FINAL Terrestrial Biological Assessment, Evaluation, and Wildlife Report

Rim Fire Recovery

Stanislaus National Forest

Stanislaus National Forest
Pacific Southwest Region
USDA Forest Service
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1. INTRODUCTION

The purpose of this document is to evaluate and disclose the effects of the Stanislaus National Forest (STF) Rim Fire Recovery project to Threatened, Endangered, and Sensitive wildlife species; pursuant to the Endangered Species Act (ESA) of 1973, the National Forest Management Act (1976), Forest Service Manual (FSM) 2670.4, the Stanislaus National Forest Land Management Plan (USDA 1991), as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) Final Supplemental Environmental Impact Statement (FSEIS) (USDA 2004). The STF "Forest Plan Direction" presents the current Forest Plan management direction, based on the original Forest Plan as modified through the Forest Plan appeals and amendment processes (USDA 2010). The content of this BA and BE conforms to legal requirements set forth under Section 7, 19 U.S.C. 1536C, and 50 CFR 402.12.

Threatened & Endangered species are those Federally listed by the USFWS; Candidate species are candidates to become Proposed species but issuance of a proposed rule is currently precluded by higher priority listing actions (USFWS 1998). Sensitive species are those designated by the Regional Forester with the goal of proactively developing and implementing management practices to ensure that those species do not become Threatened or Endangered, and therefore require protection under the Endangered Species Act because of Forest Service actions (FSM 2670). Other species of particular conservation concern may also be identified during the planning process for site-specific projects.

Table 1.	Endangered, Threatened (T), Candidate (C), Sensitive species (S), and other species of conservation concern considered in this analysis. Some species may also be identified as Management Indicator Species (MIS) -- see the Rim Recovery EIS Terrestrial MIS Report for additional details and analysis of species identified as MIS here.

Common Name	Scientific Name	Status	Addressed in detail in this BA/BE/WR
Threatened & Endangered			
Invertebrates			
Valley Elderberry Longhorn Beetle	*Desmocerus californicus dimorphus*	T	yes
Sensitive			
Birds			
Bald Eagle	*Haliaeetus leucocephalus*	S	yes
California Spotted Owl	*Strix occidentalis occidentalis*	S, MIS	yes
Great Gray Owl	*Strix nebulosa*	S	yes
Northern Goshawk	*Accipiter gentilis*	S	yes
Willow Flycatcher	*Empidonax traillii*	S	no
Mammals			
Pacific Marten	*Martes caurina*	S, MIS	yes
Fisher	*Pekania pennanti (*formerly *Martes pennanti pacifica)*	S, C	yes
California Wolverine	*Gulo gulo luteus*	S	no
Sierra Nevada Red Fox	*Vulpes vulpes necator*	S	no
Fringed Myotis	*Myotis thysanodes*	S	yes
Pallid Bat	*Antrozous pallidus*	S	yes
Townsend's Big-Eared Bat	*Corynorhinus townsendii*	S	no
Other species of conservation concern			
Other Species of particular conservation concern for this project			
Black-Backed Woodpecker	*Picoides arcticus*	MIS, SCC	yes
Mule Deer	*Odocoileus hemionus*	MIS, SCC	yes

[1] T = Threatened, C = Candidate, S = Sensitive, MIS = Management Indicator Species, SCC = Species of Conservation Concern.

Species are considered in detail where occupancy has been confirmed or where suitable habitat occurs in close proximity to the project and effects are expected. Refer to the Sierra Nevada Forest Plan Amendment (USDA 2001 and 2004), hereby incorporated by reference, for additional information on species considered in this document.

The Rim Fire Recovery project action area is either outside the geographic range or elevation range or doesn't provide habitat for; willow flycatcher, California wolverine, Sierra Nevada red fox, and Townsend's big-eared bat. Therefore, they will not be considered further in this BA/BE. The following briefly discusses our rationale for not considering these species further:

Willow Flycatcher (*Empidonax traillii)*

The action area is within the historic geographic range of willow flycatcher but this species is most likely extirpated from this area (Siegel et al. 2008a). Although willow flycatcher (*Empidonax traillii*) have been historically documented near portions of the project area, including the Ackerson Meadow complex, the Rim Fire Recovery project footprint does not contain areas with suitably dense willows or wet meadows. Project areas are not expected to result in any disturbance to nesting or foraging willow flycatchers if they

occur in the larger Rim Fire area because project areas are not sufficiently proximal to potential habitat. Thus, this species is not addressed in further detail in this document.

California Wolverine (*Gulo gulo*)

The action area is within the historic geographic range of wolverine (USFS 2001, 2004), but suitable habitat is not present sufficient to meet habitat capability needs for this species. The wolverine is dependent on non-forest alpine habitats associated with permanent snowfields; a critical habitat element is low human disturbance potential (USFS 2001; McKelvey et al. 2008). This habitat type and element are not present in the action area (Rich and Baumbach, pers. obs.). The much publicized occurrence of a wolverine near Lake Tahoe was determined to not be ssp. *luteus* and was most likely a widely dispersing individual from the Sawtooth Range (PSW 2008). Thus, this species is not addressed in further detail in this document.

Sierra Nevada Red Fox (*Vulpes vulpes necator)*

The action area is within the species' historic range (USFS 2001, 2004) but suitable habitat is not present sufficient to meet habitat capability needs. Suitable habitat consists of subalpine zone forests and alpine fell fields at high elevations (USDA 2001, Perrine et al. 2010, Rich et al. 2011, Statham et al. 2012). Such habitat is not present in the action area (Rich and Baumbach, pers.obs.). Thus, this species is not addressed in further detail in this document.

Townsend's Big-eared bat (*Corynorhinus townsendii)*

The action area is within the species' geographic range and suitable habitat exists (USFS 2001, 2004). Foraging habitat is generally described as forested stands, meadows, and the edges of these habitats. The Townsend's big-eared bat is most often associated with and dependent upon buildings, caves or abandoned mines, and bridges for roosting (Kunz and Martin 1982, Pierson et al. 2001, Philpott 1997, USDA 2001). All documented occurrences of Townsend's big-eared bats in the vicinity of the Rim Fire were in caves, mines, and bridges (Bridgman pers. comm., CNDDB database, Pierson and Fellers 1998, Pierson et al. 2001). One maternity colony has been documented on the STF system lands, Bower Cave; about three miles west of the fire perimeter. Although documented to occasionally use basal hollows of trees in coastal forest dominated by redwood, Douglas fir, and California bay (Fellers and Pierson 2002), this has not been documented in the Sierra Nevada. Snag habitat is not considered typical roosting habitat for this species and a reduction in snag habitat has not been identified as a significant threat to this species (Philpott 1997, Region 5 species account). Significant threats identified for this species include White Nose Syndrome, renewed mining, mine reclamation, recreational caving, loss of building roosts, bridge replacement, and human disturbance at these roost sites (Philpott 1997, Region 5 species account). No buildings, caves, abandoned mines, or bridges are expected to be impacted by this project. Further, no change in the distribution of foraging habitat is expected from project implementation. Because no measureable effects to Townsend's big-eared bats are expected from project implementation, no additional analysis for this species is warranted.

2. CONSULTATION TO DATE

Jeremiah Karuzas of the Sacramento office of the US Fish and Wildlife Service was contacted by the STF several days after the Rim Fire started to notify him there may be impacts from the fire or fire suppression activities to listed species, including the VELB and several listed and candidate amphibian species. During preparation of the wildlife portion of the Burned Area Emergency Response report, Mr. Karuzas was contacted to discuss the level of concern and risk to VELB associated with any necessary roadwork. Two Stanislaus National Forest biologists conducted a field trip with Mr. Karuzas through the Rim Fire burn area on November 4th, 2013 and discussed conditions and concerns for listed and candidate species. An official list of Threatened, Endangered, and Proposed species that could occur in or be affected by the Rim Fire Recovery project was obtained from the Sacramento FWS website on January

16, 2014 (Terrestrial Wildlife Biological Evaluation Appendix). This list identified all species that could be affected by activities in the Cherry Lake South, Ascension Mountain, Duckwall Mountain, Tuolumne, Jawbone Ridge, Cherry Lake North and Hull Creek 7½ minute quadrangle maps, and was used as a basis for determining which species should be considered in this document.

3. CURRENT MANAGEMENT DIRECTION

Regional Forester Sensitive Species:

Departmental regulation 9500-004 provides the following direction to Department agencies:

1. Assure that the values of fish and wildlife are recognized, and that their habitats, both terrestrial and aquatic, including wetlands, are recognized and enhanced where possible as the Department carries out its overall missions.
2. Consider fish and wildlife and their habitats in developing programs for these lands. Alternatives that maintain or enhance fish and wildlife habitat should be promoted. When compatible with objectives for the area, management alternatives that improve habitat will be selected.
3. Balance the competing uses for habitat supporting fish and wildlife through strong, clear policies, relevant programs, and effective actions to sustain and enhance fish and wildlife in desired locations and numbers.
4. Recognize that fish and wildlife have inherent values as components and indicators of healthy ecosystems, and that they often demonstrate how altered environments may affect changes in quality of life for humans.
5. Avoid actions "which may cause a species to become threatened or endangered".

Threatened, endangered, candidate, and proposed species under the Endangered Species Act

Departmental regulation 9500-004 directs Department agencies to:

1. Conduct activities and programs "to assist in the identification and recovery of threatened and endangered plant and animal species."
2. Avoid actions "which may cause a species to become threatened or endangered."
3. Consult "as necessary with the Departments of the Interior and/or Commerce on activities that may affect threatened and endangered species."
4. Not "approve, fund or take any action that is likely to jeopardize the continued existence of threatened and endangered species or destroy any habitat necessary for their conservation unless exemption is granted pursuant to subsection 7(h) of the Endangered Species Act of 1973, as amended."

4. PROJECT DESCRIPTION

Following is a description of the alternatives analyzed in detail in this document. Refer to the Rim Fire Recovery EIS for in depth discussion on the alternatives, including those not analyzed in detail. Management requirements specific to each alternative are listed following the alternative description and management requirements common to all alternatives are listed at the end of this section.

Alternative 1 (Proposed Action)

The Forest Service proposed action, within the Rim Fire perimeter in the Stanislaus National Forest, includes: salvage of dead trees; removal of hazard trees and dead trees along roads open to the public and roads used to access and implement proposed treatments; fuel reduction for future forest resiliency to fire; and, road improvements for proper hydrologic function. Implementation is expected to begin summer 2014 and continue up to 5 years. Dead trees in timber units will be designated for removal based on "no green needles visible from the ground". Proposed treatments in the project area include:

- Salvage of dead trees and fuel reduction (28,326 acres) including ground based mechanized equipment such as harvesters and rubber tired skidders (24,127 acres) and aerial based helicopter (2,930 acres), skyline treatments (1,253 acres), or ground based/skyline swing treatments (16).
- Removal of hazard trees, salvage of dead trees and fuel reduction along existing forest roads (341 miles or 16,315 acres).
- Road reconstruction (319.9 miles) and road maintenance (216.1 miles) for proper hydrologic function and stream protection.
- New road construction (5.4 miles) to allow for salvage removal and long-term access for future activities.
- Temporary road construction (13.2 miles). Temporary roads will be decommissioned following completion of project activities and another 8.4 miles of existing non-system roads tied to current and future uses would be used for the project and then reverted afterwards to their original use.
- Rock quarry sites (7 sites) identified to accommodate road needs.
- Water sources (81 locations) identified for road construction, reconstruction and maintenance as well as long-term resource needs.

Wildlife habitat improvement:

Units were identified for treatments to enhance Critical Winter Deer Range (see Mule Deer Section in this report). Also, a Carnivore Connectivity Corridor was identified and established for long-term movement of wildlife from Yosemite National Park through the Stanislaus National Forest.

Management Requirements Specific to Alternative 1

1. Consider additional snags and downed logs to meet habitat needs in Old Forest Emphasis Areas, Spotted Owl Home Range Core Areas, and forest carnivore connectivity corridor.
2. Consider avoiding new landings and skid trails within PACs.
3. Consider avoiding road construction within 0.25 miles of nest roost sites.
4. Within critical winter deer range and migration corridors, remove or pile and burn non-merchantable material to protect remnant oaks and achieve desired forage/cover ratios identified in consultation with the California Department of Fish and Wildlife. This includes proposed units L03, L06, L07, L202 through L206, M201, O201 and P201.
5. Consider mitigating areas where roadside hazard treatments are within PACs and HRCAs by adding acreage to the PAC and/or HRCA equivalent to the treated acres of the most suitable habitat available.

Alternative 2 (No Action)

This alternative provides a baseline for comparing the other alternatives.

Under Alternative 2 (No Action), current management plans would continue to guide management of the project area. General salvage tree removal would not occur. No hazard tree removal would occur adjacent to Level 2 roads. No new permanent road construction, road maintenance, reconstruction, or temporary road construction would occur.

Management Requirements Specific to Alternative 2

There are no management requirements associated with this alternative.

Alternative 3

Alternative 3 responds to resource concerns and research needs by proposing additional treatments and requirements for wildlife habitat enhancement, soil and watershed protections, reduction in the miles of new road construction, and inclusion of several research projects within and outside of treatment units. The proposed activities within Alternative 3 are described under the Proposed Action and would be implemented in a similar manner.

Under Alternative 3, the Stanislaus National Forest proposes to:

- Salvage of dead trees and fuel reduction (30,399 acres) including ground based mechanized equipment such as harvesters and rubber tired skidders (26,252 acres) and aerial based helicopter (3,035 acres), skyline system treatments (1,096 acres), or ground-based/skyline swing treatments (16).
- Removal of hazard trees, salvage of dead trees and fuel reduction along existing forest roads (314.8 miles or 15,253 acres).
- Road reconstruction (323.6 miles) and road maintenance (200.6 miles) for proper hydrologic function and stream protection.
- New road construction (1 mile) to allow for salvage removal and long-term access for future activities.
- Temporary road construction (32.2 miles). Temporary roads will be decommissioned following completion of project activities or used and another 3.3 miles of existing non-system roads tied to current and future uses would be used for the project and then reverted afterwards to their original use.
- Rock quarry sites (7 sites) identified to accommodate road needs.
- Water sources (81 locations) identified for road construction, reconstruction and maintenance as well as long-term resource needs.

In addition to the aforementioned treatments, the following are also proposed under this alternative:

Wildlife habitat improvement:

Several additional units were identified for treatments to enhance the Deer Winter Range (see Mule Deer section in this report).

Several units were identified for management emphasis as a habitat connectivity corridor for old-forest associated species, particularly forest carnivores. The corridor would lead from Yosemite National Park and the North Mountain roadless area west to the Clavey River (see Fisher section in this report for figure). This corridor would include the following proposed units: L02, L05, M1 through M10, M12, M13, M15, M16, M18, M19, and N1.

Management Requirements Specific to Alternative 3

Ensure consistency with Forest Plan and Regional Conservation strategies for terrestrial wildlife:

1. In OFEA, HRCA and FCCC units: (1) Retain all hardwood snags greater than or equal to 12 inches diameter at breast height (dbh); and (2) Retain conifer snags at the rate of 30 square feet basal area per acre on a unit basis (a minimum of the four largest).

   In OFEA, HRCA, FCCC, and in roadside hazard units within Protected Activity Centers (PACs), retain the largest size classes of down woody material at a rate of 15 to 20 tons per acre on a unit basis. In all units, emphasize down woody material retention greater than 100 feet from roadsides.

2. Where roadside hazard treatments are within PACs and HRCAs, add acreage to the PAC and/or HRCA equivalent to the treated acres of the most suitable habitat available.
3. Within suitable post-fire PACs, flag and avoid current and historic nest trees and avoid altering screening vegetation within 500 feet; if hazard abatement is deemed immediately necessary, coordinate with a wildlife biologist and with other disciplines (e.g. recreation) as needed to identify options for the deciding official.
4. LOPs may be reduced in PACs to a 0.25 mile area around a nest site if surveys are conducted to confirm the location of activity centers.
5. Within critical winter deer range and migration corridors, remove or pile and burn non-merchantable material to protect remnant oaks and achieve desired cover/forage ratios identified in collaboration with the California Department of Fish and Wildlife and partners. This includes proposed units L03, L04, L07, L201 through L206, M201 through M204, O201 and P201.
6. Flag and avoid hardwood aggregations and meadows and seeps within units. Aggregations are 1/10 to 1/2 acre groups of sprouting hardwood or of meadow/seep vegetation. Groups or meadows/seeps may be linear along drainages. Reaching in and end lining allowed. Ground-based equipment prohibited. Exceptions should be limited but may be made for operability in consultation with the sale administrator and project biologist.

Alternative 4

Alternative 4 responds to public concerns regarding new road construction and protection of black-backed woodpecker habitat. Thus, proposed activities under Alternative 4 are the same as described under Alternative 3 except: This alternative proposes no new permanent road construction (temporary roads are being used) and drops approximately 2,500 acres of salvage logging in highly suitable black-backed woodpecker habitat.

Management Requirements Specific to Alternative 4

Same as those listed under Alternative 3 above.

Management Requirements Common to All Action Alternatives

Ensure consistency with Forest Plan and Regional Conservation strategies for terrestrial wildlife. Where Protected Activity Centers (PACs) are discussed it applies to spotted owls, goshawks, and great gray owls.

1. In all units retain:
    - All large hardwood snags greater than or equal to 12 inches dbh.
    - A minimum of 4 snags (in the largest size class available) per acre on a unit basis in mixed conifer forest type.
    - A minimum of six snags per acre in red fir forest type.
    - The largest size classes of dead and downed logs greater than or equal to 12 inches in diameter at the midpoint at a rate of 10 to 20 tons/acre.
2. Provide for a forest carnivore connectivity corridor for fisher and marten, linking Yosemite National Park and the North Mountain inventoried roadless area west to the Clavey River, including the following proposed salvage units: L02, L05, M1 through M10, M12, M13, M15, M16, M18, M19, and N1.
3. Do not salvage harvest within PACs unless a biological evaluation determines that the areas proposed for harvests were rendered unsuitable by the Rim Fire for the purpose they were intended.

4. Maintain a Limited Operating Period (LOP) prohibiting vegetation treatments, new road construction, blasting, landing construction, and helicopter flight paths within ¼ mile of a protected activity center during the breeding season for California spotted owls (March 1 through August 31), northern goshawks (February 15 through September 15), great gray owls (March 1 through August 15) and within 0.5 miles of the known bald eagle nest (January 1 through August 31) unless surveys conducted by a Forest Service biologist confirm non-nesting status.
5. Conduct surveys in compliance with the Pacific Southwest Region's survey protocols to establish or confirm the location of the nest activity center for spotted owl, great gray owl and goshawk.
6. For any new permanent road construction within PACs, HRCAs, forest carnivore connectivity corridors or winter deer range, designate the route as blocked Level 1 or Level 2 gated year round.
7. Flag and avoid elderberry plants with stems greater than one inch diameter that occur below 3,000 feet elevation and within 100 feet of planned activities (units V10, V12A, V12B, V13, V14B, X15, X16, X25, Y01A, Y01C, and Y01D).
   - Prohibit ground based mechanical operations and burning within 50 feet of elderberry plants.
   - Pile burning and mechanical activities within 100' of flagged shrubs will be subject to an LOP from April 1 through June 30 of any given year to avoid fire and dust impacts to beetles.
   - If additional elderberry shrubs with stems over 1" diameter are found prior to or during project implementation, they will be similarly avoided and the District wildlife biologist will be notified immediately and adequate mitigation measures will be taken.
8. Notify the District Wildlife Biologist if any Federally Threatened, Endangered, Candidate species or any Region 5 Forest Service Sensitive species are discovered during project implementation so that Limited Operating Periods or other protective measures can be applied, if needed.

5. EXISTING CONDITION

Project Action Area

The Rim Fire area occurred at elevations ranging from about 1,000-7,000 feet and encompasses portions of the Clavey River, Cherry Creek, North, Middle, and South Fork Tuolumne River, North Fork Merced, and Tuolumne River-Don Pedro Reservoir 5th level watersheds, on the west slope of the Sierra Nevada. The Rim Fire burned in a mosaic pattern and includes areas that burned at low, moderate, and high severity. The fire burned with high to extreme fire behavior on two consecutive days, with multiple flaming fronts, the fire made runs of 30,000 to 50,000 acres. Table 2 displays the vegetation burn severity and associated acres across the entire Rim Fire area.

Table 2. Vegetation Burn Severity Within the Rim Fire Area.

Percent Vegetation Burn Severity	Approximate Acres in Rim Fire Perimeter	Percent of Rim Fire Area
0 (unburned)	58,000	23
0-25	55,500	21
25-50	21,500	8
50-75	18,000	7
75-100	104,000	41
TOTAL	**257,000**	**100**

Data source – Rapid Assessment of Vegetation Condition after Wildfire (RAVG), created by the USFS Remote Sensing Applications Center (RSAC), October 2013. Vegetation burn severity is loss of basal area when compared to the pre-fire condition.

This landscape is comprised of vegetative communities including grassland, meadows, oak woodlands, chaparral, lower westside ponderosa pine, mixed conifer and high elevation true fir and lodgepole pine. The majority of forested area is Sierran Mixed Conifer, which includes ponderosa pine, incense cedar, white fir, sugar pine, and black oak. Plantations are also present throughout the project area and consist mainly of ponderosa pine. Other tree species found less frequently include live oak, cottonwood, alder, birch, and Douglas fir. Shrub species present include greenleaf and white leaf manzanita, deer brush, chinquapin, mountain whitethorn, buck brush, gooseberry, toyon, and birch leaf mountain mahogany. The Rim Fire resulted in dramatic changes to habitat availability and distribution across the landscape. Table 3 displays the dominant habitat types present within the Rim Fire area pre- and post-fire.

Table 3. Dominant Habitat Types within the Rim Fire area Pre- and Post fire.

CWHR Habitat Type*	Pre-Fire (acres)	Post-Fire (acres)	Percent Change
Blue Oak Woodland and Blue Oak-Foothill Pine	1,943	1,943	0
Chaparral	31,817	80,541	153
Grassland (annual & perennial)	19,850	19,850	0
Jeffrey Pine	9,038	6,948	-23
Lodgepole Pine	963	413	-57
Montane Hardwood	31,926	31,926	0
Montane Hardwood-Conifer	14,734	14,734	0
Ponderosa Pine	29,994	17,252	-42
Red Fir	3,194	2,446	-23
Sierran Mixed Conifer	105,889	74,050	-30
Subalpine Conifer	1,171	734	-37
White Fir	2,264	1,949	-14

*Represents habitat types with greater than 500 acres pre-fire.

A diverse array of terrestrial wildlife species occur across the landscape, an indication of the diverse habitats available. The Rim Fire resulted in changes to most habitat types and therefore affected wildlife species to varying degrees. Some common species encountered throughout the area include northern flickers, nuthatches, great horned and western screech owls, white-headed and pileated woodpeckers, band-tailed pigeons, California and mountain quail, Douglas and gray squirrels, long-tailed weasels, raccoons, bobcats, mountain lions, bear, coyotes, and mule deer. Some less common species found in the

area include northern goshawks, California spotted owls, and great gray owls, all Region 5 Forest Service Sensitive species. Although Pacific marten and fisher are not documented to occur on the Stanislaus National Forest within the fire perimeter, they are known to occur in close proximity and are also Region 5 Forest Service Sensitive species.

Habitat connectivity across the landscape is critical to wildlife as it provides a means for dispersal, linkages between suitable habitat patches or core habitat areas, and genetic exchange. The Rim Fire resulted in reducing forest habitat connectivity at various scales, affecting habitat availability and wildlife movement. Cover in high severity burned areas has been compromised and wildlife responses to this include: avoidance, modified use, or increased use as vegetation becomes re-established. Habitat connectivity can be affected by the presence of roads. Roads provide increased access, resulting in additional disturbance to wildlife and adversely affecting habitat quality. Both roads and unsuitable habitat can be effective barriers isolating suitable habitat patches for a given species. The total road density (motorized and non-motorized routes) is 3.67 miles per square mile on National Forest System lands.

Key habitat elements commonly used by wildlife include: downed woody debris and snags in various stages of decay, understory vegetation, large trees with deeply fissured bark and cat faces, closed and open canopies, and defective trees with mistletoe, broken tops, and cavities. Pre-existing snags and downed woody material were lost as a result of the fire, while some areas were already void of these features pre-fire. Some elements, such as snags, were created as a result of the fire. It is important to retain these key habitat elements, where they exist across the landscape, because they provide structural complexity, are critical to many wildlife species, and are known to increase wildlife diversity when present.

6. ASSUMPTIONS

While some of these assumptions may be debatable, the comparison of alternatives using these assumptions is valid because the same assumptions are applied to all alternatives.

- For the snag retention management requirement in Old Forest Emphasis Area (OFEA), Home Range Core Area (HRCA), and Forest Carnivore Connectivity Corridor (FCCC) units, intent is to retain legacy structure where it exists for long-term resource recovery needs (i.e. the development of future old forest habitat with higher than average levels of large conifer snags and down woody material). This management requirement will retain all hardwood snags greater than or equal to 12 inches diameter at breast height (dbh) and in addition, retain 30 square feet basal area of conifer snags per acre by starting at the largest snag and working down, with a minimum of four and a maximum of six per acre (the maximum number was identified to meet economic and fuel reduction objectives in the purpose and need). We assume based on pre-fire stand exam data that on average this will result in retention of six 30” dbh snags per acre on a unit basis (six 30” dbh trees = 30 square feet basal area per acre). This requirement applies to Alternatives 3 and 4.
- For the snag retention management requirements in General Forest and other land allocations not managed for old forest emphasis objectives, intent is to retain snags in patches, avoiding uniformity across large areas. This management requirement will retain all hardwood snags > 12” dbh and in addition, retain the largest conifer snags > 15” dbh at the rate of 4 per acre on a unit basis in mixed conifer (6 per acre in red fir). We assume based on pre-fire stand exam data that this is equivalent to an approximate basal area retention rate of 12 square feet per acre (four 24” dbh trees = 12 square feet basal area per acre). This requirement applies to all action alternatives. In Alternative 1, this requirement applies to all units.
- For the snag retention requirements in PSW study plots, treatment type may change in specific plots based on existing condition and experimental design needs during implementation; we considered

these possibilities in the analysis of effects and report total treatment unit acres as a best net estimate across plots based on the overall study design (EIS Appendix D).

- Snag retention along range fence units is a best estimate but is dependent on hazard tree criteria developed in cooperation with Yosemite National Park. On FR6469 in great gray owl PAC 16, hazards to the range fence may be felled but will be left in place.
- For the down woody material retention management requirement, emphasis is for retention at a rate of 15 – 20 tons / acre on a unit basis in OFEA, HRCA, FCCC, and roadside hazard units within Protected Activity Centers (PACs) while retention in general forest units is within the broader range of 10 – 20 tons / acre. "Of the largest" is defined as > 12 inches in diameter at midpoint and first retaining > 45" at midpoint if available, then >24" – 45" at midpoint if available, then >12" – 24" at midpoint if available.
- Pile and burn treatments will only take place where loading exceeds 20 tons per acre and burning will not reduce large coarse woody debris below the 10 tons per acre standard.
- Hazard tree abatement would include the removal of all dead trees that have the potential to hit a target. A target is defined as the road prism or facilities such as fences or structures. Live trees may qualify as hazards if they are expected to fall and hit a target within the next two years. Very few green trees are expected to be removed based on the criteria, and all green trees would be identified and marked by qualified Forest Service personnel. We assume the amount of green tree removal as hazards will be conservative and that strict guidelines for marking, developed by Forest Health Protection (FHP) staff, will be followed.
- Dead trees have been defined for this project as trees with no visible green needles. Salvage of fire-killed trees would result in the removal of dead trees only, not trees that are declining or may die in the near future.
- The proposed application of a borax-based fungicide (Sporax) on cut stumps is considered very low risk and is not expected to result in adverse effects to terrestrial wildlife. The risk of exposure or ingestion is far below the level of concern (USDA 2006a).
- Unit boundaries were developed using GIS data at various scales. The level of inaccuracy of a line on a map at most scales used was approximately 20 feet. When utilizing these data on the ground, some variation in unit boundaries may occur. The scope of these variations was considered in our effects analysis.

7. DATA SOURCES

- California Wildlife Habitat Relationships (CWHR).
- California Natural Diversity Database (CNDDB).
- Natural Resource Information System (NRIS Wildlife).
- Deer telemetry data (CDFW).
- Black-backed woodpecker occupancy model by Tingley et al. 2014a.
- GIS layers including: RAVG database, Worldview Imagery, Stanislaus vegetation database, land allocations, project unit boundaries and road treatments.
- Project survey reports and incidental detection records.
- Scientific literature and internal reports.
- Terrestrial Wildlife Biological Evaluation Appendix.

8. EFFECTS OF THE PROJECT ALTERNATIVES

The following section includes species and habitat accounts along with effects analysis for all alternatives considered in detail.

Direct and Indirect Effects

Direct effects are effects that are caused by the action and occur at the same time and place. Indirect effects are effects that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable.

Project Action Area

Unless otherwise specified, the analysis area used to analyze the direct and indirect effects on wildlife and wildlife habitat is approximately 155,000 acres and includes Stanislaus National Forest System lands within the Rim Fire perimeter. The analysis area is based on 1) acres burned in a distinct geographic area and administrative setting that influences the purpose and need of proposed activities, 2) area of impact to forest vegetation from the wildfire and subsequent proposed project activities, 3) furthest measurable extent of changes to disturbance levels and habitat modification that would occur as a result of implementing any of the proposed alternatives, and 4) consistency with the analysis area described in the Rim Fire Recovery EIS reports for fire and fuels, soils, and vegetation because ecologically, the dynamics among these elements are inherently linked with terrestrial wildlife habitat.

Cumulative Effects

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

The analysis area used to analyze the cumulative effects on wildlife and wildlife habitat is approximately 264,100 and includes all lands within the Rim Fire perimeter. The analysis area is based on 1) treatments are proposed in and would modify burned areas within the Rim Fire area only, 2) this area provides an appropriate context for the reasonable determination of effects to species considered herein and their habitat, and 3) relevant cumulative effects, particularly other projects that have or will treat areas within the fire perimeter, can be effectively and meaningfully addressed. This analysis is bounded in time for short term effects (up to 20 years) and long term effects (20-50 years). Past activities are considered part of the existing condition. Appendix B, Rim EIS provides a list and description of past, present and reasonably foreseeable future actions considered for the Rim Fire Recovery project. All activities listed and described are not expected to affect all species considered in this document. See individual species analysis sections for further discussion of relevant present and reasonably foreseeable future actions. Cumulative effects are the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7).

Terrestrial Wildlife

Threatened and Endangered Species

VALLEY ELDERBERRY LONGHORN BEETLE

AFFECTED ENVIRONMENT

Species and Habitat Account

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) is listed as Threatened under the Endangered Species Act. There is no Designated Critical Habitat on the Stanislaus National Forest. The valley elderberry beetle (VELB) is thought to range from the Central Valley into the eastern portion of the Coast Range and the foothills of the Sierra Nevada up to approximately 3,000 (USFWS 1999). This species is most often found along the margins of rivers and streams in the lower Sacramento River and upper San Joaquin Valley. The current known range of the VELB extends from southern Shasta County south to Fresno County (Barr 1991). When the VELB was originally listed as Threatened, it was only known from 10 populations; however, after extensive surveys it is known from almost 200 locations. USFWS has proposed to delist the VELB, based on the ongoing protection and restoration of habitat and because of the many populations of VELB discovered after the species was listed (USFWS 2006). At the time of listing, the main risk to VELB was the loss of valley riparian habitat; from 80 to over 90% of this habitat had been lost in the Central Valley. In recent years, this loss has been somewhat mitigated through regulatory protection, reserves, and restoration efforts. However, the primary habitat in the Central Valley remains limited due to levee and river maintenance projects (USFWS 2006).

Although surveys confirmed similar occupancy between 1991 and 2001, Collinge (2001) documented a 10% decline in the number of sites with elderberry shrubs. This decline resulted in a reduction in total numbers of occupied sites and shrub groups. Loss of riparian habitat and resulting fragmentation in the VELBs range may have resulted in a loss of populations and reduced occupancy rates (Ibid).

Valley elderberry longhorn beetle have not been observed on the Stanislaus National Forest; however, systematic surveys to determine the extent of occupancy on the Forest have not been conducted. Surveys typically focus on suitable habitat in project areas below 3,000 feet in elevation. Low suitability areas (i.e., dense shrubs and forested stands) are not typically surveyed but it is likely mature plants would have been detected if present. Elderberry plants with the distinctive exit holes VELB create have been documented in the Tuolumne and Clavey River canyons. While several elderberry plants with exit holes have been documented within the analysis area, no VELB detections were made as a result of survey efforts. Most documented sites are alongside roads, due to the limited access and active management in much of the river canyons.

The project is located within the potential elevation and geographic range of the species. The nearest documented occurrence was one beetle on an elderberry shrub almost 24 miles to the west of the fire near Jamestown in 2002. Their presence within the analysis area is unknown. However, presence is assumed where elderberry plants of adequate size occur below 3,000' in elevation. Adequate size is defined as stems greater than one inch in diameter at the base (Barr 1991).

Habitat for the VELB consists of elderberry shrubs and trees in a variety of habitats and plant communities, but most often in riparian, elderberry savannah or moist valley oak woodlands. Common associated plants include *Populus* spp., *Salix* spp., *Fraxinus* spp., *Quercus* spp., *Juglans* spp., *Acer negundo, Rubus* spp., *Toxicodendron diversiloba, Vitis californica, Rosa* spp., and *Baccharis* spp. (USFWS 2006). VELB appear to favor sites with high elderberry densities and are limited in dispersal and colonization of new sites (Collinge et al. 2001).

The Rim Fire may have eliminated much of the suitable habitat for VELB in the Tuolumne and Clavey River canyons in the short term. Elderberry plants damaged by fire are expected to resprout and new plants typically appear the season following fire (Crane 1989). Nonetheless, resprouting plants and new sprouts will likely take several seasons to reach suitable size for VELB. Several recorded plants on the Lumsden Road (1N10), on Road 1S01along Highway 120, and the Cherry Lake Road (1N07) were severely damaged by fire. Any beetles or larvae would likely have perished with the plants based on the high burn severity in these areas. The condition of documented plants along the Tuolumne River is not known, but includes more mixed burn severity along the riparian corridor at the base of the canyon.

There are about 24,713 acres of potential habitat area below 3,000' elevation within the analysis area. There are about 24,817 acres of potential habitat area within the cumulative analysis area. This is mainly in the river canyons where treatments are not proposed.

Eggs are laid in late spring on elderberry stems greater than 1 inch in diameter, as measured at the base, on healthy and unstressed plants. Larvae excavate passages into the elderberry shrub where they may remain in larval form for as long as two years before they emerge as adults. Exit holes are usually on stems greater than 0.5 inches in diameter, with 70 percent of the exit holes at heights of 4 feet or greater; these holes are circular to slightly oval, with a diameter of 7 to 10 mm (Barr 1991).

VELB has been found only in association with its host plant, elderberry. Adults feed on the foliage and perhaps flowers of elderberry plants, and are present from March through early June (Barr 1991).

