road proposed for reopening in Alt 5, not connected, outside of RCA, and would not affect FYLF in Diamond Ck.	Proposed action alternatives prohibit cross country travel on up to 2 of 15 existing intermittent/perennial NFS crossings.
South Yuba River-Jefferson Creek	D_CA-20_a (Alt 6).	H20-8-5 (Alt 5).	Two FYLF sites. Road H20-8-5 ties into NFTS road, and FYLF site south of reopened ML 1 road is not connected, no impact to frog. D_CA-20_a not connected and would not affect FYLF sites.	All action alternatives prohibit cross country travel on 2 of 13 existing intermittent/perennial NFS crossings.
South Yuba River-Logan Canyon	None	None	None	All action alternatives prohibit cross country travel on 4 of 13 existing intermittent/perennial NFS crossings.
South Yuba River-New York Canyon	D_20-3-5_a, D_20-3_a (Alt 6).	H20-3-5-2-3, H20-3-5-2-4 (Alt 5).	D_20-3-5_a, D_20-3_a; H20-3-5-2-3, and H20-3-5-2-4, not connected to FYLF site.	All action alternatives prohibit cross country travel on 2 of 4 existing intermittent/perennial NFS crossings.
South Yuba River-Scotchman Creek	YRS-066 (Alt 2,5,6), YRS-SF6 (Alt 2, 4, 5, 6, 7), YRS-SF6b (Alt 2,4,5,7).	None	Multiple FYLF sites. YRS-066, YRS-SF6, and YRS-SF6b not likely to affect FYLF sites, not connected.	Proposed action alternatives prohibit cross country travel on up to 8 of 11 existing intermittent/perennial NFS crossings.
Upper North Shirttail Canyon	ARM-2 (Alt 2,5,6,7), ARM-5 (Alt 2,4,5,6,7).	None	Multiple FYLF sites. ARM-2 some potential to impact FYLF site, ARM-5 on ridge - no connection and would not impact to FYLF site	All action alternatives prohibit cross country travel on 14 of 30 existing intermittent/perennial NFS crossings.
Upper Poorman Creek	D_843-9_a (Alt 2,5,6).	None	Multiple FYLF sites in Poorman Ck, not likely to be affected by short spur to dispersed recreation ~ ½ mile south of Poorman Ck..	Proposed action alternatives prohibit cross country travel on up to 4 of 29 existing intermittent/perennial NFS crossings.

Watershed Name	Motorized Additions/Route ID	Reopened ML1 Road ID	Direct and Indirect Impacts of motorized additions and reopening ML 1 roads	Prohibition of Cross Country Travel
Upper Shirttail Canyon	ARM-3r (Alt 2,4,5,6,7).	None	Multiple FYLF sites. ARM-3r is not proximal to sites and will not impact FYLF. All action alts prohibits cross country travel on unauthorized routes nearest to FYLF sites	All action alternatives prohibit motorized cross country travel on 5 of 25 intermittent/perennial NFS crossings.
Upper Steephollow Creek	YRS-SF5, YRS-S6 (Alt 2,4,5,6,7,); YRS-B10 (Alt 2,5); D_18_6; D_20-17, D_20-17-1, D_29-5, D-32, D_CA-20_b, D_NEV-329 (Alt 6).	None	Most of YRS-S5, part of YRS-F6 and YRS-B10 above FYLF site - not likely to affect FYLF, YRS-S5 could put sediment into main channel where FYLF site is located. 4 dispersed recreation routes not connected and would not affect FYLF site in Steephollow Ck.	Proposed action alternatives prohibit motorized cross country travel on up to 5 of 16 existing intermittent/perennial NFS crossings.
Willow Creek	H293 (Alt 5); D-Y-122_a,b,c (Alt 2,4,5,6).	None	H293 in southeastern portion of watershed has low risk of affecting FYLF sites. D-Y-122_a,b,c, on Brandy Ck is upstream from FYLF in Brandy and Willow creeks, may affect FYLF	Proposed action alternatives prohibit motorized cross country travel on up to 19 of 28 existing intermittent/perennial NFS crossings.
Wolf Creek	None	None	None	Proposed action alternatives prohibit motorized cross country travel on 5 intermittent/perennial NFS crossings.

Route Density within Riparian Conservation Areas (RCAs): Route density within Riparian Conservation Areas (RCAs) for all native surfaced motorized routes within 7th field watersheds with known observations of foothill yellow-legged frogs was determined for the proposed alternatives. Alternative 1 poses the greatest risk of high route densities within Riparian Conservation Areas (RCAs) (Table 3.03-140, Figure 3.03-13).

Under Alternative 1, 26% (11 of 42) of the HUC7 watersheds with FYLF detections are within route density categories of highest, 35% (9 of 42) are in the moderately high, 36% (15 of 42) are in moderately low, and 17% (70 of 42) are in the lowest density category. The remaining alternatives would reduce the RCA route densities for motorized route density (native surfaced routes) compared to Alternative 1. Alternative 5 would reduce the least, followed by Alternatives 2, 6, 7, 4, and 3, in descending order of high risk route densities within the RCAs that would potentially capture sediment affecting FYLF habitats.

Table 3.03-140. Number and proportion of Foothill Yellow-legged Frog 7th Field Watersheds within Route Density Categories of Highest, Moderately High, Moderately Low, and Lowest or Forty two 7th Field Watersheds (HUC7s) with Foothill Yellow-legged Frog Observations

Alternatives	Highest (8.9 - 27.3 mi/mi^2)	Moderately High (6.3 – 8.8 mi/mi^2)	Moderately Low (4.3 – 6.2 mi/mi^2)	Lowest (0.2 – 4.2 mi/mi^2)
Alt 1	11 (26%)	9 (21%)	15 (36%)	7 (17%)
Alt 2	5 (12%)	8 (19%)	9 (21%)	20 (48%)
Alt 3	3 (7%)	7 (17%)	9 (21%)	23 (55%)
Alt 4	4 (10%)	6 (14%)	9 (21%)	23 (55%)
Alt 5	7 (17%)	7 (17%)	10 (24%)	18 (43%)
Alt 6	4 (10%)	7 (17%)	10 (24%)	21 (50%)
Alt 7	4 (10%)	6 (14%)	9 (21%)	23 (55%)

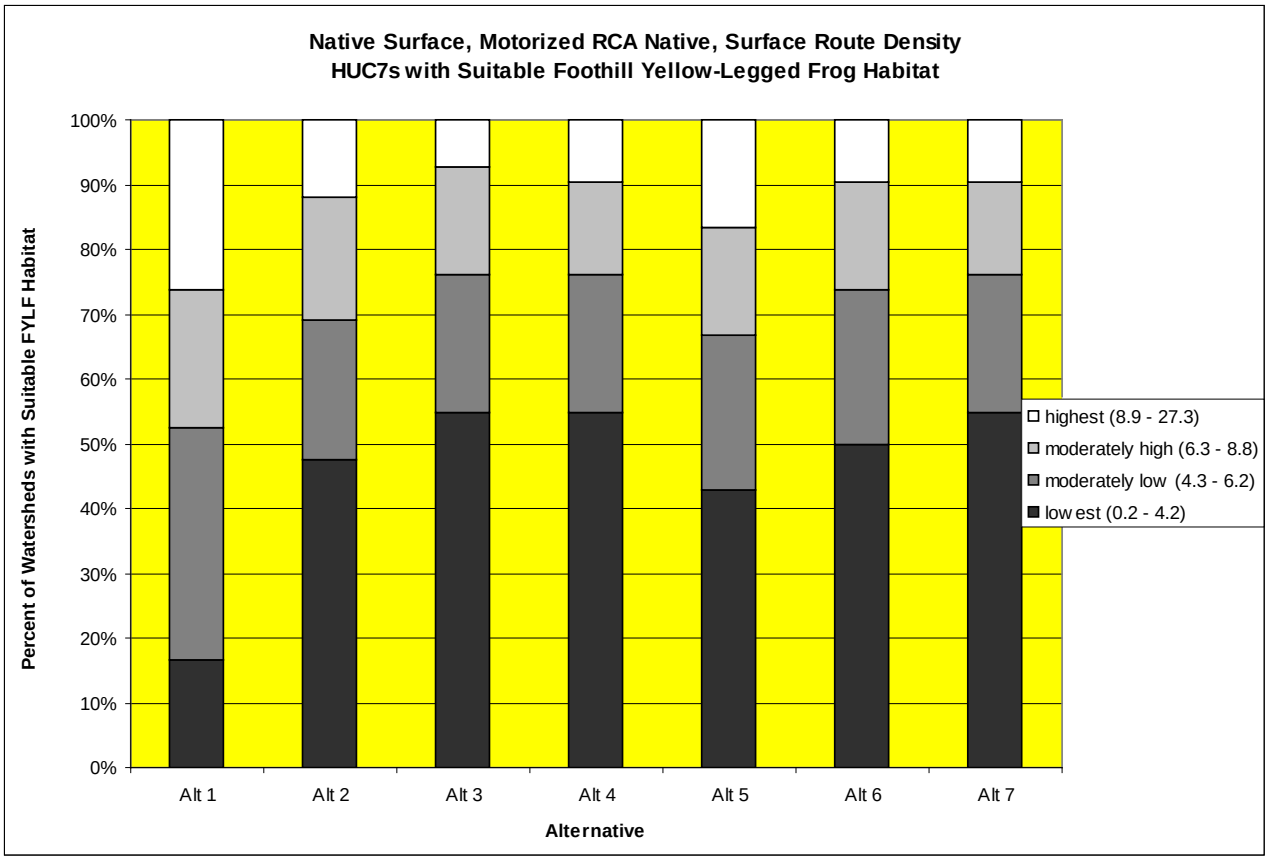

Figure 3.03-13. Number of HUC7 Watersheds with Foothill Yellow-legged Frogs by Route Density Category for Motorized Route Density (Native Surfaced) with Riparian Conservation Areas

Stream Crossing Density within Riparian Conservation Areas (RCAs): RCA stream crossing density was assessed by route density categories of highest (8.9 - 27.3 crossings/mi^2), moderately high (6.3 - 8.8 crossings/ mi^2), moderately low (4.3 - 6.2 crossings/ mi^2), and lowest (0.2 - 4.2 crossings/ mi^2)

within 7th field watersheds (HUC7s) with known foothill yellow-legged frog observations (Table 3.03-141, Figure 3.03-14).

Alternative 1 poses the greatest direct impacts to foothill yellow-legged frogs (FYLF) from stream crossing densities where frogs may be disturbed and/or killed; and FYLF aquatic habitat conditions can be impacted from bank alteration and sediment input associated with motorized route crossings. Under Alternative 1, 62% (26 of 42) of HUC7 watersheds with known FYLF detections are within the highest, 14% (6 of 42) in the moderately high, 12% (5 of 42) in moderately low, and 12% (5 of 42) are in the lowest crossing density categories.

All the alternatives would significantly reduce crossing densities where Alternative 5 would reduce the least, followed by Alternatives 2, 6, 4, 7, and 3, in decreasing order of crossing densities.

Table 3.03-141. Number and Proportion of Foothill Yellow-legged Frog 7th Field Watersheds within Route Crossing Density Categories of Highest, Moderately High, Moderately Low, and Lowest *or* Forty one HUC7s with Foothill Yellow-legged Frog Observations

Alternatives	Highest (8.9 -27.3 crossings/mi^2)	Moderately High (6.3-8.8 crossings/mi^2)	Moderately Low (4.3- 6.2 crossings/mi^2)	Lowest (0.2-4.2 crossings/mi^2)
Alt 1	26 (62%)	6 (14%)	5 (12%)	5 (12%)
Alt 2	16 (38%)	12 (28%)	5 (12%)	9 (21%)
Alt 3	13 (31%)	11 (26%)	9 (21%)	9 (21%)
Alt 4	13 (31%)	12 (28%)	8 (19%)	9 (21%)
Alt 5	17 (40%)	13 (31%)	5 (12%)	8 (19%)
Alt 6	13 (31%)	13 (31%)	8 (19%)	8 (19%)
Alt 7	13 (31%)	11 (26%)	9 (21%)	9 (21%)

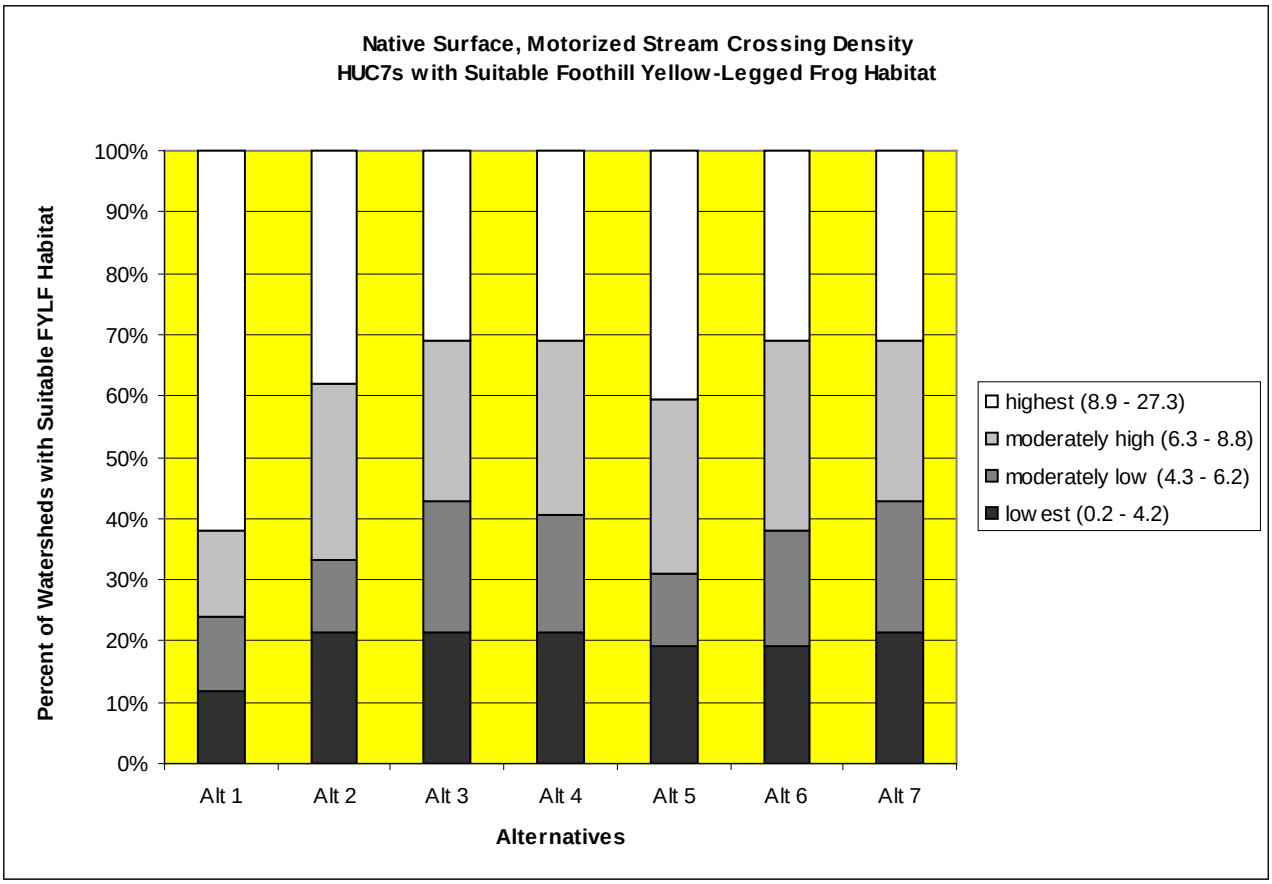

Figure 3.03-14. Number of HUC7 Watersheds with Foothill Yellow-legged Frogs by Route Density Category for Motorized Stream Crossing Density (Native Surfaced) with Riparian Conservation Areas

Cumulative Effects

Cumulative Effects Boundary in Space and Time

The geographic boundary for assessing cumulative effects to the Foothill yellow-legged frog (FYLF) is the westside of the Tahoe NF below 6,000 feet within slow-moving streams, since this is within habitat that is considered suitable on the Tahoe NF. This geographic boundary is sufficiently large to encompass historic and potential FYLF habitat on the Tahoe NF. Any larger boundary could dilute the effects of past, present, and future cumulative impacts to this species. The timeframe for assessing cumulative impacts in the past includes activities that occurred within the last 50 to 100 years. Reasonably foreseeable future impacts expand out to approximately 25 years into the future.

Cumulative Effects of Past, Present, and Reasonably Foreseeable Actions

Foothill yellow-legged frogs were once common in streams of the Sierra Nevada, and are now increasingly rare. 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 that FYLF populations (prior to 1980) have disappeared from approximately 51% of their historic range.