Risk Factors identified for VELB include:

1. *Loss or alteration of habitat*- The primary threat to survival of VELB is the loss or alteration of habitat. Stream development and urbanization have resulted in the removal of significant amounts of suitable habitat. On National Forest System lands, cattle grazing has heavily damaged elderberry in some areas and may reduce the quantity and quality of available habitat.
2. *Pesticides& Herbicides*- Individual beetles, localized beetle populations, and plants are subject to injury or loss from pesticide applications. Pesticides pose a risk to the VELB and its host plant. Some chemicals from the valley are known to drift upslope and into the Sierra on prevailing wind currents (McConnell et al. 1998, Bradford et al. 2010). Smaller amounts of pesticides and herbicides are used in the local area by the Forest Service to control shrubs and noxious weeds, and lesser amounts are used by surrounding local landowners.
3. *Predation*- Predation by birds, other insects, and small mammals may have negative effects on localized populations.
4. *Argentine Ant*- The widely established non-native Argentine ant (Linepithema humile) also poses a threat to VELB. While Argentine ants are common in the core valley habitat of the VELB, it does not appear to be widely established in the Sierra foothills, likely due to summer drought or winter cold.

Management Direction

Conservation Guidelines for VELB are provided in USFWS (1999). The valley elderberry longhorn beetle is listed as Threatened under the ESA. While there is no Designated Critical Habitat on the Stanislaus National Forest, habitat exists and so there is the potential for the beetle to occur on the forest. The following management requirements would mitigate adverse effects to this species under the proposed action and are consistent with the VELB Conservation Measures (USDI 1999):

- Flag and avoid elderberry plants greater than one inch stem diameter that occur below 3,000 feet elevation and within 100 feet of planned activities (units V10, V12A, V12B, V13, V14A, V14B, X15, X16, X25, Y01, Y02, and Y03 and level 2 roads identified for hazard tree removal).
- Within 50 feet of elderberry plants, prohibit ground based mechanical operations and burning.
- Pile burning and mechanical activities within 100' of flagged shrubs will be subject to an LOP from April 1 through June 30 to prevent smoke and dust impacts to beetles.

- If additional elderberry shrubs with stems over 1" diameter are found prior to or during project implementation, they will be similarly avoided and the District wildlife biologist will be notified immediately and adequate mitigation measures will be taken.

ENVIRONMENTAL CONSEQUENCES

The project action alternatives could result in direct and indirect effects to the VELB through the following activities:

- Salvage of fire-killed trees, including roadside hazard trees.
- Fuels treatments (e.g., pile burning).

These activities may have direct and indirect effects on VELB through the following:

- Project related death, injury, or disturbance.
- Project related modifications to habitat quality.

Death, injury, or displacement:

Death or injury from project related activities would be unlikely to occur given the mechanical activity buffers around suitable habitat (elderberry plants with stems greater than one inch) and Limited Operating Periods (LOPs) which would eliminate the potential for dust and smoke impacts. Larvae and the elderberry plants would be protected by buffers from mechanical operations. However, there is the potential for death or injury if a tree were felled and it crushed an elderberry plant or beetle.

Project related modifications to habitat quality:

Because all identified elderberry plants with stems greater than one inch in diameter would be flagged and a buffer applied restricting mechanical activities, no modifications to habitat quality are expected.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the VELB and to determine how well project alternatives comply with Forest Plan Direction and the species' conservation strategies.

- Disturbance potential
- Habitat alteration potential

Effects Common to all Action Alternatives

Direct & Indirect Effects

Because there is a small difference in the amount of treatment areas proposed under the action alternatives, the effects are expected to be the same and are therefore analyzed together.

Indicator 1. Because virtually all of the VELB lifecycle is spent on elderberry shrubs, either inside the stems as larvae or on the foliage or flowers as adults, the greatest risk to individuals would come from activities in the immediate vicinity of elderberry plants.

Buffers applied to individual plants where no mechanical activity would occur and LOPs in place during the adult flight period restricting mechanical activities and pile burning would eliminate almost all risk to individuals associated with implementation of the action alternatives.

Indicator 2. Table 2 displays the proposed activities within the potential elderberry habitat area for the action alternatives.

Table 2 Proposed Treatments within the Potential Elderberry Habitat Area by Alternative.

Alternative	Removal of Fire-Killed Trees:	Road Treatments: (temporary road construction,	Percent of Potential Habitat Area Treated

	Salvage & Hazard tree (acres)	reconstruction, maintenance) (miles)	
1	1,055	13	4%
3	573	13	2%
4	573	13	2%

Under Alternative 1, the additional 482 acres of proposed treatment is associated with hazard tree removal along Lumsden Road where there are documented occurrences of elderberry plants. Very few, if any hazard trees remain along this route so any additional effects associated with these acres are considered negligible.

Most of the documented plants in the project area were burned at varying levels of intensity in the Rim Fire. All potential habitat areas would be surveyed prior to implementation and all plants and buffers would be identified and flagged. Contractors will be briefed on the need to avoid damaging the elderberry plants and the possible penalties for not complying with these requirements. All crews working in the area will be instructed on the status of the beetle and the need to protect its elderberry host plant.

Because of the current open condition in burned areas where trees would be removed, it is expected that any plants sufficiently large enough to support VELB will be found. It is likely that if plants are not detected during surveys, they are small and isolated, and would not provide suitable habitat value for VELB. If new plants are detected prior to or during project implementation, all mitigation measures would be applied.

The protective measures proposed for this project have been applied repeatedly on the Stanislaus National Forest, for road improvements, noxious weed control, vegetation management, and prescribed burning, and have been successful in preventing damage to individual plants.

While there is some risk of disturbance or damage during implementation from vehicles using adjacent roads or people on foot, this risk is considered negligible and not beyond risks associated with ongoing activities and uses on public lands. Operating heavy equipment may result in excess deposition of dust and other particulate matter on individual plants; however, a study of proximity to roads and dust impacts to elderberry plants found no evidence of negative effects (Talley et al. 2006).

Elderberry plants in the project area may benefit from mechanical removal of dead trees because it would reduce the risk of direct impacts when the trees fall. Elderberry burned by the fire are expected to resprout vigorously and benefit from the more open, post-fire habitat, along with the greater availability of water, light, and minerals.

Thus based on the above analysis, the potential for disturbance or habitat alteration with respect to VELB is either insignificant (i.e., cannot be meaningfully measured, detected, or evaluated) or discountable (i.e., extremely unlikely to occur).

Cumulative Effects

This analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions reflect the aggregate impact of all prior human actions and natural events that affected the environment and might contribute to cumulative effects (Appendix B, Rim EIS).

In making the determination for the action alternatives, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered. A list of the actions considered can be found in Appendix B, Rim EIS. The Forest queried its databases, including the Schedule of Proposed Actions (SOPA) to determine past, present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands.

A separate Biological Assessment was prepared as part of the consultation process with USFWS and cumulative effects were analyzed in that document as follows: Under the Endangered Species Act (50 CFR 402.02) cumulative effects are "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Thus, not all projects found in Appendix B (Rim EIS) are applicable, such as Federal actions. This Biological Assessment is available in the project record.

Risk factors potentially affecting VELB have been identified and include habitat loss and alteration through development, use of pesticides and herbicides, and grazing. Habitat modification was used as a relative measure of cumulative effects of the action alternatives.

The potential habitat area below 3,000' elevation is almost entirely within the Tuolumne River Canyon and its tributaries, which is managed by the Forest Service and the Bureau of Land Management. Much of the Tuolumne River aside from the Hetch-Hetchy facilities are designated and managed as Wild and Scenic.

Habitat Modification

Federal Lands: The Rim Hazard Tree Removal project is the only present action on public lands within the potential habitat area. This project is not likely to affect habitat suitability for VELB because management requirements in place will protect elderberry plants and the valley elderberry longhorn beetle.

There are no foreseeable future actions on federal lands within the potential habitat area.

Private Lands: The cumulative effects analysis area contains private timberland, residential areas, and rangeland below 3,000' elevation where elderberry plants and beetles may occur. Some of the private inholdings include meadows and associated riparian habitat that may support elderberry shrubs. There are also power plants, dams, powerlines, and other facilities associated with Hetch-Hetchy in the Tuolumne River Canyon and Cherry Creek within the elevation range of VELB. There are 58 acres of private land where emergency fire salvage plans have been submitted to Cal Fire.

Headwater disturbances, which result in downstream flooding or mudslides, could result in the destruction of elderberry plants (USFWS 1984). Activities on private lands that may result in the incidental take of elderberry plants include removal of fuels around residences and infrastructure, grazing, introduction of noxious weeds, irrigation and landscaping, or habitat conversion such as recreation buildings or paved areas.

Action Alternatives Contribution/Summary: Because the Rim Recovery project is not expected to result in any measurable effects to VELB, it is not expected to contribute to cumulative effects.

Alternative 2

Direct and Indirect Effects

Under No Action, death, injury or disturbance would not be an issue because no active management would occur.

The indirect effects of Alternative 2 are primarily related to the influence no action may have on future wildfires and how future wildfires may impact VELB habitat.

Indicator 1. Because no management activities would occur under this alternative, there would be no project related direct effects to individual valley elderberry longhorn beetles or larvae.

Indicator 2. Within the areas that burned at high severity, elderberry shrubs and other herbaceous and shrub vegetation is expected to be established within 3-5 years. Elderberry shrubs that are of appropriate size for beetle and larvae occupancy would provide additional suitable habitat for VELB. These benefits are expected in the short term (10-20 years).

When wildfire returns to this landscape, the elderberry shrubs providing suitable habitat for VELB in or near areas that burned at high severity may be at increased risk of loss. One of the greatest risks to VELB is habitat loss. Within 30 years, the fuel loading is predicted to be four to eight times higher (78 tons/acre) than the desired condition (Rim EIS Fuels Report). There is uncertainty predicting the effect no action would have on future wildfires and VELB habitat given the numerous factors involved over time. However, as fire-killed trees fall and contribute to surface fuel pools, potential fire behavior may be expected to increase (Rim EIS Fuels Report).

Cumulative Effects

The cumulative effects analysis discussion under Effects Common to All Action Alternatives outlines those present and foreseeable future activities scheduled on public and private lands considered under this alternative, refer to this discussion.

Federal Lands: The Rim Hazard Tree Removal project is the only present action on public lands within the potential habitat area. This project is not likely to affect habitat suitability for VELB because management requirements in place will protect elderberry plants and the valley elderberry longhorn beetle.

There are no foreseeable future actions on federal lands within the potential habitat area.

Private Lands: The cumulative effects analysis area contains private timberland, residential areas, and rangeland below 3,000' elevation where elderberry plants and beetles may occur. Some of the private inholdings include meadows and associated riparian habitat that may support elderberry shrubs. There are also power plants, dams, powerlines, and other facilities associated with Hetch-Hetchy in the Tuolumne River Canyon and Cherry Creek within the elevation range of VELB. There are 58 acres of private land where emergency fire salvage plans have been submitted to Cal Fire.

Headwater disturbances, which result in downstream flooding or mudslides, could result in the destruction of elderberry plants (USFWS 1984). Activities on private lands that may result in the incidental take of elderberry plants include removal of fuels around residences and infrastructure, grazing, introduction of noxious weeds, irrigation and landscaping, or habitat conversion such as recreation buildings or paved areas.

Alternative 2 Contribution/Summary: The cumulative contribution of Alternative 2 is attributed to the influence no action may have on how future wildfires may adversely impact elderberry habitat. Since no trees would be removed, fuel loading would increase over time, resulting in increased fire intensity and a greater potential for loss of suitable habitat when wildfire returns to this landscape.

SUMMARY OF EFFECTS ANALYSIS ACROSS ALL ALTERNATIVES:

Alternatives 1, 3, and 4 would be unlikely to have any adverse direct or indirect effects to the VELB.

All elderberry plants capable of supporting VELB would be flagged and avoided. LOPs would be in place under all action alternatives to eliminate negative impacts from dust or smoke. Since there would be no removal of dead trees under Alternative 2, there would be no potential direct such as death or injury of individuals. The indirect effects of Alternative 2 are primarily related to the influence no action may have on future wildfires and how future wildfires may impact VELB habitat.

Determination

Implementing the Rim Fire Recovery Project action alternatives has a very small potential to impact individual valley elderberry longhorn beetles and the elderberry habitat required by the species. The planned surveys and buffers established around individual plants and project management requirements would greatly reduce the potential risk associated with potential direct and indirect effects to individual VELB or associated elderberry plants. The project does not occur within Designated Critical Habitat for the species and would have no effect on critical habitat; however, the primary constituent elements occur

within and adjacent to the planning area indicating suitable habitat is present. Therefore, the following determinations are supported by the analysis contained herein. Specifically, the potential for effects to VELB from implementation of the alternatives are either discountable (i.e. extremely unlikely to occur) or insignificant (i.e. cannot be meaningfully measured, detected, or evaluated).

Alternative 1

It is our determination that Alternative 1 may affect but is not likely to adversely affect the valley elderberry longhorn beetle.

It is our determination that Alternative 1 will not affect Designated Critical Habitat for the valley elderberry longhorn beetle.

Our determination is based on the following rationale:

- The valley elderberry longhorn beetle has never been documented to occur on the Stanislaus National Forest. (discountable effect)

- All elderberry plants greater than one inch stem diameter will be flagged and avoided where they occur below 3,000 feet elevation and within 100 feet of planned activities (units V10, V12A, V12B, V13, V14A, V14B, X15, X16, X25, Y01, Y02, and Y03 and level 2 roads identified for hazard tree removal). (discountable effect)

- Any ground based mechanical equipment operations and burning within 50 feet of elderberry plants will be prohibited. (discountable effect)

- Pile burning and mechanical activities within 100' of flagged shrubs will be subject to an LOP from April 1 through June 30 to prevent smoke and dust impacts to beetles. (discountable effect)

Alternative 2

It is our determination that Alternative 2 may affect but is not likely to adversely affect the valley elderberry longhorn beetle.

It is our determination that Alternative 2 will not affect Designated Critical Habitat for the valley elderberry longhorn beetle.

Our determination is based on the following rationale:

- The valley elderberry longhorn beetle has never been documented to occur on the Stanislaus National Forest.

- There is potential for a fire-killed tree to fall and crush an elderberry plant or beetle.

Alternative 3

It is our determination that Alternative 3 may affect but is not likely to adversely affect the valley elderberry longhorn beetle.

It is our determination that Alternative 3 will not affect Designated Critical Habitat for the valley elderberry longhorn beetle.

Our determination is based on the following rationale:

- The valley elderberry longhorn beetle has never been documented to occur on the Stanislaus National Forest. (discountable effect)

- All elderberry plants greater than one inch stem diameter will be flagged and avoided where they occur below 3,000 feet elevation and within 100 feet of planned activities (units V10, V12A, V12B, V13, V14A, V14B, X15, X16, X25, Y01, Y02, and Y03 and level 2 roads identified for hazard tree removal). (discountable effect)

- Any ground based mechanical equipment operations and burning within 50 feet of elderberry plants will be prohibited. (discountable effect)

- Pile burning and mechanical activities within 100' of flagged shrubs will be subject to an LOP from April 1 through June 30 to prevent smoke and dust impacts to beetles. (discountable effect)

Alternative 4

It is our determination that Alternative 4 may affect but is not likely to adversely affect the valley elderberry longhorn beetle.

It is our determination that Alternative 4 will not affect Designated Critical Habitat for the valley elderberry longhorn beetle.

Our determination is based on the following rationale:

- The valley elderberry longhorn beetle has never been documented to occur on the Stanislaus National Forest. (discountable effect)

- All elderberry plants greater than one inch stem diameter will be flagged and avoided where they occur below 3,000 feet elevation and within 100 feet of planned activities (units V10, V12A, V12B, V13, V14A, V14B, X15, X16, X25, Y01, Y02, and Y03 and level 2 roads identified for hazard tree removal). (discountable effect)

- Any ground based mechanical equipment operations and burning within 50 feet of elderberry plants will be prohibited. (discountable effect)

- Pile burning and mechanical activities within 100' of flagged shrubs will be subject to an LOP from April 1 through June 30 to prevent smoke and dust impacts to beetles. (discountable effect)

Further rationale for determinations:

Guidance provided in the Endangered Species Consultation Handbook (USFWS and NMFS 1998, page 3-12) indicates that "MAY AFFECT BUT IS NOT LIKELY TO ADVERSELY AFFECT" is the appropriate conclusion when effects on listed species are expected to be discountable, or insignificant, or completely beneficial. Discountable effects are those that are extremely unlikely to occur. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Beneficial effects are positive effects without adverse effects to the species.

COMPLIANCE WITH THE FOREST PLAN AND OTHER DIRECTION

On August 8, 1980, VELB was listed as a Threatened species (45 FR 52803). Critical Habitat was also designated at this time, but does not occur on the Stanislaus National Forest. The action alternatives would not affect the recovery plan objectives for the VELB. The recovery plan objectives for VELB are to minimize further degradation, development, or environmental modification of VELB habitat, and to delist the VELB (USFWS 1984).

VELB Conservation Strategy Guidelines

The United States Department of the Interior, Fish and Wildlife Service issued Conservation Guidelines (USFWS 1999) to assist Federal agencies, during project planning, to avoid or minimize adverse effects on the valley elderberry longhorn beetle. The following guidelines and previous consultation recommendations from the Service were used when developing management requirements the Rim Fire Recovery project:

Fence and Flag all areas to be avoided during construction activities. In areas where encroachment on the 100' buffer has been approved by the Service, provide a minimum, providing at minimum setback of 20 feet from the dripline of each elderberry plant.

Apply a limited operating period from April 1 through June 30 prohibiting pile burning and mechanical activities within 100 feet of elderberry plants to prevent smoke and dust impacts to beetles.

Management Requirement Compliance

The following management requirements are consistent with VELB Conservation Guidelines and apply to all action alternatives considered for the Rim Fire Recovery Project:

1. Flag and avoid elderberry plants greater than one inch stem diameter that occur below 3,000 feet elevation and within 100 feet of planned activities (units V10, V12A, V12B, V13, V14A, V14B, X15, X16, X25, Y01, Y02, and Y03 and level 2 roads identified for hazard tree removal).

2. Within 50 feet of elderberry plants, prohibit ground based mechanical operations and burning.

3. Pile burning and mechanical activities within 100' of flagged shrubs will be subject to an LOP from April 1 through June 30 to prevent smoke and dust impacts to beetles.

4. If additional elderberry shrubs with stems over 1" diameter are found prior to or during project implementation, they will be similarly avoided and the District wildlife biologist will be notified immediately and adequate mitigation measures will be taken.

BALD EAGLE

AFFECTED ENVIRONMENT

Species and Habitat Account

The bald eagle (*Haliaeetus leucocephalus*) is currently managed as a USDA Forest Service Sensitive species (USDA 2013). In USFS Region 5 the bald eagle breeds primarily in specific and localized large

rivers and lakes of the northern third of California, with scattered nesting throughout the state (R5 Sensitive species evaluation form of 2012).

Bald eagles typically nest in live trees, some with dead tops, and build a large (~1.8 m/6 ft diameter), generally flat-topped and cone-shaped nest usually below the top with some cover above the nest (Jackman and Jenkins 2004). In general, bald eagles require a large tree to accommodate a large nest in a relatively secluded location within the range of their tolerance of human disturbance (Ibid). Diurnal perch habitat is characterized by the presence of tall, easily accessible; often predominate trees adjacent to shoreline foraging habitat (Buehler 2000). The entire breeding cycle, from initial activity at a nest through the period of fledgling dependency, is about 8 months (Ibid).

In the Rim Fire area there is one bald eagle nest. The nest is at Cherry Lake. This site has been occupied for more than 15 years. Although nest trees have changed over this period, the nest site has consistently been in the same general stand on the Cherry Lake shoreline. The post-fire condition of the nest, nest tree, and nest stand all appear intact and suitable (Roy Bridgman, pers.comm.). After over 15 years of being occupied as a bald eagle territory, it appears the carrying capacity of Cherry Lake is limited to one pair of breeding bald eagles. Bald eagles also use the Cherry Lake area during migration and for overwintering (NRIS Wildlife database).

Risk Factors

Risk factors potentially affecting bald eagle abundance and distribution have been identified and primarily include nest site loss and disturbance, and loss of habitat and habitat elements such as potential nest or roost trees (USDA 2001, R5 Sensitive species evaluation form 2012).

Management Direction

Current management direction for bald eagle is to follow all law, regulation, and policy as it relates to bald eagle because the species is still vulnerable to potential disturbance impacts and is still within the delisting monitoring period (R5 Sensitive species evaluation form of 2012). Forest Plan Direction (2010) p. 43 states: When nesting bald eagles are found, implement suitable restrictions on nearby activities based on the Regional habitat management guidelines and the habitat capability model for the species. Protect all historic and active nests, as required by the Eagle Protection Act and the Migratory Bird Treaty Act.

The Eagle Protection Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal and civil penalties for persons who disturb nest sites by substantially interfering with normal breeding, feeding, or sheltering behavior (USFWS 2007).

The Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703-712, prohibits the taking of any migratory bird or any part, nest, or egg, except as permitted by regulation. The MBTA was enacted in 1918; a 1972 agreement supplementing one of the bilateral treaties underlying the MBTA had the effect of expanding the scope of the Act to cover bald eagles and other raptors.

Habitat management guidelines to follow for bald eagle are provided by the National Bald Eagle Management Guidelines (USFWS 2007).

ENVIRONMENTAL CONSEQUENCES

The project alternatives could result in direct and indirect effects to the bald eagle through the following activities:

1. Salvage harvest of fire-killed trees.
2. Salvage harvest of roadside hazard trees.

3. New permanent road construction, temporary road construction, and road reconstruction.
4. Landing construction and use.
5. Use of material sources and water sources.
6. Biomass and similar fuels treatments.

These actions may have direct and indirect effects on bald eagles through the following:

- Project related death, injury, or disturbance.
- Project related modifications to habitat quantity and/or quality.

Death, injury or disturbance:

Death, injury, and disturbance are potential direct effects to consider for bald eagle (USDA 2004). Project activities have the potential to cause death or injury by tree-falling or by the use of heavy equipment. There is the potential for death or injury if nest trees are not protected and are felled while being used by nesting birds during the reproductive season. In addition, historic nest trees could be removed if not identified and protected.

Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. Human presence in nest stands and loud noise in the vicinity of nest stands have the potential to change normal behavior and potentially impair essential behavior patterns of the bald eagle related to breeding, feeding, or sheltering. The potential for disturbance is minimized by following the National Bald Eagle Management Guidelines (USFWS 2007) and by the implementation of Limited Operating Periods (LOPs) as a management requirement.

Disturbance issues are expected to be most pronounced within ½ mile of nests (USFWS 2007).

Habitat modification:

Salvage harvest of fire-killed trees and salvage harvest of roadside hazard trees could remove snags or live trees that could potentially serve as bald eagle perch sites or nest trees. There is considerable uncertainty with regards to treatment intensity in roadside hazard salvage treatments because treatment intensity is subject to a wide range of environmental conditions (e.g. drought and moisture stress) related to tree status.

New permanent road construction, temporary ("temp") road construction, road reconstruction, and landing construction, also may modify bald eagle habitat. If conducted in or too near bald eagle nest stands, project roads or landings could result in increased habitat fragmentation, disturbance, and lower habitat capability for bald eagle (USFWS 2007, Pyron et al. 2009). Biomass removal and other understory treatments outside of nest stands is generally not an issue and none are proposed in the nest stand.

As bald eagles focus nesting, roosting, and perching behaviors along lake shorelines, habitat modification effects are expected to be most pronounced within 500 feet of lake shorelines (Jackman and Jenkins 2004).

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the bald eagle and to determine how well project alternatives comply with Forest Plan Direction and species conservation strategies:

1. Project activities within ½ mile of the known bald eagle nest.
2. Treatment units within 500 feet of lake shorelines.

Alternative 1 (Proposed Action)

Direct and Indirect Effects

Indicator 1. Four salvage units occur within ½ mile of the known bald eagle nest. These units, displayed in Table 3, are subject to the bald eagle Limited Operating Period (LOP) management requirement. One roadside hazard tree salvage unit skirts the edge of the ½ mile buffer but is basically outside the ½ mile buffer circle. No landings, water sources, or material sources occur in the ½ mile buffer, see Terrestrial Wildlife Biological Evaluation Appendix for maps.

Table 3. Units within one half mile of bald eagle nest.

Project activity	Distance to nest site (feet)
Unit O1A. Salvage harvest.	1,284
Unit O1B. Salvage harvest.	538
Unit O08. Salvage harvest	1,658
Unit O09. Salvage harvest.	950

Indicator 2. Only one treatment unit occurs within 500 feet of the Cherry Lake shoreline (see Terrestrial Wildlife Biological Evaluation Appendix for maps). The unit is a roadside hazard salvage unit on route 1N15Y. Route 1N15Y is gated closed to public access but may be used for facility maintenance needs. There is considerable uncertainty with regards to treatment intensity in roadside hazard salvage treatments because treatment intensity is subject to a wide range of environmental conditions (e.g. drought and moisture stress) related to tree status. If conducted aggressively, hazard tree salvage could remove trees bald eagles are known to use within this unit (Rich, pers.obs.) and thus lower habitat capability in approximately 25 acres of prime bald eagle habitat. However, because the road is gated closed to public use, and because it is unlikely that a target would be present within potential tree failure zones, probably fewer than three and more likely no trees would be removed. For this analysis and determination, I assume the latter and conclude there would be no measurable effect to bald eagle within the expected treatment scope of this unit.

Cumulative Effects

Relevant risk factors potentially affecting bald eagle abundance and distribution have been identified and primarily include nest site loss and disturbance, and loss of habitat and habitat elements such as potential nest or roost trees (USDA 2001, R5 Sensitive species evaluation form 2012).

Based on relevant risk factors and location, the following present and reasonably foreseeable actions from Appendix B, Rim EIS are the most relevant to bald eagle: Rim Fire Hazard Tree project, and recreation. As this project and the Rim Fire Hazard Tree project includes implementation of required LOPs, and as recreation is limited to existing and mostly quiet uses in this area (i.e. primarily trailhead parking and hiking), Alternative 1 will not likely contribute cumulatively to other actions.

Alternative 2 (No Action)

Direct and Indirect Effects

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur. Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur. The indirect effects of no action are uncertain but not an issue because the influence no action would have on fire risk to bald eagle habitat is probably not measurable.

Cumulative Effects

Alternative 1 is not expected to result in any definitive direct or indirect cumulative effects.

Alternative 3

Direct and Indirect Effects

Numerical values for indicators are the same for all action alternatives. Thus, effects are the same as discussed in Alternative 1.

Cumulative Effects

Same as Alternative 1.

Alternative 4

Direct and Indirect Effects

Numerical values for indicators are the same for all action alternatives. Thus, effects are the same as discussed in Alternative 1.

Cumulative Effects

Same as Alternative 1.

SUMMARY OF EFFECTS ANALYSIS ACROSS ALL ALTERNATIVES

Indicator 1. Numerical values for indicators are the same for all action alternatives. Thus, effects are the same for all action alternatives.

Indicator 2. Numerical values for indicators are the same for all action alternatives. Thus, effects are the same for all action alternatives.

Determination

Alternatives 1, 3, and 4

It is our determination that the action alternatives may affect individuals but are not likely to result in a trend toward Federal listing or loss of viability for the bald eagle.

Our determination for Alternative 1, 3, and 4 is based on the following rationale:

- This alternative includes actions to reduce the long-term risk of high-severity fire effects to habitat of this species.
- This alternative occurs in or affects suitable habitat but compliance with existing forest plan direction (USDA 2010) and the National Bald Eagle Habitat Management Guidelines (USFWS 2007) is clearly demonstrated.

Alternative 2

It is our determination that Alternative 2 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the bald eagle.

Our determination for Alternative 2 is based on the following rationale:

- No actions would occur to potentially impact this species or habitat. However, we note that with no action to address potential fuel loads, habitat for this species may be at greater long-term risk of high-severity fire effects.
- Compliance with existing conservation strategies and forest plan direction is demonstrated.

COMPLIANCE WITH THE FOREST PLAN AND CONSISTENCY WITH HABITAT MANAGEMENT GUIDELINES

Applicable Forest Plan Direction:

USDA 2010 p. 43: When nesting bald eagles are found, implement suitable restrictions on nearby activities based on the Regional habitat management guidelines.

Regional habitat management guidelines are provided by USFWS 2007. As per USFWS 2007, the proposed activities in the action alternatives fall under Category C. Timber Operations. Under Category C, the following is required:

1. Avoid removal of trees within 330 feet of the nest at any time.

2. Avoid timber harvest operations during the breeding season within specified buffers.

Forest Plan Direction Compliance

Action alternatives:

Regional habitat management guidelines are provided by USFWS 2007. As per USFWS 2007, the proposed activities in the action alternatives fall under Category C. Timber Operations. Under Category C, the following is required:

- Avoid removal of trees within 330 feet of the nest at any time.
- Avoid timber harvest operations during the breeding season within specified buffers.

The action alternatives demonstrate compliance with USFWS 2007 as follows:

1. No tree removal is proposed within 330 feet of the nest.

2. The following is a management requirement that avoids timber harvest operations during the breeding season:

Maintain a Limited Operating Period (LOP) prohibiting vegetation treatments, new road construction, blasting, landing construction, and helicopter flight paths within 0.5 miles of the known bald eagle nest (January 1 through August 31) unless surveys conducted by a Forest Service biologist confirm non-nesting status.

Thus, it is our determination that this project complies with forest plan direction and the National Bald Eagle Management Guidelines (USFWS 2007).

CALIFORNIA SPOTTED OWL

AFFECTED ENVIRONMENT

Species and Habitat Account

The California spotted owl (*Strix occidentalis occidentalis*) is currently managed as a USDA Forest Service Sensitive species (USDA 2013). Sensitive species are species identified by the Regional Forester where population viability is a concern because of 1) downward population trends and/or 2) diminished habitat capacity that would reduce species distribution. Habitat descriptions, species population trends, and the status of known or suspected limiting factors are summarized by USDA 2001, 2004, the R5 Sensitive species evaluation form 2012, and Keane 2014 and are incorporated here by reference. Key suitable habitat for spotted owl consists of 1) two or more tree canopy layers, 2) trees in the dominant and co-dominant crown classes averaging 24 inches dbh or greater, 3) at least 70 percent tree canopy cover (including hardwoods). As per the California Habitat Wildlife Relationships model or CWHR (CDFW 2014b), this means stands in descending order of priority: 6, 5D, 5M, 4D, and 4M and other stands with at least 50 percent canopy cover (USDA 2004). Nests and roosts are typically located in stands that 70 percent or greater canopy cover and contain one or several large trees of declining vigor,

and multiple canopy layers resulting from mixtures of different aged trees (Keane 2014). Recent research suggests that within their habitat matrix, spotted owls depend on "green" stands with the aforementioned characteristics for nesting, repeated roosting, and for foraging. Spotted owls use a broader range of vegetation conditions for foraging than they do for nesting and roosting (Ibid.), and this includes post-fire habitats as discussed below.

The most recent population status and trend information can be found in Keane 2014, Conner et al. 2013, Tempel and Gutiérrez 2013, and Tempel et al. 2014. In summary, the most recent estimate of population size for California spotted owls in the Sierra Nevada reported 1865 owl sites, with 1399 sites on National Forest System lands. Ongoing research of recent population trends indicates increasing evidence for population declines on the three demographic study areas on National Forest System lands and a stable or increasing population on the National Park study area, (Conner et al. 2013, Tempel and Gutiérrez 2013, Tempel et al. 2014). The factors driving these population trends are not known (Keane 2014).

California spotted owls are top trophic-level avian predators associated with heterogeneous forests characterized by areas with large trees, large snags, and large down woody material (North et al. 2009, Roberts and North 2012, Keane 2014). Spotted owls show the strongest associations with mature forest conditions for nesting and roosting but will forage in a broader range of vegetation types (Keane 2014). Recent research indicates that California spotted owls will occupy landscapes that experience low-to moderate-severity wildfire, as well as areas with mixed-severity wildfire that include some proportion of high-severity fire (Bond et al. 2009, Bond et al. 2010, Roberts et al. 2011, Lee et al. 2012, Bond et al. 2013, Lee et al. 2013). However, applying results from these studies to the Rim Fire should be done with caution. It is important to note that because of the overall size and severity of the Rim Fire, many owl sites in the Rim Fire had far larger proportions of core areas burned at high severity relative to any of these studies (Figure 1). Further, several of the studies had limited sample sizes. For example, Bond et al. (2009) studied only seven owls from four sites and high standard errors indicated that there is individual variability in selection among study owls. How owls use habitat for foraging where high-severity patch sizes are relatively large, and the relationship of owl use to the amount and arrangement of burned-unburned edge, among other factors needs further study (such as that proposed in the Rim EIS Appendix D). In the closely related Northern spotted owl, Clark (2007) found that while spotted owls did roost and forage within high severity burn areas, the use was very low suggesting that this cover type was poor habitat for spotted owls. Clark et al. (2013) summarized the results provided by the few studies that have been conducted on spotted owls in burned landscapes and noted that results were equivocal. Thus, uncertainties remain regarding long-term occupancy and demographic performance of spotted owls at burned sites (Keane 2014). Specifically, uncertainty exists regarding how the amounts and patch sizes of high-severity fire will affect California spotted owl occupancy, demographics, and habitat over long time frames (Ibid).

Clark (2007) found that while Northern spotted owls did roost and forage within high severity burn areas, the use was very low suggesting that this cover type was poor habitat for spotted owls. Clark et al. (2013) summarized the results provided by the few studies that have been conducted on spotted owls in burned landscapes and noted that results were equivocal. Thus, uncertainties remain regarding long-term occupancy and demographic performance of spotted owls at burned sites (Keane 2014). Specifically, uncertainty exists regarding how the amounts and patch sizes of high-severity fire will affect California spotted owl occupancy, demographics, and habitat over long time frames (Ibid).

For the past two decades, California spotted owl management has been based on recommendations provided by the California Spotted Owl Technical Report (Verner et al. 1992) and incorporated into forest plan direction at a bioregional scale (USDA 1993, 2001, 2004). This direction uses a system of land allocations of protected activity centers (PACs) and home range core areas (HRCAs) that are specifically managed for owl habitat and heterogeneous old forest conditions. The management of owl habitat and heterogeneous old forest condition is specifically focused on large structures, with an emphasis on a

primarily green forest mosaic infused with large trees, large snags, and large down logs as shown in Figure 3.15-2 and described by North et al. 2009 and Roberts and North 2012. Spotted owl sites are known as "activity centers" because the spotted owl is a central place forager, meaning activities are typically centered around a specific location (Verner et al. 1992). Sites are identified through the use of protocol surveys (USDA March 12, 1991). Protocol surveys have been conducted throughout the Rim Fire area for the past two decades. These surveys are best described as opportunistic depending upon planned activities and funding levels but have occurred at a level such that inventory information for the analysis area is considered essentially complete (USDA, unpublished data, NRIS Wildlife database).

Spotted Owl protected activity centers (PACs) are delineated surrounding each territorial owl activity center detected on National Forest System lands since 1986 (USDA 2010, p. 183). PACs are delineated to encompass the best available 300 acres of habitat in as compact a unit as possible. A home range core area (HRCA) includes the PAC and is established surrounding each territorial spotted owl activity center detected after 1986 (USDA 2010, p. 188). The core area amounts to 1,000 acres based on 20 percent of the area described by the sum of the average breeding pair home range plus one standard error (USDA 2010, p. 188).

Forest Plan direction requires that after a stand-replacing event such as the Rim Fire, specialists evaluate habitat conditions around owl activity centers to determine if there is sufficient suitable habitat remaining after the disturbance event, and if there are opportunities for re-mapping to better encompass suitable habitat. If there is insufficient suitable habitat for designating a PAC around the activity center, the PAC may be removed from the conservation network (USDA 2010, p. 184). The post-fire PAC evaluation was completed with technical assistance from Pacific Southwest Region (PSW) owl scientists. For the analysis, each PAC was evaluated within the Rim Fire boundary using several criteria. The three main criteria used were 1) acres of post-fire suitable habitat defined as CWHR 4M, 4D, 5M, and 5D (including class 6) burned at less than 75 percent basal area mortality, 2) percent of PAC within a 496 ac (200 ha) circle burned at high severity (defined as greater than 75% basal area mortality), and 3) percent of pre-fire suitable habitat burned at high severity. We found that 46 spotted owl sites are located within the Rim Fire perimeter. An additional four spotted owl sites are located primarily outside of the Rim Fire perimeter. These four sites were not included in the larger analysis because 1) the activity center did not occur within the fire perimeter, 2) no PAC acres occurred within the fire perimeter, and 3) approximately 10 percent or less of the home range core area occurred within the fire perimeter. Thus, these four sites were considered suitable and their boundaries were left as is. For the 46 sites substantially within the Rim Fire perimeter, we found that sites clustered into three categories as shown in the figure below where Category 1 sites are shown in red, Category 2 sites in green, and Category 3 sites in orange:

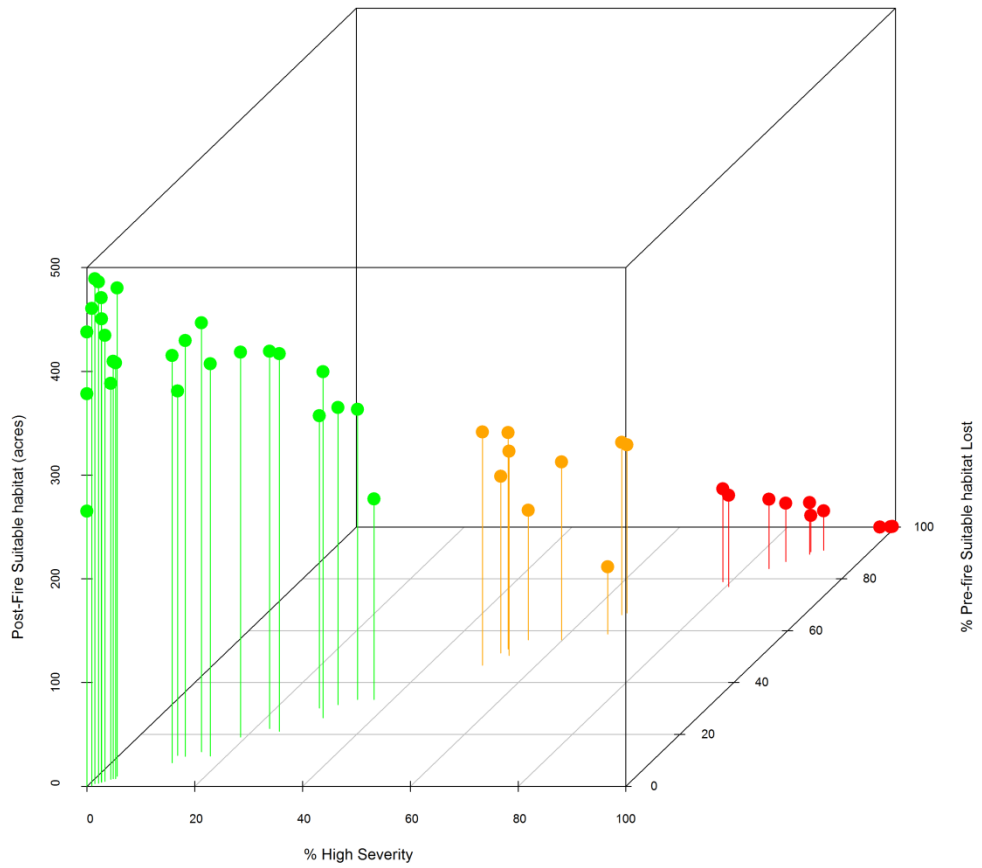

Figure 1. Three dimensional pin graph showing post-fire spotted owl PAC condition.

From the figure above it is clear that ten sites cluster into Category 1 (red), 27 sites into Category 2 (green), and 9 sites into a Category 3 (orange). Details on individual sites are provided in the Terrestrial Wildlife Biological Evaluation Appendix; categories may be summarized as follows:

Category 1 (red): These sites burned primarily at high severity across the 200 ha analysis area, had nearly all pre-fire suitable habitat burn at high severity, and have small amounts of post-fire suitable habitat. It is clear that these sites have very low to no probability of continued occupancy. Thus, we concluded that it is appropriate to remove these sites from the conservation network.

Category 2 (green): These are sites with lower amounts of high severity fire within the 200 ha analysis area, lower amounts of suitable habitat loss, and high amounts of remaining suitable habitat. Available literature suggests that these sites have high probabilities of continued occupancy. Thus, we concluded that it is appropriate to consider these sites as suitable post-fire, and that it is appropriate to keep the boundaries intact as is.

Category 3 (orange): These are sites with intermediate values. Based on the scientific literature, there is some uncertainty as to the probability of occupancy for sites within this range of values. The literature does document that individuals can persist in sites within these ranges of high severity burn, though this is an uncertainty requiring further research to identify where more specific thresholds might exist. Thus, we

concluded that in order to reduce uncertainty in occupancy, it is appropriate to re-map the boundaries of these sites to encompass habitat of better quality where possible and to consider the re-mapped sites as suitable. We also concluded that it would be particularly important to research owls in these sites so more can be learned about occupancy thresholds.

Area of Concern

The Rim Fire area is located in Spotted Owl Area of Concern 6. Area of Concern 6 was identified as an area with habitat fragmentation creating a potential bottleneck in the distribution of owls on the west slope of the Sierra Nevada. Areas of concern were identified in the California Spotted Owl Technical Report (Verner et al. 1992) and were defined as areas within the range of California Spotted Owl where potential gaps in habitat and the associated loss of forest connectivity were a potential issue. Thus, the Rim Fire area may be considered particularly important to the distribution of California spotted owl. An analysis of how changes to habitat in each alternative relates to the distribution of the California spotted owl can be found in MIS policy and the MIS report written for this project (USDA 2007 MIS FEIS, Rim Recovery MIS report 2013). Areas of Concern represent areas where management decisions may have a disproportionate potential to affect the California spotted owl population (USDA 2004).

Risk Factors

Risk factors potentially affecting California spotted owl abundance and distribution have been identified and primarily include nest site loss and disturbance, and loss of habitat and habitat elements, especially large snags and large down woody material (USDA 2001, R5 Sensitive species evaluation form 2012). The primary driver for nest habitat loss is stand-replacing wildfire and additionally, the extent and severity of wildfire has increased in the Sierra Nevada as a result of climate change (Keane 2014). The twelve month listing decision of the US Fish and Wildlife Service found stand-replacing fire to be the primary threat to California spotted owl (Federal Register 2006).

Management Direction

Current management direction is defined by project-level standards and guidelines from the Forest Plan (USDA 2010) and is based on the desired future condition of land allocations (Robinson 1996). The spotted owl is a Region 5 Sensitive species associated with old forest ecosystems (USDA 2004). The following land allocations pertain to spotted owl and old forest ecosystems: Protected Activity Centers (PACs), Home Range Core area (HRCA), Old Forest Emphasis Area (OFEA), and proposed Forest Carnivore Connectivity Corridor (FCCC).

The desired condition for spotted owl Protected Activity Center (PAC) is to have 1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

The desired condition for Spotted Owl Home Range Core Area (HRCA) is to encompass the best available habitat in the closest proximity to the owl activity center (USFS 2004 ROD pp. 39-40). HRCAs consist of large habitat blocks that have: 1) at least two tree canopy layers; 2) at least 24 inches dbh in dominant and co-dominant trees; 3) a number of very large (greater than 45 inches dbh) old trees; 4) at least 50 to 70 percent canopy cover; and 5) higher than average levels of snags and down woody material.

The desired condition for Old Forest Emphasis Area (OFEA) is to provide habitat conditions for mature forest associates (spotted owl, northern goshawk, Pacific marten, and fisher). Specifically, forest structure and function across old forest emphasis areas generally resemble pre-settlement conditions. High levels of horizontal and vertical diversity exist at the landscape-scale (roughly 10,000 acres). Stands are composed of roughly even-aged vegetation groups, varying in size, species composition, and structure. Individual vegetation groups range from less than 0.5 to more than 5 acres in size. Tree sizes range from seedlings to very large diameter trees. Species composition varies by elevation, site

productivity, and related environmental factors. Multi-tiered canopies, particularly in older forests, provide vertical heterogeneity. Dead trees, both standing and fallen, meet habitat needs of old-forest-associated species. Figure 1 shows forest structure and function generally resemble pre-settlement conditions (Figure 1).

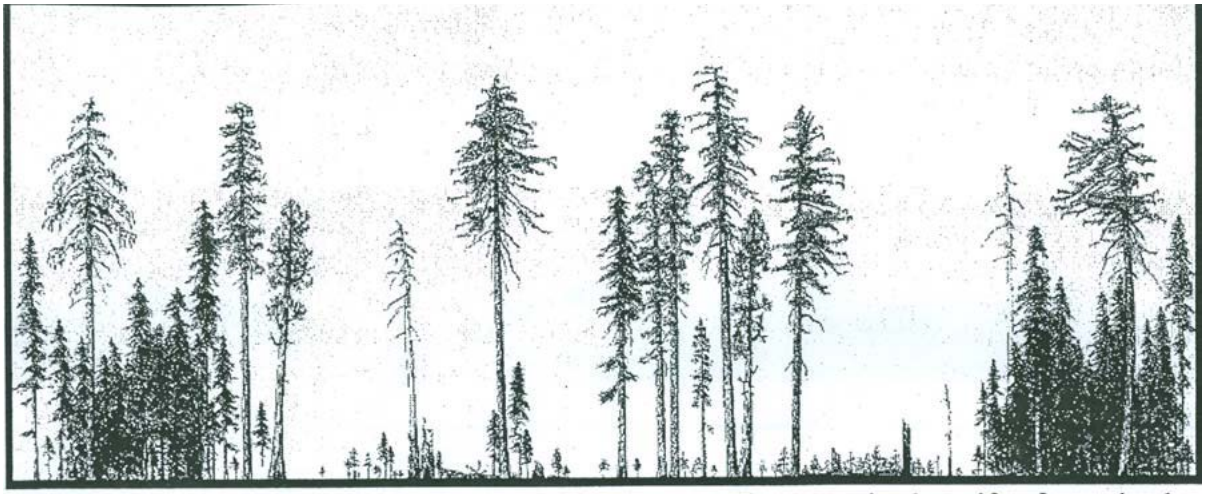

Figure 1. Schematic cross section of a typical pre-settlement mixed conifer forest in the Western Sierra Nevada. From the Sierra Nevada Ecosystem Project (SNEP 1996, drawing by Robert Van Pelt).

The desired future condition of forest carnivore connectivity corridor (FCCC) is to provide habitat connectivity for fisher and marten, linking Yosemite National Park and the North Mountain inventoried roadless area west to the Clavey River. For habitat connectivity, a future forested area is desired with a minimum of 50 percent of the forested area having at least 60 percent canopy cover. Higher than average levels of large snags and large down woody material is also desired (as in USDA 2004). Habitat structures are important to retain that may constitute rest sites as described in Lofroth et al. 2010 (e.g. see plate 7.7 and 7.8). Desired conditions in forest carnivore connectivity corridor (FCCC) for fisher and marten also provide suitable habitat conditions for spotted owl.

ENVIRONMENTAL CONSEQUENCES

The project alternatives could result in direct and indirect effects to the California spotted owl through the following activities:

1. Salvage harvest of fire-killed trees.
2. Salvage harvest of roadside hazard trees.
3. New permanent road construction, temporary road construction, and road reconstruction.
4. Landing construction and use.
5. Use of material sources and water sources.
6. Biomass and similar fuels treatments.

These actions may have direct and indirect effects on spotted owls through the following:

- Project related death, injury, or disturbance.
- Project related modifications to habitat quantity and/or quality.

Death, injury or disturbance:

Death, injury, and disturbance are potential direct effects to consider for spotted owl (USDA 2004). Project activities have the potential to cause death or injury by tree-falling or by the use of heavy equipment. There is the potential for death or injury if nest trees are felled while being used by nesting birds during the reproductive season. In addition, historic nest trees could be removed. The mobility of the species in question and the management requirement of LOPs, make it highly improbable that death or injury would occur as a result of project activities. Flagging and avoiding current and historic nest trees provides a way to minimize nest tree loss.

Project activities have the potential to cause disturbance mainly because of the use of loud machinery. Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. Loud noise has the potential to change normal behavior patterns during the period operations would take place and potentially impair essential behavior patterns of the spotted owl related to breeding, feeding, or sheltering. The potential for disturbance is minimized by the implementation of Limited Operating Periods (LOPs) as a management requirement.

The location of nest sites or activity centers are more uncertain following large-scale disturbance events (Keane, pers. comm.); conducting surveys to establish or confirm any new locations of nests or activity centers is a way to address this movement uncertainty. Conducting protocol surveys is a management requirement common to all alternatives.

Habitat modification:

Salvage harvest of fire-killed trees and salvage harvest of roadside hazard trees primarily removes snags and existing down woody material. Salvage harvest of roadside hazard trees may also remove existing living trees meeting certain criteria for hazard definition. The removal of snags reduces future recruitment of down woody material.

Short term, within the next ten years, snags and down woody material function as habitat elements important for owl prey. Snags also serve as potential hunting perch sites that may be utilized by foraging owls. Recent research indicates that prey species may be abundant and available in the post-fire environment. Work by Bond et al. (2009, 2013) indicates that owls may use high-severity fire areas for foraging and that foraging owls with burned forest in their home range appear to utilize a variety of prey, particularly gophers (*Thomomys* spp.) and flying squirrels (*Glaucomys sabrinus*). Bond et al. (2013) also found that wood rats (*Neotoma* spp.), sciurid squirrels (Family Sciuridae), and deer mice (*Peromyscus* spp.) were also represented as important prey items for owls within a post-fire habitat mosaic. Results from studies of small mammal habitat associations demonstrate the species-specific importance of habitat elements such as shrubs, downed logs, snags, and truffles (Keane 2014). The time elapsed since fire is closely correlated with habitat elements and the composition of prey species (Roberts 2008, Roberts and van Wagtendonk 2008). For example, post-fire habitats are typically rich in gophers and deer mice in the first decade following a fire, followed by wood rats when understory conditions are well developed in the first and following decades and finally by sciurid squirrels and flying squirrels when trees reach maturity (Ingles 1965, Quinn and Keeley 2006). A diversity of prey species within a habitat mosaic can be expected to benefit predators such as the spotted owl (Roberts and North 2012). Post-fire salvage logging may adversely affect rates of owl occupancy (Lee et al. 2012) but more research is needed to determine owl response to post-fire land management activities (see FEIS Appendix D). For example, Clark et al. (2013) found that habitat disturbance due to wildfire and subsequent salvage logging on private lands negatively affected site occupancy by Northern spotted owls. However, Clark et al. (2013) were unable to separate the impacts of wildfire from land management activities. Further, salvage logging treatments on private land are different from salvage logging treatments on National Forest with regards to various project requirements and environmental protection measures. While research (such as that proposed in Appendix D) will help better determine retention thresholds and spatial arrangements of snags compatible

with owl use, areas where snag retention is required on National Forest System land (e.g. 4 to 6 per acre) are likely to allow for an adequate number of perch sites for owl foraging in post-fire environments.

Long term over several decades, large snags and large down logs are considered biological legacies in the post-fire environment and play important roles in the structure of the future forest (Lindenmayer et al. 2008). For example, large snags and large down logs are fundamental to the definition of old forest and are important attributes for the development of the old forest ecosystem and associated species such as the spotted owl. Snags may stand for decades and in time, may become future nest trees for spotted owl as the regenerating forest nears maturity, although few large snags may be expected to remain intact by that time. Snag dynamics in the Sierra Nevada are complex and snags fall at different rates depending on many factors (Cluck and Smith 2007). Once recruited into the down woody material on the ground, this coarse woody debris again serves as an important element in owl habitat (Verner et al. 1992). Thus, decaying wood serves different functional roles overtime, first providing cover for spotted owl prey in the complex early seral stage of the forest, and ultimately decaying and playing a critical role in soil development of old forests. For example, logs in decay class five (i.e. highly decayed) are associated with hypogeous fungi (i.e. truffles), which in turn serve as a primary food source for spotted owl prey in old forests - the flying squirrel in particular (Verner et al. 1992).

New permanent road construction, temporary road construction, road reconstruction, and landing construction also modify habitat. In particular, road construction and continued use can result in increased habitat fragmentation, disturbance, and lower habitat capability for spotted owl (Pyron et al. 2009). Basic road maintenance such as grading and cleaning culverts is generally not an issue for wildlife. Basic road maintenance protects water quality and soils by preventing degradation of road drainage structures and function (Rim Recovery EIS Hydrology Report). The use of water sources may reduce water availability for spotted owls and their prey, especially in drought years. Landing construction results in habitat fragmentation. Helicopter landings are typically between 1 and 3 ac in size and tractor landings are typically ¼ to 1 ac in size.

The removal of snags and down woody material reduces fuel loading. The reduction in fuel loading may be expected to promote the development of old forest habitat. However, the effectiveness of the various treatments proposed is difficult to predict and there is considerable uncertainty with how salvage logging influences future fire. A review of recent research on this topic and the associated controversy can be found in Long et al. (2014) Ch. 4.3 pp. 195-197. Salvage logging is controversial because few short-term positive ecological effects and many potential negative effects have been associated with post-fire logging (Ibid). That said, it is certain that salvage harvest reduces fuel loading over time (i.e. as snags fall, large surface fuel loadings result) and reduced surface fuel loads may reduce soil and forest regrowth damage in a reburn (e.g. as was observed on the Chips Fire). Reburns of high severity lengthen the time for establishment of suitable nesting habitat, the most limiting factor needed to improve reproductive performance and population trend for the spotted owl (Federal Register 2006). Further, salvage may improve the likelihood of future reforestation efforts that, contingent upon future surface fuels management and treatment at appropriate scales, would re-establish forests with large trees and sufficient canopy cover within shorter time frames.

The effect salvage logging has on reburn fire severity of future mature forest habitat is likely to remain widely variable depending on numerous factors including how future prescribed fire management is planned and implemented. However, as stated in Chapter 3.05 (Fuels),reducing fuel loads, especially activity fuels and biomass, is likely to be effective in reducing flame lengths and fire line intensities. Piling and burning activity fuels is an effective method for disposal and is expected to promote development of mature forest habitat (Stephens et al. 2009). Also, preventing high fuel loadings along roadsides can reasonably be expected to play an important role in reducing fire severity to developing mature forest habitat, especially where roads are identified as critical fire management features (see Crook et al. 2013). Roadside hazard salvage treatments involve the removal of snags and

live trees identified as hazards to public safety. There is considerable uncertainty with regards to treatment intensity in roadside hazard salvage treatments because treatment intensity is subject to a wide range of environmental conditions (e.g. drought and moisture stress) related to tree status.

As spotted owls focus their activities in the best available habitat around roost and nest sites known as activity centers (Verner et al. 1992), habitat modification effects are expected to be most pronounced in PACs.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the spotted owl and to determine how well project alternatives comply with Forest Plan Direction and species conservation strategies:

1. Number of current and historic nest sites within suitable PACs in treatment units or within ¼ mile of potentially disturbing activities.

2. Acres of treatment unit overlap within suitable PACs.

3. Acres of areas managed for old forest condition with higher than average levels of large snags and higher than average levels of large down woody material.

4. Miles of new permanent road construction and other project road miles in PACs by road type.

5. Number of material sources, water sources, and landings in owl habitat.

6. Acres of fuels treatments by type (biomass, pile and burn) including deer forage units and watershed soil cover treatments (mastication, drop & lop).

Alternative 1 (Proposed Action)

Direct and Indirect Effects

Indicator 1. Potentially five known activity center nest trees intersect with Maintenance Level 2 roadside hazard salvage treatment units and 26 known activity center nest trees are within ¼ mile of potentially disturbing activities. It is expected that the implementation of LOPs and protocol surveys as management requirements will minimize disturbance potential to these sites. However, there is no provision in this alternative to flag and avoid current and historic nest trees or trigger special coordination measures designed to promote nest tree protection. Therefore, it is likely that approximately 14 percent of spotted owl territories could be negatively affected by nest tree loss.

Indicator 2. Under Alternative 1, 2,017 acres of roadside hazard salvage treatments would occur within post-fire suitable PACs. Site-specifically, Table 4 shows spotted owl sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to approximately 40 percent of a PAC. There is no provision in this alternative to mitigate treatment overlap by adding equivalent acreage to the PAC. This would result in a potential net loss of 2,015 acres of owl habitat and possibly influence continued occupancy probabilities (Seamans and Gutiérrez 2007) in approximately 50 percent of spotted owl territories.

Table 4. Treatment unit overlap within post-fire suitable PACs, Alternative 1. There is no provision in this alternative to mitigate treatment overlap by adding equivalent acreage to the PAC.

PAC#	Maintenance Level 2 roadside hazard tree treatment acres
MPA0019 - McCauley Ranch	65
TUO0010 - Soldier Crk	42

TUO0011 - Big Crk	116
TUO0012 - Ackerson Crk	46
TUO0024 - SF Tuolumne	101
TUO0026 - Rush Crk	57
TUO0027 - N Bear Mtn	93
TUO0032 - Reynold's Crk	17
TUO0034 - D54 Niagara Crk	30
TUO0039 - Ackerson Mtn	28
TUO0040 - MF Tuolumne	84
TUO0053 - Brushy Crk	128
TUO0054 - Thompson Peak	0
TUO0059 - L 13 Mile Crk	39
TUO0061 - D51 Bear Spring Crk	108
TUO0065 - L Reynold's Crk	43
TUO0078 – Crocker	28
TUO0085 - Harden Flat NW	98
TUO0129 - U 2 Mile Crk	72
TUO0130 - Camp Clavey	96
TUO0146 - Hunter Crk	18
TUO0148 - U 13 Mile Crk	89
TUO0149 - Cottonwood Crk	91
TUO0151 - L Cottonwood Crk	64
TUO0176 - Clavey-Wolfin	84
TUO0187 - Thompson Meadow	24
TUO0188 - Loney Crk	59
TUO0205 - N Niagara	59
TUO0210 – Buchanan	3
TUO0218 - L Skunk Crk	62
TUO0219 - U Cherry Lake	19
TUO0255 - Box Spring	30
TUO0256 - Clavey Rvr	0
TUO0257 - Westside E	76
TUO0258 - Westside W	29
TUO0261 - U Camp 25	19
Total	2,017

Indicator 3. Under Alternative 1, zero acres of salvage units managed for old forest condition would be managed for higher than average levels of large conifer snags and large down woody material. Large down woody material would be retained at the average management rate of 10 – 20 tons / ac for all units. Higher than average levels of large conifer snags and large down woody material is a management objective in areas managed for old forest condition. Areas managed for old forest condition include Old Forest Emphasis Area (OFEA), Spotted Owl Home Range Core Area (HRCA), and Forest Carnivore Connectivity Corridor (FCCC). Not leaving higher than average levels of large conifer snags and large down woody material would likely reduce long-term habitat quality of future forest habitat (i.e. habitat elements that define old forest habitat) and would fall short of desired conditions described under management direction and habitat modification sections for this species.

Table 5. Unit acres by snag retention level in basal area (BA) per acre of snags, Alternative 1.

	12 sq. ft. BA / acre* General Forest matrix management average	30 sq. ft. BA / acre OFEA, HRCA, FCCC above average level management objective	60 - 120 sq. ft. BA / ac Low intensity salvage treatment units
Unit acres	28,326	0	0

*converted from 4 snags/ac for comparison purposes; assuming retention of 24"dbh snags.

Indicator 4. Table 6 for Alternative 1 shows, 0.9 miles of new permanent road construction, 31.3 miles of road reconstruction , 0.6 miles of "skid zones" (see Rim EIS Transportation Report), and 2.2 miles of temporary road occurring in suitable PACs. A total of 35 project road miles intersect PACs. Of the road reconstruction miles, 2.2 miles would occur in suitable PACs on routes currently decommissioned or not designated for motor vehicle travel. The remaining road reconstruction miles occur mainly on open Maintenance Level 2 roads. The management requirement of re-closing all routes post-project that are currently designated closed pre-project is expected to minimize long-term habitat fragmentation and disturbance potential. Under this alternative, 0.5 miles of new permanent road construction would occur in PAC# TUO0258 and 0.4 miles of new permanent road construction would occur in PAC# TUO130. The management requirement of designating any new permanent road construction in PACs as blocked Maintenance Level 1 or Maintenance Level 2 gated year-round is expected to minimize long-term disturbance potential to affected sites. With the minimization of long-term disturbance potential, this disturbance effect is expected to be minor.

Table 6. Project road miles in PACs by road type, Alternative 1 (PACs not shown did not have project roads).

PAC	Miles			
	New permanent construction	Reconstruction	Skid zone	Temporary Road
Spotted Owl PAC MPA0019 - McCauley Ranch		1.3		
Spotted Owl PAC TUO0010 - Soldier Crk		0.4		0.1
Spotted Owl PAC TUO0011 - Big Crk		2.4	0.1	
Spotted Owl PAC TUO0012 - Ackerson Crk		0.7	0.1	0.1
Spotted Owl PAC TUO0024 - SF Tuolumne		2.4		
Spotted Owl PAC TUO0026 - Rush Crk		1.5		
Spotted Owl PAC TUO0027 - N Bear Mtn		2.0		
Spotted Owl PAC TUO0032 - Reynold's Crk		0.3		
Spotted Owl PAC TUO0034 - D54 Niagara Crk		0.5		
Spotted Owl PAC TUO0039 - Ackerson Mtn		0.3		
Spotted Owl PAC TUO0040 - MF Tuolumne		1.5		
Spotted Owl PAC TUO0053 - Brushy Crk		2.1	0.2	
Spotted Owl PAC TUO0059 - L 13 Mile Crk		0.1		
Spotted Owl PAC TUO0061 - D51 Bear Spring Crk		2.3		
Spotted Owl PAC TUO0078 - Crocker		0.9		
Spotted Owl PAC TUO0085 - Harden Flat NW		2.2		
Spotted Owl PAC TUO0129 - U 2 Mile Crk		1.1		0.1
Spotted Owl PAC TUO0130 - Camp Clavey	0.4	1.6		
Spotted Owl PAC TUO0148 - U 13 Mile Crk		0.8		
Spotted Owl PAC TUO0149 - Cottonwood Crk		1.7	0.0	
Spotted Owl PAC TUO0151 - L Cottonwood Crk		1.4		
Spotted Owl PAC TUO0188 - Loney Crk		1.3		
Spotted Owl PAC TUO0218 - L Skunk Crk		1.3		
Spotted Owl PAC TUO0219 - U Cherry Lake		0.4		
Spotted Owl PAC TUO0255 - Box Spring				0.7

Spotted Owl PAC TUO0257 - Westside E		0.7	0.2	0.8
Spotted Owl PAC TUO0258 - Westside W	0.5	0.0	0.0	
Spotted Owl PAC TUO0261 - U Camp 25				0.4
Total	**0.9**	**31.3**	**0.6**	**2.2**

Indicator 4 (continued). Under Alternative 1, a total of 107 miles of project road treatments would occur in suitable HRCAs (see table below). The management requirement of re-closing all routes post-project that are currently designated closed pre-project, and the management requirement of designating any new permanent road construction in PACs as blocked Maintenance Level 1 or Maintenance Level 2 gated year-round are expected to minimize long-term habitat fragmentation and disturbance potential. The two HRCAs with new permanent road construction proposed are associated with the corresponding PAC and roads in the "Project road miles in PACs" table above.

Table 7. Project road miles in HRCAs by road type Alternative 1 (HRCAs not shown did not have project roads.)

HRCA	Miles			
	New permanent construction	Reconstruction	Skid zone	Temporary road
Spotted Owl HRCA MPA0019		1.4		
Spotted Owl HRCA MPA0082		1.2		0.2
Spotted Owl HRCA TUO0010		1.6		0.1
Spotted Owl HRCA TUO0011		6.5	0.1	
Spotted Owl HRCA TUO0012		1.1	0.2	0.2
Spotted Owl HRCA TUO0024		6.4		0.2
Spotted Owl HRCA TUO0026		4.9		
Spotted Owl HRCA TUO0027		4.9		
Spotted Owl HRCA TUO0032		2.4	0.2	
Spotted Owl HRCA TUO0034		1.1		
Spotted Owl HRCA TUO0035				0.4
Spotted Owl HRCA TUO0039		1.5	0.2	0.2
Spotted Owl HRCA TUO0040		3.1		
Spotted Owl HRCA TUO0053		3.7	0.6	0.3
Spotted Owl HRCA TUO0054		1.5		
Spotted Owl HRCA TUO0059		3.8		
Spotted Owl HRCA TUO0061		4.0		
Spotted Owl HRCA TUO0065		0.4	0.4	
Spotted Owl HRCA TUO0078		3.8		
Spotted Owl HRCA TUO0085		7.0		0.1
Spotted Owl HRCA TUO0129		1.7	0.3	0.4
Spotted Owl HRCA TUO0130	0.5	2.9		0.0
Spotted Owl HRCA TUO0142		0.1		
Spotted Owl HRCA TUO0148		4.2		
Spotted Owl HRCA TUO0149		6.1	0.4	
Spotted Owl HRCA TUO0151		3.3		
Spotted Owl HRCA TUO0176		0.1		
Spotted Owl HRCA TUO0187		3.6		
Spotted Owl HRCA TUO0188		1.6	0.1	
Spotted Owl HRCA TUO0205		1.0	0.0	
Spotted Owl HRCA TUO0218		4.1		

Spotted Owl HRCA TUO0219		2.0		
Spotted Owl HRCA TUO0255		0.2		1.0
Spotted Owl HRCA TUO0257		2.9	0.6	1.3
Spotted Owl HRCA TUO0258	1.6	1.0	0.2	
Spotted Owl HRCA TUO0261		0.0		1.6
Total	**2.1**	**95.3**	**3.4**	**6.2**

Indicator 5. Table 8 shows Alternative 1, has zero material sources, nine water sources, and six landings in suitable PACs (see table below). Of the landings in suitable PACs, two are helicopter landings and four are tractor landings. One PAC contains two proposed landings, the remainder contains one each. The implementation of Best Management Practices (BMPs) at project water sources (see Rim EIS Hydrology Report) is expected to minimize potential effects to spotted owls and their prey related to water availability. There is no provision in this alternative to mitigate habitat loss caused by landing construction by adding acreage to the PAC. This would result in a minimal amount of potential net loss of spotted owl habitat on 10 acres across 5 PACs.

Table 8. Water sources and landings within PACs, Alternative 1 (PACs not shown did not have these features.)

PAC	**Water sources**	**Landings**	
		Tractor	**Helicopter**
TUO0011 - Big Crk	0	1	0
TUO0027 – N Bear Mtn	1	0	0
TUO0039 - Ackerson Mtn	1	0	1
TUO0053 - Brushy Crk	0	1	0
TUO0061 - D51 Bear Spring Crk	1	0	0
TUO0078 - Crocker	2	0	0
TUO0129 – Upper 2 Mile Crk	1	0	0
TUO0148 – Upper 13 Mile Crk	1	0	0
TUO0151 – L. Cottonwood Crk	0	1	1
TUO0187 - Thompson Meadow	1	0	0
TUO0218 – L. Skunk Crk	1	0	0
TUO0257 - Westside E	0	1	0

Indicator 6. Alternative 1 has 7,626 acres of biomass fuels. Of the biomass acres, 1,064 acres occur in critical winter deer range and have a cover/forage ratio emphasis for deer habitat (see table below). Treatments designed to achieve optimal deer cover/forage ratios would also break up fuel continuity within those units and contribute to fuels management goals (see section 3.14 mule deer). Fuels management goals are important components of the fire and fuels strategy (Crook et al. 2013) and would assist in moving toward the desired condition of old forest habitat development. Specifically, fuels management actions in the deer range units, which are located downslope of the old forest corridor and PAC TUO021, are likely to break up fuel continuity and prevent fire spread into the developing forest upslope, at least in the short-term. Based on location, these treatments would likely influence old forest development in at least three spotted owl territories. However, long-term effectiveness is uncertain because future long-term management actions (e.g., prescribed burn schedules) are unknown at this time. This would likely play a critical role in contributing to the development of future old forest linking Yosemite National Park and the North Mountain Roadless Area to the Clavey River watershed. More details are in the Terrestrial Wildlife Biological Evaluation Appendix.

Table 9. Biomass in critical winter deer range units, Alternative 1.

Unit	**Biomass Acres**	**Total Unit Acres**	**Percent**

L03	31	30	100%
L06	10	10	100%
L07	5	5	100%
L202	28	142	20%
L203	265	265	100%
L204	87	87	100%
L205	140	140	100%
L206	138	138	100%
M201	35	50	70 %
O201	140	299	27%
P201	185	185	100%
Total	**1,064**	**1,352**	**79%**

Cumulative Effects

In making the determination for this alternative, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered, found in Appendix B, Rim EIS. Relevant risk factors potentially affecting California spotted owl abundance and distribution have been identified and primarily include nest site loss and disturbance, and loss of habitat and habitat elements, especially large snags and large down woody material (USDA 2001, R5 Sensitive species evaluation form 2012). The removal of fire from the ecosystem and resulting fuel loadings is a primary driver for nest habitat loss through stand-replacing wildfire; coupled with climate change, the extent and severity of wildfire has increased in the Sierra Nevada as a result (Keane 2014). The twelve month finding listing decision of the US Fish and Wildlife Service found stand-replacing fire to be the primary threat to the California spotted owl (Federal Register 2006).

Based on relevant risk factors, the following present and reasonably foreseeable actions from Appendix B, Rim EIS are the most relevant to spotted owl: green thinning sales, emergency fire salvage on private land, and the Rim Fire Hazard Tree project.

The green thinning sales are designed to reduce ladder fuels and retain and improve key habitat components such as retention of large trees, defect trees, snags, downed wood, and hardwoods. Based on the biological evaluations for each, spotted owl habitat is expected to improve in the long-term with implementation of these projects.

As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acre is presently being salvage logged. These salvage activities generally remove all fire-killed and dying trees, important habitat elements to spotted owl habitat in the short and long-term. There is considerable uncertainty regarding the ecological effects of varying levels of salvage treatments to this species (Appendix D, Rim EIS).