Many past cumulative impacts have contributed to the decline in FYLF numbers and distribution. The reduction in foothill yellow-legged frog distribution and population numbers has largely been attributed to the stocking of non-native fish species. FYLF previously extended to Sacramento Valley floor. In addition, the introduction of bullfrogs has likely contributed to the decline in the FYLF as well from competition and predation by the bullfrog. Predation on the FYLF from other species includes birds, mammals, and snakes, however, the population effects on the FYLF from predation of these species is unknown.

Historic livestock grazing likely had a significant cumulative impact to FYLF and their habitat. Historic livestock grazing evidence indicates that heavy livestock use in the Sierra Nevada led to riparian habitat degradation across much of the Sierra Nevada. Livestock trampling has the potential to directly kill all life stages of FYLF. The greatest potential of mortality risk from livestock trampling is expected to occur when adult FYLF aggregate and lay egg masses in the early season, and during metamorphosis, when juveniles are metamorphosing along aquatic margins. Current standards and guidelines in the Sierra Nevada Forest Plan Amendment were implemented to reduce the risk of trampling by livestock (USDA 2001). Known of FYLF habitat sites on the Forest currently overlap with 5 active livestock allotments (American Hill, Middle Yuba, Oregon Creek, Sugar Pine and Willow Creek). Suitable foothill yellow-legged frog habitat (no known detections) overlaps with an additional 6 allotments.

Urbanization within private lands makes up the largest fraction (about 50 percent) of historic FYLF range in the Sierra Nevada. Only about 25 percent of historic foothill yellow-legged frog range occurs on National Forest lands, they are not documented from Wilderness Areas or National Park lands in the Sierra Nevada, where roads are few. The remaining 25 percent of foothill yellow-legged frog habitat lies on state lands, other federal lands (e.g., Bureau of Land Management [BLM], Bureau of Reclamation [BOR]), or tribal lands.

Historic vegetation management and fuels reduction projects have likely contributed to past and present cumulative effects, especially if projects occurred adjacent to FYLF aquatic habitats. Ground disturbing activities including timber harvest and fuels treatment projects (burning and mastication projects) potentially caused direct mortality to this species which may have affected the abundance of the species on the Tahoe NF. In general, current vegetation and fuels projects are designed to reduce potential impact on FYLF habitats, and therefore, minimize disturbance to the species. However, as FYLF migrate between breeding sites, and between breeding sites and overwintering sites, there is some potential for direct impacts from being crushed or burned from vegetation and fuels projects. In general the magnitude of this happening across the range of the FYLF frog habitats on the Tahoe NF should be limited given the timing of FYLF migration which is in the spring.

Hydroelectric projects have likely contributed to the decline of FYLF across its range in the Sierra Nevada and on the Tahoe NF. FYLF egg masses are unable to service regulated pulsed flow events.

Under Alternative 1, HUC7 watersheds occupied by FYLF would have the highest RCA route densities and the highest route crossing densities as a result of continued cross country travel, including on routes unauthorized to motorized public use within Riparian Conservation Areas. Direct and indirect impacts of these motorized routes in Alternative 1 would pose considerable cumulative impacts to known

FYLF sites where approximately 40% of HUC7 watersheds with FYLF observations have high to moderately high RCA route densities that may contribute to habitat degradation from off-site sedimentation. In addition, under Alternative 1, 56% of HUC7 watersheds with known FYLF detections are within the highest or moderately high route density categories which have the potential to degrade stream condition by altering streambank vegetation and stream hydrology. Under Alternative 1, motorized route proliferation would likely continue and increase at an accelerated rate in the future, potentially increasing sediment delivery and alteration of streambank vegetation and hydrologic condition which may affect the abundance and distribution on the Tahoe NF. Declining population trends of this species could be affected by Alternative 1.

Alternative 5 also adds to existing cumulative impacts to the FYLF, though impacts are considerably less than Alternative 1 as a result of the closure of a significant number of miles of motorized routes within RCAs and reduction in the number of route crossings. Under Alternative 5, RCA route densities and route crossing densities are the second highest after Alternative 1, where 32% of the HUC7 watersheds with are within the highest and moderately high RCA route density categories; and 44% of HUC7 watersheds are within the highest to moderately high RCA route density categories. Site-specific impacts from proposed route additions in Alternative 5, directly or indirectly affects FYLF within 20 HUC7 watersheds where proposed route additions have the potential to contribute to FYLF habitat degradation.

Alternatives 2 and 6 are similar in their cumulative impacts to FYLF where known FYLF sites may be directly or indirectly affected within 15-17% FYLF HUC7 watersheds by proposed motorized route additions. The remaining action alternatives are similar in their cumulative effects to the FYLF where a slight potential for cumulative impacts from direct and indirect impacts to known FYLF sites have the potential to occur within 0% (Alternative 3) to 5% (Alternative 7) of FYLF HUC7 watersheds (n=41). FYLF sites are similarly affected by Alternatives 2 and 6, where 7 (17%) and 6 (15%) FYLF HUC7 watersheds are affected by motorized route additions, respectively. Alternatives 2, 4, and 7 affect the least number of FYLF sites within 0 (0%), 1(2%), and 2 (5%) HUC7 watersheds respectively, where FYLF would most benefit from the prohibition of cross country travel, including on unauthorized routes. For all the action alternatives, future unmanaged cross country motorized travel would be prohibited, including on the majority of unauthorized routes, which would benefit FYLF in the long-term once these routes are rehabilitated through obliteration or other means.

Summary of Direct, Indirect, and Cumulative Effects of Proposed Actions

Table 3.03-142 summarizes the direct, indirect, and cumulative effects of native surfaced, motorized route crossings within FYLF HUC 7 watersheds, from existing motorized routes, motorized route additions, and routes unauthorized to motorized public travel from the proposed actions, including wet weather seasonal restrictions, changes in class of vehicles, prohibition of cross country travel. See Chapter 3.02, Watershed Resources: Geology, Soil, Hydrology, for more detailed information and assumptions.

Table 3.03-142. Foothill Yellow-legged Frog 7th Field Watersheds – Summary of Direct, Indirect, and Cumulative Effect of Proposed Actions as Measured by Native Surfaced, Motorized Crossings

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
RCA Acres Prohibited	0	34,092	34,092	34,092	34,092	34,092	34,092
Crossings Closed in previous NEPA decisions, pending implementation	19	19	19	19	19	19	19
RCA Miles Closed in previous NEPA decisions, pending implementation	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Crossings Prohibited	0	218	228	220	186	214	224
RCA Miles Prohibited	0	68.1	71.2	69.1	57.0	65.8	69.9
Native Surfaced, Motorized Stream Crossings							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Existing	155	155	155	155	155	155	155
Crossing Additions	228	10	0	8	42	14	4
Change in Class of Vehicles Resulting in Smooth Surfaced to Native Surfaced Crossings	0	2	0	0	2	1	0
Reopened ML 1 Roads	0	0	0	0	0	0	0
Net Native Surfaced, Motorized Crossings	**383**	**167**	**155**	**163**	**199**	**170**	**159**

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Wet Weather Seasonal Restrictions on all Native Surfaced Routes							
Trend of Effect	Negative	Negative	Negative	Beneficial	Beneficial	Beneficial	Negative
	No additional wet weather restrictions	No additional wet weather restrictions	No additional wet weather restrictions	**Wet Weather Restrictions would be implemented**	**Wet Weather Restrictions would be implemented**	**Wet Weather Restrictions would be implemented**	No additional wet weather restrictions
Establishment of "Open Areas" at Greenhorn Creek	No Effect	Negative	No Effect	No Effect	No Effect	No Effect	No Effect
Amendments to the Forest Plan	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Net Direct, Indirect, and Cumulative Effect of Proposed Actions	Adverse cumulative effects from motorized cross country travel continued on 34,092 RCA acres, including on 228 native surfaced, stream crossings unauthorized for motorized use. Continued use on 383 motorized crossings No additional protection to FYLF habitats from wet weather seasonal restrictions.	6th most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on 218 native surfaced, stream crossings. 167 crossings available for motorized use. No additional protection to FYLF habitats from wet weather seasonal restrictions.	4th most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on 228 native surfaced, stream crossings 155 crossings available for motorized use. No additional protection to FYLF habitats from wet weather seasonal restrictions.	Most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on 220 native surfaced, stream crossings 163 crossings available for motorized use. Reduced sedimentation risk to FYLF habitats from wet weather seasonal restrictions.	3rd most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on186 native surfaced, stream crossings 199 crossings available for motorized use. Reduced sedimentation risk to FYLF habitats from wet weather seasonal restrictions.	2nd most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on214 native surfaced, stream crossings 170 crossings available for motorized use. Reduced sedimentation risk to FYLF habitats from wet weather seasonal restrictions.	5th most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on 224 native surfaced, stream crossings 159 crossings available for motorized use. No additional protection to FYLF habitats from wet weather seasonal restrictions.

*Alternative 1 includes existing native surfaced, crossings unauthorized to motorized use, while all the action alternatives include motorized route additions.

Table 3.03-143 summarizes the direct, indirect, and cumulative effects of native surfaced, motorized RCA route miles within FYLF HUC 7 watersheds, from existing motorized routes and from the proposed actions: prohibition of cross country travel, motorized route additions to the NFTS, and changes to the NFTS. See Chapter 3.02, Watershed Resources: Geology, Soil, Hydrology, for more detailed information and assumptions.

Table 3.03-143. Foothill Yellow-legged Frog 7th Field Watersheds – Summary of Direct, Indirect, and Cumulative Effect of Proposed Actions as Measured by RCA Motorized Route Miles

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres of FYLF RCA Cross Country Travel Prohibited	0	34,092	34,092	34,092	34,092	34,092	34,092
RCA Route Miles Prohibited to Cross Country Travel	0	68.1	71.2	69.1	57.0	65.8	69.9
RCA Miles Closed in Previous NEPA decisions, pending implementation	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Native Surfaced, Motorized Routes							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Existing NFTS RCA Miles	52.7	52.7	52.7	52.7	52.7	52.7	52.7
RCA Miles of Additions*	71.3	3.1	0	2.2	14.2	5.4	1.3
Closed by Previous NEPA decisions, pending implementation (positive)	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Change in Class of Vehicles Resulting in Changed Maintenance Level, Changed from Smooth Surfaced to Native Surfaced Route	0	0.6	0	0	0.6	0.3	0
Net NFTS Native Surfaced, Motorized RCA Miles	**132.0**	**64.4**	**60.7**	**62.9**	**75.5**	**66.4**	**62.0**

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Wet Weather Seasonal Restrictions on all Native Surfaced Routes							
Trend of Effect	Negative	Negative	Negative	Beneficial	Beneficial	Beneficial	Negative
Proposed Wet Weather	No additional wet weather restrictions	No additional wet weather restrictions	No additional wet weather restrictions	**Wet Weather Restrictions would be implemented**	**Wet Weather Restrictions would be implemented**	**Wet Weather Restrictions would be implemented**	No additional wet weather restrictions
Net Direct, Indirect, and Cumulative Effect of Proposed Actions	Cumulative adverse effects from continued motorized cross country travel on 34,092 RCA acres, including on 71.3 RCA miles of unauthorized routes . Motorized use continues on 132 RCA miles	6th most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on 76.1 RCA miles of routes unauthorized for motorized use. NFTS motorized use available on 64.4 RCA miles.	4th most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on 79.2 RCA miles of routes unauthorized for motorized use. NFTS motorized use available on 60.7 RCA miles.	Most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on 77.1 RCA miles of routes unauthorized for motorized use. NFTS motorized use available on 62.9 RCA miles. Additional wet weather restrictions apply.	3rd most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on 65.0 RCA miles of unauthorized routes. NFTS motorized use available on 75.5 RCA miles. Additional wet weather restrictions apply	2nd most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on 73.8 RCA miles of unauthorized routes. NFTS motorized use available on 66.4 RCA miles. Additional wet weather restrictions apply	5th most beneficial alternative. Motorized cross country travel prohibited on 34,092 RCA acres, including on 77.9 RCA miles of unauthorized routes. NFTS motorized use available on 62.0 RCA miles.

*Alternative 1 includes existing native surfaced, unauthorized routes, while all the action alternatives include motorized route additions.

Mountain Yellow-Legged Frog: Affected Environment

The mountain yellow-legged frog (MYLF) is listed as Sensitive on the Region 5 Forester's Sensitive Species List (USDA Forest Service 1998). Mountain yellow-legged frogs occur in the Sierra Nevada from 4,500 feet to over 12,000 feet elevation (Jennings and Hayes 1994). Previously the mountain yellow-legged frog in the Sierra Nevada was considered to be one species; *Rana muscosa*. Recent genetic studies indicate mountain yellow-legged frogs in the Sierra Nevada are comprised of two species: *R. sierrae*, with a distribution in the northern and central Sierra Nevada, and *R. muscosa*, with a distribution in the southern Sierra Nevada and southern California. The contact zone for these two newly recognized species is in the vicinity of Mather Pass and the Monarch Divide, Fresno County (Vredenburg et al. 2007).

Mountain yellow-legged frogs in the Sierra Nevada inhabit high mountain lakes, ponds, tarns, and streams, largely in areas that were glaciated (Zweifel 1955, In Lannoo 2005). Mountain yellow-legged frogs are seldom far from water, although they have been observed moving overland to disperse to other pond habitats. Typically, mountain yellow-legged frogs prefer well illuminated, sloping banks of meadow streams, riverbanks, isolated pools, and lake borders with vegetation that is continuous to the water's edge (Martin 1992, Zeiner et al. 1988). Vredenburg et al. (2004) found that *R. muscosa* (*sensu stricto*) tended to use stillwater habitats more frequently than *R. sierrae*, but it is unclear whether is difference is the result of stillwater habitat being more frequent within the formers geographic range or an actual phylogenetic difference in habitat selection behavior.

The Tahoe National Forest database has records for mountain yellow-legged frogs in 79 locations. Most of these observations were of individual frogs. Only 49 of these sightings are considered recent (Since 1980). Mountain yellow-legged frogs have been observed in both stream and pond habitats on the forest. The largest populations observed in recent surveys (1993-2002) were those containing 5 adults (Lyon Bog, Rattlesnake Creek, and Poorman Creek). The species appears to have disappeared from a significant number of historic locations within the Tahoe National Forest and is in very low abundance where it still persists.

Mountain Yellow-Legged Frog: Environmental Consequences

Indicators used to Measure Effects

Cross Country Travel: The prohibition of cross country travel is analyzed for the alternatives to estimate the potential benefits and reduction in effects to MYLF 7th field watersheds from motorized cross country travel.

NFTS Additions and Establishment of "Open Areas" (MYLF 7th field watersheds): Measures or indicators of changes in sedimentation and water surface shade are assessed by analyzing the number of stream crossings additions associated with motorized route additions to the NFTS, and the miles of motorized route additions within Riparian Conservation Areas (RCAs) for MYLF 7th field watersheds. MYLF is not affected by the "Open Area" establishments, since no MYLF habitat occurs within or adjacent to proposed "Open Area" establishments at Greenhorn Creek or at Boca, Stampede, or Prosser reservoirs.

Site-specific Physical Impacts and Disturbance to known mountain yellow-legged frog locations: Proposed motorized route additions were evaluated to determine site-specific impacts to known mountain yellow-legged frog (MYLF) locations for each of the alternatives. Native surfaced routes that cross or intersect MYLF streams and ponds have the greatest potential to disturb MYLF, kill and crush MYLF egg masses and to alter stream banks and deliver sediment which can degrade MYLF habitat condition. In addition, proposed motorized route additions that are within RCAs or have the potential to deliver sediment to known MYLF locations were also evaluated by the alternatives.

Change in Class of Vehicle: Changing the class of vehicle on a particular route potentially changes the impacts to soil and water resource due to changes in the road surface (i.e. from smooth surfaced to rough surfaced) (see Chapter 3.02, Watershed Resources: Geology, Soil, and Hydrology). If the route changes from smoothed surfaced to native surfaced (rough surfaced), the change in class of vehicle may result in increased sediment and erosion risk to MYLF habitat. The change in class of vehicle and associated maintenance downgrades is evaluated for their potential to affect selected 7th field watersheds that may have suitable habitat for the MYLF.

Wet Weather Seasonal Closures: Wet weather seasonal restrictions on native surfaced roads and routes are analyzed under "Effects Common to All Aquatic Species."

Reopened ML 1 Roads: Reopening ML 1 roads within any MYLF HUC7 watersheds has the potential to adversely impact MYLF habitats through habitat modification from increased sedimentation and changes in riparian habitat cover; therefore the reopening of ML 1 roads are analyzed for the alternatives.