The Rim Fire Hazard Tree project removes snags along high-use, typically paved roads (Maintenance Level 3 to 5 roads). The hazard tree removal along Maintenance Level 3-5 roads was considered when remapping Category 3 PACs for Alternatives 1, 3, and 4. For Category 2 PACs, hazard tree removal along Maintenance Level 3-5 roads was considered in Alternative 3 and 4, but not Alternative 1 (Spotted Owl PAC evaluation/remapping narratives in the Terrestrial Wildlife Biological Evaluation Appendix).

Alternative 1 may contribute cumulatively to short and long-term effects on spotted owl. The combination of past Forest Service and private timber harvests has cumulatively reduced the amount of suitable habitat available across the analysis area, and the area has been identified as an area of concern

(Verner et al. 1992). The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

Alternative 2 (No Action)

Direct and Indirect Effects

Under No Action, death, injury or disturbance would not be an issue because no active management would occur. The indirect effects of no action are primarily related to the influence no action may have on future wildfires and how future wildfires may impact spotted owl habitat.

A growing body of evidence indicates that spotted owls persist within fire affected landscapes (Bond et al. 2002, Roberts et al. 2011, and Lee et al. 2012). At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and spotted owl habitat given the numerous factors involved over time. Potential fire behavior may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuel pools, potential fire behavior may be expected to increase (Rim EIS Fuels Report) and ultimately affect the amount of mature forest habitat available for spotted owl nesting and roosting. Specifically, Alternative 2 is likely to result in excessive fuel loads that could inhibit future fire and fuels management (i.e. inability to safely or effectively construct holding lines) and result in severe effects to forest soils on large scales (i.e. from landscape scale and long residency times of future fire). Excessive fuel loads are likely to result under the No Action Alternative because within 10 years, as trees fall over, surface fuels are projected to average 42 tons per acre, and within 30 years, surface fuels are projected to average 78 tons per acre, and could range as high as 280 tons per acre (Rim EIS Fuels Chapter).

Thus, not removing fire-killed trees would result in additional difficulties related to future management, such as planting conifers that could help accelerate the establishment of mature forest conditions. Suitable nesting and roosting habitat for spotted owl may be delayed under this alternative resulting in long-term negative effects. When wildfire returns to this landscape, the remaining mature forest adjacent to or near areas that burned at high severity may be at increased risk of loss. As noted above, within 30 years, the fuel loading is predicted to be four to eight times higher (78 tons per acre on average) than the desired condition (Rim EIS Fuels Report). This would significantly increase the risk to fire suppression activities when wildfire occurs in the future. In conclusion, although uncertainty exists, this alternative may result in negative long-term effects on habitat for spotted owl.

Cumulative Effects

The cumulative effects discussion under Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. Under Alternative 2, no direct cumulative effect is expected because no active management would occur. The cumulative contribution under this alternative may not complement the fuel reduction treatments that have occurred in the past, thus increasing the risk of loss of remaining suitable habitat to wildfire in the long-term. The short-term beneficial impacts to spotted owl such as retention of snags may be outweighed by the increased risk of additional habitat loss in the next wildfire.. Thus, no action is not expected to result in any definitive direct or indirect cumulative effects.

Alternative 3

Direct and Indirect Effects

Indicator 1. Potentially five known activity center nest trees intersect with Maintenance Level 2 roadside hazard salvage treatment units and 26 known activity center nest trees are within ¼ mile of potentially disturbing activities. It is expected that the implementation of LOPs and protocol surveys as management

requirements will minimize disturbance potential to these sites. Under this alternative, the management requirement to flag and avoid current and historic nest trees is expected to protect nest trees. The risk of nest tree loss is minimized and not expected to occur.

Indicator 2. Approximately 2,015 acres of roadside hazard salvage treatments would occur within post-fire suitable PACs (see table below). Site-specifically, spotted owl sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to approximately 40 percent of a PAC. Under Alternative 3, overlap with roadside hazard treatments would be mitigated by adding acreage to the PAC equivalent to the treatment acres as per Forest Plan Direction (USDA 2010 p. 185). Under this alternative, 85 percent of affected PAC acres would be mitigated; six PACs would have unmitigated treatment overlap. For unmitigated acres, additional acres of suitable habitat were not available. PAC evaluation narratives and maps are in the Terrestrial Wildlife Biological Evaluation Appendix. In Alternative 3, unmitigated habitat alteration and the potential influence on continued occupancy probabilities would be minimized to the greatest extent possible. Few studies are available for guidance on specific thresholds (Seamans and Gutiérrez 2007). Although precise thresholds for the analysis area are not known, potential net loss is mitigated over the majority of acres in all but 2 PACs (Harden Flat and Hunter Creek).

Table 10. Treatment unit overlap within post-fire suitable PACs, Alternative 3.

PAC#	Maintenance Level 2 roadside hazard salvage treatment acres	Percent mitigated
MPA0019 - McCauley Ranch	65	100
TUO0010 - Soldier Crk	42	100
TUO0011 - Big Crk	119	100
TUO0012 - Ackerson Crk	46	100
TUO0024 - SF Tuolumne	104	100
TUO0026 - Rush Crk	82	61
TUO0027 - N Bear Mtn	93	72
TUO0032 - Reynold's Crk	16	100
TUO0034 - D54 Niagara Crk	30	100
TUO0039 - Ackerson Mtn	31	100
TUO0040 - MF Tuolumne	84	73
TUO0053 - Brushy Crk	127	100
TUO0054 - Thompson Peak	0	N/A
TUO0059 - L 13 Mile Crk	39	100
TUO0061 - D51 Bear Spring Crk	108	51
TUO0065 - L Reynold's Crk	43	100
TUO0078 – Crocker	26	100
TUO0085 - Harden Flat NW	98	1
TUO0129 - U 2 Mile Crk	74	100
TUO0130 - Camp Clavey	94	100
TUO0146 - Hunter Crk	18	0
TUO0148 - U 13 Mile Crk	76	100
TUO0149 - Cottonwood Crk	91	100
TUO0151 - L Cottonwood Crk	64	100
TUO0176 - Clavey-Wolfin	92	100
TUO0187 - Thompson Meadow	24	100
TUO0188 - Loney Crk	59	100
TUO0205 - N Niagara	65	100

TUO0210 – Buchanan	3	100
TUO0218 - L Skunk Crk	75	76
TUO0219 - U Cherry Lake	33	100
TUO0255 - Box Spring	2	100
TUO0256 - Clavey Rvr	0	N/A
TUO0257 - Westside E	68	100
TUO0258 - Westside W	5	100
TUO0261 - U Camp 25	19	100
Total	**2,015**	

Indicator 3. Table 11 shows Alternative 3 would have 12,359 acres of salvage units managed for old forest condition would be managed for higher than average levels of large conifer snags and large down woody material (see table below). Large down woody material would be retained at the rate of 10 – 20 tons / ac with 20 tons/ac emphasized in units managed for old forest condition. Higher than average levels of large conifer snags and large down woody material is a management objective in areas managed for old forest condition. Areas managed for old forest condition include Old Forest Emphasis Area (OFEA), Spotted Owl Home Range Core Area (HRCA), and Forest Carnivore Connectivity Corridor (FCCC). Under this alternative, 2,089 acres would receive low intensity salvage treatment as part of a PSW research project. The PSW research project is designed to address questions related to salvage logging intensities and spotted owl occupancy and use of post-fire environments. This research will provide information to better understand the effects of wildfire and salvage-logging on spotted owl and serve as an empirical basis for informing future management decisions (Keane, pers.comm.). Thus, the PSW research is expected to benefit California spotted owl conservation by addressing the uncertainty related to thresholds of effect. Retaining higher than average levels of large conifer snags and large down woody material in areas managed for old forest condition would be consistent with the desired condition of habitat for this and other old forest associated species. The importance of higher than average levels of large conifer snags and large down woody material to habitat quality is described in the "habitat modification" section above. Generally, habitat managed for higher than average levels may be best qualified as developing into highly suitable habitat, while habitat managed at average levels may be best qualified as developing into low to moderate suitability.

Table 11. Unit acres by snag retention level in basal area (BA) per acre of snags, Alternative 3.

	12 sq. ft. BA / acre* General Forest matrix management average	30 sq. ft. BA / acre OFEA, HRCA, FCCC above average level management objective	60 - 120 sq. ft. BA / ac Low intensity salvage treatment units
Unit acres	15,955	12,359	2,089

*converted from 4 snags/ac for comparison purposes; assuming retention of 24"dbh snags.

Indicator 4. Table 12 shows Alternative 3 would have 0.2 miles of new permanent road construction, 29.1 miles of road reconstruction , 0.1 miles of "skid zones" (see Rim EIS Transportation Report report), and 0.6 miles of temp road would occur in suitable PACs. A total of 30 project road miles intersect PACs. Of the road reconstruction miles, 2.8 miles would occur in suitable PACs on routes currently decommissioned or not designated for motor vehicle travel. The remaining road reconstruction miles occur mainly on open Maintenance Level 2 roads. The management requirement of re-closing all routes post-project that are currently designated closed pre-project is expected to minimize long-term habitat fragmentation and disturbance potential. Under this alternative, 0.2 miles of new permanent road construction would occur in PAC# TUO130. The management requirement of designating any new

permanent road construction in PACs as blocked Maintenance Level 1 or Maintenance Level 2 gated year-round is expected to minimize long-term disturbance potential of affected sites.

Table 12. Project road miles in PACs by road type under Alternative 3 (PACs not shown did not have project roads in them).

PAC	Miles			
	New permanent construction	Reconstruction	Skid zone	Temporary road
Spotted Owl PAC MPA0019 - McCauley Ranch		1.4		
Spotted Owl PAC TUO0010 - Soldier Crk		0.4		0.0
Spotted Owl PAC TUO0011 - Big Crk		2.5	0.1	
Spotted Owl PAC TUO0012 - Ackerson Crk		0.8		
Spotted Owl PAC TUO0024 - SF Tuolumne		2.4		
Spotted Owl PAC TUO0026 - Rush Crk		1.8		
Spotted Owl PAC TUO0027 - N Bear Mtn		2.0		
Spotted Owl PAC TUO0032 - Reynold's Crk		0.0		
Spotted Owl PAC TUO0034 - D54 Niagara Crk		0.6		
Spotted Owl PAC TUO0039 - Ackerson Mtn		0.5		
Spotted Owl PAC TUO0040 - MF Tuolumne		1.2		
Spotted Owl PAC TUO0053 - Brushy Crk		1.5		
Spotted Owl PAC TUO0059 - L 13 Mile Crk		0.1		
Spotted Owl PAC TUO0061 - D51 Bear Spring Crk		2.3		
Spotted Owl PAC TUO0078 - Crocker		0.9		
Spotted Owl PAC TUO0085 - Harden Flat NW		2.1		0.1
Spotted Owl PAC TUO0129 - U 2 Mile Crk		1.2		
Spotted Owl PAC TUO0130 - Camp Clavey	0.2	1.3		
Spotted Owl PAC TUO0148 - U 13 Mile Crk		0.5		
Spotted Owl PAC TUO0149 - Cottonwood Crk		1.3		
Spotted Owl PAC TUO0151 - L Cottonwood Crk		1.1		
Spotted Owl PAC TUO0205 - N Niagara				0.1
Spotted Owl PAC TUO0218 - L Skunk Crk		1.1		0.3
Spotted Owl PAC TUO0219 - U Cherry Lake		0.1		
Spotted Owl PAC TUO0255 - Box Spring				0.1
Spotted Owl PAC TUO0257 - Westside E		1.2		
Spotted Owl PAC TUO0258 - Westside W		0.0		
Spotted Owl PAC TUO0261 - U Camp 25		0.4		
Totals	**0.2**	**29.1**	**0.1**	**0.6**

Indicator 4 (continued). Table 13 for Alternative 3 shows a total of 97.7 miles of project road treatments would occur in suitable HRCAs (see table below). The management requirement of re-closing all routes post-project that are currently designated closed pre-project, and the management requirement of designating any new permanent road construction in PACs and HRCAs as blocked Maintenance Level 1 or Maintenance Level 2 gated year-round are expected to minimize long-term habitat fragmentation and disturbance potential. The one HRCA with new permanent road construction proposed is associated with the corresponding PAC and road in the "Project road miles in PACs" table above.

Table 13. Project road miles in HRCAs by road type (HRCAs not shown did not have project roads in them), Alternative 3.

HRCA	Miles			
	New permanent construction	Reconstruction	Skid zone	temp
Spotted Owl HRCA MPA0019		2.3		
Spotted Owl HRCA MPA0082		1.2		0.2
Spotted Owl HRCA TUO0010		1.6		0.1
Spotted Owl HRCA TUO0011		6.4	0.1	
Spotted Owl HRCA TUO0012		1.5	0.2	
Spotted Owl HRCA TUO0024		6.0		1.3
Spotted Owl HRCA TUO0026		5.0		
Spotted Owl HRCA TUO0027		4.9		0.2
Spotted Owl HRCA TUO0032		2.0		
Spotted Owl HRCA TUO0034		1.7		0.1
Spotted Owl HRCA TUO0035		0.3		0.2
Spotted Owl HRCA TUO0039		1.9	0.2	
Spotted Owl HRCA TUO0040		2.8		0.3
Spotted Owl HRCA TUO0053		3.3	0.2	
Spotted Owl HRCA TUO0054		1.5		
Spotted Owl HRCA TUO0059		2.9		
Spotted Owl HRCA TUO0061		3.6		
Spotted Owl HRCA TUO0065		0.4	0.4	
Spotted Owl HRCA TUO0078		3.7		0.2
Spotted Owl HRCA TUO0085		6.8		0.4
Spotted Owl HRCA TUO0129		2.0	0.2	0.2
Spotted Owl HRCA TUO0130	0.3	2.0		
Spotted Owl HRCA TUO0142		0.1		0.0
Spotted Owl HRCA TUO0148		3.7		
Spotted Owl HRCA TUO0149		6.3	0.4	
Spotted Owl HRCA TUO0151		3.1		
Spotted Owl HRCA TUO0176		0.1		
Spotted Owl HRCA TUO0187		2.8		
Spotted Owl HRCA TUO0205				0.2
Spotted Owl HRCA TUO0218		4.0		0.3
Spotted Owl HRCA TUO0219		1.8		0.2
Spotted Owl HRCA TUO0255		0.2		0.1
Spotted Owl HRCA TUO0257		3.9		
Spotted Owl HRCA TUO0258		0.9	0.0	
Spotted Owl HRCA TUO0261		1.2		
Total	**0.3**	**91.7**	**1.8**	**3.9**

Indicator 5. Table 14 shows Alternative 3 has zero material sources, nine water sources, and two tractor landings in suitable PACs (see table below). Of the landings in suitable PACs, none are helicopter landings. Two PACs contain one tractor landing each. The implementation of Best Management Practices (BMPs) at project water sources (see Rim EIS Hydrology Report) is expected to minimize potential effects to spotted owls and their prey related to water availability. Under this alternative, habitat loss caused by landing construction was mitigated by adding equivalent acreage to the PAC. No net habitat loss is expected for this indicator.

Table 14. Water sources and landings within PACs, Alternative 3 (PACs not shown did not have these features.)

PAC	Water sources	Landings	
		Tractor	Helicopter
TUO0011 - Big Crk	0	1	0
TUO0027 – N Bear Mtn	1	0	0
TUO0039 - Ackerson Mtn	1	0	0
TUO0061 - D51 Bear Spring Crk	1	0	0
TUO0078 - Crocker	2	0	0
TUO0129 – Upper 2 Mile Crk	1	0	0
TUO0148 – Upper 13 Mile Crk	1	0	0
TUO0151 – L. Cottonwood Creek	0	1	0
TUO0187 - Thompson Meadow	1	0	0
TUO0218 – L. Skunk Crk	1	0	0

Indicator 6. Alternative 3 has 8,379 acres of biomass fuels treatments. Of the biomass acres, 1,1,739 acres occur in critical winter deer range and have a cover/forage ratio emphasis for deer habitat (see table below). Treatments designed to achieve optimal deer cover/forage ratios would also break up fuel continuity within those units and contribute to fuels management goals (see mule deer section). Fuels management goals are important components of the fire and fuels strategy (Crook et al. 2013) and would assist in moving toward the desired condition of old forest habitat development. In particular, for critical winter deer range units located downslope of forest carnivore connectivity corridor units and PAC TUO0218, breaking up fuel continuity within the deer range units is likely to influence the development of future old forest linking Yosemite National Park and the North Mountain Roadless Area to the Clavey River watershed as shown in the Terrestrial Wildlife Biological Evaluation Appendix. Additional fuels treatments include 22,036 acres of pile and burn. Pile and burn treatments may be machine piled or hand piled with the objective of disposing of activity fuels. Also under this alternative, 3,537 acres of watershed treatments involving mastication or "drop & lop" techniques would be used to provide soil cover in watershed sensitive areas (see Rim EIS Hydrology report). These techniques are expected to benefit the establishment of vegetation and thus would benefit spotted owl habitat development. Alternative 3 treats 675 more biomass acres than Alternative 1 in critical areas and may potentially be more effective in managing fuels and future fire behavior downslope of an estimated 4 spotted owl territories.

Table 15. Biomass in critical winter deer range units, Alternative 3.

Unit #	Biomass Acres	Total Unit Acres	Percent
L03	30	30	100%
L04	25	79	32%
L07	5	5	100%
L201	92	92	100%
L202	28	142	20%
L203	250	695	36%
L204	340	1519	22%
L205	475	755	63%
L206	15	81	19%
M201	35	74	47%
M202	20	138	14%
M203	20	63	32%
M204	79	282	28%

O201A	80	156	51%
O201B	60	121	50%
P201	185	185	100%
Total	**1,739**	**4,416**	**39%**

Cumulative Effects

The Cumulative effects discussion under Alternative 1 outlines those present and reasonably foreseeable future activities relevant to this alternative as well. The cumulative contribution of Alternative 3 would be less than Alternative 1 because management requirements minimize the potential for nest tree loss, habitat loss, and reduction in habitat quality of future old forest. In particular, snag retention would be higher within OFEA, HRCA, and FCCC units, and new permanent road construction would be greatly reduced. The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

Alternative 4

Direct and Indirect Effects

Alternative 4 is the same as Alternative 3 except that it drops all new permanent road construction and the following eighteen units from treatment: A01B, A03, A04, A05A, A05B, D01A, D02, E01A, E01B, E02, O01, O02A, O02B, O04, O05, O12, R01A, and R02.

Indicator 1. As in Alternative 3, potentially five known activity center nest trees intersect with Maintenance Level 2 roadside hazard salvage treatment units and 26 known activity center nest trees are within ¼ mile of potentially disturbing activities. It is expected that the implementation of LOPs and protocol surveys as management requirements will minimize disturbance potential to these sites. Under this alternative, the management requirement to flag and avoid current and historic nest trees is expected to protect nest trees. As in Alternative 3, the risk of nest tree loss is minimized and not expected to occur.

Indicator 2. As in Alternative 3, approximately 2,015 acres of roadside hazard salvage treatments would occur within post-fire suitable PACs and spotted owl sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to approximately 40 percent of a PAC. Mitigation for overlap with roadside hazard treatment units are the same in this Alternative as described in Alternative 3 above.

Indicator 3. Under Alternative 4, 12,315 acres of salvage units managed for old forest condition would be managed for higher than average levels of large conifer snags and large down woody material (see table below). Large down woody material would be retained at the rate of 10 – 20 tons / ac with 20 tons/ac emphasized in units managed for old forest condition. Higher than average levels of large conifer snags and large down woody material is a management objective in areas managed for old forest condition. Areas managed for old forest condition include Old Forest Emphasis Area (OFEA), Spotted Owl Home Range Core Area (HRCA), and Forest Carnivore Connectivity Corridor (FCCC). As in Alternative 3, 2,089 acres would receive low intensity salvage treatment as part of a PSW research project as described above. Under Alternative 4, 2,571 acres would be dropped from salvage treatment specifically for species associated with post-fire environments (see black-backed woodpecker section), except for roadside hazard salvage. Units designated for full snag retention incorporate 97 acres of retired PAC TUO030, 289 acres of retired PAC TUO0145, 57 acres of remapped PAC TUO078, and 148 acres of re-mapped PAC TUO0257. Although it was determined that these areas have little to no probability of continued occupancy for nesting or roosting as discussed in the PAC evaluation narratives and maps in the Terrestrial Wildlife Biological Evaluation Appendix, recent research indicates that the proposed retention may provide foraging habitat for spotted owls at least over the next decade (Bond et al. 2009). Retaining higher than average levels of large conifer snags and large down woody material in areas managed for old forest condition would improve habitat quality in the majority of territories in this project.

Table 16. Unit acres by snag retention level in basal area (BA) per acre of snags, Alternative 4.

	12 sq. ft. BA / acre* General Forest matrix management average	30 sq. ft. BA / acre OFEA, HRCA, FCCC above average level management objective	60 - 120 sq. ft. BA / acre Low intensity salvage treatment	Full retention
Unit acres	13,427	12,315	2,089	2,571

*converted from 4 snags/ac for comparison purposes; assuming retention of 24"dbh snags.

Indicator 4. Under Alternative 4, project road miles in PACs by road type would be the same as described in Alternative 3 above except that there would be no new permanent road construction within any PACs or HRCAs. Thus in Alternative 4, long-term habitat fragmentation and disturbance potential from new permanent roads would not be an issue for the following two PACs and HRCAs: PAC# TUO0258 and PAC# TUO130.

Indicator 5. As in Alternative 3, there are zero material sources, nine water sources, and two landings in suitable PACs. As described in Alternative 3 above, the implementation of Best Management Practices (BMPs) at project water sources (see Rim EIS Hydrology Report) is expected to minimize potential effects to spotted owls and their prey related to water availability. Also as described in Alternative 3, habitat loss caused by landing construction was mitigated by adding equivalent acreage to the PAC.

Indicator 6. As in Alternative 3 above, Alternative 4 biomass and watershed treatments would occur except that biomass treatments and pile and burn treatments would not occur within the units dropped from salvage harvest. This totals 404 acres of dropped biomass treatments and 1,716 acres of dropped pile and burn treatments. Biomass treatments in critical winter deer range would still occur as described above in Alternative 3. As in Alternative 3, Alternative 4 treats 675 more biomass acres than Alternative 1 in critical areas and so is expected to be more effective in managing fuels and future fire behavior downslope of an estimated 4 owl territories.

Cumulative Effects

Same as Alternative 3, Alternative 4 would have the least habitat alteration with full retention of snags across 2,571 more acres than Alternative 3. Alternative 4 is not expected to affect the viability of spotted owl.

SUMMARY OF EFFECTS ANALYSIS ACROSS ALL ALTERNATIVES

Indicator 1. The number of current and historic nest sites within suitable PACs in treatment units and the number of activity center nest sites within ¼ mile of potentially disturbing activities are the same for all alternatives. LOPs are common to all action alternatives. However, Alternatives 3 and 4 include a management requirement (see table below) to minimize the potential for effect and Alternative 1 does not (see wildlife management requirements in Alternative descriptions).

Table 17. Summary of current and historic nest sites within suitable PACs in treatment units and the number of activity center nest sites within ¼ mile of potentially disturbing activities by alternative.

	Number of nest sites in treatment units	Number of nest sites within ¼ mile of potentially disturbing activities	Management requirement
Alternative 1	5	26	No
Alternative 2	0	0	N/A
Alternative 3	5	26	Yes*
Alternative 4	5	26	Yes*

* management requirement is to flag and avoid current and historic nest trees.

Indicator 2. Acres of treatment unit overlap within suitable PACs is mitigated wherever possible in Alternatives 3 and 4 but not mitigated in Alternative 1.

Table 18. Summary of acres of treatment unit overlap within suitable PACs by alternative.

	Treatment overlap acres mitigated	Management requirement
Alternative 1	0	No
Alternative 2	N/A	N/A
Alternative 3	1,715	Yes*
Alternative 4	1,715	Yes*

* management requirement is to mitigate treatment overlap in PACs by adding acreage to the PAC equivalent to the treated acreage wherever possible and adding adjacent acres of comparable quality wherever possible (USDA 2010 p. 185).

Indicator 3. Table 19 shows the acres of areas managed for old forest objectives with higher than average levels of large snags and higher than average levels of large down woody material are highest in Alternatives 3 and 4. In contrast, Alternative 1 manages no acres for higher than average levels of large snags. For retention of large down woody material, all action alternatives manage to a 10 – 20 tons / acre standard but Alternatives 3 and 4 emphasize retention at the higher end (i.e. 20 tons/ac) while Alternative 1 does not. Alternative 4 additionally manages 2,571 acres under full retention of snags and down woody material (1,414 acres from Alternative 3's 12 sq.ft. BA/acre category and 1,157 acres from Alternative 3's 30 sq.ft. BA/acre category are moved to the full retention category).

Table 19. Summary of large snag and large down woody material retention by alternative.

	12 sq. ft. BA / acre General Forest matrix management average	30 sq. ft. BA / acre OFEA, HRCA, FCCC above average level management objective	60 - 120 sq. ft. BA / acre Low intensity salvage treatment units	Full retention
Alternative 1	28,326	0	0	0
Alternative 2	0	0	0	30,403*
Alternative 3	15,955	12,359	2,089	0
Alternative 4	13,427	12,315	2,089	2,571

* represents maximum number of potential unit acres in all land allocations.

Indicator 4. Miles of new permanent road construction and other project road miles in PACs and HRCAs is highest in Alternative 1. Alternatives 1 and 3 include new permanent road construction in PACs and HRCAs. Alternative 4 proposes no new permanent road construction.

Table 20. Project road summary in PACs by Alternative.

	Miles				
	New Construction	Reconstruction	Skid zone	Temporary Road	Total
Alternative 1	0.9	31.3	0.6	2.2	35
Alternative 2	0	0	0	0	0
Alternative 3	0.2	29.1	0.1	0.6	30
Alternative 4	0	29.1	0.1	0.6	28.8

Table 21. Project road summary in HRCAs by Alternative.

	Miles

	New Construction	Reconstruction	Skid zone	Temporary Road	Total
Alternative 1	2.1	95.3	3.4	6.2	107
Alternative 2	0	0	0	0	0
Alternative 3	0.3	91.7	1.8	3.9	97.7
Alternative 4	0	91.7	1.8	3.9	97.4

Indicator 5. The number of water sources in PACs is the same in all action alternatives. Of the action alternatives, the number of landings in PACs is highest in Alternative 1and lowest in Alternatives 3 and 4.

Table 22. Summary of number of water sources and landings in PACs by alternative (no material sources are located in PACs).

	Water sources	Landings	
		Tractor	Helicopter
Alternative 1	9	4	2
Alternative 2	0	0	0
Alternative 3	9	2	0
Alternative 4	9	2	0

Indicator 6. Alternatives 3 and 4 best address disposal of activity fuels and the need for soil cover treatments for watershed protection.

Table 23. Summary of fuels treatments by alternative.

	Biomass	Biomass deer units	Pile & burn	Watershed soil cover treatments
Alternative 1	6,562	1,064	0	0
Alternative 2	0	0	0	0
Alternative 3	6,640	1,739	22,036	3,537
Alternative 4	6,236	1,739	20,320	3,537

Determination

Alternative 1

It is our determination that Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl.

Our determination for Alternative 1 is based on the following rationale:

- This alternative includes actions to reduce fuel loading and the long-term risk of high-severity fire effects and habitat loss to this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.

Alternative 2

It is our determination that Alternative 2 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl.

Our determination for Alternative 2 is based on the following rationale:

- No actions would occur to potentially impact this species or habitat. However, we note that with no action to address potential fuel loads, habitat for this species may be at greater long-term risk of high-severity fire effects.

Alternative 3

It is our determination that Alternative 3 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl.

Our determination for Alternative 3 is based on the following rationale:

- This alternative includes actions to reduce the long-term risk of high-severity fire effects to habitat of this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.
- This alternative includes several project requirements to minimize potential effects to individuals and habitat. Specifically, this alternative 1) mitigates for potential nest tree loss in suitable PACs, 2) accounts for potential losses of snags due to hazard removal or the effects of future prescribed fire, 3) adds acreage to PACs equivalent to unavoidable treatment acres, and 4) manages HRCA and other appropriate land allocations consistent with old forest objectives for higher than average levels of snags and down woody material.

Alternative 4

It is our determination that Alternative 4 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl.

Our determination for Alternative 4 is based on the same rationale as Alternative 3.

COMPLIANCE WITH THE FOREST PLAN AND OTHER DIRECTION

Applicable Forest Plan Direction:

USDA 2010 p. 43: Assess the potential impact of projects on the connectivity of habitat for old forest associated species.

USDA 2010 p. 44: General guidelines for large-snag retention are as follows: 1) in westside mixed conifer and ponderosa pine types - four of the largest snags per acre, and 2) in red fir forest type - six of the largest snags per acre.

USDA 2010 p. 44: When some snags are expected to be lost due to hazard removal or the effects of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels.

USDA 2010 p. 185: If nesting or foraging habitat in PACs is mechanically treated, mitigate by adding acreage to the PAC equivalent to the treated acres using adjacent acres of comparable quality wherever possible.

USDA 2010 p. 186 and November 15, 2006 Regional Forester Guidance Letter on Limited Operating Periods for the California Spotted Owl: Maintain a limited operating period (LOP), prohibiting vegetation treatments within approximately ¼ mile of the activity center during the breeding season (March 1 through August 31), unless surveys confirm that California spotted owls are not nesting. Prior to implementing activities within or adjacent to a California spotted owl PAC and the location of the nest site or activity center is uncertain, conduct surveys to establish or confirm the location of the nest or activity center.

USDA 2010 p. 189: Manage HRCA for higher than average levels of snags and down woody material.

Forest Plan Direction Compliance

Alternative 1:

Alternative 1 does not mitigate for potential nest tree loss in suitable PACs.

Alternative 1 manages for the minimum amount of snag retention as per general guidelines in forest plan direction but does not take into account potential losses due to hazard removal or the effects of prescribed fire.

Alternative 1 does not mitigate habitat mechanically treated in PACs by adding acreage to the PAC equivalent to the treated acres.

Alternative 1 applies LOPs as required.

Alternative 1 does not manage HRCA for higher than average levels of snags and down woody material nor other land allocations managed for old forest objectives.

Alternatives 3 and 4:

Alternatives 3 and 4 best demonstrate compliance with management direction described above. Specifically, Alternatives 3 and 4: 1) mitigate for potential nest tree loss in suitable PACs, 2) account for potential losses of snags due to hazard removal or the effects of future prescribed fire, 3) adds acreage to PACs equivalent to unavoidable treatment acres, 4) applies LOPs as required, and 5) manages HRCA and other appropriate land allocations consistent with old forest objectives for higher than average levels of snags and down woody material.

GREAT GRAY OWL

AFFECTED ENVIRONMENT

Species and Habitat Account

The great gray owl (*Strix nebulosa*) is currently managed as a USDA Forest Service Sensitive species (USDA 2013). Sensitive species are species identified by the Regional Forester where population viability is a concern because of 1) downward population trends and/or 2) diminished habitat capacity that would reduce species distribution. Habitat descriptions, species population trends, and the status of known or suspected limiting factors are summarized by Beck and Winter 2000, USDA 2001, 2004, and the R5 Sensitive species evaluation form of 2012, and are incorporated here by reference.

Great gray owls are regarded as locally rare throughout their range in USFS Region 5 and no more than 100-200 individuals have been estimated in California since 1980, and only 80 were estimated in 2006 (R5 Sensitive species Evaluation Form 2012). Although the great gray owl population in California is small, the Stanislaus National Forest contains more great gray owl sites than any other National Forest in Region 5, or any area outside of Yosemite National Park (Siegel 2001, 2002, NRIS Wildlife database, CNDDB database). Of the great gray owl sites on the Stanislaus National Forest, most are concentrated within the Rim Fire perimeter in areas that border Yosemite National Park. (Rich, pers.obs.).

Hull et al. 2010 and Hull et al. 2014 found that great gray owls in the Yosemite area (i.e. including the Rim Fire area), are a genetically-unique population warranting subspecies status as ssp. *yosemitensis*. The genetic analysis completed by Hull et al. 2010 indicates that the *S.n. yosemitensis* population has experienced a recent genetic bottleneck and exhibits a small effective population size -- both of these latter factors are a significant conservation concern. The limited genetic diversity in this population may contribute to population instability because of the already low population levels, the low census numbers, the limited migration potential, and the potential for inbreeding depression (Hull et al. 2010).

Habitat requirements of great gray owls in the Sierra Nevada were summarized by Beck and Winter (2000), studied specifically by Greene (1995), Sears (2006), Powers et al. (2011), and Kalinowski et al. (2014), and are currently under additional investigations by PSW research (Keane, pers.comm.).

Great gray owls in the Sierra Nevada inhabit coniferous forest surrounding wet meadows (USDA 2001). Great gray owls typically breed in large flat-topped broken snags located in conifer stands with higher than average levels of large snags and woodland cover in the immediate vicinity of montane meadows (Bull and Duncan 1993, Beck and Winter 2000). Great gray owls may also utilize abandoned nests of other birds of prey, and mistletoe or other broom growths (Ibid).

Recent burns, where they exist in the Sierras, provide some structural similarity to a meadow ecosystem for a few years before the trees or brush shade out the grasses and forbs (Beck and Winter 2000). Such sites can provide foraging areas for nearby breeding great gray owls, but only on a short-term basis (Greene 1995, Beck pers.comm.). Meadows or meadow complexes at least 25 acres in size appear to be necessary for persistent occupancy and reproduction but meadows as small as 10 acres will support infrequent breeding (Beck and Winter 2000). Reproductive sites are associated with high vole abundance and high vole abundance is associated with meadow vegetation height (Beck 1985; Greene 1995; Sears 2006, Kalinowski et al. 2014).

Mean home-range size in the Sierra Nevada during a radio-tagging study was estimated at 148 acres in females and 50 acres in males during the breeding season; great gray owls enlarge their home ranges substantially in winter (Van Riper and Van Wagtendonk 2006).

Great gray owl sites are identified through the use of protocol surveys (Beck and Winter 2000, Keane et al. 2011). Protocol surveys for great gray owl have been conducted throughout the Rim Fire area for the past two decades. These surveys are best described as twofold: management oriented and research

oriented. Management oriented survey work is generally opportunistic depending upon planned activities and funding levels. Research oriented survey work is generally more systematic and focused. Together these efforts have occurred at a level such that inventory information for the analysis area is considered essentially complete (USDA unpublished data, NRIS Wildlife database).

Great gray owl sites receive special management consideration as protected activity centers (PACs). Protected activity centers (PACs) are established and maintained to include the forested area and adjacent meadow around all known great gray owl nest stands. The PAC encompasses at least 50 acres of the highest quality nesting habitat (CWHR types 6, 5D, and 5M) available in the forested area surrounding the nest. The PAC also includes the meadow or meadow complex that supports the prey base for nesting owls (USDA 2010 p.187).

We completed a post-fire PAC evaluation on National Forest in the Rim Fire area. We found that there are 13 great gray owl sites located within the Rim Fire perimeter on National Forest. This represents half of all great gray owl sites on the Stanislaus National Forest and a significant proportion of the estimated population size of 80 to 100 individuals for this subspecies (R5 Sensitive species evaluation form 2012). All of the great gray owl PACs in the Rim Fire burned at mixed severity. Overall, approximately half of all PAC acres burned at high severity (> 75% basal area mortality) and although only preliminary ground assessment work has been completed, we know of at least two historic nest trees that were lost in the fire. However, since great gray owls may nest in burned forest (Beck, pers.comm.), and since post-fire conditions may provide preferred foraging habitat in the short term (Greene 1995), we left all great gray owl PAC boundaries intact except that we added acreage to PAC boundaries where feasible to offset unavoidable treatment overlap. Unavoidable treatment overlap occurred along roads where hazard tree removal was identified as a public safety need. Details on individual sites can be found in the Terrestrial Wildlife Biological Evaluation Appendix and in the effects analysis below. Based on early survey results this season using an Automatic Recording Unit (ARU), continued great gray owl use has already been confirmed in one Rim Fire great gray owl PAC (USFS unpubl. data). The vocalizations obtained at this site involve courtship calls of a pair, suggesting a possible nesting attempt. Occupation of additional great gray owl PACs post-fire is highly likely.

Management Direction

The Regional Forester for the Pacific Southwest Region has listed the great gray owl (GGOW) as a Sensitive species, which means that management of the species is subject to Forest Service policy found in FSM 2672.1. It states: "Sensitive species of native plant and animal species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing."

Current management direction is defined by project-level standards and guidelines from the Forest Plan (USDA 2010) and is based on the desired future condition of land allocations (Robinson 1996). The desired condition for great gray owl PAC described in the Forest Plan Direction focuses on protecting nest sites with a minimum 50 acre buffer and managing meadow habitat for sufficiently large vole populations to provide a food source for great gray owls through the reproductive period (USDA 2010 p187).

Also, there is an emphasis to conduct additional surveys to established protocols to follow up reliable sightings of great gray owls (USDA 2010 p. 43).

ENVIRONMENTAL CONSEQUENCES

The project alternatives could result in direct and indirect effects to the great gray owl through the following activities:

1. Salvage harvest of fire-killed trees.
2. Salvage harvest of roadside hazard trees.

3. New permanent road construction, temporary road construction, and road reconstruction.
4. Landing construction and use.
5. Use of material sources and water sources.
6. Biomass and similar fuels treatments.

These actions may have direct and indirect effects on great gray owls through the following:

- Project related death, injury, or disturbance.
- Project related modifications to habitat quantity and/or quality.

Death, injury or disturbance:

Death, injury, and disturbance are potential direct effects to consider for great gray owl (USDA 2004). Project activities have the potential to cause death or injury by tree-falling or by the use of heavy equipment. There is the potential for death or injury if nest trees are felled while being used by nesting birds during the reproductive season. In addition, historic nest trees could be removed. The great gray owl is also susceptible to getting "roadkilled". Collision with vehicles is a major cause of mortality (Keane et al. 2011); great gray owls tend to fly low over the ground in open areas especially adjacent to meadows (Bull and Duncan 1993). The management requirement of LOPs, mitigates the probability that death or injury would occur as a result of project activities. Flagging and avoiding current and historic nest trees provides a way to minimize nest tree loss. Keeping screening vegetation intact within 500 feet of nests also helps to minimize disturbance potential and/or nest abandonment. Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. Human presence in nest stands and loud noise in the vicinity of nest stands have the potential to change normal behavior and potentially impair essential behavior patterns of the great gray owl related to breeding, feeding, or sheltering. The potential for disturbance is minimized by the implementation of Limited Operating Periods (LOPs) as a management requirement.

The location of nest sites or activity centers are more uncertain following large-scale disturbance events (Keane, pers. comm.); conducting surveys to establish or confirm any new locations of nests or activity centers is a way to address this movement uncertainty (USDA 2004). Conducting protocol surveys is a management requirement common to all action alternatives.

Habitat modification:

Post-fire salvage harvest is identified as a risk factor for great gray owl (Hull et al. 2010). Salvage harvest of fire-killed trees and salvage harvest of roadside hazard trees primarily removes snags and existing down woody material. Salvage harvest of roadside hazard trees may also remove existing living trees meeting certain criteria for hazard definition. There is considerable uncertainty with regards to treatment intensity in roadside hazard salvage treatments because treatment intensity is subject to a wide range of environmental conditions (e.g. drought and moisture stress) related to tree status. The removal of snags reduces future recruitment of down woody material. Snags and down logs are important habitat elements for great gray owls and their prey (USDA 2001, Bull and Henjum 1990). Sears (2006) found that sites with a higher density of large snags were more likely to be occupied by great gray owl. Salvage logging typically reduces snag densities especially large-diameter snags used for nesting, leaning trees used by juveniles for roosting before they can fly, and high stem density in stands used by juveniles for cover and protection (Bull and Henjum 1990). Bull and Henjum (1990) noted that roosts accessible to flightless young, such as leaning and deformed trees and perches high enough to avoid terrestrial predators, may increase reproductive success. Additionally, if perches are not left, great gray owls cannot readily hunt in those areas (Ibid). Because fledglings leave the nest before they can fly, screening cover around the nest is considered important for their survival (Hayward and Verner 1994).

New permanent road construction, temp road construction, road reconstruction, landing construction, and biomass removal also modify habitat. In particular, road construction and continued use can result in increased habitat fragmentation, disturbance, and lower habitat capability for great gray owl (Pyron et al. 2009). Basic road maintenance such as grading and cleaning culverts is probably not an issue provided vehicles are slow moving. Also, basic road maintenance protects water quality and soils by preventing degradation of road drainage structures and function (Rim Recovery EIS Hydrology Report). In this project, landings and biomass removal are not proposed in great gray owl PACs. The use of water sources is probably not an issue given that great gray owls typically nest adjacent to wet meadow sites and wet meadow sites typically have high water availability. Further, the implementation of Best Management Practices (BMPs) at project water sources (see Rim Recovery EIS Hydrology Report) is expected to minimize potential effects to great gray owls and their prey related to water availability.

As great gray owls concentrate foraging around wet meadows and have relatively small breeding home ranges, the potential for habitat modification effects are expected to be most pronounced in the nesting habitat within PACs.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the great gray owl and to determine how well project alternatives comply with Forest Plan Direction and species conservation strategies:

1. Number of current and historic nest sites within PACs in treatment units or within ¼ mile of potentially disturbing activities.

2. Acres of treatment unit overlap within suitable PACs.

3. Miles of new permanent road construction and other project road miles in PACs by road type.

Alternative 1 (Proposed Action)

Direct and Indirect Effects

Indicator 1. Potentially two known historic nest trees intersect with Maintenance Level 2 roadside hazard salvage treatment units and 22 known historic nest trees are within ¼ mile of potentially disturbing activities. This represents approximately 70 percent of all known great gray owl nest trees on the Stanislaus National Forest. It is expected that the implementation of LOPs and protocol surveys as management requirements will minimize disturbance potential to these sites. However, there is no provision in Alternative1 to flag and avoid current and historic nest trees and specify coordination triggers.

Indicator 2. Under this alternative, 201 acres of roadside hazard salvage treatments would occur along Maintenance Level 2 roads (i.e. typically graded dirt roads) within great gray owl PACs. Table 24 shows site-specifically, great gray owl sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to approximately 50 percent overlap of a PAC. There is no provision in this alternative to mitigate treatment overlap by adding equivalent acreage to the PAC.

Table 24. Treatment unit overlap within great gray owl PACs, Alternative 1. There is no provision in this alternative to mitigate treatment overlap by adding equivalent acreage to the PAC.

PAC#	Maintenance Level 2 roadside hazard tree treatment acres overlapping PAC	Percent of PAC affected*
Ackerson 11-15	0	0
Ackerson 16	17	23
Ackerson 1ABC	25	28
Ackerson 3	20	43

Ackerson 4	38	51
Ackerson 6	2	3
Ackerson South	0	0
Crocker Meadow	3	5
Drew Meadow	42	23
North Stone Meadow	2	4
Spinning Wheel	46	52
Wilson Meadow Lower	15	22
Wilson Meadow Upper	15	33

* total great gray owl PAC acres vary, see Terrestrial Wildlife Biological Evaluation Appendix for narratives and maps of individual PACs.

Indicator 3. Under Alternative 1, 3.8 project road miles intersect great gray owl PACs. Table 25 shows 0.1 miles of new permanent road construction, 3.1 miles of road reconstruction, 0 miles of "skid zones" (see Rim EIS Transportation Report), and 0.6 miles of temporary road in great gray owl PACs. The management requirement of re-closing all routes post-project that are currently designated closed pre-project is a mitigation measure that is expected to minimize long-term habitat fragmentation and disturbance potential. The management requirement of designating any new permanent road construction in PACs as blocked Maintenance Level 1 or Maintenance Level 2 gated year-round is expected to minimize long-term disturbance potential of affected sites, but not habitat fragmentation effects. For example, although locations are approximate, it appears that the placement of the new permanent road in the Drew Meadow PAC would partially go through a surviving group of green trees (Figure 2), potentially lowering capability of suitable roosting and nesting habitat for great gray owl.

Table 25. Project road miles in great gray owl PACs by road type, Alternative 1 (PACs not shown did not have project roads in them).

Row Labels	New permanent road construction	Reconstruction	Temporary Road	Total
Ackerson 16		0.09		0.09
Ackerson 3		0.17		0.17
Ackerson 4		0.39		0.39
Ackerson 6		0.03		0.03
Crocker Meadow		0.02		0.02
Drew Meadow	0.1	1.01	0.6	1.67
Spinning Wheel		0.89		0.89
Wilson Meadow Lower		0.10		0.10
Wilson Meadow Upper		0.40		0.40
Total	**0.1**	**3.1**	**0.6**	**3.76**

Figure 2. Figure showing placement of new permanent road construction in the Drew Meadow PAC (new permanent road construction is shown as solid red, temporary road is shown as solid yellow, reconstruction is shown as solid blue, PAC boundary is shown as solid black, and imagery shows live trees as red).

Cumulative Effects

In making the determination for this alternative, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered. A list of the actions considered can be found in Appendix B, Rim EIS.

Relevant risk factors potentially affecting great gray owl abundance and distribution have been identified and primarily include nest site loss and disturbance, roadkill, livestock grazing, and loss of habitat and habitat elements, especially large snags and large down woody material adjacent to wet meadows (USDA 2001, R5 Sensitive species evaluation form 2012).

Based on relevant risk factors and location, the following present and reasonably foreseeable actions from Appendix B, Rim EIS are the most relevant to great gray owl: livestock grazing, meadow restoration, and the Rim Fire Hazard Tree project.

Thirteen grazing allotments are either wholly or partially within the analysis area, resulting in a maximum number of 1,632 cow/calf pairs across the landscape. Livestock grazing may influence the the abundance and availability of prey in wet meadows great gray owls use for foraging (Kalinowski et al., in press). Livestock grazing is subject to utilization and forest plan standards that are specifically designed to minimize grazing impacts on great gray owl prey. Meadow restoration projects are expected to improve foraging habitat for great gray owl. Based on the biological evaluations for each of these projects, short-term impacts are minimized and great gray owl habitat is expected to improve in the long-term with implementation of these projects.

Hazard tree removal along Maintenance Levels 3, 4 and 5 roads (i.e. typically paved) within great gray owl PAC and was considered as shown below:

Table 26. Overlap acres of PACs with activities and acres mitigated

PAC	Acres of overlap	Acres mitigated*
Ackerson 11-15	0	N/A
Ackerson 16	13	13
Ackerson 1ABC	0	N/A
Ackerson 3	0	N/A
Ackerson 4	14	0**
Ackerson 6	28	28
Ackerson South	0	N/A
Crocker Meadow	17	17
Drew Meadow	93	55**
North Stone Meadow	4	4
Spinning Wheel	30	30
Wilson Meadow Lower	0	N/A
Wilson Meadow Upper	10	0**

*acres were mitigated by adding acreage to the PAC equivalent to the treated acres using adjacent acres of comparable quality wherever possible.
**no additional comparable habitat was available to offset total overlapping treatment acres.

Cumulative effects of roadside hazard salvage treatments were mitigated in five PACs, partially mitigated in the Drew Meadow PAC, and could not be mitigated in two PACs. This would result in a net loss of habitat for three great gray owl territories, although precise thresholds of significance are unknown.

Alternative 1 may contribute cumulatively to short and long-term effects on great gray owl and there is at least a moderate level of uncertainty with thresholds of significance. The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

Alternative 2 (No Action)

Direct and Indirect Effects

Under No Action, death, injury or disturbance would not be an issue because no active management would occur. The indirect effects of no action are primarily related to the influence no action may have on future wildfires and how future wildfires may impact great gray owl habitat.

At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and great gray owl habitat given the numerous factors involved over time. Potential fire behavior in the future may be dependent on how future management actions, especially prescribed fire,

are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuel pools, fire behavior may be expected to increase (3.05 Fuels).

Cumulative Effects

The cumulative effects discussion under Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. Under Alternative 2, no direct cumulative effect is expected because no active management would occur. At the landscape scale, the cumulative contribution under this alternative may not complement the fuel reduction treatments that have occurred in the past, thus increasing the risk of loss of suitable nesting and roosting habitat to wildfire in the long-term.

Alternative 3

Direct and Indirect Effects

Indicator 1. Potentially two known historic nest trees intersect with Maintenance Level 2 roadside hazard salvage treatment units and 22 known historic nest trees are within ¼ mile of potentially disturbing activities. This represents approximately 70 percent of all known great gray owl nest trees on the Stanislaus National Forest. It is expected that the implementation of LOPs and protocol surveys as management requirements will minimize disturbance potential to these sites. Under Alternative 3, the management requirement to flag and avoid current and historic nest trees and screening vegetation is a mitigation measure expected to protect nest trees.

Indicator 2. Under Alternative 3, 201 acres of roadside hazard salvage treatments would occur along Maintenance Level 2 roads (i.e. typically graded dirt roads) within great gray owl PACs. Table 26 shows, site-specifically, great gray owl sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to approximately 40 percent overlap of a PAC. Table 27 shows in Alternative 3, acres of roadside hazard salvage treatments overlapping great gray owl PAC were mitigated by adding acreage to the PAC equivalent to the treated acres using adjacent acres of comparable quality wherever possible (see table below). Two PACs would not be affected by overlapping treatment units. Treatments overlapping great gray owl PAC were completely mitigated in four out of eleven cases. Treatments overlapping great gray owl PAC were almost entirely mitigated in one case. The remaining six cases had no additional comparable habitat available to offset treatment acres proposed inside the respective PAC (see details on individual sites in the Terrestrial Wildlife Biological Evaluation Appendix).

Table 27. Treatment unit overlap within great gray owl PACs, Alternative 3.

PAC#	Maintenance Level 2 roadside hazard tree treatment acres overlapping PAC	Percent of PAC affected*	Percent mitigated**
Ackerson 11-15	0	0	N/A
Ackerson 16	17	23	95
Ackerson 1ABC	25	28	100
Ackerson 3	20	43	100
Ackerson 4	38	51	0***
Ackerson 6	2	3	100
Ackerson South	0	0	N/A
Crocker Meadow	3	5	0***
Drew Meadow	42	23	0***
North Stone Meadow	2	4	100

Spinning Wheel	46	52	0***
Wilson Meadow Lower	15	22	0***
Wilson Meadow Upper	15	33	0***

* total great gray owl PAC acres vary, see Terrestrial Wildlife Biological Evaluation Appendix for narratives and maps of individual PACs.
**acres of roadside hazard salvage treatments overlapping great gray owl PAC were mitigated by adding acreage to the PAC equivalent to the treated acres using adjacent acres of comparable quality wherever possible. Maintenance Levels 3, 4, and 5 roadside hazard salvage were mitigated first (see cumulative effects section below) followed by Maintenance Level 2 roadside hazard salvage.
*** no additional comparable habitat was available to offset treatment acres proposed inside this PAC.

Indicator 3. Under Alternative 3, a total of 3.8 project road miles intersect great gray owl PACs. Table 28 shows there are 0 miles of new permanent road construction, 3.5 miles of road reconstruction , 0 miles of "skid zones" (see Rim EIS Vegetation Report), and 0.3 miles of temporary road in great gray owl PACs. The management requirement of re-closing all routes post-project that are currently designated closed pre-project is a mitigation measure that is expected to minimize long-term habitat fragmentation and disturbance potential. Road reconstruction in the Drew Meadow PAC would partially go through a surviving group of green trees (Figure 3), potentially lowering capability of suitable roosting and nesting habitat for great gray owl (the segment of new permanent road construction in Alternative 1 is reclassified in Alternative 3 as reconstruction; a reconstructed road would be blocked after use while a new permanent road would be gated).

Table 28. Project road miles in great gray owl PACs by road type (PACs not shown did not have project roads), Alternative 3.

PAC	Reconstruction	Temporary Road	Total
Ackerson 16	0.09	0	0.09
Ackerson 3	0.17	0	0.17
Ackerson 4	0.39	0	0.39
Ackerson 6	0.03	0	0.03
Crocker Meadow	0.02	0	0.02
Drew Meadow	1.37	0.30	1.67
Spinning Wheel	0.89	0	0.89
Wilson Meadow Lower	0.10	0	0.10
Wilson Meadow Upper	0.40	0	0.40
Total	**3.5**	**0.3**	**3.8**

Figure 3. Figure showing placement of new permanent road construction in the Drew Meadow PAC (temporary road is shown as solid yellow, reconstruction is shown as solid blue, PAC boundary is shown as solid black, and imagery shows live trees as red).

Cumulative Effects

The Cumulative effects discussion under Alternative 1 outlines those present and reasonably foreseeable future activities relevant to this alternative as well. Although there is a moderate level of uncertainty with significance thresholds, the cumulative contribution of Alternative 3 would be less than Alternative 1 because management requirements minimize the potential for nest tree and net habitat loss, and new permanent road construction would be greatly reduced. The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

Alternative 4

Direct and Indirect Effects

Alternative 4 is the same as Alternative 3 except that it drops the following eighteen units from treatment: A01B, A03, A04, A05A, A05B, D01A, D02, E01A, E01B, E02, O01, O02A, O02B, O04, O05, O12, R01A, and R02. Numerical values for indicators 1, 2, and 3 are the same in Alternative 4 as in Alternative 3. Under Alternative 4, the group O units are adjacent to great gray owl PACs Wilson Meadow Lower and Wilson Meadow Upper. Full retention in the O units under Alternative 4 would increase habitat capability for great gray owl in the Wilson Meadow area. Full retention would maintain the maximum number of snags for potential nests and hunting perches for great gray owl, reduce

disturbance potential, and provide high stem densities great gray owls are likely to use for screening and cover (Figure 4).

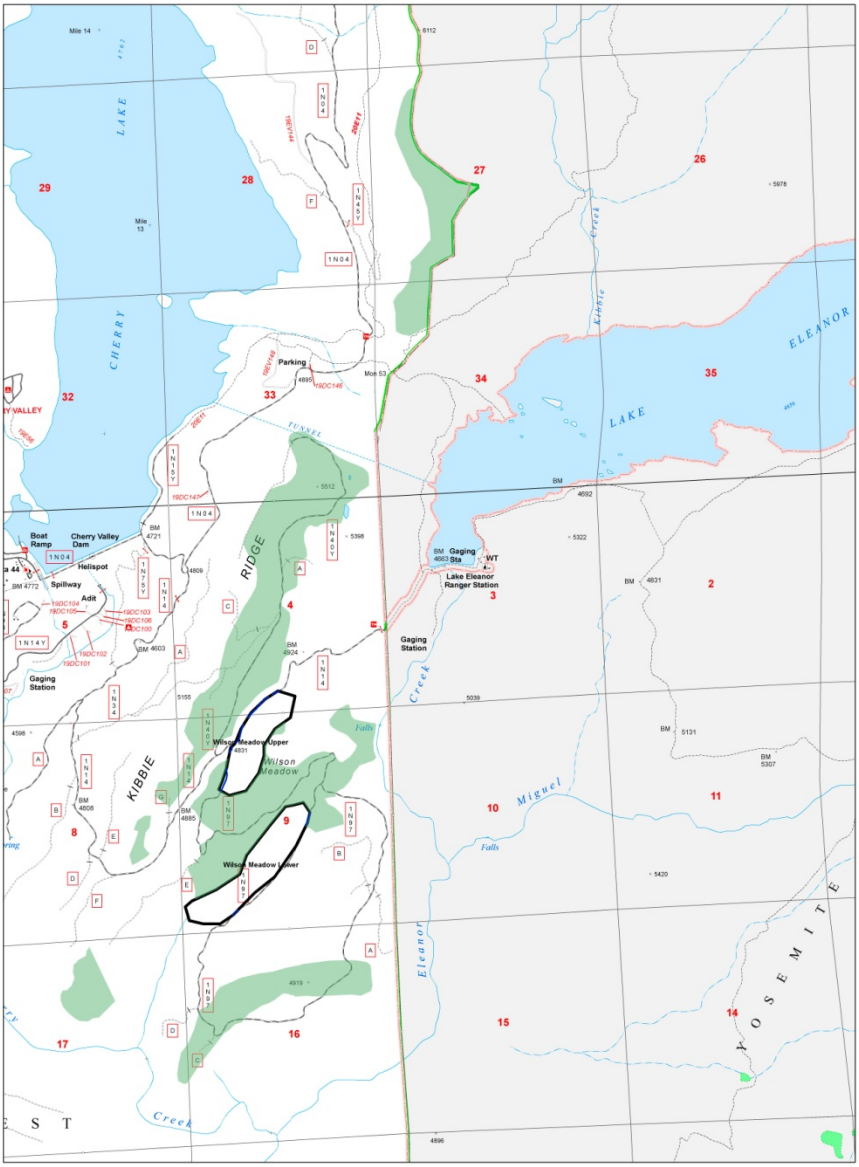

Figure 4. Great gray owl PACs (black outline) in relation to Group O full snag retention units (shaded green) of Alternative 4.

Cumulative Effects

The Cumulative effects discussion under Alternative 1 outlines those present and reasonably foreseeable future activities relevant to this alternative as well. The incremental impact of Alterative 4 is very similar to Alternative 3 but overall, Alternative 4 would have the least amount of habitat alteration. The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

SUMMARY OF EFFECTS ANALYSIS ACROSS ALL ALTERNATIVES

Indicator 1. The number of current and historic nest sites within suitable PACs in treatment units and the number of activity center nest sites within ¼ mile of potentially disturbing activities are the same for all alternatives. However, Alternatives 3 and 4 include a management requirement to minimize the potential for effect and Alternative 1 does not.

Table 29. Summary of current and historic nest sites within suitable PACs in treatment units and the number of activity center nest sites within ¼ mile of potentially disturbing activities by alternative.

	Number of nest sites in treatment units	Number of nest sites within ¼ mile of potentially disturbing activities	Management requirement
Alternative 1	2	22	No
Alternative 2	0	0	N/A
Alternative 3	2	22	Yes*
Alternative 4	2	22	Yes*

* management requirement is to flag and avoid current and historic nest trees and screening vegetation. Also puts in place special coordination measures.

Indicator 2. Acres of treatment unit overlap within suitable PACs is mitigated wherever possible in Alternatives 3 and 4 but not mitigated in Alternative 1. For Alternatives 3 and 4, 30 percent of treatment overlap acres were mitigated; no additional comparable habitat was available to offset the remaining 70 percent. . In Alternative 4, full retention of units in Group O may reduce treatment effect magnitude to two PACs (Wilson Meadow Lower and Wilson Meadow Upper).

Table 30. Summary of acres of treatment unit overlap within suitable great gray owl PACs by alternative.

	Treatment overlap acres mitigated	Management requirement
Alternative 1	0	No
Alternative 2	N/A	N/A
Alternative 3	61	Yes*
Alternative 4	61	Yes*

* management requirement is to mitigate treatment overlap in PACs by adding acreage to the PAC equivalent to the treated acreage wherever possible and adding adjacent acres of comparable quality wherever possible.

Indicator 3. Miles of project road miles in great gray owl PACs is the same in all action alternatives. The classification of road treatments varies by alternative. Under Alternative 1, 0.1 mile of project road is classified as new permanent road construction; under Alternatives 3 and 4, the same segment is classified as reconstruction. A reconstructed road is blocked after project use while a new permanent road is typically gated. A blocked road is typically used less frequently than a gated road. Also under Alternative 1, a 0.3 mile segment of road is classified as temporary; under Alternatives 3 and 4, the same segment is classified as reconstruction. A temporary road is typically decommissioned after use while a reconstructed road managed as closed is typically blocked. Decommissioning facilitates the establishment of vegetation.

Table 31. Project road summary in PACs by Alternative.

	New permanent road construction	Reconstruction	Temporary	Total

Alternative 1	0.1	3.1	0.6	3.8
Alternative 2	0	0	0	0
Alternative 3	0	3.5	0.3	3.8
Alternative 4	0	3.5	0.3	3.8

Determination

Alternative 1

It is our determination that Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl.

Our determination for Alternative 1 is based on the following rationale:

- This alternative includes actions to reduce fuel loading and the long-term risk of high-severity fire effects and habitat loss to this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.

Alternative 2

It is our determination that Alternative 2 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl.

Our determination for Alternative 2 is based on the following rationale:

- No actions would occur to potentially impact this species or habitat. However, we note that with no action to address potential fuel loads, habitat for this species may be at greater long-term risk of high-severity fire effects.

Alternative 3

It is our determination that Alternative 3 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl.

Our determination for Alternative 3 is based on the following rationale:

- This alternative includes actions to reduce the long-term risk of high-severity fire effects to habitat of this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.
- This alternative includes several project requirements to minimize potential effects to individuals and habitat. Specifically, this alternative 1) mitigates for potential nest tree loss in suitable PACs, 2) accounts for potential losses of snags due to hazard removal or the effects of future prescribed fire, 3) adds acreage to PACs equivalent to unavoidable treatment acres, and 4) manages appropriate land allocations consistent with old forest objectives for higher than average levels of snags and down woody material.

Alternative 4

It is our determination that Alternative 4 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the great gray owl.

Our determination for Alternative 4 is based on the same rationale as Alternative 3.

COMPLIANCE WITH FOREST PLAN AND OTHER DIRECTION

Applicable Forest Plan Direction:

USDA 2010 p. 185: If nesting or foraging habitat in PACs is mechanically treated, mitigate by adding acreage to the PAC equivalent to the treated acres using adjacent acres of comparable quality wherever possible.

USDA 2010 p. 187: Protected activity centers (PACs) are established and maintained to include the forested area and adjacent meadow around all known great gray owl nest stands. The PAC encompasses at least 50 acres of the highest quality nesting habitat (CWHR types 6, 5D, and 5M) available in the forested area surrounding the nest. The PAC also includes the meadow or meadow complex that supports the prey base for nesting owls.

USDA 2010 p. 187: 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. In meadow areas of great gray owl PACs, maintain herbaceous vegetation at a height commensurate with site capability and habitat needs of prey species. Follow regional guidance to determine potential prey species and associated habitat requirements at the project level.

USDA 2010 p. 187: Apply a limited operating period, prohibiting vegetation treatments and road construction within ¼ mile of an active great gray owl nest stand, during the nesting period (typically March 1 to August 15).

Forest Plan Direction Compliance

Alternative 1:

Alternative 1 does not mitigate for potential nest tree loss in suitable PACs.

Alternative 1 does not mitigate habitat mechanically treated in PACs by adding acreage to the PAC equivalent to the treated acres.

Alternative 1 applies LOPs as required.

Alternatives 3 and 4:

Alternatives 3 and 4 comply with management direction described above. Specifically, Alternatives 3 and 4: 1) mitigate for potential nest tree loss in suitable PACs, 2) account for potential losses of snags due to hazard removal or the effects of future prescribed fire, 3) add acreage to PACs equivalent to unavoidable treatment acres, 4) apply LOPs as required, and 5) manage appropriate land allocations consistent with old forest objectives for higher than average levels of snags and down woody material.

NORTHERN GOSHAWK

AFFECTED ENVIRONMENT

Species and Habitat Account

The northern goshawk (*Accipiter gentilis*) is currently managed as a USDA Forest Service Sensitive species (USDA 2013). Sensitive species are species identified by the Regional Forester where population viability is a concern because of 1) downward population trends and/or 2) diminished habitat capacity that would reduce species distribution. Habitat descriptions, species population trends, and the status of known or suspected limiting factors are summarized by USDA 2001 and the R5 Sensitive species evaluation form 2012, and are incorporated here by reference.

The northern goshawk has attracted substantial interest over the past two decades because management activities in forest environments have the potential to affect nesting habitat and, hence, population levels of this species (Woodbridge and Hargis 2006). Northern goshawks are associated with large trees, large snags, large downed logs, and use forests with a mix of dense tree cover interspersed with meadows, shrub patches, riparian areas, and other natural or artificial openings for foraging (Reynolds et al. 2008). In California, the occupancy rate of nest stands is positively correlated with stand size but smaller nest stands (< 25 ac) are occasionally occupied (Woodbridge and Detrich 1994). Goshawk breeding area reoccupancy appears to be a function of the amount of potential nesting habitat available in the area surrounding the nest; goshawks tend to reoccupy breeding areas when >39% potential nesting habitat remains (Moser and Garton 2009). Stand replacing fire events have eliminated nesting territories but goshawks are known to nest in stands that have experienced understory fires that did not reduce canopy cover and numbers of large trees below suitable levels (USDA 2001).

Northern goshawk sites are identified through the use of protocol surveys (USDA 2000). Protocol surveys for goshawk have been conducted throughout the Rim Fire area for the past two decades. These surveys are best described as opportunistic depending upon planned activities and funding levels but have occurred at a level such that inventory information for the analysis area is considered essentially complete (USDA, unpublished data, NRIS Wildlife database).

Northern goshawk sites receive special management consideration as protected activity centers (PACs). Goshawk PACs are delineated surrounding all known and newly discovered breeding territories detected on National Forest System lands. Northern goshawk PACs are designated based upon the latest documented nest site and location(s) of alternate nests. If the actual nest site is not located, the PAC is designated based on the location of territorial adult birds or recently fledged juvenile goshawks during the fledgling dependency period.

PACs are delineated to: (1) include known and suspected nest stands and (2) encompass the best available 200 acres of forested habitat in the largest contiguous patches possible, based on aerial photography. Where suitable nesting habitat occurs in small patches, PACs are defined as multiple blocks in the largest best available patches within 0.5 miles of one another. Best available forested stands for PACs have the following characteristics: (1) trees in the dominant and co-dominant crown classes average 24 inches dbh or greater; (2) in westside conifer and eastside mixed conifer forest types, stands have at least 70 percent tree canopy cover; and (3) in eastside pine forest types, stands have at least 60 percent tree canopy cover. Non-forest vegetation (such as brush and meadows) should not be counted as part of the 200 acres.

PACs may be removed from the network after a stand-replacing event if the habitat has been rendered unsuitable as a northern goshawk PAC and there are no opportunities for re-mapping the PAC in proximity to the affected PAC (USDA 2010 p. 184).

The post-fire PAC evaluation was completed with technical assistance from Pacific Southwest Region (PSW) scientists. For the analysis, each PAC was evaluated within the Rim Fire boundary using several criteria. The three main criteria used were 1) acres of post-fire suitable habitat defined as CWHR 4M, 4D, 5M, and 5D (including class 6) burned at less than 75 percent basal area mortality, 2) percent of PAC within a 496 ac (200 ha) circle burned at high severity (defined as greater than 75% basal area mortality), and 3) percent of pre-fire suitable habitat burned at high severity. We found that 22 northern goshawk sites are located within the Rim Fire perimeter. We found that sites clustered into three categories as shown in the figure below where Category 1 sites are shown in red, Category 2 sites in green, and Category 3 sites in orange:

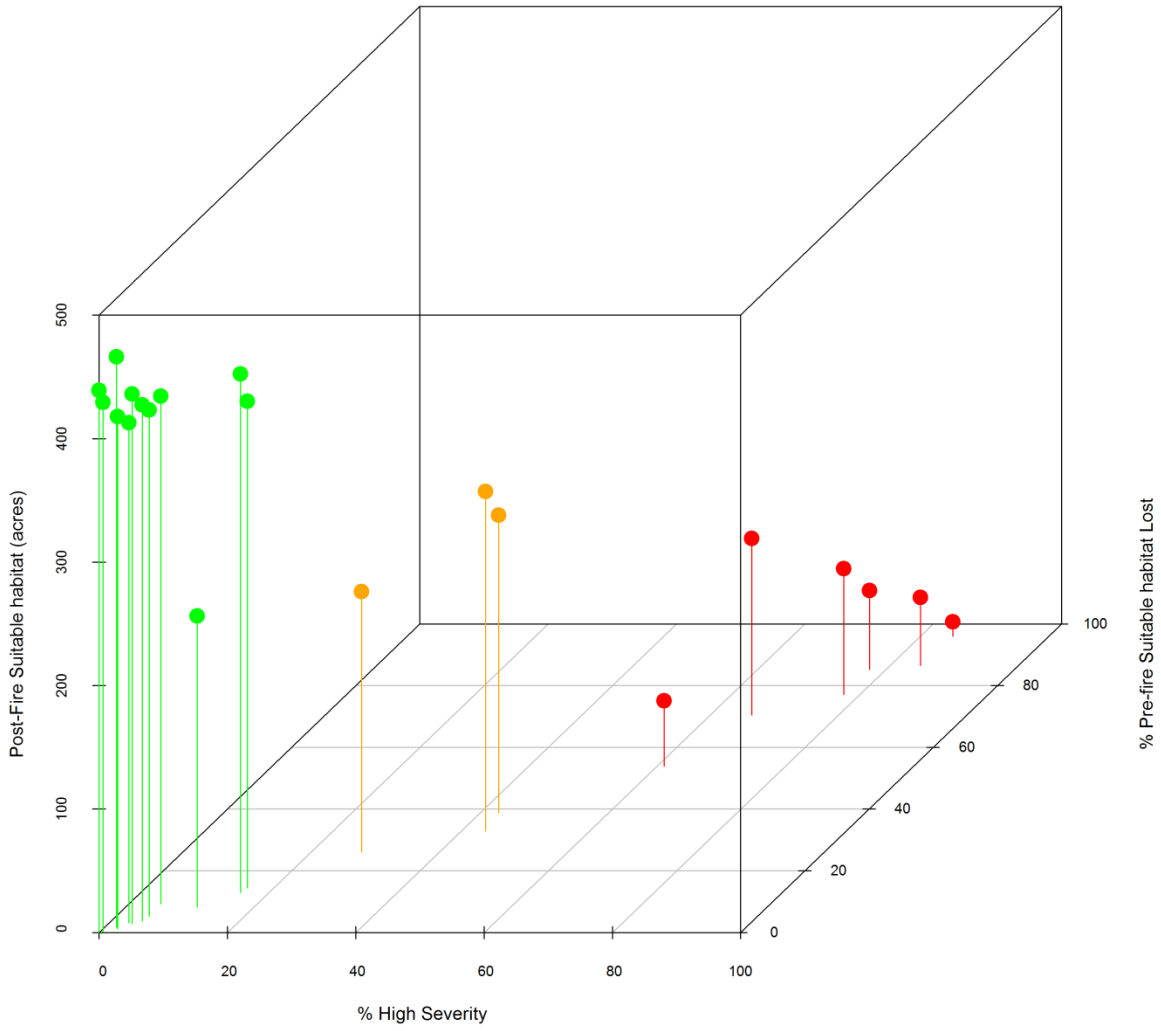

Figure 5. Three dimensional pin graph showing post-fire northern goshawk PAC condition.