Route Density within Riparian Conservation Areas (RCAs): route densities of native surfaced routes within RCAs were evaluated to compare the overall effects of all motorized routes (including existing routes and routes unauthorized to motorized public use) for the alternatives within each 7th field watershed occupied by mountain yellow-legged frog (MYLF). According to Chapter 3.02 (Watershed Resources: Geology, Soil, Hydrology), Level 2 roads and below have the greatest potential for off-site sediment delivery into streams and lakes. Therefore, this effects analysis includes route density of all native surfaced motorized routes. Route density provides a relative index to measure the potential indirect effects to occupied habitat of MYLF from increased sedimentation from routes. Thresholds for route density have not been established, however, route density provides a relative way to compare the effects of the alternatives.

Stream Crossing Density within RCAs: The 7th field watersheds occupied by mountain yellow-legged frog were evaluated for the crossing density of native surfaced motorized routes within RCAs to compare direct and indirect effects of motorized routes for the alternatives. Route crossing density provides a way to measure the potential direct and indirect effects to MYLF and habitat. Direct effects include potential MYLF mortality as a result of use of motorized crossings of occupied MYLF streams. Indirect effects include changes to channel and streambank characteristics and changes in vegetation structure. Thresholds for motorized crossing route density have not been established, however, route crossing density provides a relative way to compare the effects of the alternatives.

Direct and Indirect Effects

Cross Country Travel. Under Alternative 1, no action, motorized cross country travel would continue on 22,717 Riparian Conservation Areas (RCAs) acres within MYLF HUC7 watersheds, where the potential for adversely affecting MYLF habitat could occur by increasing sedimentation and altering streamside vegetation. Under the action alternatives, the prohibition of cross country travel results in prohibiting motorized use on 22,717 RCA acres, including approximately 49 to 52 RCA miles and from 96 to 101 motorized crossings (Alternatives 5 and prohibit the least, Alternative 3 prohibits the most). Cross country travel prohibitions would likely reduce the potential for sedimentation and alteration of streamside vegetation, and therefore benefit MYLF habitat.

NFTS Additions – Motorized Stream Crossings and RCA Miles

Number of Native Surfaced, Motorized Stream Crossing Additions within MYLF 7th Field Watersheds. The number of native surfaced, motorized stream crossings, proposed for addition to the NFTS, are assessed for the alternatives, and provides a useful way to compare potential changes in sediment delivery within MYLF HUC7 watersheds. Alternative 1 poses the greatest risk of increased sedimentation where 101 motorized stream crossings are associated with the continuance of cross country travel on existing unauthorized motorized routes. In decreasing order, Alternatives 5, 6, 2, 4, and 7 would result in the addition of 1 to 5 native surfaced, motorized route crossings. Alternative 3 does not add motorized route crossings to the NFTS, and therefore sedimentation or streamside vegetation would not be affected within any MYLF HUC7 watershed.

Table 3.03-144. Mountain Yellow-legged Frog 7th Field Watersheds - Number of Native Surfaced, Stream Crossings Associated with Motorized Route Additions and Cross Country Prohibitions

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Stream crossings associated with proposed motorized route additions to NFTS* (negative impact)	101	3	0	1	5	5	1
Closed by previous NEPA decisions, pending implementation	2	2	2	2	2	2	2
Motorized Stream Crossings that would be unauthorized to motorized use with the prohibition of cross country travel (positive impact	0	98	101	100	96	96	100

*Alternative 1 includes motorized stream crossings that would remain with the continuance of cross country travel on existing unauthorized routes, while all the action alternatives include motorized crossing additions.

RCA Miles of Proposed Additions to the NFTS within MYLF 7th Field Watersheds. The miles of proposed motorized route additions to the NFTS within RCAs were assessed for the alternatives, and provide additional information to assess the potential for off-site sediment delivery into MYLF habitats at the HUC7 level. Alternative 1 poses the greatest risk to increased sedimentation potential from 51.8 RCA miles of unauthorized motorized routes that would remain due to not prohibiting cross country travel. Similar to stream crossing numbers, Alternatives 2, 4, 5, 6, and 7 propose to add between 0.6 and 2.5

RCA miles (Alternatives 4 and 7add the least, Alternative 5 adds the most) of motorized routes to the NFTS. Alternative 3 does not add motorized routes to the NFTS, and therefore changes to sedimentation or streamside vegetation would not occur within any MYLF HUC7 watershed.

Table 3.03-145. RCA Miles of Proposed Route Additions and Cross Country Prohibitions within MYLF HUC7 Watersheds

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized route additions within RCAs* (negative impact)	51.8	1.2	0	0.6	1.8	2.5	0.5
Routes closed by previous NEPA decisions, pending implementation (positive impact)	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Motorized routes within RCAs that would be prohibited to cross country travel (positive impact)	0	50.5	51.8	51.2	49.9	49.3	51.3

*Alternative 1 includes motorized stream crossings that would remain with the continuance of cross country travel on existing unauthorized routes, while all the action alternatives include motorized crossing additions.

Changes to the NFTS

Change in Class of Vehicles. For each of the alternatives, Table 3.03-146 displays the effects of proposed changes in class of vehicles and the associated changes in maintenance standards that have to potential to increase the risk of delivering sedimentation and erosion to MYLF HUC7 watersheds. Alternatives 2, 4, 5, 6, and 7 would result in changes to road maintenance levels potentially resulting in changes from smooth surfaced roads to rough surfaced roads. This change in road surface type has a higher potential to result in increased sedimentation to MYLF habitat affected by between 2 to 17 native surfaced, crossings and from approximately 1 to 5 miles of motorized routes.

Reopened ML 1 Roads. Under Alternatives 5 and 6, ML 1 Road SV-005 would be reopened within the Perazzo Canyon HUC7 watershed (Table 3.03-147). A MYLF site occurs within Perazzo Creek near the confluence to the Little Truckee River. Road SV-005 is located upstream of the known MYLF site and connects to two NFTS roads. SV-005 is nearest to Perazzo Creek about 1 mile south of the known MYLF site and is connected to an existing system road on the side opposite to the creek. The route is located on less than 5% slope and surveys indicate that some sediment has come off of the route, however, maintenance of existing waterbars would mitigate these effects. Therefore, there is a low likelihood that that reopening Road SV-005 would capture and deliver sediment to MYLF habitat in Perazzo Creek, and therefore effects to MYLF would likely be low to nonexistent.

The remaining alternatives would not affect MYLF habitat, since reopening ML 1 roads are not proposed within the RCAs of MYLF HUC7 watersheds.

Table 3.03-146. Mountain Yellow-Legged Frog – as a Result of the Change in Class of Vehicles as Measured by Native Surfaced, Motorized Crossings and Motorized Route Miles

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number of Native Surfaced Crossings where changed maintenance standards result in smooth surfaced to native surfaced crossings	0	15	0	2	15	13	2
RCA Motorized Route Miles where changed maintenance standards result in smooth surfaced to native surfaced crossings	0	5.1	0	1.1	5.1	5.0	1.1

Site-specific Physical Impacts and Disturbance to Known Mountain Yellow-legged Frog Locations: On the Tahoe NF, MYLF has been documented from 25 7th field watersheds. Table 3.03-147 displays the MYLF 7th field watersheds (HUC7) where proposed motorized route additions are located and shows the relationship of proposed unauthorized routes with known MYLF locations. Potential site-specific adverse and beneficial impacts at the HUC7 scale are described.

Table 3.03-147. Direct and indirect impacts of proposed motorized route additions in relation to known mountain yellow-legged frog locations by 7th field watersheds

7th Field Watershed Name	Route ID/ Description for Action Alternatives	Reopened ML1 Road ID	Direct and Indirect Impacts	Beneficial Impacts
Alder Creek	No proposals.	No proposals.	No effect to one MYFL site.	All action alternatives prohibit cross country travel on 4 of 9 existing intermittent/perennial NFS crossings
Boca Reservoir	D_N72-1_a (Alt 6), N894-2-11 (Alt 5), TKN-M1,TKN-J2 (Alt 2,4,5,6,7); TKN-Q1 (Alt 2,5,6).	No proposals.	MYLF sighting east of Boca Res: TKN-M1 & TKN-Q1, and TKN-J2 not connected to MYLF location. Alt 5 proposal N894-2-11 comes off of system road not likely to affect MYLF habitat. D_N72-1_a, Alt 6 proposal is not connected to MYLF site over 1 mile to the south.	Proposed action alternatives prohibit cross country travel on up to 15 of 36 existing intermittent/perennial NFS crossings.
Canyon Creek-Sawmill Lake	YRS-003b (Alt 2,5,6).	No proposals.	No impact to MYLF site at south edge of HUC7, YRS-003b at top end of watershed > 3 miles from frog site and not connected.	Proposed action alternatives prohibit cross country travel on up to 3 of 4 existing intermittent/perennial NFS crossings.
Fordyce Lake	SV-004 (Alt 2,5,6) YRS-AF (Alt 2,4,5,6,7).	No proposals.	Multiple MYLF sites. SV-004 is 1 mile east of MYLF site not connected to sites and will not impact MYFL. YRS-AF is adjacent to MYFL site and has low potential to impact MYLF.	Proposed action alternatives prohibit cross country travel on up to 3 of 25 existing intermittent/perennial NFS crossings
Headwaters North Fork American River	No proposals.	No proposals.	No effects to one MYFL site at southernmost edge of watershed.	Proposed action alternatives prohibit cross country travel on 0 of 13 existing intermittent/perennial NFS crossings.
Headwaters North Yuba River	No proposals	No proposals.	No effects to one MYFL site at northern boundary of watershed.	Proposed action alternatives prohibit cross country travel on 6 of 26 existing intermittent/perennial NFS crossings.
Headwaters South Yuba River	TKN-J-4 (Alt 2,5,6,7)TKN-J5 (Alt 2,5,6,7).	No proposals.	TKN-J4 and TKN-J5 in northern part of HUC7 above So. Yuba Rr, MYLF site in southern part of HUC7 on opposite side of So. Yuba Rr. on private land. TKN-J 4 and TKN-J5 not connected.	Proposed action alternatives prohibit cross country travel on 1 of 22 existing intermittent/perennial NFS crossings.
Independence Creek	SV-P11 (Alt 2,5,6), D_350-10 (Alt 6).	No proposals.	Two MYLF sites. SV-P11 in same watershed, 1 ridge over, connection at bottom, route is in good condition, very little erosion and sediment off route, northern section has been ripped and decommissioned, south half very low use, effects to MYLF habitat not expected. Route D_350-10 has a low likelihood of delivering sediment to MYLF sites.	All action alternatives prohibit cross country travel on 4 of 19 existing intermittent/perennial NFS crossings.
Little Truckee River-Saddle Meadow	SV-P8 (Alt 2,5,6,7), D_S260 (Alt 6).	No proposals.	One MYLF site. SV-P8 is not connected to MYLF sites.	Proposed action alternatives prohibit cross country travel on 2 intermittent/perennial NFS crossings.
Lower Fordyce Creek	No proposals	No proposals.	No effect to MYLF site.	Proposed action alternatives prohibit cross country travel on 0 of 25 existing intermittent/perennial NFS crossings.
Lower Sagehen Creek	No proposals	No proposals.	No effect to MYLF site.	Proposed action alternatives prohibit cross country travel 1 of 14 existing intermittent/perennial NFS crossings.

7th Field Watershed Name	Route ID/ Description for Action Alternatives	Reopened ML1 Road ID	Direct and Indirect Impacts	Beneficial Impacts
Lower Salmon Creek	YRN-004 (Alt 2,5).	No proposals.	MYLF site near lakes, YRN-004, not connected to MYLF site and therefore no impacts to MYLF	All action alternatives prohibit cross country travel on 1 of 3 existing intermittent/perennial NFS crossings.
Middle Martis Creek	No proposals	No proposals.	No effect	Proposed action alternatives prohibit cross country travel on 0 of 35 existing intermittent/perennial NFS crossings.
Middle Truckee River-Lower Prosser Creek	TKN-M1 (Alt 2,4,5,6,7), TKN-PP (Alt 6).	No proposals.	TKN-M1 and TKN-PP not connected to MYLF site, not likely to affect MYLF.	All action alternatives prohibit cross country travel on 3 of 9 existing intermittent/perennial NFS crossings.
North Creek	No proposals.	No proposals.	2 MYLF sites not affected.	All action alternatives prohibit cross country travel on 3 of 9 existing intermittent/perennial NFS crossings.
North Yuba River-Haskell Creek	No proposals.	No proposals.	Two MYLF sites not affected.	Proposed action alternatives prohibit cross country travel on up to 6 of 17 existing intermittent/perennial NFS crossings.
North Yuba River-Howard Creek	No proposals.	No proposals.	No effects to two MYLF sites in upper watershed.	Proposed action alternatives prohibit cross country travel on up to 10 of 17 existing intermittent/perennial NFS crossings.
Perazzo Canyon	No proposals.	SV-005 (Alt 5, 6)	MYLF site in Perazzo Ck (near confluence to Little Truckee Rv) is downstream of SV-005,. MYLF not likely affected by SV-005 which connects to 2 NFTS roads.	All action alternatives prohibit cross country travel on 4 of 14 existing intermittent/perennial NFS crossings.
Prosser Creek	No proposals.	No proposals.	One MYLF site on Prosser Creek not affected.	Proposed action alternatives prohibit cross country travel on up to 4 of 16 existing intermittent/perennial NFS crossings.
Rattlesnake Creek	No proposals.	No proposals.	Multiple MYLF sites not affected.	Proposed action alternatives prohibit cross country travel on 5 of 9 existing intermittent/perennial NFS crossings.
South Yuba River-Lower Castle Creek	TKNJ-4	No proposals.	TKN-J4 on watershed boundary south of MYLF site with no connection and no impacts. Route is ~1 mile from MYLF site.	All action alternatives prohibit cross country travel on 5 of 8 existing intermittent/perennial NFS crossings.
Squaw Creek	No proposals.	No proposals.	No effects	Proposed action alternatives prohibit cross country travel on 0 of 20 existing intermittent/perennial NFS crossings.
Upper Cold Stream	D_5_b, D_89-55_a, D_89-55_c (Alt 6).	No proposals.	SVP-7e in headwaters no connection with MYLF along main channel and highway, no impacts expected.	Proposed action alternatives prohibit cross country travel on 10 of 10 existing intermittent/perennial NFS crossings.
Upper Five Lakes	No proposals.	No proposals.	No effects	Proposed action alternatives prohibit cross country travel on 1 of 10 existing intermittent/perennial NFS crossings.
Upper Sagehen Creek	No proposals.	No proposals.	No impacts to multiple MYLF sites.	All action alternatives prohibit cross country travel on 5 of 8 existing intermittent/perennial NFS crossings.

Route Density within Riparian Conservation Areas (RCAs): Route density within Riparian Conservation Areas (RCAs) for all native surfaced motorized routes within 7th field watersheds with known observations of mountain yellow-legged frogs was determined for the proposed alternatives. Alternative 1 poses the greatest risk of high route densities within Riparian Conservation Areas (RCAs) (Table 3.03-148, Figure 3.03-15). Under Alternative 1, 64% of the HUC7 watersheds with MYLF detections fall under the highest (32%) and moderately high (32%) categories for motorized route density (native surfaced routes). The action alternatives have decreasing RCA route densities compared to Alternative 1, ranging between 48% (Alternatives 2 and 5) and 36% (Alternatives 3, 4, and 7) of MYLF HUC7 watersheds that fall within the highest route densities category to moderately high route density category.