From the figure above it is clear that four sites cluster into Category 1 (red), 15 sites into Category 2 (green), and three sites into a Category 3 (orange). Details on individual sites are provided in the Terrestrial Wildlife Biological Evaluation Appendix; categories may be summarized as follows:

Category 1 (red): These sites burned primarily at high severity across the 200 ha analysis area, had nearly all pre-fire suitable habitat burn at high severity, and have small amounts of post-fire suitable habitat. These sites lack attributes for suitable habitat (Laudenslayer and Parisi 2007). It is clear that these sites have very low to no probability of continued occupancy. Thus, we concluded that it is appropriate to remove these sites from the conservation network.

Category 2 (green): These are sites with lower amounts of high severity fire within the 200 ha analysis area, lower amounts of suitable habitat loss, and high amounts of remaining suitable habitat. Available literature suggests that these sites have high probabilities of continued occupancy. Thus, we concluded that it is appropriate to consider these sites as suitable post-fire, and that it is appropriate to keep the boundaries intact as is.

Category 3 (orange): These are sites with intermediate values. There is some uncertainty as to the probability of occupancy for sites within this range of values. We concluded that in order to reduce uncertainty in occupancy, it is appropriate to re-map the boundaries of these sites to encompass habitat of better quality where possible and to consider the re-mapped sites as suitable. We also concluded that it would be particularly important to monitor these sites so more can be learned about occupancy thresholds.

Management Direction

Current management direction is defined by project-level standards and guidelines from the Forest Plan (USDA 2010) and is based on the desired future condition of land allocations (Robinson 1996). The northern goshawk is a Region 5 Sensitive species associated with old forest ecosystems (USDA 2004). The following land allocations pertain to goshawk and old forest ecosystems: Goshawk Protected Activity Centers (PACs), spotted owl Home Range Core area (HRCA), Old Forest Emphasis Area (OFEA), and Forest Carnivore Connectivity Corridor (FCCC). Although goshawks occupy a broad ecological niche and utilize a variety of habitats, the desired conditions in areas managed for old forest objectives provide suitable habitat for goshawk nesting, post-fledgling use, and are preferentially selected for foraging (USDA 2004).

The desired condition for goshawk Protected Activity Center (PAC) is that stands in each PAC have: (1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

Desired conditions in Home Range Core Area (HRCA) for spotted owls also provide suitable habitat conditions for goshawk. The desired condition for HRCA is for large habitat blocks that have: 1) at least two tree canopy layers; 2) at least 24 inches dbh in dominant and co-dominant trees; 3) a number of very large (greater than 45 inches dbh) old trees; 4) at least 50 to 70 percent canopy cover; and 5) higher than average levels of snags and down woody material.

The desired condition for Old Forest Emphasis Area (OFEA) is to provide habitat conditions for mature forest associates (northern goshawk, spotted owl, Pacific marten, and fisher). Specifically, forest structure and function across old forest emphasis areas generally resemble pre-settlement conditions. High levels of horizontal and vertical diversity exist at the landscape-scale (roughly 10,000 acres). Stands are composed of roughly even-aged vegetation groups, varying in size, species composition, and structure. Individual vegetation groups range from less than 0.5 to more than 5 acres in size. Tree sizes range from seedlings to very large diameter trees. Species composition varies by elevation, site productivity, and related environmental factors. Multi-tiered canopies, particularly in older forests, provide vertical heterogeneity. Dead trees, both standing and fallen, meet habitat needs of old-forest-

associated species. Forest structure and function generally resemble pre-settlement conditions (see Figure 1).

Desired conditions in forest carnivore connectivity corridor (FCCC) for fisher and marten also provide suitable habitat conditions for goshawk. The desired future condition of (FCCC) is to provide habitat connectivity for fisher and marten, linking Yosemite National Park and the North Mountain inventoried roadless area west to the Clavey River. For habitat connectivity, a future forested area is desired with a minimum of 50 percent of the forested area having at least 60 percent canopy cover. Higher than average levels of large snags and large down woody material is also desired (as in USDA 2004). Habitat structures are important to retain that may constitute rest sites as described in Lofroth et al. 2010 (e.g. see plate 7.7 and 7.8).

ENVIRONMENTAL CONSEQUENCES

The project alternatives could result in direct and indirect effects to the northern goshawk through the following activities:

1. Salvage harvest of fire-killed trees.
2. Salvage harvest of roadside hazard trees.
3. New permanent road construction, temporary road construction, and road reconstruction.
4. Landing construction and use.
5. Use of material sources and water sources.
6. Biomass and similar fuels treatments.

These actions may have direct and indirect effects on northern goshawks through the following:

- Project related death, injury, or disturbance.
- Project related modifications to habitat quantity and/or quality.

Death, injury or disturbance:

Death, injury, and disturbance are potential direct effects to consider for northern goshawk (USDA 2004). Project activities have the potential to cause death or injury by tree-falling or by the use of heavy equipment. There is the potential for death or injury if nest trees are felled while being used by nesting birds during the reproductive season. In addition, historic nest trees could be removed. The mobility of the species in question and the management requirement of LOPs, make it highly improbable that death or injury would occur as a result of project activities. Flagging and avoiding current and historic nest trees provides a way to minimize nest tree loss. Keeping screening vegetation intact within 500 feet of nests also helps to minimize disturbance potential and/or nest abandonment.

Goshawks are highly susceptible to human disturbance (Squires and Reynolds 1997). During courtship and nest building, goshawks have been recorded to abandon nest areas following human intrusion alone (USDA 2000). In addition, incubating or brooding females may interrupt incubation or nestling care for extended periods to defend a nest (Ibid).

Logging activities near nests can cause failure, especially during incubation (Boal and Mannan 1994). Loading and skidding too close to active nests can cause abandonment, even with 20 day-old nestlings present (Squires and Reynolds 1997). Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. Human presence, particularly loud noise, has the potential to change normal behavior and potentially impair essential behavior patterns of the northern goshawk related to breeding, feeding, or sheltering. The potential for disturbance is minimized by the implementation of Limited Operating Periods (LOPs) as a management requirement.

The location of nest sites or activity centers are more uncertain following large-scale disturbance events (Keane, pers. comm.); conducting surveys to establish or confirm any new locations of nests or activity centers is a way to address this movement uncertainty (USDA 2000). Conducting protocol surveys is a management requirement common to all action alternatives.

Habitat modification:

Salvage harvest of fire-killed trees and salvage harvest of roadside hazard trees primarily removes snags and existing down woody material. Salvage harvest of roadside hazard trees may also remove existing living trees meeting certain criteria for hazard definition. The removal of snags reduces future recruitment of down woody material. Snags and down logs are important habitat elements for goshawks and their prey (USDA 2001).

Short term, within the next ten years, snags and down woody material function as habitat elements important for goshawk prey. Snags also serve as potential hunting perch sites that may be utilized by goshawks. Goshawks feed on a variety of prey present in post-fire habitat mosaics. Primary prey groups include tree and ground squirrels, cottontails, jackrabbits, hares, and medium and large sized birds (Squires and Reynolds 1997). In the Sierra Nevada primary prey species are Douglas squirrel, golden-mantled ground squirrel, chipmunks, Steller's jay, northern flicker, and American robin (Keane 1999).

Long term over several decades, large snags and large down woody material are considered biological legacies in the post-fire environment and play important roles in the structure of the future forest (Lindenmayer et al. 2008). Snag dynamics in the Sierra Nevada are complex and snags fall at different rates depending on many factors (Cluck and Smith 2007). The time elapsed since fire is closely correlated with habitat elements present and the composition of prey species (Ingles 1965, Quinn and Keeley 2006). Ground squirrels, northern flickers, and the American robin use a variety of open forests and shrub habitats with abundant insects and fruits (USDA 2001). Douglas squirrels use intermediate and mature stands containing large trees capable of providing cones and fungi, and Steller's jays prefer mature forest with open to moderate canopy cover and large, mature trees (Ibid). Thus, snags and down woody material serve different functional roles overtime for the goshawk, first providing cover for prey in the complex early seral stage of the forest, and ultimately decaying and playing a critical role in soil development of the future forest (Lindenmayer et al. 2008).

New permanent road construction, temp road construction, road reconstruction, and landing construction also modify habitat. In particular, road construction and continued use can result in increased habitat fragmentation, disturbance, and lower habitat capability for northern goshawk (Pyron et al. 2009). Woodbridge and Detrich (1994) found that northern goshawk territories associated with large contiguous forest patches were more consistently occupied compared to highly fragmented stands. Basic road maintenance such as grading and cleaning culverts is generally not an issue. Basic road maintenance protects water quality and soils by preventing degradation of road drainage structures and function (Rim Recovery EIS Hydrology Report). The use of water sources may reduce water availability for northern goshawks and their prey, especially in drought years. Free water is important to the goshawk and in California, permanent water was generally closer to nesting ranges than to the centers of random circles (Hargis et al. 1994). Landing construction results in habitat fragmentation. Helicopter landings are typically between 1 and 3 ac in size and tractor landings are typically ¼ to 1 ac in size.

The removal of snags and down woody material can be expected to reduce fuel loadings. However, the effectiveness of the various treatments proposed is difficult to predict and there is considerable uncertainty with how salvage logging influences future fire. A review of recent research on this topic and the associated controversy can be found in Long et al. (2014) Ch. 4.3 pp. 195-197.

The effect salvage logging has on reburn fire severity of future mature forest habitat is likely to remain widely variable depending on numerous factors including how future prescribed fire management is planned and implemented. However, as stated in Chapter 3.05 (Fuels), reducing fuel loads, especially

activity fuels and biomass, is likely to be effective in reducing flame lengths and fire line intensities. Piling and burning activity fuels is an effective method for disposal and is expected to promote development of mature forest (Ibid). Also, preventing high fuel loadings along roadsides can reasonably be expected to play an important role in reducing fire severity to developing mature forest habitat, especially where roads are identified as critical fire management features (see fire and fuels strategy report by Crook et al. 2013 in the project record). Roadside hazard salvage treatments involve the removal of snags and live trees identified as hazards to public safety. There is considerable uncertainty with regards to treatment intensity in roadside hazard salvage treatments because treatment intensity is subject to a wide range of environmental conditions (e.g. drought and moisture stress) related to tree status.

The management of goshawk habitat is typically thought of in three spatial scales (Reynolds et al. 1992, Reynolds et al. 2008). The first is the nesting habitat scale, or the PAC which corresponds to 200 acres. The second addresses the post-fledgling area which corresponds to about 420 acres (USDA 2001), and the third addresses the whole foraging area or home range which corresponds to about 5,000 acres (Ibid). Goshawks in the Sierra Nevada are year-round residents, and expand their breeding ranges in the winter (Keane 1999). As northern goshawks focus their breeding activities around roost and nest sites within PACs, habitat modification effects are expected to be most pronounced in PACs.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the northern goshawk and to determine how well project alternatives comply with Forest Plan Direction and species conservation strategies:

1. Number of current and historic nest sites within suitable PACs in treatment units or within ¼ mile of potentially disturbing activities.

2. Acres of treatment unit overlap within suitable PACs.

3. Acres of areas managed for old forest condition with higher than average levels of large snags and higher than average levels of large down woody material.

4. Miles of new permanent road construction and other project road miles in PACs by road type.

5. Number of material sources, water sources, and landings in PACs.

6. Acres of fuels treatments by type (biomass, pile and burn) including deer forage units and watershed soil cover treatments (mastication, drop & lop).

Alternative 1 (Proposed Action)

Direct and Indirect Effects

Indicator 1. Potentially ten known goshawk protected activity center nest trees intersect with Maintenance Level 2 roadside hazard salvage treatment units and 39 known activity center nest trees are within ¼ mile of potentially disturbing activities. It is expected that the implementation of LOPs and protocol surveys as management requirements will minimize disturbance potential to these sites. However, there is no provision in Alternative 1 to flag and avoid current and historic nest trees or trigger special coordination measures designed to promote nest tree protection. Therefore, it is likely that approximately 56 percent of goshawk territories may be negatively affected by nest tree loss.

Indicator 2. Under Alternative 1, 653 acres of roadside hazard salvage treatments would occur within post-fire suitable PACs. Table 32 shows site-specifically, northern goshawk sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to approximately 40 percent of a PAC. There is no provision in this alternative to mitigate treatment overlap by adding

equivalent acreage to the PAC. Although thresholds of significance for individual PACs are unknown, Alternative 1 would result in a potential net loss of 653 acres of goshawk habitat and potentially affect occupancy or reproduction in the majority of goshawk territories.

Table 32. Treatment unit overlap within post-fire suitable goshawk PACs, Alternative 1. There is no provision in this alternative to mitigate treatment overlap by adding equivalent acreage to the PAC.

PAC#	Maintenance Level 2 roadside hazard tree treatment acres
PAC R05F16D51T02	0
PAC R05F16D51T03	39
PAC R05F16D51T10	51
PAC R05F16D51T11	10
PAC R05F16D51T16	19
PAC R05F16D51T24	76
PAC R05F16D51T25	34
PAC R05F16D54T02	18
PAC R05F16D54T07	27
PAC R05F16D54T08	82
PAC R05F16D54T13	43
PAC R05F16D54T21	59
PAC R05F16D54T25	23
PAC R05F16D54T40	41
PAC R05F16D54T41	44
PAC R05F16D54T42	20
PAC R05F16D54T43	52
PAC R05F16D54T44	15
Total	**653**

Indicator 3. Under Alternative 1, zero acres of salvage units managed for old forest condition would be managed for higher than average levels of large conifer snags and large down woody material. Large down woody material would be retained at the average management rate of 10 – 20 tons / ac for all units. Higher than average levels of large conifer snags and large down woody material is a management objective in areas managed for old forest condition. Areas managed for old forest condition include Old Forest Emphasis Area (OFEA), Home Range Core Area (HRCA), and Forest Carnivore Connectivity Corridor (FCCC). The importance of higher than average levels of large conifer snags and large down woody material to habitat quality is described in the "habitat modification" section above. Generally, habitat managed for higher than average levels may be best qualified as developing into highly suitable habitat, while habitat managed at average levels may be best qualified as developing into low to moderate suitability.

Table 33. Unit acres by snag retention level in basal area (BA) per acre of snags, Alternative 1.

	12 sq. ft. BA / acre* General Forest matrix management average	30 sq. ft. BA / acre OFEA, HRCA, FCCC above average level management objective	60 - 120 sq. ft. BA / ac Low intensity salvage treatment units
Unit acres	28,326	0	0

*converted from 4 snags/ac for comparison purposes; assuming retention of 24"dbh snags.

Indicator 4. Under Alternative 1, Table 34 shows a total of approximately 10 project road miles intersect goshawk PACs. There are no miles of new permanent road construction, 9.7 miles of road

reconstruction, 0.1 miles of "skid zones" (see Rim EIS Transportation Report), and 0.1 miles of temporary road in suitable PACs. Of the road reconstruction miles, approximately 0.6 miles would occur in suitable PACs on routes currently decommissioned or not designated for motor vehicle travel. The remaining road reconstruction miles occur mainly on open Maintenance Level 2 roads. The management requirement of re-closing all routes post-project that are currently designated closed pre-project is expected to minimize long-term habitat fragmentation and disturbance potential.

Table 34. Project road miles in goshawk PACs by road type, Alternative 1 (PACs not shown did not have project roads in them).

Goshawk PAC	Reconstruct	Skid Zone	Temporary Road
R05F16D51T03	0.99		
R05F16D51T10	1.09		
R05F16D51T11	0.09		
R05F16D51T24	0.45	0.11	
R05F16D51T25	0.10		
R05F16D54T08	1.12		
R05F16D54T13	1.71		
R05F16D54T21	1.14		
R05F16D54T40	0.73		
R05F16D54T41	0.96		
R05F16D54T42	0.20		
R05F16D54T43	1.07		0.05
R05F16D54T44	0.05		
Grand Total	**9.72**	**0.11**	**0.05**

Indicator 5. Under Alternative 1, Table 35 shows there are zero material sources, three water sources, and two landings in suitable PACs. Of the landings in suitable PACs, one is a helicopter landing in PAC R05F16D54T13. The implementation of Best Management Practices (BMPs) at project water sources (see Rim EIS Hydrology Report) is expected to minimize potential effects to northern goshawks and their prey related to water availability. There is no provision in this alternative to mitigate habitat loss caused by landing construction by adding acreage to the PAC. This would result in a potential net loss of four acres of goshawk habitat.

Table 35. Water sources and landings within PACs, Alternative 1 (PACs not shown did not have these features in them).

PAC	Water sources	Landings	
		Tractor	Helicopter
R05F16D51T24		1	
R05F16D54T13			1
R05F16D54T21	1		
R05F16D54T40	2		
R05F16D54T44	1		
Total	**4**	**1**	**1**

Indicator 6. Under Alternative 1 7,626 acres of biomass fuels would be removed or piled and burned. Of the biomass acres, 1,064 acres occur in critical winter deer range and have a cover/forage ratio emphasis for deer habitat (see Table 36). Treatments designed to achieve optimal deer cover/forage ratios would also break up fuel continuity within those units and contribute to fuels management goals (see mule deer

section). Fuels management goals are important components of the fire and fuels strategy (Crook et al. 2013) and would assist in moving toward the desired condition of old forest habitat development. In particular, for critical winter deer range units located downslope of forest carnivore connectivity corridor units and goshawk PAC R05F16D54T21, breaking up fuel continuity within the deer range units is likely to play a critical role in the development of future old forest, and goshawk nesting habitat, linking Yosemite National Park and the North Mountain Roadless Area to the Clavey River watershed (see Terrestrial Wildlife Biological Evaluation Appendix). Specifically, fuels management actions in the deer range units, which are located downslope of the old forest corridor, are likely to prevent fire spread into the developing forest upslope, at least in the short-term (Terrestrial BE Appendix maps).

Table 36. Biomass in critical winter deer range units, Alternative 1.

Unit	Biomass Acres	Total Unit Acres	Percent
L03	31	30	100%
L06	10	10	100%
L07	5	5	100%
L202	28	142	20%
L203	265	265	100%
L204	87	87	100%
L205	140	140	100%
L206	138	138	100%
M201	35	50	70 %
O201	140	299	27%
P201	185	185	100%
Total	**1,064**	**1,352**	**79%**

Cumulative Effects

In making the determination for this alternative, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered. A list of the actions considered can be found in Appendix B, Rim EIS.

Relevant risk factors potentially affecting northern goshawk abundance and distribution have been identified and primarily include nest site loss and disturbance, and loss of habitat and habitat elements, especially large snags and large down woody material (USDA 2001, R5 Sensitive species evaluation form 2012).

Based on relevant risk factors, the following present and reasonably foreseeable actions from Appendix B, Rim EIS are the most relevant to northern goshawk: green thinning sales, emergency fire salvage on private land, and the Rim Fire Hazard Tree project.

The green thinning sales are designed to reduce ladder fuels and retain and improve key habitat components such as retention of large trees, defect trees, snags, downed wood, and hardwoods. Based on the biological evaluations for each, desired conditions in goshawk habitat are expected to improve in the long-term with implementation of these projects.

As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acre is presently being salvage logged. These salvage activities generally remove all fire-killed and dying trees, important habitat elements to goshawk habitat in the short and long-term. There is considerable uncertainty regarding the ecological effects of varying levels of salvage treatments to this species (Appendix D, Rim EIS).

The Rim Fire Hazard Tree project removes snags along high-use, typically paved roads (Maintenance Level 3 to 5 roads). Hazard tree removal along Maintenance Level 3-5 roads was considered when

remapping Category 3 PACs for Alternatives 1, 3, and 4. For Category 2 PACs, hazard tree removal along Maintenance Level 3-5 roads was considered in Alternative 3 and 4, but not Alternative 1 (see northern goshawk PAC evaluation/remapping narratives in the Terrestrial Wildlife Biological Evaluation Appendix).

Alternative 1 may contribute cumulatively to short and long-term effects on northern goshawk. The combination of past Forest Service and private timber harvests has cumulatively reduced the amount of suitable old forest habitat available across the analysis area. The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

Alternative 2 (No Action)

Direct and Indirect Effects

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur. The indirect effects of no action are primarily related to the influence no action may have on future wildfires and how future wildfires may impact northern goshawk habitat.

There is uncertainty predicting the incremental effect no action would have on future wildfires and goshawk habitat given the numerous factors involved over time. Potential fire behavior in the future may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuel pools, potential fire behavior may be expected to increase (3.05 Fuels). Goshawks occupy forest mosaics with heterogeneous habitat types (Squires and Reynolds 1997) but the optimal mosaic or mix of habitat is largely unknown. Presumably, occupancy rates would be highest under conditions that most closely approximate the environment goshawks evolved with, such as those described in North et al. 2009 and North 2012.

Cumulative Effects

The cumulative effects discussion under Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. Under Alternative 2, no direct cumulative effect is expected because no active management would occur. At the landscape scale, the cumulative contribution under this alternative may not complement the fuel reduction treatments that have occurred in the past, thus increasing the risk of loss of suitable nesting and roosting habitat to wildfire in the long-term.

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Alternative 3

Direct and Indirect Effects

Indicator 1. Potentially nine known activity center nest trees intersect with Maintenance Level 2 roadside hazard salvage treatment units and 37 known activity center nest trees are within ¼ mile of potentially disturbing activities. It is expected that the implementation of LOPs and protocol surveys as management requirements will minimize disturbance potential to these sites. Under this alternative, the management requirement to flag and avoid current and historic nest trees and screening vegetation is a measure expected to protect nest trees.

Indicator 2. Table 37 shows approximately 653 acres of roadside hazard salvage treatments would occur within post-fire suitable PACs. Site-specifically, northern goshawk sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to approximately 40 percent of a PAC. Under Alternative 3, overlap with roadside hazard treatments was mitigated by adding acreage to the PAC equivalent to the treatment acres as per Forest Plan Direction (USDA 2010 p. 185). Under this alternative, 83 percent of affected PAC acres would be mitigated; two PACs had unmitigated treatment

overlap. For unmitigated acres, additional acres of suitable habitat were not available (see PAC evaluation narratives and maps in the Terrestrial Wildlife Biological Evaluation Appendix. Nevertheless, in this alternative, unmitigated habitat alteration would be minimized to the greatest extent possible. Although thresholds of significance for individual PACs are unknown, Alternative 1 would minimize potential net loss of goshawk habitat to 102 acres and reduce the risk of non-occupancy in the majority of goshawk territories. Information on the PAC evaluation narratives and maps is in the Terrestrial Wildlife Biological Evaluation Appendix.

Table 37. Treatment unit overlap within post-fire suitable Northern Goshawk PACs, Alternative 3.

PAC#	Maintenance Level 2 roadside hazard salvage treatment acres	Percent mitigated
PAC R05F16D51T02	0	N/A
PAC R05F16D51T03	39	100
PAC R05F16D51T10	51	100
PAC R05F16D51T11	10	100
PAC R05F16D51T16	19	100
PAC R05F16D51T24	76	100
PAC R05F16D51T25	34	100
PAC R05F16D54T02	18	100
PAC R05F16D54T07	27	100
PAC R05F16D54T08	82	100
PAC R05F16D54T13	43	0
PAC R05F16D54T21	59	0
PAC R05F16D54T25	23	100
PAC R05F16D54T40	41	100
PAC R05F16D54T41	44	100
PAC R05F16D54T42	20	100
PAC R05F16D54T43	52	100
PAC R05F16D54T44	15	100
Total	**653**	

Indicator 3. Under Alternative 3, 12,359 acres of salvage units managed for old forest condition would be managed for higher than average levels of large conifer snags and large down woody material (see table below). Large down woody material would be retained at the rate of 10 – 20 tons / ac with 20 tons/ac emphasized in units managed for old forest condition. Higher than average levels of large conifer snags and large down woody material is a management objective in areas managed for old forest condition. Areas managed for old forest condition include Old Forest Emphasis Area (OFEA), Home Range Core Area (HRCA), and Forest Carnivore Connectivity Corridor (FCCC). Under this alternative, 2,089 acres would receive low intensity salvage treatment as part of a PSW research project. Goshawk occupancy will be monitored and studied in the PSW research project. This research will provide information to better understand the effects of wildfire and salvage-logging on northern goshawk occupancy and use, and serve as an empirical basis for informing future management decisions (Keane, pers.comm.). Thus, the PSW research is expected to address important management questions and benefit northern goshawk conservation. Retaining higher than average levels of large conifer snags and large down woody material in areas managed for old forest condition would be consistent with forest plan direction and improve habitat quality for the majority of territories in this project.

Table 38. Unit acres by snag retention level in basal area (BA) per acre of snags, Alternative 3.

	12 sq. ft. BA / acre* General Forest matrix management	30 sq. ft. BA / acre OFEA, HRCA, FCCC above average level management objective	60 - 120 sq. ft. BA / ac Low intensity salvage treatment units
Unit acres	15,955	12,359	2,089

*converted from 4 snags/ac for comparison purposes; assuming retention of 24"dbh snags.

Indicator 4. Under Alternative 3, a total of 8.6 project road miles intersect goshawk PACs. Table 39 shows there are 0 miles of new permanent road construction, 8.3 miles of road reconstruction , 0.1 miles of "skid zones" (see Rim EIS Transportation Report), and 0.2 miles of temp road in suitable PACs. Of the road reconstruction miles, 0.6 miles would occur in suitable PACs on routes currently decommissioned or not designated for motor vehicle travel. The remaining road reconstruction miles occur mainly on open Maintenance Level 2 roads. The management requirement of re-closing all routes post-project that are currently designated closed pre-project is a mitigation measure that is expected to minimize long-term habitat fragmentation and disturbance potential.

Table 39. Project road miles in PACs by road type (PACs not shown did not have project roads in them), Alternative 3.

Row Labels	Reconstruct	Skid Zone	Temporary Road
R05F16D51T03	0.79		
R05F16D51T11	0.07		
R05F16D51T24	0.45	0.11	
R05F16D51T25	0.07		
R05F16D54T08	1.46		0.09
R05F16D54T13	1.39		
R05F16D54T21	1.14		0.07
R05F16D54T40	0.73		
R05F16D54T41	0.96		
R05F16D54T42	0.13		
R05F16D54T43	1.07		0.05
R05F16D54T44	0.05		
Grand Total	**8.33**	**0.11**	**0.21**

Indicator 5. Table 40 shows Alternative 3 has zero material sources, four water sources, and one landing in suitable PAC (see table below). Of the landings in suitable PACs, none are helicopter landings. The implementation of Best Management Practices (BMPs) at project water sources (see Rim EIS Hydrology Report) is expected to minimize potential effects to northern goshawks and their prey related to water availability. Under this alternative, habitat loss caused by landing construction was mitigated by adding equivalent acreage to the PAC. No net habitat loss is expected for this indicator.

Table 40. Water sources and landings within PACs, Alternative 3 (PACs not shown did not have these features).

PAC	Water sources	Landings	
		Tractor	Helicopter
R05F16D51T24		1	
R05F16D54T21	1		
R05F16D54T40	2		
R05F16D54T44	1		
Total	**4**	**1**	**0**

Indicator 6. Under Alternative 3, there are 8,379 acres of biomass fuels treatments. Table 42 shows 1,739 acres of biomass removal would occur in critical winter deer range and have a cover/forage ratio emphasis for deer habitat (see table below). Treatments designed to achieve optimal deer cover/forage ratios would also break up fuel continuity within those units and contribute to fuels management goals (see mule deer section). Fuels management goals are important components of the fire and fuels strategy (Crook et al. 2013) and would assist in moving toward the desired condition of old forest habitat development. In particular, for critical winter deer range units located downslope of forest carnivore connectivity corridor units and goshawk PAC R05F16D54T21, breaking up fuel continuity within the deer range units is likely to play a critical role in the development of future old forest, and goshawk nesting habitat, linking Yosemite National Park and the North Mountain Roadless Area to the Clavey River watershed (see Terrestrial Wildlife Biological Evaluation Appendix). Additional fuels treatments include 22,036 acres of pile and burn. Pile and burn treatments may be machine piled or hand piled with the objective of disposing of activity fuels. Also under this alternative, 3,537 acres of watershed treatments involving mastication or "drop & lop" techniques would be used to provide soil cover in watershed sensitive areas (see Rim EIS hydrology report). These techniques are expected to benefit the establishment of vegetation and thus would benefit northern goshawk habitat development.

Table 41. Biomass in critical winter deer range units, Alternative 3.

Unit #	Biomass Acres	Total Unit Acres	Percent
L03	30	30	100%
L04	25	79	32%
L07	5	5	100%
L201	92	92	100%
L202	28	142	20%
L203	250	695	36%
L204	340	1519	22%
L205	475	755	63%
L206	15	81	19%
M201	35	74	47%
M202	20	138	14%
M203	20	63	32%
M204	79	282	28%
O201A	80	156	51%
O201B	60	121	50%
P201	185	185	100%
Total	**1,739**	**4,416**	**39%**

Cumulative Effects

The cumulative effects discussion under Alternative 1 outlines those present and reasonably foreseeable future activities relevant to Alternative 3 as well. The cumulative contribution of Alternative 3 would be less than Alternative 1 because management requirements minimize the potential for nest tree loss, habitat loss, and reduction in habitat quality of future old forest. In particular, snag retention would be higher within OFEA, HRCA, and FCCC units, and new permanent road construction would be reduced. The cumulative contribution under this alternative may affect individual territories, but is not expected to affect the viability of this species.

Alternative 4

Direct and Indirect Effects

Alternative 4 is the same as Alternative 3 except that it drops all new permanent road construction and the following eighteen units from treatment: A01B, A03, A04, A05A, A05B, D01A, D02, E01A, E01B, E02, O01, O02A, O02B, O04, O05, O12, R01A, and R02.

Indicator 1. As in Alternative 3, potentially nine known suitable activity center nest trees intersect with Maintenance Level 2 roadside hazard salvage treatment units and 37 known nest trees are within ¼ mile of potentially disturbing activities. It is expected that the implementation of LOPs and protocol surveys as management requirements will minimize disturbance potential to these sites. Under this alternative, the management requirement to flag and avoid current and historic nest trees and screening vegetation is a mitigation measure expected to protect nest trees.

Indicator 2. As in Alternative 3, approximately 653 acres of roadside hazard salvage treatments would occur within post-fire suitable PACs and northern goshawk sites would be potentially affected by habitat fragmentation at varying degrees ranging from 0 acres of overlap to approximately 40 percent of a PAC. Mitigation for overlap with roadside hazard treatment units are the same in this Alternative as described in Alternative 3 above.

Indicator 3. Table 42 shows under Alternative 4, 12,315 acres of salvage units managed for old forest condition would be managed for higher than average levels of large conifer snags and large down woody material. Large down woody material would be retained at the rate of 10 – 20 tons / ac with 20 tons/ac emphasized in units managed for old forest condition. Higher than average levels of large conifer snags and large down woody material is a management objective in areas managed for old forest condition. Areas managed for old forest condition include Old Forest Emphasis Area (OFEA), Home Range Core Area (HRCA), and Forest Carnivore Connectivity Corridor (FCCC). As in Alternative 3, 2,089 acres would receive low intensity salvage treatment as part of a PSW research project as described above. Under this alternative, 2,571 acres would be dropped from salvage treatment specifically for species associated with post-fire environments (see black-backed woodpecker section), except for roadside hazard salvage. Goshawks forage over large areas (see species account above) and the proposed retention may provide a greater variety of goshawk prey and perch sites for goshawks but little is known about goshawk use of post-fire environments. Goshawks forage over large areas (see species account above) and the proposed retention may provide a greater variety of goshawk prey and perch sites for goshawks but little is known about goshawk use of post-fire environments.

Table 42. Unit acres by snag retention level in basal area (BA) per acre of snags, Alternative 4.

	12 sq. ft. BA / acre* General Forest matrix management average	**30 sq. ft. BA / acre OFEA, HRCA, FCCC above average level management objective**	**60 - 120 sq. ft. BA / acre Low intensity salvage treatment units**	**Full retention**
Unit acres	13,427	12,315	2,089	2,571

*converted from 4 snags/ac for comparison purposes; assuming retention of 24"dbh snags.

Indicator 4. Under Alternative 4, project road miles in PACs by road type would be the same as described in Alternative 3 above except that there would be 0.8 miles less of road reconstruction in Alternative 4.

Indicator 5. As in Alternative 3, there are zero material sources, four water sources, and one tractor landing in suitable PACs. As described in Alternative 3 above, the implementation of Best Management Practices (BMPs) at project water sources (see Rim EIS Hydrology Report) is expected to minimize potential effects to northern goshawks and their prey related to water availability. Also as described in

Alternative 3, habitat loss caused by landing construction was mitigated by adding equivalent acreage to the PAC.

Indicator 6. As in Alternative 3 above, there would be biomass and watershed treatments except that biomass treatments and pile and burn treatments would not occur within the units dropped from salvage harvest. This totals 404 acres of dropped biomass treatments and 1,716 acres of dropped pile and burn treatments. Biomass treatments in critical winter deer range would still occur as described above in Alternative 3.

Cumulative Effects

The cumulative contribution of Alternative 4 would be similar to Alternative 3. Alternative 4 would have the least habitat alteration with full retention of snags across 2,571 more acres than Alternative 3. The cumulative contribution under Alternative 4 may affect individual territories, but is not expected to affect the viability of this species.

SUMMARY OF EFFECTS ANALYSIS ACROSS ALL ALTERNATIVES

Indicator 1. The number of current and historic nest sites within suitable PACs in treatment units and the number of activity center nest sites within ¼ mile of potentially disturbing activities are the same for all alternatives. However, Alternatives 3 and 4 include a management requirement to minimize the potential for effect and Alternative 1 does not.

Table 43. Summary of current and historic nest sites within suitable PACs in treatment units and the number of activity center nest sites within ¼ mile of potentially disturbing activities by alternative.

	Number of nest sites in treatment units	Number of nest sites within ¼ mile of potentially disturbing activities	Mitigation measure
Alternative 1	10	39	No
Alternative 2	0	0	N/A
Alternative 3	9	37	Yes*
Alternative 4	9	37	Yes*

* management requirement is to flag and avoid current and historic nest trees and screening vegetation.

Indicator 2. Acres of treatment unit overlap within suitable PACs is mitigated wherever possible in Alternatives 3 and 4 but not mitigated in Alternative 1.

Table 44. Summary of acres of treatment unit overlap within suitable goshawk PACs by alternative.

	Treatment overlap acres mitigated	Mitigation measure
Alternative 1	0	No
Alternative 2	N/A	N/A
Alternative 3	551	Yes*
Alternative 4	551	Yes*

* management requirement is to mitigate treatment overlap in PACs by adding acreage to the PAC equivalent to the treated acreage wherever possible and adding adjacent acres of comparable quality wherever possible (USDA 2010 p. 185).

Indictor 3. Of the action alternatives, the acres of areas managed for old forest objectives with higher than average levels of large snags and higher than average levels of large down woody material are highest in Alternatives 3 and 4. In contrast, Alternative 1 manages no acres for higher than average levels of large snags. For retention of large down woody material, all action alternatives manage to a 10 – 20 tons / acre standard but Alternatives 3 and 4 emphasize retention at the higher end (i.e. 20 tons/ac) while Alternative 1 does not. Alternative 4 additionally manages 2,571 acres under full retention of snags and down woody material (1,414 acres from Alternative 3's 12 sq.ft. BA/acre category and 1,157 acres from Alternative 3's 30 sq.ft. BA/acre category are moved to the full retention category).