Table 3.03-148. Number 7th Field Watersheds (HUC7s) with Mountain Yellow-legged Frog Sites by RCA Route Density Category or Number (Percent) of HUC7s by Route Density Category (n=25)

Alternatives	**Highest** (%)	**Moderately High** (%)	**Moderately Low** (%)	**Lowest** (%)
Alt 1	8 (32%)	8 (32%)	6 (24%)	3 (12%)
Alt 2	8 (32%)	4 (16%)	7 (28%)	6 (24%)
Alt 3	6 (24%)	4 (16%)	7 (28%)	8 (32%)
Alt 4	6 (24%)	4 (16%)	7 (28%)	8 (32%)
Alt 5	8 (32%)	4 (16%)	7 (28%)	6 (24%)
Alt 6	6 (24%)	5 (20%)	7 (28%)	7 (28%)
Alt 7	6 (24%)	4 (16%)	7 (28%)	8 (32%)

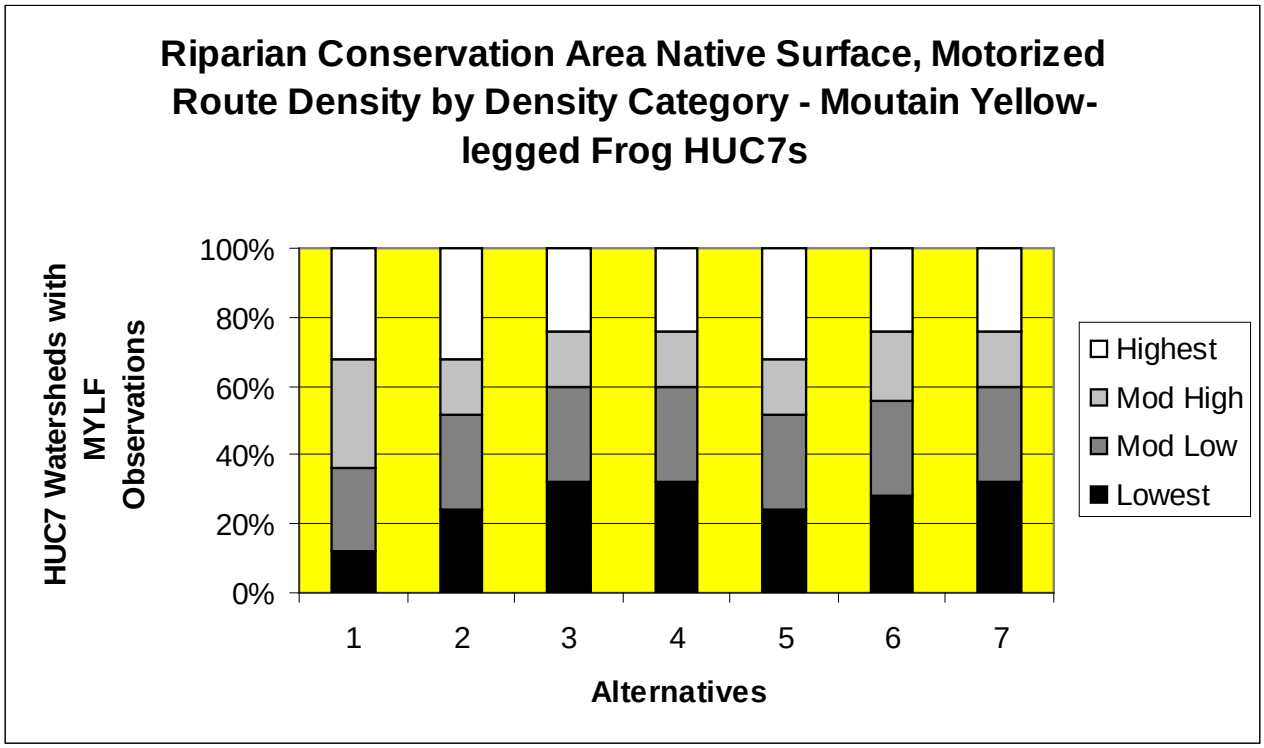

Figure 3.03-15. Number of 7th Field Watersheds within RCA Route Density Categories with Known Mountain Yellow-legged Frogs Locations

Stream Crossing Density within Riparian Conservation Areas (RCAs): RCA stream crossing density was assessed by route density categories of highest (10.4–20.4 crossings/sq. mile), moderately high (7.3-10.3 crossings/sq. mile), moderately low (4.2-7.6 crossings/sq. mi.), and lowest (0-4.1 crossing/sq. mi.) within 7th field watersheds (HUC7s) with known mountain yellow-legged frog observations (Table 3.03-149 and Figure 3.03-16). Alternative 1 poses the greatest direct impacts to mountain yellow-legged frogs (MYLF) from stream crossing densities where frogs may be disturbed and/or killed; and MYLF aquatic habitat conditions can be impacted from bank alteration and sediment input associated with motorized route crossings. Under Alternative 1, 40% of HUC7 watersheds with known MYLF detections are within the highest (24%) and moderately high (16%) route crossing density, and alternatively Alternative 1 has the least proportion of MYLF HUC7 watersheds with low crossing densities (20%). Alternatives 2 and 5 pose the next greatest risk to MYLF from stream crossings where 40% of MYLF HUC7 watersheds are within the highest (20%) and moderately high (20%) motorized crossing density categories. Alternative 6 has slightly lower route densities within both the highest and the moderately high crossing density categories compared to Alternatives 1, 2, and 5.

Alternatives 3, 4, and 7 have the lowest route densities of all the alternatives, and similarly reduces the potential direct and indirect effects of unauthorized motorized routes where only 8 % of HUC7 watersheds with route crossing densities within the highest category and the most HUC7 watersheds (44%) in the lowest crossing density category. Within all the action alternatives, unmanaged cross country

motorized travel would be prohibited, and over time as unauthorized routes are physically rehabilitated, MYLF and their habitat would benefit in the long term.

Table 3.03-149. Number (Percent) 7th Field Watersheds (HUC7s) with Mountain Yellow-legged Frog Sites by Native Surfaced, Motorized Crossing Density Category

Alternatives	Highest (%)	Moderately High (%)	Moderately Low (%)	Lowest (%)
Alt 1	6 (24%)	4 (16%)	10 (40%)	5 (20%)
Alt 2	5 (20%)	5 (20%)	7 (28%)	8 (32%)
Alt 3	2 (8%)	6 (24%)	6 (24%)	11 (44%)
Alt 4	2 (8%)	6 (24%)	6 (24%)	11 (44%)
Alt 5	5 (20%)	5 (20%)	7 (28%)	8 (32%)
Alt 6	4 (8%)	4 (8%)	9 (28%)	8 (32%)
Alt 7	2 (8%)	6 (24%)	6 (24%)	11 (44%)

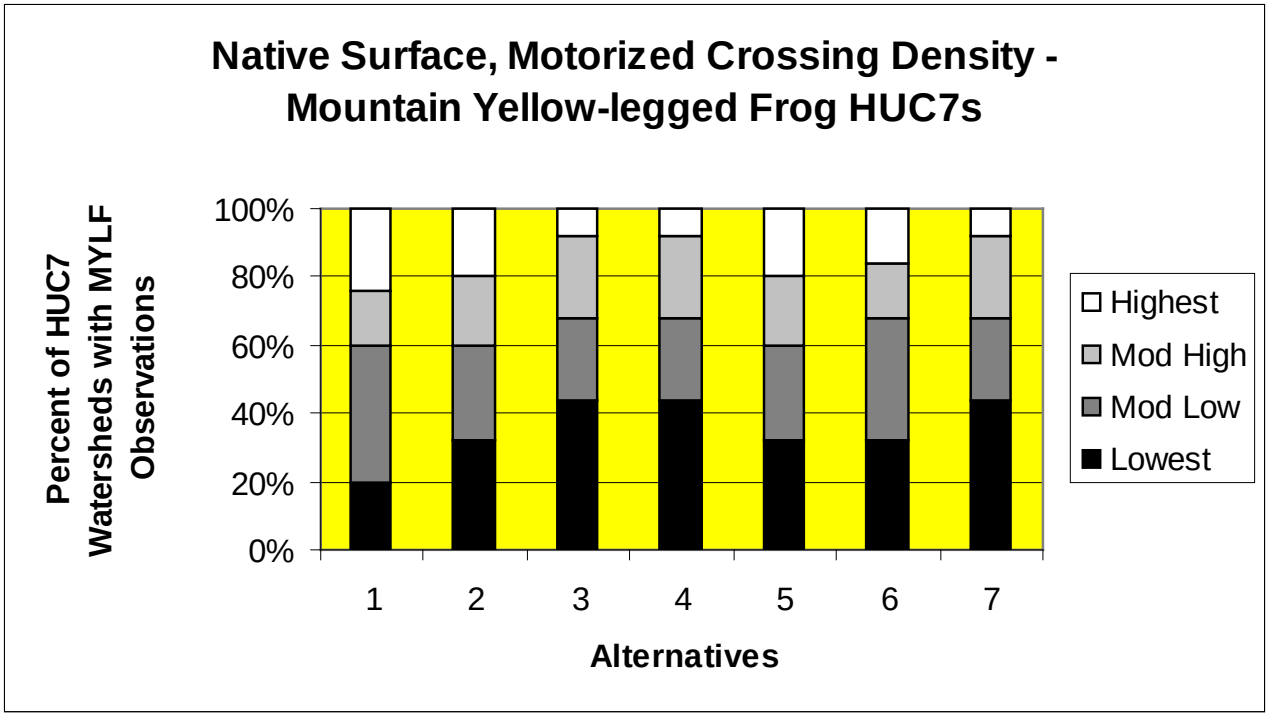

Figure 3.03-16. Number of 7th Field Watersheds by Native Surfaced, Motorized Crossing Density Category for Known Mountain Yellow-legged Frog Locations

Cumulative Effects

Cumulative Effects Boundary in Space and Time

The geographic boundary for assessing cumulative effects to the MYLF is suitable habitat on the Tahoe NF above 6,000 feet within high elevation ponds and slow moving portions of perennial and intermittent streams. This geographic boundary is sufficiently large to encompass historic and potential MYLF habitat on the Tahoe NF. Any larger boundary could dilute the effects of past, present, and future cumulative

impacts to this species. The timeframe for assessing cumulative impacts in the past includes activities that occurred within the last 50 to 100 years. Reasonably foreseeable future impacts expand out to approximately 25 years into the future.

Cumulative Effects of Past, Present, and Reasonably Foreseeable Actions

Historically the mountain yellow-legged frog was extremely abundant within high elevation aquatic ecosystems of the Sierra Nevada Mountains (Grinnell and Storer 1924, Zweifel 1955, In Lannoo 2005). Beginning around the 1970s, the mountain-yellow frog has undergone dramatic population declines throughout the Sierra Nevada (Knapp and Matthews 2000, ranging between 50-90% declines of their historic localities (USFWS 2004).

Many past and current cumulative impacts have contributed to the decline in mountain yellow-legged frog numbers and distribution. The decline of the MYLF has largely been attributed to the introduction of salmonid fishes during the last century (Bradford et al. 1993, Knapp 1996).

Other factors that have contributed to cumulative impacts to the species includes pesticides, ultraviolet radiation; bacterial, fungal, and viral pathogens; acidification from the atmospheric deposition; nitrate deposition; livestock grazing; recreational activities (including motorized); and drought have all been identified as potential factors affecting the species and its habitat (USDA 2001).

Historic livestock grazing likely had a significant cumulative impact to this species and their habitat. Historic livestock grazing evidence indicates that heavy livestock use in the Sierra Nevada led to riparian habitat degradation across much of the Sierra Nevada. Livestock trampling has the potential to directly kill all life stages of MYLF. The greatest potential of mortality risk from livestock trampling is expected to occur when adult MYLF aggregate and lay egg masses in the early season, and during metamorphosis, when juveniles are metamorphosing along aquatic margins. Current standards and guidelines in the Sierra Nevada Forest Plan Amendment were implemented to reduce the risk of trampling by livestock (USDA 2004). Known MYLF habitat sites currently overlap with 5 active livestock grazing allotments (Canyon Creek, Devils Peak, Euer Valley, Independence, and Perazzo Meadows). Potential mountain yellow-legged frog habitat overlaps with an additional 29 allotments. Management direct including standards and guidelines for grazing should reduce potential grazing impacts from livestock grazing.

Introduced trout species within high mountain lakes has severely affected mountain yellow-legged frog population trends in the Sierra Nevada including the Tahoe NF. In recent years, the California Department of Fish and Game has actively addressing this issue to proactively manage for mountain yellow-legged frog restoration opportunities while still providing a recreational fisheries within high mountain lakes. Recent experimental efforts to remove introduced trout species from high mountain lakes has shown that MYLF will recover once introduced trout have been removed.

Historic vegetation management and fuels reduction projects have likely contributed to past and present cumulative effects, especially if projects occurred adjacent to MYLF aquatic habitats. Ground disturbing activities including timber harvest and fuels treatment projects (burning and mastication projects) potentially caused direct mortality to this species which may have affected the abundance of the species on the Tahoe NF. In general, current vegetation and fuels projects are designed to reduce potential

impacts on MYLF habitats, and therefore, minimize disturbance to the species. However, as MYLF migrate between breeding sites, and between breeding sites and overwintering sites, there is some potential for direct impacts from being crushed or burned from vegetation and fuels projects. In general the magnitude of this happening across the range of the MYLF frog habitats on the Tahoe NF should be limited given the timing of MYLF migration which is in the spring, with the exception to spring prescribed burning projects. In general, the adverse impacts of spring burning is expected to be low given the relatively low amount that occurs on the Forest within an average year.

Under Alternative 1, cumulative effects from unauthorized routes would be greatest within HUC7 watersheds occupied by MYLF would have the highest RCA route densities and the highest route crossing densities. In addition, 24 of 25 (96%) of MYLF HUC7 watersheds would have cross country travel and continued route proliferation. Direct and indirect impacts of unauthorized motorized routes in Alternative 1 would result in considerable cumulative impacts to known MYLF sites where approximately 64% of HUC7 watersheds with MYLF observations have high to moderately high RCA route densities that may contribute to habitat degradation from off-site sedimentation. In addition, under Alternative 1, 64% of HUC7 watersheds with known MYLF detections are within the highest or moderately high route crossing density categories which have the potential to degrade stream condition by altering streambank vegetation and stream hydrology. Under Alternative 1, unauthorized route proliferation would likely continue and increase at an accelerated rate in the future, potentially increasing sediment delivery and alteration of streambank vegetation and hydrologic condition which may affect the abundance and distribution on the Tahoe NF. Already declining population trends of this species could be significantly affected by Alternative 1 in the long term.

Alternatives 2 and 5 also add to existing cumulative impacts to the MYLF, though impacts are considerably less than Alternative 1 as a result of the closure of a significant number of miles of motorized routes within RCAs and reduction in the number of route crossings. Proposed routes site-specifically has the potential to directly and indirectly degrade habitat condition within known mountain yellow-legged frog sites within 28% of all MYLF HUC7s (n=25). At the 7th field watershed scale, under Alternatives 2 and 5, 40% of MYLF HUC7 watersheds have route crossing densities within the highest (20%) and moderately high (20%) motorized crossing density categories.

Alternative 2 cumulatively affects 3 of 25 (12%) MYLF HUC7 sites. Alternatives 4, 6, and 7 affect MYLF habitat within 2 of 25 (8%) HUC7 watersheds from short routes accessing dispersed recreation sites. The potential for off-site sedimentation from these short route segments is expected to be relatively low. All action alternatives have decreasing RCA route densities compared to Alternative 1, ranging between 48% (Alternatives 2 and 5– most) and 36% (Alternative 3, 4, and 7– least) of MYLF HUC7 watersheds that fall within the highest route densities category to moderately high route density category.

For all the action alternatives, cross country motorized travel, including on routes unauthorized to motorized travel, would be prohibited. In addition, the majority these routes would benefit MYLF in the long-term once they are rehabilitated through obliteration or other means. Non-motorized use (hiking, mountain bicycling, equestrian, etc.) may occur on routes that would be prohibited to cross country travel. In general, it is expected that impacts from non-motorized use would be less than motorized use. Over

time, it is expected that these unauthorized motorized routes would become revegetated and recover through active or passive means, and ultimately benefit MYLF in the future.

Summary of Direct, Indirect, and Cumulative Effects of Proposed Actions

Table 3.03-150 summarizes the direct, indirect, and cumulative effects of native surfaced, motorized route crossings within MYLF HUC 7 watersheds, from existing motorized routes, motorized route additions, and routes unauthorized to motorized public travel from the proposed actions, including wet weather seasonal restrictions, changes in class of vehicles, prohibition of cross country travel. See Chapter 3.02, Watershed Resources: Geology, Soil, Hydrology, for more detailed information and assumptions.