Table 45. Summary of large snag and large down woody material retention by alternative.

	12 sq. ft. BA / acre General Forest matrix management average	30 sq. ft. BA / acre OFEA, HRCA, FCCC above average level management objective	60 - 120 sq. ft. BA / acre Low intensity salvage treatment units	Full retention
Alternative 1	28,326	0	0	0
Alternative 2	0	0	0	30,403*
Alternative 3	15,955	12,359	2,089	0
Alternative 4	13,427	12,315	2,089	2,571

* represents maximum number of potential unit acres in all land allocations.

Indicator 4. Miles of project road miles in goshawk PACs is highest in Alternative 1. There is 0.1 miles of additional temporary road under Alternatives 3 and 4 because the PACs are larger (following the Forest Plan Direction for mitigating treatment overlap) and one happens to incorporate a short piece of temporary road. Of the action alternatives, Alternative 4 has the least overall amount of project road activity overlapping suitable goshawk PAC.

Table 46. Project road summary in PACs by Alternative.

	Miles				
	New Construction	Reconstruction	Skid zone	Temporary Road	Total
Alternative 1	0	9.7	0.1	0.1	9.9
Alternative 2	0	0	0	0	0
Alternative 3	0	8.3	0.1	0.2	8.6
Alternative 4	0	7.5	0.1	0.2	7.8

Indicator 5. The number of water sources in PACs is the same in all action alternatives. Of the action alternatives, Alternative 1 has a helicopter landing in suitable goshawk PAC and Alternatives 3 and 4 do not.

Table 47. Summary of number of water sources and landings in goshawk PACs by alternative (no material sources are located in goshawk PACs).

	Water sources	Landings	
		Tractor	Helicopter
Alternative 1	4	1	1
Alternative 2	0	0	0
Alternative 3	4	1	0
Alternative 4	4	1	0

Indicator 6. Alternatives 3 and 4 best address disposal of activity fuels and the need for soil cover treatments for watershed protection.

Table 48. Summary of fuels treatments by alternative.

	Biomass	Biomass deer units	Pile & burn	Watershed soil cover treatments
Alternative 1	6,808	1,064	0	0
Alternative 2	0	0	0	0

Alternative 3	6,825	1,739	22,036	3,537
Alternative 4	6,421	1,739	20,320	3,537

Determination

Alternative 1

It is our determination that Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk.

Our determination for Alternative 1 is based on the following rationale:

- This alternative includes actions to reduce fuel loading and the long-term risk of high-severity fire effects and habitat loss to this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.

Alternative 2

It is our determination that Alternative 2 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk.

Our determination for Alternative 2 is based on the following rationale:

- No actions would occur to potentially impact this species or habitat. However, we note that with no action to address potential fuel loads, habitat for this species may be at greater long-term risk of high-severity fire effects.

Alternative 3

It is our determination that Alternative 3 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk.

Our determination for Alternative 3 is based on the following rationale:

- This alternative includes actions to reduce the long-term risk of high-severity fire effects to habitat of this species.
- The only areas proposed for salvage treatments, other than hazard removal, are those that burned at high severity; abundant foraging habitat will remain in the project area.
- This alternative requires the use of LOPs to reduce disturbance potential.
- This alternative conducts surveys to establish or confirm the location of activity centers and boundaries.
- This alternative includes several project requirements to minimize potential effects to individuals and habitat. Specifically, this alternative 1) mitigates for potential nest tree loss in suitable PACs, 2) accounts for potential losses of snags due to hazard removal or the effects of future prescribed fire, 3) adds acreage to PACs equivalent to unavoidable treatment acres, and 4) manages appropriate land allocations consistent with old forest objectives for higher than average levels of snags and down woody material.

Alternative 4

It is our determination that Alternative 4 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk.

Our determination for Alternative 4 is based on the same rationale as Alternative 3.

COMPLIANCE WITH FOREST PLAN AND OTHER DIRECTION

Applicable Forest Plan Direction:

USDA 2010 p. 43: Assess the potential impact of projects on the connectivity of habitat for old forest associated species.

USDA 2010 p. 44: General guidelines for large-snag retention are as follows: 1) in westside mixed conifer and ponderosa pine types - four of the largest snags per acre, and 2) in red fir forest type - six of the largest snags per acre.

USDA 2010 p. 44: When some snags are expected to be lost due to hazard removal or the effects of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels.

USDA 2010 p. 185: If nesting or foraging habitat in PACs is mechanically treated, mitigate by adding acreage to the PAC equivalent to the treated acres using adjacent acres of comparable quality wherever possible.

USDA 2010 p. 186: Maintain a limited operating period (LOP), prohibiting vegetation treatments within approximately ¼ mile of the nest site during the breeding season (February 15 through September 15) unless surveys confirm that northern goshawks are not nesting. If the nest stand within a protected activity center (PAC) is unknown, either apply the LOP to a ¼- mile area surrounding the PAC, or survey to determine the nest stand location.

USDA 2010 p. 189: Manage HRCA for higher than average levels of snags and down woody material.

Forest Plan Direction Compliance

Alternative 1:

Alternative 1 does not mitigate for potential nest tree loss in suitable PACs.

Alternative 1 manages for the minimum amount of snag retention as per general guidelines in forest plan direction and does not take into account potential losses due to hazard removal or the effects of prescribed fire.

Alternative 1 does not mitigate habitat mechanically treated in PACs by adding acreage to the PAC equivalent to the treated acres.

Alternative 1 applies LOPs as required.

Alternative 1 does not manage HRCA for higher than average levels of snags and down woody material nor other land allocations managed for old forest objectives.

Alternatives 3 and 4:

Alternatives 3 and 4 comply with management direction described above. Specifically, Alternatives 3 and 4: 1) mitigate for potential nest tree loss in suitable PACs, 2) account for potential losses of snags due to hazard removal or the effects of future prescribed fire, 3) add acreage to PACs equivalent to

unavoidable treatment acres, 4) apply LOPs as required, and 5) manage appropriate land allocations consistent with old forest objectives for higher than average levels of snags and down woody material.

PACIFIC MARTEN

AFFECTED ENVIRONMENT

Species and Habitat Account

The marten (*Martes caurina*) is a Region 5 Forest Service Sensitive species and is also a Sierra Nevada Management Indicator Species (MIS), as described in the Rim Fire Recovery MIS report available in the project record (USDA 2013). Marten occur throughout much of their historic range from Trinity and Siskyou counties east to Mount Shasta, south through the Cascades and Sierra Nevada mountain ranges to Tulare county. They are considered rare when compared to other forest carnivore species (USDA 2001). Their core elevation range is 5,500 – 10,000 feet. Marten have been documented on the Stanislaus National Forest as low as 5,200 feet elevation.

Population estimates and trends are not available for marten in California. Although classified as a furbearer, there has been no open trapping season for this species since 1954 (USDA 2001). Declines in marten population size in the early twentieth century have been attributed to habitat modifications, trapping, and predator control. Based on surveys conducted from 1989-2002, the marten appears to occupy much of its historic range in California (Zielinski et al. 1995, Slauson et al. 2007).

Carnivore camera stations have been employed within suitable habitat in and near the project area in 2005-2013 following the protocol designed by Zielinski and Kucera (1995a). No marten detections were made as a result of these survey efforts (NRIS Wildlife database).

The project is within the current distribution of marten across the Sierra Nevada Bioregion. The nearest documented occurrence of marten was in 2006 less than two miles north of the project area near Reynolds Creek and south of the project area in Yosemite National Park. Their presence within the analysis area is unknown; however, presence is assumed where suitable habitat exists. Because there are no documented den sites, LOPs for this species are not required for this project.

Marten are considered one of the most habitat-specific mammals in North America. Habitat quality is likened to the structural diversity consistent with late seral, mesic coniferous forests, interspersed with riparian areas and meadows. Preferred forest vegetation types include red fir, red fir/white fir mix, lodgepole pine, and Sierra mixed conifer (Freel 1991). Marten home ranges are very large relative to their body size. Mean home ranges in the central Sierra Nevada are 960 acres for males and 801 acres for females (USDA 2001). The analysis area still contains relatively high quality habitat for marten in areas that burned at low or low-moderate intensity such as Twomile, Bourland, and Reynolds Creek, Pilot Ridge and the Crocker Meadow area. Post-fire, the analysis area contains about 17,695 acres of moderate and high capability habitat on NFS lands only. Table 49 displays pre- and post-fire acres by CWHR vegetation type, size class, and density on NFS lands. There are about 46,135 acres of moderate and high capability habitat within the cumulative effects analysis area post-fire, including all ownerships.

Table 49. Pre- and Post-Fire Moderate to High Capability Habitat for Pacific Marten in the Rim Fire Recovery Project Area.

CWHR Vegetation Type[1]	Size Class & Density	Pre-Fire CWHR Veg Type (acres)	Post-Fire CWHR Veg Type (acres)
LPN, MHC, RFR,	4P	22	33
JPN, LPN, MHC, PPN, RFR, SMC, WFR	4M	4,040	2,705
JPN, LPN, MHC, PPN, RFR, SMC, WFR	4D	12,282	8,765
JPN, MHC, SMC, WFR	5M	177	147
JPN, MHC, PPN, RFR, SMC, WFR	5D	7,207	6,045
TOTAL		**23,728**	**17,695**

[1]Moderate to High Capability habitat is defined as that in which a CWHR suitability rating is ≥0.55. Two of three categories (reproduction, cover, food) must have a medium rating to achieve the minimum rating. See CWHR version 8.2 user's manual for further explanation on suitability ratings. Acres include National Forest system lands only.
CWHR habitat types: JPN=Jeffrey pine, LPN=Lodgepole Pine, MHC=montane hardwood conifer, PPN=ponderosa pine, SMC=sierra mixed conifer, WFR=white fir
CWHR Size Classes: 4=12-24"dbh, 5=24-40"dbh and CWHR Density Classes (Canopy Closure): P=25-39%, M=40-59%, D=>60%

A road density of <1 mile of road per square mile has been recommended for high quality habitat for marten (USDA 1991). A road density of 1 to 2 miles of road per square mile is recommended for medium capability habitat (Ibid). The road density including all routes open to motor vehicles in the analysis area is 3.0 miles per square mile on NFS lands and is more than twice the acceptable density found in high quality habitat and more than 1 mile per square mile above that found in moderate capability habitat.

Marten natal dens are typically found in cavities in large trees, snags, stumps, logs, shrubs, burrows, caves, rocks, or crevices in rocky areas (USDA 1991 and Zielinski et al. 1997). Dens are lined with vegetation and are found in structurally complex, late succession forests (Buskirk and Powell 1994). Breeding occurs from late June to early August, followed by embryonic diapause, and birth in March-April (Ibid).

Freel (1991), Slauson (2003), and Spencer et al. (1983) characterized suitable habitat for denning/resting marten as follows:

- Canopy cover ≥ 70%.
- Largest live conifers are ≥ 24"dbh and occur at a density of at least 9/acre.
- Live tree basal area ranges from 163-326 sq ft/acre.
- Snags average 25 square feet basal area per acre and average 30 inches dbh.
- Coarse woody debris is present at 5-10 tons/acre in decay classes 1-2.

Marten diet varies geographically and seasonally with local prey availability. In the Central Sierra, marten diets are comprised primarily of voles, while in the southern Sierra it is squirrels and voles, insects, hypogeous fungi and secondarily (less than 20% of diet) reptiles and birds (Zielinski et al. 1983, Zielinski and Duncan 2004). Zielinski and others (1983) noted Douglas squirrels, snowshoe hare, northern flying squirrels and deer mice were the prey species used almost exclusively during the winter, while ground squirrels formed the largest component of the diet from late spring through fall.

Coarse woody debris is an important component of marten habitat, especially in winter, when it provides structure that intercepts snowfall and creates subnivean (below snow) tunnels, interstitial spaces, and access holes. Zielinski and others (1983) suggested that marten activity varied to take advantage of subnivean dens utilized by their prey. Sherburne and Bissonette (1994) found that when coarse woody debris covered a greater percent of the ground, marten use also increased. Older growth forests appeared to provide accumulated coarse woody debris necessary to enable marten to forage effectively during the winter.

Freel (1991) and Spencer et al. (1983) characterized suitable habitat for travel/foraging marten as follows:

- Canopy cover ≥ 40%.
- Largest live conifers are ≥ 24"dbh and occur at a density of at least 6/acre.
- Largest snags average 2.5/acre and are ≥ 24"dbh (8 sq ft/acre).
- Coarse woody debris is present at 5-10 tons/acre in decay classes 1-3.

Reports of long-distance movements, likely representing dispersal, are largely anecdotal. Movement patterns in marten, dispersal and migration, have not been intensively studied for this species because of the difficulty and high cost of studying long-distance movements in small bodied mammals (Buskirk and Powell 1994, Ruggiero et al. 1994). Martens exhibit seasonal variation in habitat selection within stable home ranges, with little evidence to suggest shifts in home range boundaries.

Risk Factors:

Hargis et al. (1999) and USDA (2001) summarize several risk factors potentially influencing marten abundance and distribution:

1. *Habitat fragmentation* – Fragmentation can limit occupancy and dispersal of marten across the landscape. Marten were negatively associated with low levels of habitat fragmentation. When the average nearest neighbor distance between non-forested patches was < 100 m, it created more edge and less interior forested habitat preferred by marten.
2. *Meadow habitat degradation* – Grazing can reduce the amount of shrub and herbaceous cover available and can increase soil compaction for prey species such as voles.
3. *Fire suppression* – Fire suppression has contributed to degraded conditions in meadows and riparian habitats by allowing encroachment of trees which reduces the availability of understory vegetation required by prey.
4. *Lack of, or removal of coarse woody debris* - Removal of coarse woody debris (piles of several smaller logs, or single large logs) can also reduce access and abundance of prey during the important winter months, and may also reduce resting site availability for marten.

Management Direction

Current management direction is defined by project-level standards and guidelines from the Forest Plan (USDA 2010) and is based on the desired future condition of land allocations (Robinson 1996). The marten is a Region 5 Forest Service Sensitive species that is associated with old forest ecosystems (USDA 2004). The following land allocations pertain to marten and old forest ecosystems: Protected Activity Centers (PACs), Home Range Core Area (HRCA), Old Forest Emphasis Area (OFEA), and Forest Carnivore Connectivity Corridor (FCCC).

The desired condition for Protected Activity Center (PAC) is to have 1) at least two tree canopy layers; 2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; 3) at least 60 to70 percent canopy cover; 4) some very large snags (greater than 45 inches dbh); and 5) snag and down woody material levels that are higher than average.

The desired condition for Spotted Owl Home Range Core Area (HRCA) is to encompass the best available habitat in the closest proximity to the owl activity center (USFS 2004 ROD pp. 39-40). HRCAs consist of large habitat blocks that have: 1) at least two tree canopy layers; 2) at least 24 inches dbh in dominant and co-dominant trees; 3) a number of very large (greater than 45 inches dbh) old trees; 4) at least 50 to 70 percent canopy cover; and 5) higher than average levels of snags and down woody material.

The desired condition for Old Forest Emphasis Area (OFEA) is to provide habitat conditions for mature forest associates (spotted owl, northern goshawk, Pacific marten, and fisher). Specifically, forest structure and function across old forest emphasis areas generally resemble pre-settlement conditions. High levels of horizontal and vertical diversity exist at the landscape-scale (roughly 10,000 acres). Stands are composed of roughly even-aged vegetation groups, varying in size, species composition, and structure. Individual vegetation groups range from less than 0.5 to more than 5 acres in size. Tree sizes range from seedlings to very large diameter trees. Species composition varies by elevation, site productivity, and related environmental factors. Multi-tiered canopies, particularly in older forests, provide vertical heterogeneity. Dead trees, both standing and fallen, meet habitat needs of old-forest-associated species. Forest structure and function generally resemble pre-settlement conditions (see Figure 1).

The desired future condition of forest carnivore connectivity corridor (FCCC) is to provide habitat connectivity for forest carnivores, linking Yosemite National Park and the North Mountain inventoried roadless area west to the Clavey River. For habitat connectivity, a future forested area is desired with a minimum of 50 percent of the forested area having at least 60 percent canopy cover. Higher than average levels of large snags and large down woody material is also desired (as in USDA 2004). Habitat

structures are important to retain that may constitute rest sites as described in Freel 1991 and Lofroth et al. 2010 (e.g. see plate 7.7 and 7.8).

ENVIRONMENTAL CONSEQUENCES

The project alternatives could result in direct and indirect effects to the marten through the following activities:

1. Salvage of fire-killed trees.

2. Salvage of roadside hazard trees.

3. New permanent and temporary road construction and road reconstruction.

4. Fuels treatments.

5. Use of material sources and water sources.

These activities may have direct and indirect effects on marten through the following:

- Project related death, injury or disturbance.
- Project related modifications to habitat quantity or quality.

Death, injury, or disturbance:

Death or injury from project related activities would be unlikely to occur given the mobility of this species. However, there is the potential for death or injury if a den or rest tree were felled while being used by martens.

Project activities, especially loud noise, could result in disturbance that may impair essential behavior patterns of the marten related to denning, resting, or foraging. Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. The location of marten within the analysis area is uncertain following the Rim Fire, a large-scale disturbance event; conducting surveys to identify areas being used is a way to address this uncertainty. Temporary avoidance of the project site or displacement of individuals is expected during project implementation. Any displacement or avoidance would be of short duration and would subside shortly after project implementation activities. LOPs in place for spotted owls, goshawks, great gray owls, and bald eagles would afford protection to individual marten in these areas during parturition, kit rearing, and subsequent breeding (March-August). The potential risk to individual marten is considered low because of the lack of documented marten occurrence within or near the analysis area and length of exposure expected given the accelerated timeframe of this project and implementation.

Habitat Modification:

Salvage logging and the removal of hazard trees along Maintenance level 2 roads would modify suitable marten habitat by reducing its quality in both the short term (10-20 years) and in the long term (20-50 years).

Short term retention of snags within and near suitable marten habitat would provide denning and resting sites, as well as habitat for prey species (Freel 1991). Marten are known to use a wide range of structures for denning and resting including cavities in large trees, snags, stumps, logs, burrows, caves, rocks, or crevices in rocky areas (USDA 1991, Zielinski et al. 1997). The number of snags and downed logs available across a marten's home range affects the quality of that habitat for foraging and breeding. For example, they select sites with at least 25 square feet basal area per acre of large snags (Slauson 2003, Spencer et al. 1983). While Spencer does not report an average dbh of snags, Slauson (2003) reports snags average 30 inches dbh in areas where marten were detected. In moderate and high capability traveling and foraging habitat they use areas with fewer snags, eight to twelve square feet basal area per

acre that are 24 inches dbh or greater (Freel 1991). Marten may travel across small open areas, but generally avoid open areas.

Prey species that tolerate disturbance or open conditions are known to be abundant in post fire environments, such as mice, rats, chipmunks, and squirrels (Amacher et al. 2008 and Diffendorfer et al. 2012). Structural elements such as snags and downed logs, when combined with the flush of shrubs, forbs and grasses expected post-fire, will provide habitat suitable for prey and foraging habitat for marten within a few years post fire.

Long term, large snags and large downed logs are considered biological legacies in a post fire environment and play important roles in the structure of future forest (Lindenmayer et al. 2008). Large snags and downed logs may take hundreds of years to develop, emphasizing the need to retain these elements across the landscape. Because large snags and large downed logs are important habitat elements found in high capability marten habitat, it is not only important to retain these structural elements during project implementation, but it is imperative that recruitment of snags and downed logs occur over time to maintain habitat suitability in the long term.

Snags remain standing for decades depending upon the species of tree and other environmental factors (Cluck and Smith 2007 and Ritchie et al. 2013). For example, Ritchie and others (2013) found that snag fall rates and decay rates vary considerably by species. When snags eventually fall, they are incorporated as large downed logs, another critical structural element important for marten and prey species (Freel 1991, Zielinski et al. 2004a).

Roads can modify marten habitat by directly removing it or indirectly reducing its quality, resulting in both short and long term effects. Gaines and others (2003) studied the response of several focal species, including marten, related to roads and trails. Martens in this study were displaced, shifting use of habitat away from human activities on or near roads or trails. Robitaille and Aubrey (2000), found that marten use of habitat within 300 and 400 meters of roads was significantly less than habitat use 700 or 800 meters distant; however, in a study conducted in northern California, Zielinski et al. (2008) 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. Zielinski and others (2008) did not study or measure behavioral changes or changes in use patterns. Andren (1994) suggested that, as landscapes become fragmented; the combination of increasing isolation and decreasing patch size of suitable habitat is negatively synergistic, compounding the effects of simple habitat loss. In particular, species associated with old forest habitats may be impacted by such effects. Reductions in interior forest patch size results in loss of habitat and greater distances between suitable interior forest patches for Sensitive species like the Pacific marten. New construction, temporary road construction and reconstruction would result in increased habitat fragmentation as well as a reduction in potential resting and denning structures.

Additional habitat modification occurs as an indirect effect new road construction, temporary road construction, and reconstruction. Trees posing a potential safety hazard (“hazard trees”) are removed along these new, temporary, and reconstructed roads. These trees are typically snags that are within a tree-height distance from the road. This safety policy results in a “snag free” zone of about 200 feet from a road’s edge, also affecting the recruitment of large downed wood within this zone. Habitat quality is reduced within this corridor.

Reducing fuel loads across the analysis area was identified as an essential first step in longer term fire and fuels management within the Rim Fire area (Crook et al. 2013). Removal of smaller material, less than 20” dbh, would not directly affect habitat suitability for marten. However, it may indirectly contribute to a more resilient landscape and less risk of further loss of remaining suitable habitat in the face of the next wildfire.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the marten and to determine how well project alternatives comply with Forest Plan Direction.

1. Amount of moderate and high capability habitat altered.

2. Habitat connectivity

3. Amount of large legacy snags and downed logs in OFEA, HRCA, and FCCC units.

4. Road density (miles/square mile) in moderate and high capability and dispersal habitat

These criteria were chosen based on the best available scientific literature which focuses on various aspects of marten ecology and life history requirements. These criteria focus on those life history aspects, or habitat elements, considered most limiting to marten persistence across their range and where project effects are expected.

Effects Common to All Action Alternatives

Direct & Indirect Effects

Indicator 1. Because there is small difference in the amount of acres proposed for treatment in moderate and high quality suitable habitat under all action alternatives, the effects are expected to be similar and are therefore analyzed together.

Under the action alternatives, habitat quality would be reduced across a portion of the remaining moderate and high capability habitat within the analysis area as a result of removing snags and hazard trees. Between 76% and 78% of the remaining suitable habitat is not proposed for treatment. Proposed treatments would not result in creating barriers to movement based on the configuration of remaining suitable habitat. Snag retention requirements vary by alternative and would serve to mitigate some of the negative effects expected to result from implementation of the action alternatives and is discussed in more detail under each alternative. The following table displays the proposed types of treatments and the proportion of suitable habitat affected under each action alternative for comparison.

Table 50. Proposed Treatments in Marten Moderate and High Capability Habitat by Alternative

Alternative	Salvage (acres)	Hazard Tree Removal (acres)	Total (acres)	Percent of Suitable Habitat Treated
Alternative 1	1,557	2,667	4,224	24%
Alternative 3	1,576	2,634	4,210	24%
Alternative 4	1,215	2,677	3,892	22%

Although a reduction in quality is expected, treated areas would continue to offer foraging habitat. Trees that are in decline and not subject for removal under this project would, over time, be incorporated as potential resting or denning structures and habitat for prey species. Marten are known to reuse rest sites slightly more often than fisher and they also use downed logs, shrubs, and rocks and aren't dependent solely on snags (Zielinski et al. 1997). Effects may result in impacts to an individual's fitness, but because there are no documented occurrences within the analysis area this risk is considered low. Furthermore, because no established populations occur in the analysis area, no population impacts are expected.

Indicator 2. Habitat connectivity across the landscape is important to marten as it provides a means for dispersal, linkages between suitable habitat patches or core habitat areas, and genetic exchange. Spencer and Rustigan-Romsos (2012) provide recommendations for the conservation of rare carnivores such as the marten in California. Marten use higher elevation habitats during the summer and snow free periods and may use lower elevation forested habitat during the winter. It is thought that the summer range is

more restrictive and limiting for marten and their persistence within a given landscape. Thus, Spencer and Rustigan-Romsos (2012) used the higher elevation summer range to base this modeling effort. They used spatially explicit, empirical models to identify large areas of suitable habitat and dispersal corridors connecting those areas. Suitable marten habitat cores were identified as a part of this effort and occur in the north, east, southeast portions of the analysis area on the Stanislaus National Forest, at elevations above 7,000 feet. The forest carnivore connectivity corridor described in the analysis for fisher is at an elevation below 5,000' and it is unlikely that marten would venture this low during the summer. Since documented occurrences of marten on the Stanislaus National Forest are usually above 5,000', it is unlikely that the corridor would be as critical for marten relative to fisher. Additionally, habitat connectivity is still largely intact at the preferred elevation of marten – the approximate elevation band at which the Rim Fire was contained. Thus, implementation of the action alternatives is not expected to create barriers to movement for marten.

Indicator 4. To analyze effects of road density, it is necessary to include more than the current suitable marten habitat because roads can be somewhat permanent features on the landscape and will affect the habitat suitability for marten not only in the short term, but long term as well. Thus, land allocations that are managed for old forest associated species (OFEA and HRCA) and suitable habitat at or above 5,000' elevation were used to calculate road density for marten within the analysis area. Small disjunct patches of habitat not contributing to this core area or connected to suitable habitat on adjacent ownerships such as Yosemite National Park were omitted. This area is about 44,842 acres and can support marten in part today and into the future based on the desired conditions outlined in the Stanislaus National Forest Plan (USDA 2010). Therefore, this is considered a logical approach to analyze project related road density and effects to marten. Analysis is discussed further under each alternative.

Alternative 1 (Proposed Action)

Direct and Indirect Effects

Indicator 1. Discusses under effects common to all action alternatives.

Indicator 2. Discussed under effects common to all action alternatives.

Indicator 3. Under alternative 1, conifer snags would be retained at the rate of 4 per acre in the largest size class available, which is considered the management standard and the minimum snag retention required in the Forest Plan (USDA 2010). Table 51 displays the acres affected by the snag retention requirements within potential marten habitat proposed under this alternative. Potential marten habitat is defined as land allocations that are managed for old forest associated species (OFEA and HRCA) and potential suitable habitat at or above 5,000' elevation.

Table 51. Acres of conifer snags retained in salvage units within potential marten habitat under Alternative 1.

12ft²/acre* General Forest Average	30ft²/acre (OFEA, HRCA, FCCC) Above Average	100-120ft²/acre (PSW Research) Above Average
6,060	0	0

* Converted from 4snags/ac for comparison; assuming retention of 24" dbh snags.

Retaining snags at a rate of 12 square feet per acre across the 6,060 acres proposed for treatment in moderate and high capability habitat would provide fewer than has been documented to occur in occupied marten habitats. Occupied marten habitat contains at least 25 square feet per acre of snags greater than or equal to 30 inches dbh (Slauson 2003, Spencer et al. 1983). Habitat quality would be reduced on 34% of moderate and high capability breeding habitat under Alternative 1; however, retained snags would provide some potential resting and denning sites for marten. The proposed retention rate would be adequate for foraging habitat utilized by marten. Although a reduction in breeding habitat quality is

expected, the treated areas would continue to offer moderate and high capability foraging habitat for marten.

Under Alternative 1, retaining snags at 12 square feet per acre would result in the lowest retention of snags to contribute to the structural complexity and diversity within recovering forested stands. Marten readily move through habitats with understory vegetation, snags, and downed woody debris within 100 meters of forested habitat (Koehler and Hornocker 1977). The units under this alternative would create some openings larger than those known to be traversed by marten. As vegetative cover returns, the edges of these units that occur adjacent to forested stands would provide habitat that marten would readily use for foraging. Minor beneficial effects on habitat quality for marten are expected in the short term. Because so much of their home range contains older forest conditions, most treated areas aren't expected to offer suitable breeding conditions for many decades (Freel 1991, Koehler and Hornocker 1977, Spencer 1983).

Hardwoods occur irregularly across the analysis area and have not been mapped. Hardwoods are utilized by marten and they provide structure for many prey species sought by them (Freel 1991, Koehler and Hornocker 1977, Spencer 1983). Because all hardwood snags would be retained under Alternative 1, no change in the number of hardwood snags available is expected as a result of implementation of this alternative.

Considering that marten utilize habitat that contains higher rates of large snags and large downed woody debris, the rate of snag retention proposed under this alternative is not adequate to maintain habitat quality for breeding and resting within the treated areas. However, snags retained are expected to contribute and provide suitable habitat, although of lower quality in the short term. In the long term these snags would be incorporated as large downed woody material, critical structural elements needed within a recovering forest.

Downed woody debris retention at 10 to 20 tons per acre, if available in larger size classes, would provide habitat important for marten and their prey. In most areas, sufficient large downed woody material is lacking, making snag retention and eventual recruitment as downed logs even more critical. Fuels treatments that result in the removal of smaller downed woody material may result in a more diverse understory including more herbaceous and shrub vegetation that would benefit marten and their prey.

Indicator 4. Under the proposed action new permanent road construction, temporary road construction, and road reconstruction are proposed (Rim Transportation Report). Table 52 displays the miles of each type of road related treatment and the resulting miles per square mile under this alternative.

Table 52. Miles of Road Treatments Proposed Under Alternative 1.

New Permanent Road Construction	Road Reconstruction (currently designated for motor vehicle travel)	Road Reconstruction (currently NOT designated for motor vehicle travel)	Temporary Road Construction	Roads Added for Project use During Implementation (mi/mi^2)	Total Road Density Existing plus Additional for Project (mi/mi^2)
2.8	57.6	10.3	6.7	+ 0.3	3.3

The new road construction and temporary road construction proposed under this alternative would result in an increase of 0.3 miles per square mile of road, effectively increasing the road density from 3.0 miles per square mile to 3.3 miles per square mile during project implementation. Minor negative effects to habitat quality are expected under this alternative. This alternative may slightly increase the potential for road related mortality during project implementation while the roads are open and being used regularly. New permanent road construction would be designated as blocked Maintenance Level 1 or Level 2 gated year round. This would alleviate the risk of road related mortality after project implementation because

the roads would only be used intermittently for management purposes. The new permanent road construction would result in habitat fragmentation in the long term because habitat would be removed as a result of the road construction and the road would additionally be subject to hazard tree removal within 200 feet of the roads edge in the long term reducing the quality of habitat adjacent to those new roads. All temporary roads would be obliterated and blocked and over time vegetation would become reestablished and all roads that were non-motorized before project implementation would be returned to the pre-project specifications.

Cumulative Effects

This analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions reflect the aggregate impact of all prior human actions and natural events that affected the environment and might contribute to cumulative effects (Appendix B, Rim EIS).

In making the determination for this alternative, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered. A list of the actions considered can be found in Appendix B, Rim EIS. The Forest queried its databases, including the Schedule of Proposed Actions (SOPA) to determine past, present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands. Some, but not all of these actions have or may contribute cumulatively to effects on martens.

Risk factors potentially affecting marten abundance and distribution have been identified and include habitat fragmentation and lack of or removal of coarse woody debris. The following evaluation criterion was used as a relative measure of cumulative effects from this alternative to marten: habitat modification.

Habitat Modification

Federal Lands: Past, present, and foreseeable future timber harvests and hazard tree removal sales on public lands have and will likely affect habitat suitability for marten through the removal of large trees, reduction in canopy cover, and potential loss of snags and downed woody debris from prescribed fire operations. Present actions within the analysis area include: The Twomile Ecological Restoration Vegetation Management Groovy and Funky timber sales and the Soldier Creek timber sale are scheduled to treat about 2,045 acres through commercial thinning, biomass removal, mastication, and prescribed fire treatments. GTR 220 was used as a guide when designing these projects including maintaining elements important to marten (large trees, snags, downed wood, areas of dense canopy cover). In addition, Yosemite National Park is currently removing hazard trees on about 816 acres, which would have negligible effects on marten and their habitat.

Foreseeable future actions on federal lands include: Reynolds Creek Ecological Restoration involving meadow and aspen restoration. These types of projects generally include the removal of encroaching trees, which will improve habitat quality for marten. Twomile-Campy, Looney, and Thommy timber sales and Reynolds Creek timber sale are scheduled to occur over the next few years and will result in treatment of about 3,798 acres through commercial thinning, biomass removal, mastication, and prescribed fire. As a result of the Rim Fire, the Rim Fire Hazard Tree removal project proposed to remove hazard trees along 10,262 acres of level 3, 4, and 5 roads and is scheduled for implementation in the summer of 2014.

The ecological restoration projects will reduce habitat quality in the short term for marten, but are designed to have long term benefits, such as improved forest health and reduced future fire intensity. Hazard tree removal will reduce habitat quality in the short and long term because the objective and priority in these areas, especially level 3, 4, and 5 roads is public safety.

Roads and trails modify habitat suitability for marten by reducing habitat or degrading quality through fragmentation. Roads and trails also improve human access, and potentially result in the displacement of

individuals. Twomile Transportation, a foreseeable future action, will result in a slight reduction in motorized routes, essentially removing 11.4 miles by gating, decommissioning, or closing to maintenance level 1 roads used only for administrative purposes. Reynolds Creek Motorized Routes project will decommission 3.5 miles of unauthorized routes in the near future as well. The Mi-Wok OHV Restoration project proposes to block and restore 11.6 miles of unauthorized OHV routes. This reduction of about 26.5 miles of motorized roads and trails across the analysis area would improve habitat quality by reducing fragmentation and human access while increasing the amount of interior habitat available.

Private Lands: As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acre is presently being salvage logged. These salvage activities are generally considered more intensive than Forest Service projects. Post salvage, the areas may provide short term foraging habitat for marten as understory vegetation becomes established; however, these benefits are expected to be limited in space and time based on typical reforestation efforts.

Wildfire: Wildfires can affect habitat in varying degrees, depending on the intensity of the fire. Wildfires can create snags, which may be used as den, rest, or forage structures by marten. Wildfires that burn at high severity such as the Rim Fire result in eliminating habitat. Treatments in green forest (past, present, future) are designed to reduce fire intensity and spread, thus reducing the risk of habitat loss. It is expected that wildfire will continue to occur on the landscape.

Alternative 1 Contribution/Summary: Alternative 1 is expected to contribute cumulatively to short and long term effects on marten. Disturbance and potential displacement of individuals may occur during project implementation and would likely be temporary. No recent occurrences of marten within the analysis area are documented; however, the analysis area is in close proximity to occupied habitat on both the Stanislaus National Forest and Yosemite National Park. Reduction in the quality of moderate and high capability habitat on about 4,224 acres (9% of the remaining suitable habitat within the analysis area) is expected from implementation of this alternative. Snag retention requirements under this alternative are less than under the other action alternatives. Habitat quality would be reduced based on the reduction of denning and resting sites. There are also 2.8 miles of new permanent road construction proposed within potential marten habitat under this alternative, which would have negative effects on marten and their habitat. Treatments would likely occur over the next two to three years and may coincide with other projects, particularly Groovy, Funky, and Soldier Creek. The combination of past Forest Service and private timber harvests, and wildfire has cumulatively reduced the amount of late succession habitat available across the analysis area. This and other Forest Service projects were and continue to be designed to prevent additional, large scale loss of mature forest from wildfires such as the Rim. These projects are designed to retain and improve key habitat components such as retention of large trees, defect trees, snags, downed wood, while focusing on releasing black oaks and pines. Habitat suitability within the analysis area is predicted to improve in the long-term for marten. The cumulative contribution under this alternative is not expected to affect the viability of this species.