Table 3.03-150. Mountain Yellow-legged Frog 7th Field Watersheds – Summary of Direct, Indirect, and Cumulative Effect of Proposed Actions as Measured by Native Surfaced, Motorized Crossings

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
RCA Acres Prohibited to Cross Country Travel	0	22,717	22,717	22,717	22,717	22,717	22,717
Stream Crossings Prohibited to Cross Country Travel	0	98	101	100	96	96	100
Native Surfaced, Motorized Stream Crossings							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Existing NFTS Crossings	93	93	93	93	93	93	93
Crossing Additions*	101	3	0	1	5	5	1
Change in Class of Vehicles from Smooth Surfaced to Native Surfaced Crossings	0	15	0	2	15	13	2
Closed crossings from previous NEPA decisions, pending implementation	2	2	2	2	2	2	2
Total Motorized Stream Crossings Prohibited to Motorized Use	2	85	103	100	83	85	100
Net Native Surfaced, Motorized Crossings	194	111	93	96	113	111	96
Wet Weather Seasonal Restrictions on all Native Surfaced Routes	None	None	None	Beneficial - Wet Weather Restrictions would be implemented	Beneficial - Wet Weather Restrictions would be implemented	Beneficial - Wet Weather Restrictions would be implemented	None
Establishment of Open Areas	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Amendments to Forest Plan	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Net Direct, Indirect, and Cumulative Effect of Proposed Actions	Negative adverse cumulative effects from continued cross country travel. Motorized cross country travel prohibited 0 acres. Motorized use prohibited on 2 crossings from previous NEPA decisions. No additional protection to MYLF habitats from wet weather seasonal restrictions.	6th most beneficial alternative. Motorized cross country travel prohibited on 22,717 RCA acres, including on 85 native surfaced, stream crossings. No additional protection to MYLF habitats from wet weather seasonal restrictions.	4th most beneficial alternative. Motorized cross country travel prohibited on 22,717 RCA acres, including on 103 native surfaced, stream crossings. No additional protection to MYLF habitats from wet weather seasonal restrictions.	Most beneficial alternative. Motorized cross country travel prohibited on 22,717 RCA acres, including on 100 native surfaced, stream crossings. Reduced sedimentation risk to MYLF habitats from wet weather seasonal restrictions.	3rd most beneficial alternative. Motorized cross country travel prohibited on 22,717 RCA acres, including on 83 native surfaced, stream crossings. Reduced sedimentation risk to MYLF habitats from wet weather seasonal restrictions.	2nd most beneficial alternative. Motorized country travel prohibited on 22,717 RCA acres, including on 85 native surfaced, stream crossings. Reduced sedimentation risk to MYLF habitats from wet weather seasonal restrictions.	5th most beneficial alternative. Motorized cross country travel prohibited on 22,717 RCA acres, including on 100 native surfaced, stream crossings. No additional protection to MYLF habitats from wet weather seasonal restrictions.

*Alternative 1 includes existing native surfaced, crossings unauthorized to motorized use, while all the action alternatives include motorized route additions.

Table 3.03-151 summarizes the direct, indirect, and cumulative effects of native surfaced, motorized RCA route miles within MYLF HUC 7 watersheds, from existing motorized routes, motorized route additions, and routes unauthorized to motorized public travel from the proposed actions, including wet weather seasonal restrictions, changes in class of vehicles, prohibition of cross country travel. See Chapter 3.02, Watershed Resources: Geology, Soil, Hydrology, for more detailed information and assumptions.

Table 3.03-151. Mountain Yellow-legged Frog 7th Field Watersheds – Summary of Direct, Indirect, and Cumulative Effect of Proposed Actions as Measured by RCA Motorized Route Miles

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Cross Country Travel Prohibited	0	22,717	22,717	22,717	22,717	22,717	22,717
Native Surfaced, Motorized Routes							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Existing RCA Miles	45.9	45.9	45.9	45.9	45.9	45.9	45.9
RCA Miles of Native Surfaced, Motorized Route Additions*	51.8	1.2	0	0.6	1.8	2.5	0.5
Change in Class of Vehicles Resulting in Maintenance Changed from Smooth Surfaced to Native Surfaced Motorized route miles	0	5.1	0	1.1	5.1	5.0	1.1
Reopened ML 1 Roads	0	0	0	0	0	0	
Closed roads by previous NEPA, pending implementation (positive)	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Total RCA Route Miles Prohibited to Motorized Use (positive)	2.4	49.1	54.2	52.5	47.3	46.7	52.6
Net NFTS Native Surfaced, Motorized RCA Miles	97.9	52.2	47.1	47.6	52.8	53.4	47.5
Establishment of Open Areas	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Wet Weather Seasonal Restrictions on all Native Surfaced Roads and Routes	None	None	None	Beneficial - Wet Weather Restrictions would be implemented	Beneficial - Wet Weather Restrictions would be implemented	Beneficial - Wet Weather Restrictions would be implemented	None
Amendments to Forest Plan	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Net Direct, Indirect, and Cumulative Effect of Proposed Actions	Adverse cumulative impacts from cross country cross travel prohibition on 0 acres and on 2.4 miles. No additional protection to MYLF habitats from wet weather seasonal restrictions.	6th most beneficial alternative. Motorized cross country travel prohibited on 22,717 RCA acres, including on 49.1 RCA miles. No additional protection to MYLF habitats from wet weather seasonal restrictions.	4th most beneficial alternative. Motorized cross country travel prohibited on 22,717 RCA acres, including on 54.2 RCA miles. No additional protection to MYLF habitats from wet weather seasonal restrictions.	Most beneficial alternative. Motorized cross country travel prohibited on 22,717 RCA acres, including on 52.5 RCA miles. Reduced sedimentation risk to MYLF habitats from wet weather seasonal restrictions.	2nd most beneficial alternative. Motorized cross country travel prohibited on 22,717 RCA acres, including on 47.3 RCA miles. Reduced sedimentation risk to MYLF habitats from wet weather seasonal restrictions.	3rd most beneficial alternative. Motorized cross country travel prohibited on 22,717 RCA acres, including on 46.7 RCA miles. Reduced sedimentation risk to MYLF habitats from wet weather seasonal restrictions.	5th most beneficial alternative. Motorized cross country travel prohibited on 22,717 RCA acres, including on 52.6 RCA miles. No additional protection to MYLF habitats from wet weather seasonal restrictions.

*Alternative 1 includes existing unauthorized routes, while all the action alternatives include motorized route additions.

Northwestern Pond Turtle: Affected Environment

The northwestern pond turtle (*Clemmys marmorata marmorata*) (NWPT) is listed as Sensitive on the Region 5 Forester's Sensitive Species List (USDA Forest Service 1998). The northwestern pond turtle ranges approximately from the American River northward to the vicinity of Puget Sound with an elevational distribution from sea level to 6,000 feet (Stebbins 1972, In Lannoo 2005). Recent genetic studies support the traditional morphological subdivision of the western pond turtle into the northern subspecies, *Clemmys marmorata marmorata* (northwestern pond turtle), and the southern subspecies, *Clemmys marmorata pallida* (Gray 1995).

Habitat for the NWPT, historically, occurs in a variety of both permanent and intermittent aquatic habitats west of the Sierra-Cascade crest. This turtle is often restricted to areas near the banks or in quiet backwaters where the current is relatively slow and basking sites and refugia are available. Currently most populations exist in smaller streams, usually in montane areas. These streams may be either permanent or intermittent, but permanent streams support larger populations. Western pond turtles occur in a variety of water courses directly or indirectly modified by man, such as reservoirs, canals, excavated farm ponds, and mill ponds. This species is considered omnivorous. Aquatic plant material, beetles and aquatic invertebrates have been reported among their food (Stebbins 1972 and Nussbaum et al. 1983, In Lannoo 2005). Northwestern pond turtles have been observed at less than 20 locations within the Tahoe NF. Five of these locations are on NFS land and the remaining are on private land or on Bureau of Land Management administered lands. Tahoe NF reported sightings are from the Yuba River and American River drainages associated with pond habitat.

Risk factors to northwestern pond turtle from roads and trails are similar to frog species described above.

Northwestern Pond Turtle: Environmental Consequences

Indicators used to Measure Effects

Cross Country Travel: The prohibition of cross country travel is analyzed for the alternatives to estimate the potential benefits and reduction in effects to NWPT 7th field watersheds from motorized cross country travel.

NFTS Additions (NWPT 7th field watersheds): Measures or indicators of changes in sedimentation and water surface shade are assessed by analyzing the number of stream crossings additions associated with motorized route additions to the NFTS, and the miles of motorized route additions within Riparian Conservation Areas (RCAs) for NWPT 7th field watersheds

Site-specific Physical Impacts and Disturbance to known northwestern pond turtle locations: Unauthorized motorized routes were evaluated to determine site-specific impacts to known northwestern pond turtle locations for each of the alternatives. Native surfaced routes that cross or intersect ponds occupied by NWPT have the greatest potential to disturb, crush and kill the pond turtle, and to alter stream banks and deliver sediment which can degrade pond turtle habitat condition. In addition, any

unauthorized motorized routes that are within RCAs or has the potential to delivery sediment to known NWPT locations were also evaluated for their potential to contribute to indirect effects by the alternatives.

Establishment of "Open Areas": Establishment of "Open Areas" would not affect the northwestern pond turtle, since none of the "Open Areas" would affect suitable pond turtle habitats. Therefore, no further analysis is warranted.

Change in Class of Vehicles: Changing the class of vehicle on a particular route potentially changes the impacts to soil and water resource due to changes in the road surface (i.e. from smooth surfaced to rough surfaced) (see Chapter 3.02, Watershed Resources: Geology, Soil, and Hydrology). If the route changes from smoothed surfaced to native surfaced (rough surfaced), the change in class of vehicle may result in increased sediment and erosion risk to NWPT habitat. The change in class of vehicle and associated maintenance downgrades is evaluated for their potential to affect selected 7th field watersheds that may have suitable habitat for the NWPT.

Wet Weather Seasonal Closures: Proposed wet weather seasonal restrictions on native surfaced roads and trails are analyzed under "Effects Common to All Aquatic Species.

Reopened ML 1 Roads: Reopened ML 1 roads within pond turtle habitats are analyzed for the alternatives.

RCA Motorized Route Density within Northwestern Pond Turtle 7th Field Watersheds: Route densities of native surfaced routes within RCAs were evaluated to compare the overall effects of all motorized routes (including existing and unauthorized) for the alternatives within each 7th field watershed occupied by the northwestern pond turtle. According to Chapter 3.02 (Watershed Resources: Geology, Soil, Hydrology), native surfaced roads have the greatest potential for off-site sediment delivery into streams and lakes. Therefore, this effects analysis includes route density of all native surfaced motorized routes. Route density provides a relative index to measure the potential indirect effects to occupied habitat of the NWPT from increased sedimentation from routes. Thresholds for route density have not been established, however, route density provides a relative way to compare the effects of the alternatives.

Stream Crossing Density within RCAs: The 7th field watersheds occupied by northwestern pond turtle were evaluated for the crossing density of native surfaced motorized routes within RCAs to compare direct and indirect effects of motorized routes for the alternatives. Route crossing density provides a way to measure the potential direct and indirect effects to the northwestern pond turtle and habitat. Direct effects include potential pond turtle mortality as a result of use of motorized crossings of occupied pond turtle. Indirect effects include changes to channel and streambank characteristics and changes in vegetation structure. Thresholds for motorized crossing route density have not been established, however, route crossing density provides a relative way to compare the effects of the alternatives.

Direct and Indirect Effects

Cross Country Travel. Under Alternative 1, no action, motorized cross country travel would continue on 7,986 Riparian Conservation Areas (RCAs) acres within NWPT HUC7 watersheds, where the potential for adversely affecting NWPT habitat could occur by increasing sedimentation and altering streamside

vegetation (Table 3.03-152). Under the action alternatives, the prohibition of cross country travel results in prohibiting motorized use on 7,986 RCA acres, including on 10.4 to 16.3 RCA miles and from 31 to 47 native surfaced, motorized crossings (Alternative 5 prohibits the least, Alternative 3 prohibits the most). Cross country travel prohibitions would likely reduce the potential for sedimentation and alteration of streamside vegetation, and therefore benefit NWPT habitat.

Table 3.03-152. Cross Country Travel on Native, Surfaced Routes within NWPT 7th Field Watersheds

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number crossings prohibited to cross country travel	1	44	47	45	31	40	47
RCA miles where cross country travel prohibited	0.5	16.3	17.1	16.7	10.4	13.9	16.8
RCA acres where cross country travel prohibited	0	7,986	7,986	7,986	7,986	7,986	7,986

Change in Class of Vehicles *(Reopening ML 1 Road and Changed Maintenance Levels)*. Several ML 1 roads are proposed for reopening in the Cherokee Creek HUC7 watershed where there are known pond turtle locations. However, none of the ML1 roads proposed for reopening or changes to maintenance levels from smooth surfaced to native surfaced would affect NWPT habitat under any of the action alternatives.

NFTS Additions – Motorized Stream Crossings and RCA Miles

Number of Native Surfaced, Motorized Stream Crossing Additions within NWPT 7th Field Watersheds. The number of native surfaced, motorized stream crossings, proposed for addition to the NFTS, are assessed for the alternatives, and provides a useful way to compare potential changes in sediment delivery within NWPT HUC7 watersheds. Alternative 1 poses the greatest risk of increased sedimentation where 47 native surfaced, stream crossings are associated with the continuance of cross country travel on existing unauthorized routes (Table 3.03-153). This includes 1 crossing that was closed in a previous NEPA decision that is pending implementation.

All the action alternatives would reduce the number of crossings within NWPT HUC7 watersheds. In increasing order, Alternatives 4, 6, 2, and 5 would result in the addition of 2 to 16 native surfaced, motorized crossings. Alternatives 3 and 7 would not result in additional native surfaced, motorized stream crossings within any NWPT HUC7 watersheds, and therefore sedimentation or streamside vegetation would not be affected.

Table 3.03-153. Northwestern Pond Turtle 7th Field Watersheds - Number of Native Surfaced, Stream Crossings Associated with Motorized Route Additions

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Stream crossings associated with proposed motorized route additions to NFTS (negative impact)	47	3	0	2	16	7	0

*Alternative 1 includes motorized stream crossings that would remain with the continuance of cross country travel on existing unauthorized routes, while all the action alternatives include motorized crossing additions.

RCA Miles of Proposed Motorized Route Additions within NWPT 7th Field Watersheds. The miles of proposed motorized route additions to the National Forest Transportation System (NFTS) within RCAs were assessed for the alternatives, and provide additional information to assess the potential for off-site sediment delivery into NWPT habitats at the HUC7 level. Alternative 1 poses the greatest risk to increased sedimentation potential from approximately 17 RCA miles of motorized unauthorized routes that would remain due to not prohibiting cross country travel (Table 3.03-154). Similar to stream crossing numbers, Alternatives 2, 4, 5, 6, and 7 propose to add between 0.2 and 6.6 RCA miles (Alternatives 4 and 7 add the least, Alternative 5 adds the most) of motorized routes to the NFTS. Alternative 3 does not add motorized routes to the NFTS, and therefore changes to sedimentation or streamside vegetation would not occur within any NWPT HUC7 watershed.

Table 3.03-154. Northwestern Pond Turtle - Miles of Proposed Route Additions within HUC7 Watersheds

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Miles of proposed motorized route additions within RCAs* (negative impact)	16.5	0.8	0	0.4	6.6	3.1	0.2

*Alternative 1 includes motorized stream crossings that would remain with the continuance of cross country travel on existing unauthorized routes, while all the action alternatives include motorized crossing additions.

Site-specific Physical Impacts and Disturbance to known Northwestern Pond Turtle locations: Within the boundaries of the Tahoe NF, the northwestern pond turtle is known from 5 locations on NFS lands and 13 locations on private and BLM administered lands. These pond turtle locations are known from nine 7th field watersheds within the boundary of the Tahoe NF. Proposed motorized route additions and reopening of ML 1 roads within nine 7th field watersheds that have northwestern pond turtle locations are shown in Table 3.03-155. Existing unauthorized routes under Alternative 1 could potentially affect the pond turtles and their habitats within the South Yuba River Pierce Meadow, Headwaters North Fork American River, and North Fork of North Fork American River-Blue Canyon watersheds. The action alternatives either do not propose motorized route additions or reopens any ML 1 roads that would directly or indirectly affect the pond turtle. Numerous private land motorized routes may contribute to direct and indirect impacts to the pond turtle.

Table 3.03-155. Description of motorized route additions for the action alternatives in relation to known northwestern pond turtle locations within 7th field watersheds

Watershed Name	Route ID/Description	Reopened ML1 Road ID	Direct and Indirect Impacts
Bullards Bar Reservoir-Bridger Creek	D_Y-125_a (Alt 2,4,5,6).	None	D_Y-125_a, not connected, no effect to pond turtle sites near Bullards Bar Res.
Cherokee Creek	YRN-008 (Alt 2,4,5,6); 491-3-1_p, 491-3-2_p (Alt 5,6); D_35_a,b, D_491-6_a,b (Alt 2,4,5,6); N39-6 (Alt 5).	0025-009, 0491-003 (Alt 2,4,5,6); 25-9-3_p, 25-9_p, 35-3_p, 35-4_p, 35-4-1_p, 39-9_p, 491-3_p (Alt 5,6) H39-12, N25-1-1, N25-3, N25-5, N25-6-1, N25-7, N25-9-1, N25-9-2, N35-1, N35-2, N35-3-1, N35-3-2, N35-6, N35-7, N39-4, N39-5, N39-5-1, N39-5-2, N39-7, N39-8-1, N491-1, N491-3-1, N55-2 (Alt 5).	YRN-008 and Cal Ida Network (numerous routes) not likely to impact turtle site, not connected D_35_a,b, D_491-6_a,b – would not affect pond turtle site.
Lower Oregon Creek	None	None	None
Lower Middle Yuba River	H18N49Y (Alt 5).	None	H18N49Y does not affect turtle sites
Middle Yuba River-Indian Creek	None	None	None
South Yuba River-Pierce Meadow	YRS-F1 short segments (Alt 2,4,5, 6,7); D_654-4-2_a, D_654-4_a, D_85-2-1-1_a (Alt 2,4,5,6); D_654-5 (Alt 5,6)	None	YRS-F1 – short route segments would not affect turtle habitat, not connected. D_654-4-2_a, D_654-4_a, D_85-2-1-1_a (Alt 2,4,5,6); D_654-5 (Alt 5,6) – short spurs t access dispersed recreation not connected to pond turtle site, no impacts. Alt 1 short segments not connected to turtle site.
Headwaters North Fork American River	Alt 1 existing unauthorized routes	None	Alt 1 unauthorized routes may impact turtles at one part of watershed,
North Fork of North Fork American River-Blue Canyon	Alt 1 existing unauthorized routes	None	Existing unauthorized routes may impact pond turtle site
Willow Creek	H293 (Alt 5), D_Y-122_a,b,c (Alt 2,4,5,6).	None	H293 located below pond turtle site, would not be impacted. D_Y-122_a,b,c – not connected would not affect pond turtle site.

RCA Motorized Route Density within Northwestern Pond Turtle 7th Field Watersheds: The northwestern pond turtle was identified to occur within nine 7th field watersheds on the Tahoe National Forest (Cherokee Creek, Willow Creek, Bullards Bar Reservoir-Bridger Creek, Lower Oregon Creek, Middle Yuba River-Indian Creek, Lower Middle Yuba River, Headwaters North Fork American River and North Fork of North Fork American River-Blue Canyon). For each of the alternatives, Table 3.03-156 and Figure 3.03-17 displays the number and percent of 7th field watersheds (HUC7s) with known locations of NWPT locations by RCA route density category of highest (8.9-27.3.mi/mi^2), moderately high (6.3-8.8 mi/mi^2), moderately low (14.3-6.2 mi/mi^2), and lowest (0.2-4.2 mi/mi^2). Alternative 1 poses the greatest direct and indirect effects to the NWPT where 2 of 9 (22%) pond turtle HUC7 watersheds are within the highest route density category, 3 of 9 (33%) are in moderately high; and 1 of 9 (11%) is in moderately low, and 3 of ((33%) are in lowest.

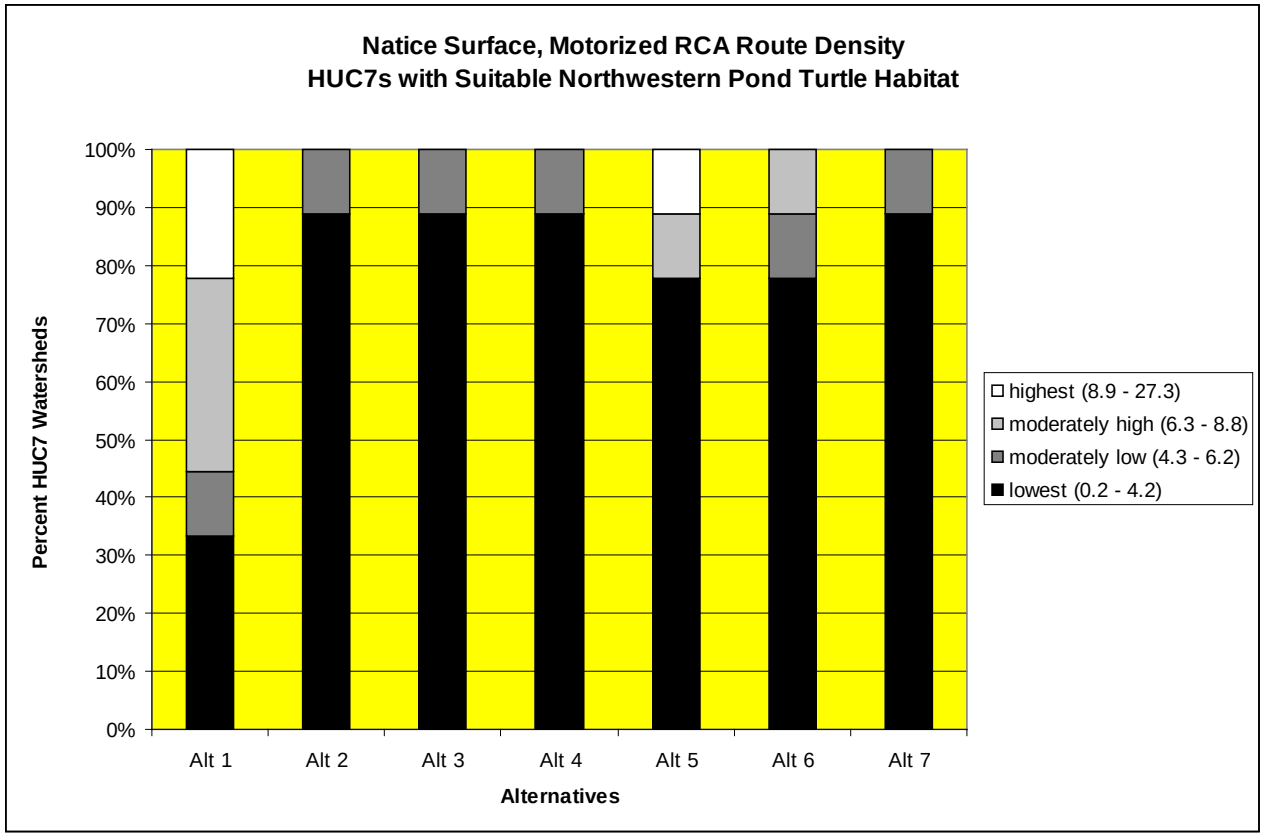

Figure 3.03-17. Number of Northwestern Pond Turtle 7th Field Watersheds by Motorized Native Surface RCA Route Density Category

All the action alternatives would reduce RCA route densities compared to Alternative 1. Under Alternative 5, 1 pond turtle HUC7 watersheds remains in the highest and moderately high route density categories, none are in moderately low, and 78% (7 of 9) HUC7s within the lowest RCA route density category. Alternative 6 would reduce route densities where 1 watershed would be in the moderately high

and moderately low route density categories, and the remaining 7 watersheds would be within the lowest category.

The remaining alternatives (Alternatives 2, 3, 4, and 7) improves RCA route densities similarly where between 1 (11%) watershed falls in the moderately low route density category and 8 pond turtle HUC7s (89%) fall within the lowest route density category.

Table 3.03-156. Number and Percent of 7th Field Watersheds (HUC7s) with Occupied Northwestern Pond Turtle Locations by Route Density Category

Alternatives	Highest (8.9 - 27.3 mi/mi^2)	Moderately High (6.3 - 8.8)mi/mi^2)	Moderately Low (4.3 - 6.2)mi/mi^2)	Lowest (0.2 - 4.2 mi/mi^2)
Alt 1	2	3	1	3
Alt 2	0	0	1	8
Alt 3	0	0	1	8
Alt 4	0	0	1	8
Alt 5	1	1	0	7
Alt 6	0	1	1	7
Alt 7	0	0	1	8

Motorized Route (native surface) Crossing Density within Northwestern Pond Turtle 7th Field Watersheds: For each of the alternatives, RCA stream crossing density was assessed by crossing density categories of highest (5.1-19.7 crossings/sq. mile), moderately high (3.1-5.0 crossings/sq. mile), moderately low (1.8-3.0 crossings/sq. mi.), and lowest (0-1.7 crossing/sq. mi.) within 7th field watersheds (HUC7s) with known northwestern pond turtles occurrences. Table 3.03-157 and Figure 3.03-18 displays the number of HUC7 watersheds with known northwestern pond turtle observations by crossing density categories listed above. Alternative 1 poses the greatest direct impacts to northwestern pond turtle from stream crossing densities (crossings/square mile) where pond turtles may be disturbed and/or killed; and pond turtle aquatic habitat conditions can be impacted from bank alteration and sediment input associated with motorized route crossings. Under Alternative 1, 22% (2 of 9) HUC7 watersheds with known pond turtle occurrences are within the highest crossing density category, 45% (4 of 9) in moderately high route crossing densities, and 11% (1 of 9) within moderately low, and 22% (2 of 9) within lowest categories. The remaining action alternatives reduce the number of stream crossings within Riparian Conservation Areas, and thus reduce the potential for direct and indirect impacts to the northwestern pond turtle. Alternative 5 would reduce crossing densities the least where 1 of 9 (11%) HUC7 remains in the highest stream crossing density category, 3 of 9 (33%) is within the moderately high category, 3 of 9 (33%) is within moderately low, and 2 of 9 (22%) HUC7s are within the lowest category. Compared to Alternative 5, Alternative 6 moves 1 HUC7 from the highest stream crossing density category to the moderately high category.

Alternatives 2 and 4 would further reduce stream crossing density where, none of the pond turtle HUC7 watersheds are in the highest category (5.1-19.7 crossings/mi^2), 3 are in the moderately high

category (3.1-5.0 crossings/mi^2), 4 are in the moderately low category (1.8-3.0 crossings/mi^2), and 2 are in the lowest category (0-1.7 crossings/mi^2).

Alternatives 3 and 7 would similarly reduce the most potential direct and indirect effects where HUC7 crossing density categories would be as follows: 0 of 9 HUC7s in the highest, 2 of 9 HUC7s (22%) in moderately high, 5 of 9 HUC7s (56%) in moderately low, and 2 of 9 HUC7s (22%) in lowest. Within all the action alternatives, unmanaged cross country motorized travel would be prohibited, and over time as routes unauthorized to motorized public use are physically revegetated and rehabilitated, the northwestern pond turtle and their habitat would benefit in the long term.

Table 3.03-157. Number of 7th Field Watersheds (HUC7s) with Occupied Northwestern Pond Turtle Locations by Stream Crossing Density Category of Native Surfaced Routes

Alternatives	Highest (5.1-19.7 crossings/mi^2)	Moderately High (3.1-5.0 crossings/mi^2)	Moderately Low (1.8-3.0 crossings/mi^2)	Lowest (0-1.7 crossings/mi^2)
Alt 1	2	4	1	2
Alt 2	0	3	4	2
Alt 3	0	2	5	2
Alt 4	0	3	4	2
Alt 5	1	3	3	2
Alt 6	0	4	3	2
Alt 7	0	2	5	2

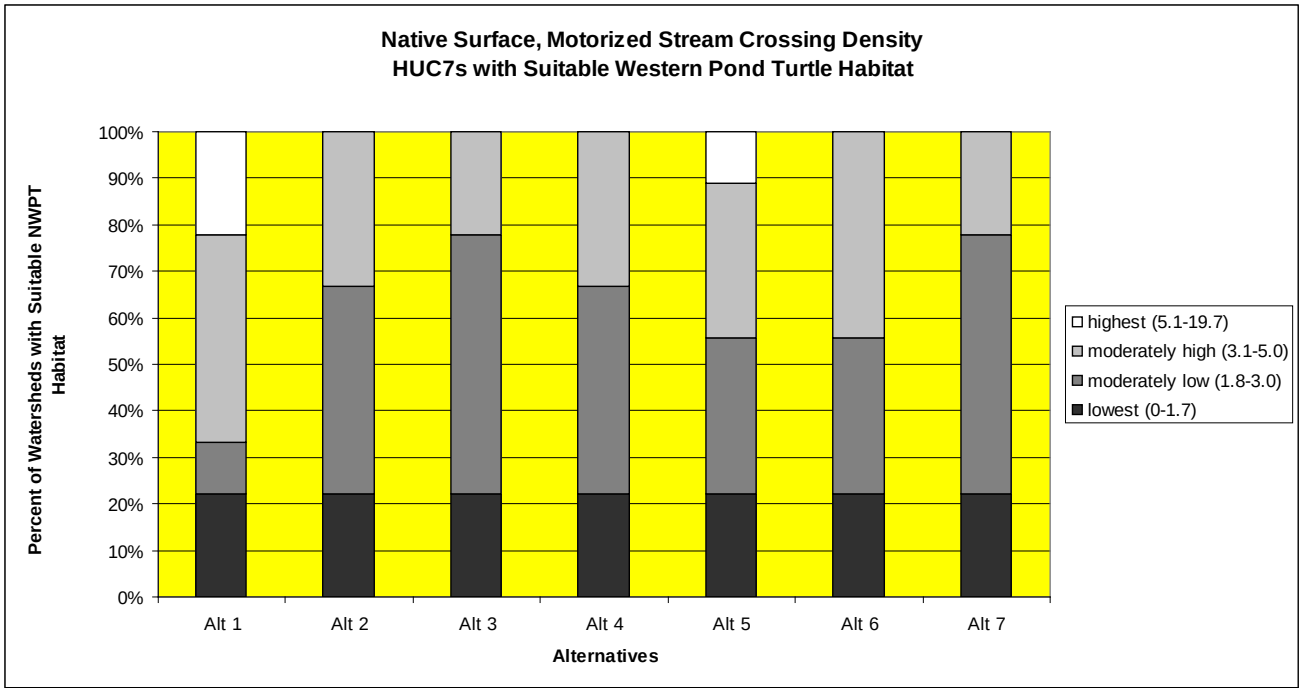

Figure 3.03-18. Northwestern Pond Turtle 7th Field Watersheds by Motorized Crossing

Cumulative Effects

The geographic boundary for assessing cumulative effects to the northwestern pond turtle is the westside of the Tahoe NF below 6,000 feet within lacustrine habitat (ponds and lakes), since this is within habitat that is considered suitable on the Tahoe NF. This geographic boundary is sufficiently large to encompass historic and potential pond turtle habitat on the Tahoe NF. Any larger boundary could dilute the effects of past, present, and future cumulative impacts to this species. The timeframe for assessing cumulative impacts in the past includes activities that occurred within approximately the last 20 years. Reasonably foreseeable future impacts expand out to approximately 20 years into the future.

Current pond turtle habitat impacts from existing motorized routes has been documented at the Pierce wetland area within the South Yuba - Pierce 7th Field watershed on the Yuba River Ranger District where vehicles have altered and degraded pond turtle riparian vegetation, soils, and hydrology. This particular pond turtle location could be at risk from crushing and mortality and habitat degradation from continued motorized vehicle use off of routes.

Grazing has the potential to add to cumulative effects to the northwestern pond turtle. Known pond turtle locations occur within one active grazing allotment - Willow Creek. The recently closed Our House Allotment also has pond turtle occurrences where grazing impacts would no longer occur in the future. An additional 10 allotments has potential pond turtle habitat and could receive cumulative impacts from livestock grazing were turtles to be found there.

Alternative 1 would result in the greatest cumulative impacts to current existing cumulative impacts where HUC7 watersheds where pond turtles are located, and would have the have the greatest route densities and stream crossing densities compared to all the action alternatives. Beneficial impacts to pond turtle habitat would occur with all the action alternatives similarly from the reduction in RCA route density and stream crossing density. Alternative 5 would benefit the least and Alternative 3 would benefit the most. Direct and indirect beneficial effects of the action alternatives would prohibit cross country travel on 31 to 47 total crossings and on between 10 to 17 RCA miles within HUC7s

Non-motorized use (hiking, mountain bicycling, equestrian, etc.) may occur on routes that would be prohibited to motorized use. In general, it is expected that impacts from non-motorized use would be less than motorized use. Over time, it is expected that these the prohibition of cross country travel, including on motorized routes unauthorized to motorized public use would become revegetated and recover through active or passive means, and ultimately benefit the northwestern pond turtle in the future.

Summary of Direct, Indirect, and Cumulative Effects of Proposed Actions

Table 3.03-158 summarizes the direct, indirect, and cumulative effects of native surfaced, motorized route crossings within NWPT HUC 7 watersheds, from existing motorized routes, motorized route additions, and routes unauthorized to motorized public travel from the proposed actions, including wet weather seasonal restrictions, changes in class of vehicles, prohibition of cross country travel. See Chapter 3.02, Watershed Resources: Geology, Soil, Hydrology, for more detailed information and assumptions.

Table 3.03-158. Northwestern Pond Turtle 7th Field Watersheds – Summary of Direct, Indirect, and Cumulative Effect of Proposed Actions as Measured by Native Surfaced, Motorized Crossings

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Habitat Prohibited to Cross Country Travel	0	7,986	7,986	7,986	7,986	7,986	7,986
Crossings closed by previous NEPA decisions, pending implementation	1	1	1	1	1	1	1
Unauthorized Crossings Prohibited to Cross Country Travel	0	43	46	44	30	39	46
Total Crossings Prohibited to Cross Country Travel	**1**	**44**	**47**	**45**	**31**	**40**	**47**
Motorized Stream Crossings							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Existing NFTS Native Surfaced, Motorized Stream Crossings	14	14	14	14	14	14	14
Native Surfaced, Motorized Crossing Additions*	46	3	0	2	16	7	0
Change in Class of Vehicles from Smooth Surfaced to Native Surfaced Crossings	0	0	0	0	0	0	0
Native Surfaced Crossings from Reopened ML 1 Roads	0	0	0	0	0	0	0

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Net Native Surfaced, Motorized Crossings*	**60**	**17**	**14**	**16**	**30**	**21**	**14**
Wet Weather Seasonal Restrictions on all Native Surfaced Routes	None	None	None	Beneficial - Wet Weather Restrictions would be implemented.	Beneficial - Wet Weather Restrictions would be implemented.	Beneficial - Wet Weather Restrictions would be implemented.	None
Net Direct, Indirect, and Cumulative Effect of Proposed Actions	Cumulative adverse effects from continued motorized cross country travel on 7,986 RCA acres, including on 46 native surfaced, stream crossings. Motorized use continues on 60 native surfaced, crossings No additional protection to NWPT habitats from wet weather seasonal restrictions.	4th most beneficial alternative. Motorized cross country travel prohibited on 7,986 RCA acres, including on 44 native surfaced, stream crossings. 17 NFTS crossings available for motorized use. No additional protection to NWPT habitats from wet weather seasonal restrictions.	3rd most beneficial alternative, shared with Alternative 7. Motorized cross country travel prohibited on 7,986 RCA acres, including on 47 native surfaced, stream crossings 14 NFTS crossings available for motorized use. No additional protection to NWPT habitats from wet weather seasonal restrictions.	Most beneficial alternative. Motorized cross country travel prohibited on 7,986 RCA acres, including on 45 native surfaced, stream crossings 16 NFTS crossings available for motorized use. Reduced sedimentation risk to NWPT habitats from wet weather seasonal restrictions.	Least beneficial alternative due to number of native surfaced crossings added. Motorized cross country travel prohibited on 7,986 RCA acres, including on 31 native surfaced, stream crossings 30 NFTS crossings available for motorized use. Reduced sedimentation risk to NWPT habitats from wet weather seasonal restrictions.	2nd most beneficial alternative. Motorized cross country travel prohibited on 7,986 RCA acres, including on 40 native surfaced, stream crossings 21 NFTS crossings available for motorized use. Reduced sedimentation risk to NWPT habitats from wet weather seasonal restrictions.	3rd most beneficial alternative, shared with Alternative 3. Motorized cross country travel prohibited on 7,986 RCA acres, including on 47 native surfaced, stream crossings 14 NFTS crossings available for motorized use. No additional protection to NWPT habitats from wet weather seasonal restrictions.

*Alternative 1 includes existing native surfaced, unauthorized routes, while all the action alternatives include motorized route additions.

Table 3.03-159 summarizes the direct, indirect, and cumulative effects of native surfaced, motorized RCA route miles within NWPT HUC 7 watersheds, from existing motorized routes, motorized route additions, and routes unauthorized to motorized public travel from the proposed actions, including wet weather seasonal restrictions, changes in class of vehicles, prohibition of cross country travel. See Chapter 3.02, Watershed Resources: Geology, Soil, Hydrology, for more detailed information and assumptions.

Table 3.03-159. Northwestern Pond Turtle 7th Field Watersheds – Summary of Direct, Indirect, and Cumulative Effect of Proposed Actions as Measured by RCA Motorized Route Miles

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Habitat Prohibited to Cross Country Travel	0	7,986	7,986	7,986	7,986	7,986	7,986
RCA miles closed by previous NEPA decisions, pending implementation	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Unauthorized RCA Miles Prohibited to Cross Country Travel	0	15.8	16.6	16.2	9.9	13.4	16.3
Total RCA Miles Prohibited to Cross Country Travel	**0.5**	**16.3**	**17.1**	**16.7**	**10.4**	**13.9**	**16.8**
RCA Miles of Native Surfaced, Motorized Routes							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Existing RCA Miles	5.3	5.3	5.3	5.3	5.3	5.3	5.3
RCA Miles of Route Additions*	16.5	0.8	0	0.4	6.6	3.1	0.2
Change in Class of Vehicles Resulting in Maintenance Changed from Smooth Surfaced to Native Surfaced Motorized Route miles	0	0	0	0	0	0	0
Net NFTS Native Surfaced, Motorized RCA Miles*	**21.8**	**6.2**	**5.3**	**5.7**	**11.9**	**8.4**	**5.5**
Wet Weather Seasonal Restrictions on all Native Surfaced Routes	None	None	None	Beneficial -	Beneficial - Wet Weather Restrictions would be implemented	Beneficial - Wet Weather Restrictions would be implemented	None

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Net Direct, Indirect, and Cumulative Effect of Proposed Actions	Cumulative adverse effects from continued motorized cross country travel on 7,986 RCA acres, including on 16.5 RCA miles of unauthorized routes . Motorized use continues on 21.8 RCA miles. No additional protection to NWPT habitats from wet weather seasonal restrictions.	4th most beneficial alternative. Motorized cross country travel prohibited on 7,986 RCA acres, including on 16.3 RCA miles of unauthorized routes. NFTS motorized use available on 6.2 RCA miles. No additional protection to NWPT habitats from wet weather seasonal restrictions.	3rd most beneficial alternative, shared with Alternative 7. Motorized cross country travel prohibited on 7,986 RCA acres, including on 17.1 RCA miles of unauthorized routes. NFTS motorized use available on 5.3 RCA miles. No additional protection to NWPT habitats from wet weather seasonal restrictions.	Most beneficial alternative. Motorized cross country travel prohibited on 7,986 RCA acres, including on 16.7 RCA miles of unauthorized routes. NFTS motorized use available on 5.7 RCA miles. Reduced sedimentation risk to NWPT habitats from wet weather seasonal restrictions.	Least beneficial alternative due to number of native surfaced crossings added. Motorized cross country travel prohibited on 7,986 RCA acres, including on 10.4 RCA miles of unauthorized routes . NFTS motorized use available on 11.9 RCA miles. Reduced sedimentation risk to NWPT habitats from wet weather seasonal restrictions.	2nd most beneficial alternative. Motorized cross country travel prohibited on 7,986 RCA acres, including on 13.9 RCA miles of unauthorized routes. NFTS motorized use available on 8.4 RCA miles. Reduced sedimentation risk to NWPT habitats from wet weather seasonal restrictions.	3rd most beneficial alternative, shared with Alternative 3. Motorized cross country travel prohibited on 7,986 RCA acres, including on 16.8 RCA miles of unauthorized routes. NFTS motorized use available on 5.5 RCA miles. No additional protection to NWPT habitats from wet weather seasonal restrictions.

*Alternative 1 includes existing native surfaced, unauthorized routes, while all the action alternatives include motorized route additions.

Sensitive Aquatic Mollusks

This section will also address two Sensitive aquatic mollusk species currently designated as Sensitive by the Regional Forester, the Great Basin ramshorn snail and the California floater.

Great Basin Ramshorn Snail: Affected Environment

The Great Basin ramshorn snail (GBRS) is listed as Sensitive on the Region 5 Forester's Sensitive Species List (USDA Forest Service 1998). The Great Basin ramshorn snail occurs in a highly restrictive distribution but is locally abundant. Historically, the Great Basin ramshorn snail occurred within the lakes and larger, slow streams in and around the northern Great Basin. In California the snail was known to occur in six local drainages in which the species probably survives in four of these drainages.

The Great Basin ramshorn snail occurs in larger lakes and slow rivers including larger spring sources and spring-fed creeks. These snails characteristically burrow in soft mud and may be invisible even when abundant (Taylor 1981). The Great Basin ramshorn snail can occur with *Pisidium ultramontanum*, *Lanx klamathensis*, or several other endemic mollusks (Frest and Johannes 1993). It also occurs with *Juga acutifilosa* and *Fluminicola seminalis*. Habitat requirements include cold highly oxygenated water, muddy substrate, and slow stream flow. Springs are preferred, but the snail will use river margins. Soft sediments are preferred. Threats to snails have been attributed to water diversions and water pollution. Mitigations for fish species, such as adding spawning gravels, may harm this species by smothering soft mud habitats.

Historically, the GBRS has been observed in the Truckee River directly downstream of Lake Tahoe, on the Lake Tahoe Basin Management Unit. Currently, this snail has not been sighted or surveyed for on the Tahoe National Forest. Suitable habitat occurs within slow segments of the Truckee and Little Truckee Rivers and their tributaries.

Road and trail-associated risks to this species are similar to those described for fish and frogs described above and include habitat alteration, changes in water flow regime, changes in water quality and loss of hosts for development.

Great Basin Ramshorn Snail: Environmental Consequences

Indicators used to Measure Effects

Cross Country Travel: The prohibition of cross country travel is analyzed for the alternatives to estimate the potential benefits and reduction in effects to twelve GBRS 7th field watersheds from motorized cross country travel.

Additions to the NFTS (GBRS 7th field watersheds): Measures or indicators of changes in sedimentation and water surface shade are assessed by analyzing the number of stream crossings additions associated with motorized route additions to the NFTS, and the miles of motorized route additions within Riparian Conservation Areas (RCAs) for GBRS 7th field watersheds

Establishment of Open Areas: The establishments of "Open Areas" at Boca, Stampede, and Prosser reservoirs were evaluated under the section "Effects Common to All Aquatic Species." The Greenhorn

"Open Area" is not within the geographic range of the GBRS, and therefore, no further analysis is warranted.

Change in Class of Vehicles (Changed Maintenance Standards): Changing the class of vehicle on a particular route potentially changes the impacts to soil and water resource due to changes in the road surface (i.e. from smooth surfaced to rough surfaced) (see Chapter 3.02, Watershed Resources: Geology, Soil, and Hydrology). If the route changes from smoothed surfaced to native surfaced (rough surfaced), the change in class of vehicle may result in increased sediment and erosion risk to GBRS habitat. The change in class of vehicle and associated maintenance downgrades is evaluated for their potential to affect selected 7th field watersheds that may have suitable habitat for the GBRS.

Wet Weather Seasonal Closures: Wet weather seasonal closures were evaluated under "Effects Common to All Aquatic Species."

Reopened ML 1 Roads. Reopening of ML 1 roads are analyzed for their potential effects to GBRS for the alternatives.

Route Density within Riparian Conservation Areas (RCAs) and Stream Crossing Density within RCAs: The GBRS shares the same twelve 7th field watersheds as the tui chub (Alder Creek, Prosser Creek, Prosser Creek Reservoir, Middle Truckee River-Lower Prosser Creek, Little Truckee River-Saddle Meadow, Lower Sagehen Creek, Lower Davies, Hoke Valley, Stampede Reservoir, Little Truckee River Canyon, Russel Valley, and Boca Reservoir). Refer to the Lahontan Lake Tui Chub section for analysis of native surfaced route densities within RCAs and stream crossing density.

Direct and Indirect Effects

The Great Basin ramshorn snail has not been sighted or surveyed for on the Tahoe National Forest. Suitable habitat occurs within slow flowing segments of the Truckee and Little Truckee Rivers and associated tributaries. Direct effects to the species from the action alternatives are not likely since confirmation of the species presence has not been confirmed. The nearest known occurrence of the GBRS is within the Truckee River downstream of Lake Tahoe on the Lake Tahoe Basin Management Unit. The alternatives will be evaluated for their potential indirect impacts to potential habitat for this species. Potential habitat for this species occurs within twelve 7th Field watersheds on the eastside of the Tahoe NF (Alder Creek, Prosser Creek, Prosser Creek Reservoir, Middle Truckee River-Lower Prosser Creek, Little Truckee River-Saddle Meadow, Lower Sagehen Creek, Lower Davies, Hoke Valley, Stampede Reservoir, Little Truckee River Canyon, Russel Valley, and Boca Reservoir).

Cross Country Travel. Table 3.03-160 shows that under Alternative 1, no action, motorized cross country travel would continue on 12,359 Riparian Conservation Areas (RCAs) acres within GBRS HUC7 watersheds, where the potential for adversely affecting GBRS habitat could occur by increasing sedimentation and altering streamside vegetation. Under the action alternatives, the prohibition of cross country travel results in prohibiting motorized use on 12,359 RCA acres, including 22.7 to 26.7 RCA miles and from 28 to 35 native surfaced, motorized crossings (Alternative 5 prohibits the least, Alternative 3 prohibits the most). Cross country travel prohibitions would likely reduce the potential for sedimentation and alteration of streamside vegetation, and therefore benefit GBRS habitat.

Table 3.03-160. Cross Country Travel within Twelve GBRS 7th Field Watersheds

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Acres cross country prohibited	0	12,359	12,359	12,359	12,359	12,359	12,359
Crossings prohibited to cross country travel	0	31	35	34	30	28	32
RCA miles prohibited to cross country travel	0.6	24.7	26.7	26.2	22.7	23.5	25.9

Additions to the NFTS – Stream Crossings and RCA Miles

Number of Native Surfaced, Motorized Stream Crossing Additions within Twelve GBRS 7th Field Watersheds. The number of native surfaced, motorized stream crossings, proposed for addition to the NFTS, are assessed for the alternatives, and provides a useful way to compare potential changes in sediment delivery within GBRS HUC7 watersheds. Alternative 1 poses the greatest risk of increased sedimentation where 35 native surfaced, stream crossings are associated with the continuance of cross country travel on existing unauthorized motorized routes (Table 3.03-161). In increasing order, Alternatives 4, 2, 7, 6, and 5 would result in the addition of 1 to 7 native surfaced, motorized route crossings. Alternative 3 does not result in additional native surfaced, motorized stream crossings within the twelve GBRS HUC7 watersheds, and therefore sedimentation or streamside vegetation would not be affected.

Table 3.03-161. Great Basin Ramshorn Snail HUC7 Watersheds - Number of Native Surfaced, Stream Crossings Associated with Motorized Route Additions to the NFTS

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Motorized Stream crossings associated with proposed motorized route additions to NFTS (negative impact)	35	2	0	1	5	7	3

*Alternative 1 includes motorized stream crossings that would remain with the continuance of cross country travel on existing unauthorized routes, while all the action alternatives include motorized crossing additions.

RCA Miles of Proposed Additions to the NFTS within GBRS 7th Field Watersheds. The miles of proposed motorized route additions to the NFTS within RCAs were assessed for the alternatives, and provide additional information to assess the potential for off-site sediment delivery into GBRS habitats at the HUC7 level. Alternative 1 poses the greatest risk to increased sedimentation potential from 26 RCA miles of motorized routes unauthorized for motorized use that would remain due to not prohibiting cross country travel (Table 3.03-162). Similar to stream crossing numbers, Alternatives 2, 4, 5, 6, and 7 propose to add between 0.5 and 3.2 RCA miles (Alternative 4 adds the least, Alternative 5 adds the most) of motorized routes. Alternative 3 does not add motorized routes to the NFTS, and therefore changes to sedimentation or streamside vegetation would not occur within any GBRS HUC7 watershed.

Table 3.03-162. Miles of Proposed Motorized Route Additions within twelve GBRS HUC7 Watersheds

	Alt 1*	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Miles of proposed motorized route additions within RCAs (negative impact)	26.1	2.0	0	0.5	4.0	3.2	0.9

*Alternative 1 includes motorized stream crossings that would remain with the continuance of cross country travel on existing unauthorized routes, while all the action alternatives include motorized crossing additions.

Change in Class of Vehicles. For each of the alternatives, Table 3.03-163 displays the effects of proposed changes in class of vehicles and the associated maintenance downgrades that have to potential to increase the risk of delivering sedimentation and erosion to GBRS HUC7 watersheds. Alternatives 2, 5, and 6 result in changed road maintenance resulting in changes from smooth surfaced roads to rough surfaced roads. This change in road surface type has a higher potential to result in increased sedimentation to GBRS habitat on 7 stream crossings and 2.3 miles of native surfaced, motorized routes.

Table 3.03-163. Great Basin Ramshorn Snail (12 HUC7s) –Change in Class of Vehicles as Measured by changes Native Surfaced, Motorized Crossings and Motorized Route Miles

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Number of Native Surfaced Crossings where changed maintenance standards result in smooth surfaced to native surfaced crossings	0	7	0	0	7	7	0
RCA Motorized Route Miles where changed maintenance standards result in smooth surfaced to native surfaced crossings	0	2.3	0	0	2.3	2.3	0

Reopened ML 1 Roads. No ML 1 roads are proposed within RCAs of GBRS habitats, and therefore would not affect GBRS or habitat under any of the alternatives.

Cumulative Effects

Cumulative Effects Boundary in Space and Time

The geographic boundary for assessing cumulative effects to the Great Basin ramshorn snail on the Tahoe NF within the twelve watersheds that may potentially indirectly impact suitable habitat for the species. Suitable habitat for this species occurs within slow flowing segments of the Truckee and Little Truckee Rivers and associated tributaries on the eastside of the Forest. This cumulative effects boundary is sufficiently large to assess all past, present, and future cumulative effects to suitable habitat for the ramshorn snail. Any larger boundary could dilute the effects of past, present, and future cumulative impacts to this species. The timeframe for assessing cumulative impacts in the past includes activities that occurred within the last 50 to 100 years. Reasonably foreseeable future impacts expand out to approximately 25 years into the future.

Cumulative Effects of Past, Present, and Reasonably Foreseeable Actions

Historically, the Great Basin ramshorn snail has been observed in the Truckee River directly downstream of Lake Tahoe, on the Lake Tahoe Basin Management Unit. The current knowledge of the species

distribution within the Great Basin is limited in scope. Potential past cumulative effects to this species includes habitat degradations from water diversions, reduced water quality, urbanization, livestock grazing, recreational activities, and others. Relatively little is known about the life history of this species to adequately and effectively address cumulative effects to this species without a lot of speculation. Therefore, there is a great deal of uncertainty surrounding the past cumulative effects to this species from these activities.

Under Alternative 1, cumulative effects from unauthorized motorized routes would be greatest where HUC7 watersheds with potential ramshorn snail habitat would have the highest RCA route densities and the highest route crossing densities. The indirect impacts of potential sediment delivery from existing motorized routes unauthorized to motorized public use in Alternative 1 would add considerable cumulative impacts to potential ramshorn snail habitat where 83% (10 of 12) HUC7 watersheds route densities within the highest route density category. Alternative 1 would have the highest stream crossing densities compared to all the action alternatives. The remaining alternatives improve both route density within Riparian Conservation Areas and stream crossing densities with Alternative 5 reducing the least and Alternatives 3, 4, and 7 reducing the most.

For all the action alternatives, future unmanaged cross country motorized travel would be prohibited. In addition, prohibition of cross country travel, including on the majority of existing routes unauthorized to motorized public use, would likely benefit suitable ramshorn snail habitat in the long-term once these routes are rehabilitated through obliteration or other means. Non-motorized use (hiking, mountain bicycling, equestrian, etc.) may occur on these routes that would be prohibited to motorized use. In general, it is expected that impacts from non-motorized use would be less than motorized use. Over time, it is expected that these routes would become revegetated and recover through active or passive means, and ultimately benefit habitat for the Great Basin ramshorn snail in the future.

Summary of Direct, Indirect, and Cumulative Effects of Proposed Actions

Table 3.03-164 summarizes the direct, indirect, and cumulative effects of native surfaced, motorized route crossings within Great Basin ramshorn snail HUC 7 watersheds, from existing motorized routes, motorized route additions, and routes unauthorized to motorized public travel from the proposed actions, including wet weather seasonal restrictions, changes in class of vehicles, prohibition of cross country travel. See Chapter 3.02, Watershed Resources: Geology, Soil, Hydrology, for more detailed information and assumptions.

Table 3.03-164. Great Basin Ramshorn Snail 7th Field Watersheds – Summary of Direct, Indirect, and Cumulative Effect of Proposed Actions as Measured by Native Surfaced, Motorized Crossings

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Cross Country Travel							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Acres Cross Country Travel Prohibited	0	12,359	12,359	12,359	12,359	12,359	12,359
Crossings Prohibited to Cross Country Travel	0	31	35	34	30	28	32
RCA Miles Prohibited to Cross Country Travel	0.6	24.7	26.7	26.2	22.7	23.5	25.9
Native Surfaced, Motorized Routes							
Trend of Effect	Negative	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Existing Stream Crossings	82	82	82	82	82	82	82
Native Surfaced, Motorized Crossing Additions*	35	2	0	1	5	7	3
Change in Class of Vehicles Resulting in Smooth Surfaced to Native Surfaced Crossings	0	7	0	0	7	7	0
Net Native Surfaced, Motorized Crossings	**117**	**91**	**82**	**83**	**94**	**96**	**85**
Wet Weather Seasonal Restrictions on all Native Surfaced Routes	None	None	None	Beneficial - Wet Weather Restrictions would be implemented	Beneficial - Wet Weather Restrictions would be implemented	Beneficial - Wet Weather Restrictions would be implemented	None

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Net Direct, Indirect, and Cumulative Effect of Proposed Actions	Most negative alternative. Motorized cross country travel continues on 12,359 RCA acres, including on 35 native surfaced, stream crossings. 117 NFTS total crossings would receive motorized use. No additional protection to GBRS habitats from wet weather seasonal restrictions.	6th most beneficial alternative. Motorized cross country travel prohibited on 12,359 RCA acres, including on 31 native surfaced, stream crossings. 91 NFTS crossings available for motorized use. No additional protection to GBRS habitats from wet weather seasonal restrictions.	4th most beneficial alternative. Motorized cross country travel prohibited on 12,359 RCA acres, including on 35 native surfaced, stream crossings. 82 NFTS crossings available for motorized use. No additional protection to GBRS habitats from wet weather seasonal restrictions.	Most beneficial alternative. Motorized cross country travel prohibited on 12,359 RCA acres, including on 34 native surfaced, stream crossings. 83 NFTS crossings available for motorized use. Reduced sedimentation risk to GBRS habitats from wet weather seasonal restrictions.	2nd most beneficial alternative. Motorized cross country travel prohibited on 12,359 RCA acres, including on 30 native surfaced, stream crossings. 94 NFTS crossings available for motorized use. Reduced sedimentation risk to GBRS habitats from wet weather seasonal restrictions.	3rd most beneficial alternative. Motorized cross country travel prohibited on 12,359 RCA acres, including on 28 native surfaced, stream crossings. 96 NFTS crossings available for motorized use. Reduced sedimentation risk to GBRS habitats from wet weather seasonal restrictions.	5th most beneficial alternative. Motorized cross country travel prohibited on 12,359 RCA acres, including on 32 native surfaced, stream crossings. 85 NFTS crossings available for motorized use. No additional protection to GBRS habitats from wet weather seasonal restrictions.

*Alternative 1 includes existing native surfaced, crossings unauthorized to motorized use, while all the action alternatives include motorized crossing additions.

Table 3.03-165 summarizes the direct, indirect, and cumulative effects of native surfaced, motorized RCA route miles within GBRS HUC 7 watersheds, from existing motorized routes, motorized route additions, and routes unauthorized to motorized public travel from the proposed actions, including wet weather seasonal restrictions, changes in class of vehicles, prohibition of cross country travel. See Chapter 3.02, Watershed Resources: Geology, Soil, Hydrology, for more detailed information and assumptions.

Table 3.03-165. Great Basin Ramshorn Snail 7th Field Watersheds – Summary of Direct, Indirect, and Cumulative Effect of Proposed Actions as Measured by RCA Motorized Route Miles

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Acres Cross Country Travel Prohibited	0	9,770	12,359	12,359	12,359	12,115	12,359
RCA Route Miles Unauthorized to Motorized Use Where Cross Country Travel is Prohibited	0.6	24.7	26.7	26.2	22.8	23.5	25.9
Existing NFTS RCA Miles of Native Surfaced, Motorized Routes	31.3	31.3	31.3	31.3	31.3	31.3	31.3
RCA Miles of Native Surfaced, Motorized Route Additions*	26.1	2.0	0	0.5	4.0	3.2	0.9
Establishment of Open Areas	Cross country travel continued around Boca, Stampede, Prosser and Greenhorn	2,589	0	0	0	244	0
Change in Class of Vehicles Resulting in Maintenance Changed from Smooth Surfaced to Native Surfaced Motorized miles	0	2.3	0	0	2.3	2.3	0
Net NFTS Native Surfaced, Motorized RCA Miles	**58**	**35.6**	**31.3**	**31.8**	**37.6**	**36.8**	**32.2**
Wet Weather Seasonal Restrictions on all Native Surfaced Routes	None	None	None	Beneficial - Wet Weather Restrictions would be implemented	Beneficial - Wet Weather Restrictions would be implemented	Beneficial - Wet Weather Restrictions would be implemented	None

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Net Direct, Indirect, and Cumulative Effect of Proposed Actions	Most negative alternative – adverse cumulative impacts. Motorized cross country travel continues on 12,359 RCA acres, including on 26 RCA miles of unauthorized routes. No additional protection to GBRS habitats from wet weather seasonal restrictions.	6th most beneficial alternative. Motorized cross country travel prohibited on 9,770 RCA acres. NFTS motorized use available on 35.6 RCA miles. No additional protection to GBRS habitats from wet weather seasonal restrictions.	4th most beneficial alternative. Motorized cross country travel prohibited on 12,359 RCA acres. NFTS motorized use available on 31.3 RCA miles. No additional protection to GBRS habitats from wet weather seasonal restrictions.	Most beneficial alternative. Motorized cross country travel prohibited on 12,359 RCA acres NFTS motorized use available on 31.8 RCA miles. Reduced sedimentation risk to GBRS habitats from wet weather seasonal restrictions.	2nd most beneficial alternative. Motorized cross country travel prohibited on 12,359 RCA acres. NFTS motorized use available on 37.6 RCA miles. Reduced sedimentation risk to GBRS habitats from wet weather seasonal restrictions.	3rd most beneficial alternative. Motorized cross country travel prohibited on 12,115 RCA acres. NFTS motorized use available on 36.8 RCA miles. Reduced sedimentation risk to GBRS habitats from wet weather seasonal restrictions.	5th most beneficial alternative. Motorized cross country travel prohibited on 12,359 RCA acres. NFTS motorized use available on 32.2 RCA miles. No additional protection to GBRS habitats from wet weather seasonal restrictions.

*Alternative 1 includes existing unauthorized routes, while all the action alternatives include motorized route additions.

California Floater: Affected Environment and Environmental Consequences

The California floater (*Anodonta californiensis*) is listed as a Sensitive Species in Region 5 and designated as a "species of special concern" by the State of California. The California floater occurs in lakes and slow rivers (Taylor 1981), generally, on soft substrates (mud-sand), in fairly large streams and lakes, in relatively slow currents (Frest and Johannes 1995).

The current known distributions in California are the Lassen, Modoc, and Shasta-Trinity National Forests. This species still survives in Fall and Pit Rivers, Shasta Co. The California floater has been reported to occur adjacent to the Tahoe NF, but no occurrences have been documented on NFS lands within the boundary of the Tahoe NF. Donner Lake is reported as the locality of an unconfirmed historic sighting in a mollusk database created by Drs. Jayne Brim-Box and Jeff Kershner (pers. communication). The species has been reported to occur at the following sites in Nevada: 1)Truckee River, 2) Humboldt River, Humboldt Basin, Elko, Co. in 1979, 3) Thousand Springs Valley northeast of Wells, Elko Co., Lake Bonneville Basin in 1989 (Nevada Natural Heritage Database).

Howard and Cuffey (2003) found that the California floater was almost exclusively found in pools with no riffles and very few in runs in the south Fork of the Eel River in Oregon.

Road and trail-associated risks to the California floater are similar to those described for other aquatic species described above, and include changes in sedimentation delivery, habitat alteration, changes in water flow regime, changes in water quality and loss of hosts for development.

Direct, Indirect and Cumulative Effects

The California floater has not been confirmed to occur on the Tahoe NF, therefore the alternatives would not directly or indirectly affect the California Floater. Historically, the California floater was reported from Donner Lake within private lands and near Lake Tahoe within the Truckee River. Potentially suitable habitat for the floater on the Tahoe NF includes the Truckee River and streams tributary to it. Direct, indirect and cumulative effects to potentially suitable habitat of the floater would be similar to those addressed for the Great Basin ramshorn snail. See Environmental Consequences for ramshorn snail in the previous section.

Compliance with Forest Plan and Other Direction

The Tahoe LRMP, as amended by the SNFPA 2004, provides management direction for riparian and aquatic dependent resources. The following management standards and guidelines apply to the TNF Travel Management Project for aquatic species and were considered for the analysis of the alternatives.

1. *Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives (RCOs) at the project level and the AMS goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species (Management Standard & Guideline 92).*

In the sections above, the alternatives for the Tahoe NF Motorized Travel Management Project were analyzed for consistency with the LRMP riparian conservation objectives (See RCO analysis). Management design standards and mitigation measures were developed to minimize the risk of increasing sediment to aquatic systems and to minimize impacts to habitat for aquatic and riparian dependent species. All proposed action alternatives reduce or minimizes adverse effects to aquatic systems, particularly through the prohibition of cross country travel within close proximity or adjacent to aquatic ecosystems.

2. *Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity (RCO#2, Management Standard & Guideline 100).*

   Under the action alternatives, native surfaced, motorized route and area additions and their associated stream crossings were evaluated for their hydrologic condition. Corrective actions and mitigation measures were developed when it was deemed necessary. See Appendix A (Site Specific Road, Trail and Open Area Information), Watershed Resources: Geology, Soil, Hydrology (Chapter 3.02), and Appendix I (Riparian Conservation Objectives).

3. *Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic-dependent species. Locate water drafting sites to avoid adverse effects to in stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features (RCO#2, Management Standard & Guideline 101).*

   Proposed stream crossings additions were inventoried and evaluated for their condition. Appropriate mitigation measures were developed (See Appendix A, Site Specific Road, Trail and Open Area Information).

4. *Prior to activities that could adversely affect streams, determine if relevant stream characteristics are within the range of natural variability. If characteristics are outside the range of natural variability, implement mitigation measures and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs (RCO#2, Standard and Guideline 102).*

   Proposed route additions to the NFTS were inventoried and assessed for their condition. Conditions were described and mitigations measures were developed as appropriate.

5. *Identify roads, trails, OHV trails and staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits, and day use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic and riparian-dependent species. At the project level, evaluate and consider actions to ensure consistency with standards and guidelines or desired conditions (RCO#3, Management Standard and Guideline 116).*

For the Tahoe NF Travel Management Project, each proposed route addition was evaluated for their potential to degrade water quality or habitat for aquatic and riparian-dependent species. Proposed route additions were evaluated for their proximity to aquatic habitats and their potential to affect aquatic systems, including water quality, soil condition, hydrologic connectivity, and riparian vegetation.

Summary of Effects Analysis across All Alternatives

The following tables provide a relative ranking of effects by Terrestrial Species and Aquatic and Riparian Species. Please refer to the alternative analyses for more detailed descriptions of effects. The score of 7 = least impact for biological resource; score of 1 = most impact for biological resource.

Table 3.03-166. Comparison of Effects to Terrestrial Species

Indicators – Terrestrial Species	Rankings of Alternatives for Each Indicator						
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Density of motorized routes at the watershed level.	1	4	7	6	2	3	5
Acres open to motorized use and Miles of unauthorized routes within terrestrial species habitat.	1	2	7	6	3	4	5
Miles of motorized routes at forest-wide scale and within the habitat for each species group.	1	4	7	6	2	3	5
Number of sensitive sites for TES species (e.g., PACs, nest sites, winter roost areas) within ¼ mile of an added route or area.	1	4	7	6	2	3	5
The proportion of a species (or species group's) habitat that is affected by motorized routes.	1	4	7	6	2	3	5
Average for Terrestrial Species	**1**	**3.6**	**7**	**6**	**2.2**	**3.2**	**5**

Table 3.03-167. Comparison of Effects to Aquatic and Riparian Species

Indicators – Aquatic and Riparian Species	Rankings of Alternatives for Each Indicator						
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
Miles of unauthorized routes within or adjacent to TES aquatic/riparian species habitat.	1	3	7	6	2	4	5
Density of high risk motor vehicle routes as a measure of habitat effectiveness at the 7th field watershed level.	1	3	7	6	2	4	5
Miles of motor vehicle routes and acres of areas at forest-wide scale and within the habitat for each species.	1	3	7	6	2	4	5
The proportion of a species habitat that is affected by motor vehicle routes	1	3	7	6	2	4	5
Number hydrologically sensitive areas within 300 ft. (RCA width) of an added route or area.	1	4	7	6	2	3	5
Average for Aquatic and Riparian Species	**1**	**3.2**	**7**	**6**	**2**	**3.8**	**5**