Alternative 2 (No Action)

Direct and Indirect Effects

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur.

Under Alternative 2, no indirect effects are expected because no active management would occur; however, there may be consequences under this alternative primarily related to the influence no action may have on future wildfires and how future wildfires may impact marten habitat. At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and marten habitat given the numerous factors involved over time. Potential fire behavior may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed

trees fall and contribute to surface fuel pools, potential fire behavior may be expected to increase (Rim EIS Fuels Report) and ultimately affect the amount of mature forest habitat available for marten denning and resting. Specifically, Alternative 2 is likely to result in excessive fuel loads that could inhibit future fire and fuels management (i.e. inability to safely or effectively construct holding lines) and result in severe effects to forest soils on large scales (i.e. from landscape scale and long residency times of future fire). Excessive fuel loads are likely to result under the No Action Alternative because within 10 years, as trees fall over, surface fuels are projected to average 42 tons per acre, and within 30 years, surface fuels are projected to average 78 tons per acre, and could range as high as 280 tons per acre (Rim EIS Fuels Chapter).

Indicator 1. Under Alternative 2, habitat quality within currently suitable moderate and high capability habitat would not be altered.

Within the areas that burned at high severity, herbaceous and shrub vegetation is expected to be established within 3-5 years (Gray et al. 2005 and Moghaddas et al. 2008) and would be suitable for marten movement and potentially as foraging habitat. These beneficial effects would be expected in the short term. Because the ability of forests to regenerate after stand replacing fire is highly dependent on seed sources, forested conditions are likely to re-establish only within mixed severity burn patches and the edges of high severity patches (Crotteau et al. 2013). It is likely that areas that burned at high severity would be dominated by herbaceous and shrub vegetation and shade tolerant conifer species such as white fir and incense cedar in the future. A consequence of shrub dominance is the reduced likelihood that forested conditions would return naturally for many decades. Not removing fire-killed trees would result in additional difficulties related to future management, such as planting conifers that could help accelerate the establishment of forest conditions. Thus, suitable denning and resting habitat would be delayed under this alternative resulting in long term negative effects to marten.

When wildfire returns to this landscape, the remaining moderate and high capability habitat adjacent to or near areas that burned at high severity may be at increased risk of loss. As mentioned above, within 30 years, the fuel loading is predicted to be four to eight times higher (78 tons/acre) than the desired condition (Rim EIS Fuels Report). This would significantly increase the risk of fire suppression activities when wildfire occurs in the future. The negative long term effects on habitat for marten from this alternative outweigh the short term beneficial effects.

Indicator 2. Under Alternative 2, no forest carnivore connectivity corridor would be proposed. As discussed above under effects common to all action alternatives, since it is unlikely that the corridor is critical for marten relative to fisher based on preferred elevation range, no effects are expected under this alternative.

Indicator 3. Under Alternative 2, all snags and downed logs would be retained. In the short term marten and their prey would benefit from the availability of more snags and downed logs within an adjacent to remaining suitable habitat, as discussed under the action alternatives. Remaining suitable habitat would be at higher risk of loss in the long term when wildfire returns to this landscape, see Indicator 1 above. The potential for recovery of forested conditions across areas that burned at high severity would also be delayed, see Indicator 1 above.

Indicator 4. Under Alternative 2, no new permanent road construction, temporary road construction, reconstruction, or maintenance would occur. This alternative would provide the greatest benefit to marten because there would be no increase in road density across the analysis area and no potential increase of road related mortality in the short or long term.

Cumulative Effects

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. Under the No Action alternative, there would be no direct cumulative effect expected because no active management would occur.

Alternative 2 Contribution/Summary: The cumulative contribution under this alternative would not complement the treatments that have occurred in the past, thus increasing the risk of loss of remaining suitable habitat to wildfire in the long-term. The short-term beneficial effects to marten such as retention of snags for denning and resting sites would be outweighed by the increased risk of additional habitat loss in the next wildfire.

Alternative 3

Direct and Indirect Effects

Indicator 1. Discussed under effects common to all action alternatives.

Indicator 2. Under Alternative 3 the Stanislaus National Forest Land and Resource Management Plan would be amended to establish the connectivity corridor as a land allocation (old forest emphasis area) prioritizing future management objective, not just those objectives associated with this project, within this connectivity corridor to benefit old forest associated species, particularly forest carnivores. The effects to marten under this alternative are the same as discussed for Indicator 2 under the effects common to all action alternatives, but would be realized in the long-term because the proposed corridor, approximately 10,000 acres, would be changed from General Forest to Old Forest Emphasis Area. This land allocation change would prioritize management emphasis in this corridor to benefit old forest associated species into the future.

Indicator 3. Under Alternative 3, in general forest, conifer snags would be retained at a rate of 4 snags per acre (12 square feet per acre) in the largest size class available, averaged across each unit, which is considered the management average. In OFEA, HRCA, and FCCC, conifer snags would be retained at a rate of 30 square feet per acre or 100 to 120 square feet per acre, averaged across each unit, which is considered greater than the management standard and above average snag retention.

Table 53 displays the acres affected by the snag retention requirements within potential marten habitat proposed under this alternative. Potential marten habitat is defined as land allocations that are managed for old forest associated species (OFEA and HRCA) and potential suitable habitat at or above 5,000' elevation.

Table 53. Acres of conifer snags retained in salvage units within potential marten habitat under Alternative 3.

12ft²/acre* General Forest Average	30ft²/acre (OFEA, HRCA, FCCC) Above Average	100-120ft²/acre (PSW Research) Above Average
3,443	2,103	262

* Converted from 4snags/ac for comparison; assuming retention of 24" dbh snags.

Retaining snags at a rate of 12 square feet per acre across the 3,443 acres proposed for treatment in moderate and high capability habitat would provide less than has been documented to occur in occupied marten habitats. Retaining snags at the rate of 30 square feet per acre would provide a supply of snags found in occupied marten habitat. Snags retained at the rate of 100 to 120 square feet per acre would provide several times the snags documented to occur in occupied marten habitat. Occupied marten habitat has at least 25 square feet per acre of snags greater than or equal to 30 inches dbh (Slauson 2003, Spencer et al. 1983). Habitat quality would be reduced on 19% of moderate and high capability breeding habitat under this alternative; however, retained snags would provide some potential resting and denning sites for marten. Habitat quality would be maintained on 14% of moderate and high capability habitat where snag

retention is 30 or 100 to 120 square feet per acre under this alternative. Marten readily move through habitats with understory vegetation, snags, and downed woody debris within 100 meters of forested habitat (Koehler and Hornocker 1977). The units under Alternative 3 would create some openings larger than those known to be traversed by marten. Minor beneficial effects on habitat quality for marten are expected in the short term. Because so much of their home range contains older forest conditions, most treated areas aren't expected to offer suitable breeding conditions for many decades (Freel 1991, Koehler and Hornocker 1977, Spencer 1983).

Areas with above average snag retention would provide the most snags to contribute to structural complexity and diversity within recovering forested stands. As vegetative cover returns, the edges of these units that occur adjacent to forested stands would provide habitat that marten would readily use for foraging, while providing protection from predators.

Hardwoods occur irregularly across the analysis area and have not been mapped. Hardwoods are utilized by marten and they provide structure for many prey species sought by them (Freel 1991, Koehler and Hornocker 1977, Spencer 1983). Because all hardwood snags would be retained under this alternative, no change in the number of hardwood snags available is expected as a result of implementation of this alternative.

Snag retention at the rate of 30 or 100-120 square feet per acre proposed under Alternative 3 is adequate to maintain moderate and high capability habitat that marten would likely occupy. These snags are expected to provide denning and resting structure in the short term and also in the long term as large downed woody debris.

Downed woody debris retention at 15-20 tons per acre, if available in larger size classes, would provide habitat important for marten and their prey. In most areas, sufficient large downed woody material is lacking, making snag retention and eventual recruitment as downed logs even more critical. Fuels treatments that result in the removal of smaller downed woody material would have a minor effect on marten.

Indicator 4. Under Alternative 3 new permanent road construction, temporary road construction, and road reconstruction are proposed (Rim EIS Transportation Report). Table 54 displays the miles of each type of road related treatment and the resulting miles per square mile under Alternative 3.

Table 54. Miles of Road Treatments Proposed Under Alternative3.

New Permanent Road Construction	Road Reconstruction (currently designated for motor vehicle travel)	Road Reconstruction (currently NOT designated for motor vehicle travel)	Temporary Road Construction	Roads Added for Project Use During Implementation (mi/mi²)	Total Road Density-Existing Plus Additional for Project (mi/mi²)
1.0	52.7	13.2	7.9	+ 0.3	3.3

The new road construction and temporary road construction proposed under this alternative would result in an increase of 0.3 miles per square mile of road, effectively increasing the road density from 3.0 miles per square mile to 3.3 miles per square mile during project implementation. Minor negative effects are expected in the short term. This alternative may slightly increase the potential for road related mortality during project implementation while the roads are open and being used regularly. New permanent roads would be designated as blocked level 1 or level 2 gated year round. This would alleviate the risk of road related mortality after project implementation because the roads would only be used intermittently for management purposes. The new permanent road construction would result in habitat fragmentation in the long term because not only would you have habitat removed as a result of the road construction, the road would be subject to hazard tree removal within 200 feet of the roads edge in the long term reducing the

quality of habitat adjacent to those new roads. All temporary roads would be obliterated and blocked and over time vegetation would become reestablished and all roads that were non-motorized before project implementation would be returned to the pre-project specifications. These effects would be less than under the proposed action because there are less miles of new permanent road proposed under this alternative.

Cumulative Effects

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands, refer to this discussion. The cumulative contribution of Alternative 3 would be the same as those described under Alternative 1 because there is only a difference of 14 acres proposed for treatment within moderate and high capability habitat. However, effects under Alternative 3 are less than Alternative 1 regarding the following: snag retention would be higher within OFEA, HRCA, and FCCC units under this alternative and there would only be 1.0 miles of new permanent road construction under this alternative. The cumulative contribution under this alternative would affect marten and their habitat in the short and long term but is not expected to affect the viability of this species.

Alternative 4 (Environmental Alternative)

Direct and Indirect Effects

Indicator 1. See discussion under effects common to all action alternatives.

Indicator 2. Under Alternative 4 the Stanislaus National Forest Land and Resource Management Plan would be amended to establish the connectivity corridor as a land allocation (old forest emphasis area) prioritizing future management objective, not just those objectives associated with this project, within this connectivity corridor to benefit old forest associated species, particularly forest carnivores. The effects to marten under this alternative are the same as discussed for Indicator 2 under the effects common to all action alternatives, but would be realized in the long-term because the proposed corridor, approximately 10,000 acres, would be changed from General Forest to Old Forest Emphasis Area. This land allocation change would prioritize management emphasis in this corridor to benefit old forest associated species into the future.

Indicator 3. Under Alternative 4, the snag retention guidelines are the same as outlined under alternative 3; however, the spatial extent of proposed treatments is less under this alternative. Table 55 displays the acres affected by the snag retention requirements within potential marten habitat proposed under this alternative. Potential marten habitat is defined as land allocations that are managed for old forest associated species (OFEA and HRCA) and potential suitable habitat at or above 5,000' elevation. Effects from Alternative 4 are expected to be less adverse because of the smaller spatial extent of treated area, but very similar as those discussed under Alternative 3.

Table 55. Acres of conifer snags retained in salvage units within potential marten habitat under Alternative 4.

12ft²/acre* General Forest Average	**30ft²/acre (OFEA, HRCA, FCCC) Above Average**	**100-120ft²/acre (PSW Research) Above Average**
2,168	1,399	262

* Converted from 4snags/ac for comparison; assuming retention of 24" dbh snags.

Indicator 4. Under Alternative 4 temporary road construction, and road reconstruction are proposed (Rim EIS Transportation Report). Table 56 displays the miles of each type of road related treatment and the resulting miles per square mile under this alternative.

Table 56. Miles of Road Treatments Proposed Under Alternative 4.

New Permanent Road Construction	Road Reconstruction (currently designated for motor vehicle travel)	Road Reconstruction (currently NOT designated for motor vehicle travel)	Temporary Road Construction	Roads Added for Project Use During Implementation (mi/mi²)	Total Road Density- Existing Plus Additional for Project (mi/mi²)
0	46.1	13.8	6.1	+ 0.3	3.3

The temporary road construction proposed under Alternative 4 would result in an increase of 0.3 miles per square mile of road, effectively increasing the road density from 3.0 miles per square mile to 3.3 miles per square mile during project implementation. Only minor negative effects are expected under this alternative in the short term. This alternative may slightly increase the potential for road related mortality during project implementation while the roads are open and being used regularly. All temporary roads would be obliterated and blocked and over time vegetation would become reestablished and all roads that were non-motorized before project implementation would be returned to the pre-project specifications. Because there is no new permanent road construction proposed under this alternative, long term negative effects from road treatments such as fragmentation and hazard tree removal would not occur.

Cumulative Effects

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands, refer to this discussion. The cumulative contribution of Alternative 4 would be the least of all the action alternatives as described under Alternatives 1 and 3 because there are the least amount of acres proposed for treatment within moderate and high capability habitat, snag retention would be higher within OFEA, HRCA, and FCCC units, and there would be no new permanent road construction under this alternative. The cumulative contribution under this alternative would affect marten and their habitat in the short and long term but is not expected to affect the viability of this species.

SUMMARY OF EFFECTS ANALYSIS ACROSS ALL ALTERNATIVES:

Indicator 1. Table 57 shows the amount of moderate and high capability marten habitat proposed for treatment is very similar for all alternatives. Alternative 1 would affect the most suitable habitat, while Alternative 4 would affect the least amount of habitat. Alternative 2 would not affect suitable habitat.

Table 57. Summary of proposed treatments within moderate and high capability marten habitat by alternative.

Alternative	Salvage (acres)	Hazard Tree Removal (acres)	Total (acres)	Percent of Suitable Habitat Treated
Alternative 1	1,557	2,667	4,224	24%
Alternative 2	0	0	0	0%
Alternative 3	1,576	2,634	4,210	24%
Alternative 4	1,215	2,677	3,892	22%

Indicator 2. None of the alternatives would result in habitat fragmentation within potential marten habitat areas. Alternatives 3 and 4 incorporate a Forest Plan Amendment to change the land allocation within the forest carnivore connectivity corridor to Old Forest Emphasis Area. Alternative 1 does not incorporate a Forest Plan Amendment. Under Alternative 2, no connectivity corridor or Forest Plan Amendment would be proposed.

Indicator 3. As shown in table 58, the acres of areas managed for old forest objectives with higher than average levels of large snags and higher than average levels of large down woody material are highest in Alternatives 3 and 4. In contrast, Alternative 1 manages no acres for higher than average levels of large

snags. For retention of large down woody material, all action alternatives manage to a 10 – 20 tons / acre standard but, Alternatives 3 and 4 emphasize retention at the higher end (i.e. 20 tons/ac) while Alternative 1 does not. Alternative 4 manages for an additional 2,571 acres under full retention of snags and down woody material compared to Alternative 3.

Table 58. Summary of large snag retention by alternative.

Alternative	12ft²/acre General Forest Average	30ft²/acre (OFEA, HRCA, FCCC) Above Average	100-120ft²/acre (PSW Research) Above Average	Full Retention
Alternative 1	6,060	0	0	0
Alternative 2	0	0	0	5,809*
Alternative 3	3,443	2,103	262	0
Alternative 4	2,168	1,399	262	2,571

* represents maximum number of potential unit acres in all land allocations.

Indicator 4. Of the action alternatives, proposed miles of new permanent road construction is highest under Alternative 1 and lowest under Alternative 4. Increases to road density are the same among all action alternatives, but long term effects related to road density are greatest under Alternative 1 because of the amount of new permanent road construction.

Table 59. Summary of road treatments proposed by alternative.

Alternative	New Permanent Road Construction	Road Reconstruction (currently designated for motor vehicle travel)	Road Reconstruction (currently NOT designated for motor vehicle travel)	Temporary Road Construction	Roads Added for Project use During Implementation (mi/mi²)	Total Road Density Existing plus Additional for Project (mi/mi²)
Alternative 1	2.8	57.6	10.3	6.7	+ 0.3	3.3
Alternative 2	0	0	0	0	0	3.0
Alternative 3	1.0	52.7	13.2	7.9	+ 0.3	3.3
Alternative 4	0	46.1	13.8	6.1	+ 0.3	3.3

Determination

Alternative 1.

It is our determination that Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the Pacific marten.

Our determination for Alternative 1 is based on the following rationale:

- Habitat quality would be reduced across 24 percent of currently moderate and high capability habitat on NFS lands and across 9 percent of the entire Rim Fire area.
- Snag retention in suitable habitat at 12 square feet basal area per acre would maintain habitat suitability for foraging.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the long term risk of further habitat modification or loss from future wildfires.
- 2.8 miles of new road construction would reduce habitat quality and increase fragmentation in localized areas.

Alternative 2.

It is our determination that Alternative 2 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the Pacific marten.

Our determination for Alternative 2 is based on the following rationale:

- With no removal of dead trees, remaining suitable habitat would be at greater risk modification or loss from future wildfires.
- Quality of currently moderate and high capability habitat would not be affected in the short-term.
- No new permanent road construction would occur.

Alternative 3.

It is our determination that Alternative 3 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the Pacific marten.

Our determination for Alternative 3 is based on the following rationale:

- Habitat quality would be reduced across 24 percent of currently moderate and high capability habitat on NFS lands and across 9 percent of the entire Rim Fire area.
- Snag retention in suitable habitat of greater than or equal to 30 square feet basal area per acre would maintain habitat suitability for denning, resting, and foraging.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the long term risk of further habitat modification or loss from future wildfires.
- 1.0 miles of new road construction would reduce habitat quality and increase fragmentation in 1 localized area.

Alternative 4.

It is our determination that Alternative 4 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the Pacific marten.

Our determination for Alternative 4 is based on the following rationale:

- Habitat quality would be reduced across 22 percent of currently moderate and high capability habitat on NFS lands and across 8 percent of the entire Rim Fire area.
- Snag retention in suitable habitat of greater than or equal to 30 square feet basal area per acre would maintain habitat suitability for denning, resting, and foraging.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the long term risk of further habitat modification or loss from future wildfires.
- 0 miles of new road construction are proposed, thus no localized fragmentation would occur.

COMPLIANCE WITH THE FOREST PLAN AND OTHER DIRECTION:

Applicable Forest Plan Direction:

USDA 2010 p. 43: Assess the potential impact of projects on the connectivity of habitat for old forest associated species.

USDA 2010 p. 44: General guidelines for large snag retention are as follows: 1) in westside mixed conifer and ponderosa pine types – four of the largest snags per acre, and 2) in red fir forest type – six of the largest snags per acre.

USDA 2010 p. 44: When some snags are expected to be lost due to hazard removal or the effects of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels.

Forest Plan Compliance

Alternative 1:

Alternative 1 may affect smaller scale habitat connectivity by implementing road treatments, including new permanent road construction.

Alternative 1 manages for the minimum amount of snag retention as per general guidelines in forest plan direction and does not take into account potential losses due to hazard removal of the effects of prescribed fire.

Alternative 1 does not manage for higher than average levels of snags and down woody material within land allocations managed for old forest objectives.

Alternatives 3 and 4:

Alternatives 3 and 4 may affect smaller scale habitat connectivity by implementing road treatments, including new permanent road construction in Alternative 3.

Alternatives 3 and 4 manage for higher than average levels of snags and down woody material within the FCCC or land allocations managed for old forest objectives, and accounts for potential losses due to hazard removal or the effects of prescribed fire.

FISHER

AFFECTED ENVIRONMENT

Species and Habitat Account

The fisher (*Pekania pennanti*, formerly *Martes pennanti pacifica*) is a Region 5 Forest Service Sensitive species and a candidate for listing under the ESA (USDA 2013). In 2004, the U.S. Fish and Wildlife Service (FWS) completed a 12-month status review of the fisher and determined that the West Coast Distinct Population Segment (DPS) warranted protection under the Endangered Species Act of 1976 et seq. but was precluded from listing by higher priority actions (Federal Register 2004), making this fisher DPS a Candidate for listing. The West Coast Fisher DPS (USDI 2004) includes all potential fisher habitats in Washington, Oregon and California from the east side of the Cascade Mountains and Sierra Nevada to the Pacific coast. A status review was initiated as part of a multidistrict litigation settlement agreement under which the Service agreed to submit a proposed rule or a not-warranted finding to the Federal Register for the West Coast DPS of the fisher no later than the end of Fiscal Year 2014 (Federal Register 2013a). If the USFWS pursues listing, they will concurrently designate critical habitat for that DPS. The Forest Service has the option of requesting technical assistance from the USFWS due to Candidate for ESA listing status.

Fishers have been listed with the State of California as a Species of Special Concern since at least 1986 (Williams 1986). In March 2009, the California Fish and Game Commission recommended that the fisher be assessed for listing as Threatened or Endangered under the California State Endangered Species Act. Based on the recommendation CDFW conducted a 12-month review and concluded that the fisher did not merit protection under the State Endangered Species Act in March 2010. Although they accepted additional comments regarding the status of fisher, they did not change their finding.

Fishers historically occurred in the Lassen, Plumas, Tahoe, Lake Tahoe Basin, Eldorado, Stanislaus, Sierra, and Sequoia National Forests. As of 1995, Zielinski et al. determined that fishers remain extant in just two areas comprising less than half of the historic distribution: northwestern California and the southern Sierra Nevada from Yosemite National Park southward, separated by a distance of approximately 250 miles.

A number of southern Sierra Nevada population estimates and simulations have been conducted for fisher populations occurring across the Sequoia and Sierra National Forests, Mountain Home State Park, tribal lands, Yosemite and Sequoia/Kings Canyon National Parks. These estimates range from 100 to 600 adults (Lamberson et al. 2000, Spencer et al. 2008, and Self et al. 2008).

Status and trend monitoring for fisher and marten was initiated in 2002; the monitoring objective is to be able to detect a 20 percent decline in population abundance and habitat (USDA 2006). This monitoring includes intensive sampling to detect population trends on the Sierra and Sequoia national forests, where the fisher currently occurs, and is supplemented by less intensive sampling in suitable habitat in the central and northern Sierra Nevada specifically designed to detect population expansion. From 2002 – 2008, 439 sites were surveyed throughout the Sierra Nevada on 1,286 sampling occasions, with the bulk of the sampling effort occurring within the Southern Sierra fisher population monitoring study area (USDA 2009).

Preliminary results indicate that fishers are well-distributed in portions of the Sequoia and Sierra National Forests; annual occupancy rates are consistently higher on the Sequoia (33.3% to 41.1%) than the Sierra (14.5% to 22.7%) (USDA 2005). Comparisons to southern Sierra Nevada survey data from the 1990's suggest that the areal extent of occurrence for fisher may have expanded during the past 10 years (USDA 2005). Thus there has been no conspicuous difference in occupancy rates among years, and no seasonal effects on detection probabilities within the June to October sampling periods (Truex et al. 2009).

Carnivore cameras stations have been employed within suitable habitat in and near the analysis area in 2005-2013 following the protocol designed by Zielinski and Kucera (1995). No fisher detections were made as a result of these survey efforts (NRIS Wildlife database).

From 2002 thru 2006, 916 primary sample units were completed, consisting of greater than 4,500 individual survey stations for over 45,000 survey nights (USDA 2006). In the seven southern Sierra Nevada monitoring seasons to date (2002 – 2008), fishers were detected at a total of 112 of 251 sample units, or 44.6 percent of sites (USDA 2009). While surveys have been conducted on the Stanislaus, they have not resulted in detections of fishers on the Stanislaus National Forest.

The project is within the historic distribution of fisher across the Sierra Nevada Bioregion. Fisher have been documented both in Yosemite National Park and south of the Merced River on the Sierra National Forest. Although their presence within the analysis area is undocumented, it is within dispersal distance of the closest known population, thus, their presence is assumed where suitable habitat exists. Because there are no documented den sites, LOPs for this species are not required for this project.

In the Sierra Nevada, fishers occur in mid-elevation forests (Grinnell et at. 1937, Zielinski et al. 1997) largely on National Forest System lands, below the elevations of most national parks and wilderness areas. In the southern Sierra Nevada, fishers occur sympatrically with martens at elevations of 5,000 to 8,500 feet in mixed conifer forests (Zielinski et al. 1995). The Sierra Nevada status and trend monitoring project has detected fishers as low as 3,110 feet and as high as 9,000 feet in the southern Sierra Nevada, which are considered to be extremes of the elevation range for this species (USDA 2006).

The following California Wildlife Habitat Relationships (CWHR) types are considered important to fishers: generally structure classes 4M, 4D, 5M, 5D and 6 (stands with trees 11" diameter at breast height or greater and greater than 40% cover) in ponderosa pine, montane hardwood-conifer, Sierran mixed conifer, montane riparian, aspen, redwood, red fir, Jeffrey pine, lodgepole pine, subalpine conifer, and eastside pine (California Department of Fish and Game, California Interagency Wildlife Task Group. 2008). CWHR assigns habitat values according to expert panel ratings. CWHR2 is a derivative of the CWHR fisher habitat relationship model constructed by Davis et al. (2007). They used best available science to revise the statewide model and eliminate some forest types that appeared to contribute little to fisher habitat: aspen, eastside pine, lodgepole pine, montane riparian, red fir, and subalpine conifer and add some canopy closure classes that weren't previously thought to contribute to suitable habitat for fisher. This can be further refined to reflect only those forest types present in the southern Sierra Nevada: Jeffrey pine, montane hardwood-conifer, ponderosa pine, Sierran mixed-conifer and white fir, terming it CWHR2.1 (see table below).

Table 60. High and Moderate Capability Habitat for Fisher (CWHR 2008 as Modified by Davis et al. 2007 [CWHR2] and Applied to Southern Sierra Nevada Forest Types [CWHR2.1]).

Habitats	Canopy Cover and Substrate Classes
JEFFREY PINE	4P, 4M, 4D, 5M, 5D
MONTANE HARDWOOD-CONIFER	4P, 4M, 4D, 5P, 5M, 5D, 6
PONDEROSA PINE	4P, 4M, 4D, 5P, 5M, 5D
SIERRAN MIXED CONIFER	4P, 4M, 4D, 5P, 5M, 5D, 6
WHITE FIR	4P, 4M, 4D, 5P, 5M, 5D, 6

In addition to habitat fragmentation within the analysis area resulting from the Rim Fire, habitat connectivity across this landscape was compromised by the 1996 Ackerson and Rogge Fires, and the 2003 Kibbie Fire. Prior to the Rim Fire, the analysis area contained about 73,081 acres of moderate and high capability habitat. The analysis area still contains relatively high quality habitat for fisher in areas that burned at low or low-moderate intensity such as Twomile, Bourland, and Reynolds Creek, Pilot

Ridge and the Crocker Meadow area. Post-fire, the analysis area contains about 44,876 acres of moderate and high capability habitat on Stanislaus NFS lands only. Table 61 displays pre- and post-fire acres by CWHR vegetation type, size class, and density on Stanislaus NFS lands. Suitable habitat has been greatly reduced in the heart of the analysis area and connectivity between large tracts of habitat on the forest and currently occupied areas in Yosemite has been further reduced. This habitat fragmentation has reduced the likelihood of fisher moving through or dispersing into the area until natural vegetation recovery or forest management practices, such as planting, effectively re-establishes connectivity. There are about 84,142 acres of moderate and high capability habitat within the cumulative effects analysis area post-fire, including all ownerships.

Table 61. Pre- and Post-Fire High and Moderate Capability Habitat for Fisher in the Rim Recovery Analysis Area.

CWHR Vegetation Type	Size Class & Density	Pre-Fire CWHR Veg Type* (acres)	Post-Fire CWHR Veg Type* (acres)
JPN, MHC, PPN, SMC, WFR	4P	1,107	4,128
JPN, MHC, PPN, SMC, WFR	4M	8,035	4,700
JPN, MHC, PPN, SMC, WFR	4D	44,872	21,898
JPN, MHC, PPN, SMC, WFR	5P	8	827
JPN, MHC, PPN, SMC, WFR	5M	200	251
JPN, MHC, PPN, SMC, WFR	5D	18,859	13,072
TOTAL		**73,081**	**44,876**

*Acres include public lands only.

CWHR habitat types: JPN=Jeffrey pine, MHC=montane hardwood conifer, PPN=ponderosa pine, SMC=sierra mixed conifer, WFR=white fir

CWHR Size Classes: 4=12-24"dbh, 5=24-40"dbh CWHR Density Classes (Canopy Closure): P=25-39%, M=40-59%, D=>60%

A road density of 0-0.5 miles per square mile is associated with high capability habitat for fishers USDA 1991). A road density of 0.5-2.0 miles per square mile is associated with medium capability habitat (Ibid). The road density including all routes open to motor vehicles in the analysis area is 3.0 miles per square mile on National Forest Service lands and is more than six times the acceptable density found in high quality habitat and more than 1 mile per square mile above that found in moderate capability habitat.

Breeding occurs from late February through May, just a few days after parturition. Breeding is followed by embryonic diapause until late winter to early spring. Den site structural elements must exist in the proper juxtaposition within specific habitats in order to provide a secure environment for birth and rearing of fisher kits. Natal dens, where kits are born, are most commonly in tree cavities at heights of greater than 20 feet (Lewis and Stinson 1998). Maternal dens, where kits are raised, may be in cavities closer to the ground so active kits can avoid injury in the event of a fall from the den (Ibid).

Truex et al. 1998, Zielinski et al. 2004, Purcell et al. 2009 characterize suitable habitat for denning/resting as follows:

- Canopy cover > 60%.
- Large live and dead conifers and hardwoods 21-51"dbh; showing preference for largest tree or snag in area.
- Live and snag tree basal area ranges from 100-500 ft^2/acre.

Fishers are considered prey generalists and their diet varies widely with local prey available in the diverse habitats they occupy (Zielinski et al. 2006). Prey items include squirrels, voles, porcupine, snowshoe hares and reptiles (Zielinski and Duncan 2004a). They also readily consume hypogeous fungi, fruit and deer carrion (Ibid). While information is lacking regarding fishers use of meadows, they are known to eat meadow voles and it is likely that they forage along meadow edges as marten do.

Freel 1991 characterized highly suitable habitat for foraging as follows:

- Canopy cover >40% with a shrub component in the understory.
- Largest snags average 4-5/acre and are > 20"dbh.
- Downed logs average 4/acre and are > 30" dbh.

There is no research available regarding fisher use of high severity burn areas in the first few years after fire, male fishers may venture several hundreds of yards into openings while female fishers would be much more cautious (Thompson pers. comm.). Although not similar to the existing condition in the project area, 1 year post-fire, Hanson et al. (2013) did look at fisher use of un-salvaged burned and unburned forest 10-12 years post-fire. Specific vegetative conditions along sampled transects at the time of the study were not presented; only the pre-fire CWHR vegetation type, size and density class were used. Thus it is unclear what the existing vegetative conditions were at the time of the study, such as understory vegetation composition. Hanson and others (2013) found that fisher selected mixed-conifer forest in both post-fire habitat and unburned forest 10-12 years post-fire. Although fisher did use pre-fire dense, mature forest more than expected, the results were not significant.

Dispersal ability is low in the western population and Arthur and others (1993) suggest that short dispersal distances (up to 6-12 miles from natal home range) may be problematic in the maintenance of suitable fisher populations in areas where suitable habitat is fragmented. The current disjunct distribution pattern may also be partially attributed to movement and dispersal constraints imposed by the elongated and peninsular distribution of montane forests in the Pacific states (Wisely et al. 2004). The synergistic effect of road and rodenticide related mortalities documented in the southern Sierra populations, the apparent reluctance of fishers to cross open areas, and the more limited mobility of this terrestrial mammal relative to birds, it is more difficult for fishers to locate and occupy distant, but suitable, habitat.

Risk Factors:

1. *Climate Change*- Climate change is a concern for fishers because of the widespread ecological effects. There is the potential that climate change could increase habitat quality for this species, but various models and studies appear to support the idea that the core habitat for fisher in the middle elevation would suffer from fires, disease, increased pressure from lower elevation.
2. *Uncharacteristically Severe Wildfire*- High severity wildfires have been increasing in number and intensity over the past several decades and this trend is predicted to continue. For example, the Rim fire of 2013 removed 28,205 acres of moderate and high capability habitat, as defined above. Many fires within the current range of the fisher have resulted in the destruction of important denning, resting, and foraging habitat. Spencer et al. (2008) found that the short-term negative localized effects to fisher from active vegetation management designed to reduce high severity wildfire in and near suitable habitat would out-weigh the positive long-term effects of protecting suitable fisher habitat.
3. *Vegetation Manipulation to Reduce Risk of Uncharacteristically Severe Wildfire*- Aggressive stand thinning for forest health and reduced fire risk may remove important cover, snags, and vegetative diversity for fisher. These treatments may prevent more adverse effects associated with drought and wildfire, but may nonetheless leave habitat with reduced value for fisher or even render it unsuitable.
4. *Habitat Fragmentation or Loss of Connectivity*- Habitat connectivity is a key to maintaining fisher within a landscape. Activities under Forest Service control that result in habitat fragmentation or population isolation pose a risk to the persistence of fishers. Timber harvest, fuels reduction treatments, road presence and construction, and recreational activities may result in the loss of habitat connectivity resulting in a negative impact on fisher distribution and abundance.

Management Direction

Current management direction is defined by project-level standards and guidelines from the Forest Plan (USDA 2010) and is based on the desired future condition of land allocations (Robinson 1996). The fisher

is a candidate for listing under the ESA, is a Region 5 Forest Service Sensitive species that is associated with old forest ecosystems (USDA 2004). The following land allocations pertain to fisher and old forest ecosystems: Protected Activity Centers (PACs), Home Range Core Area (HRCA), Old Forest Emphasis Area (OFEA), and Forest Carnivore Connectivity Corridor (FCCC).

The desired condition for Protected Activity Center (PAC) is to have 1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

The desired condition for Spotted Owl Home Range Core Area (HRCA) is to encompass the best available habitat in the closest proximity to the owl activity center (USFS 2004 ROD pp. 39-40). HRCAs consist of large habitat blocks that have: 1) at least two tree canopy layers; 2) at least 24 inches dbh in dominant and co-dominant trees; 3) a number of very large (greater than 45 inches dbh) old trees; 4) at least 50 to 70 percent canopy cover; and 5) higher than average levels of snags and down woody material.

The desired condition for Old Forest Emphasis Area (OFEA) is to provide habitat conditions for mature forest associates (spotted owl, northern goshawk, marten, and fisher). Specifically, forest structure and function across old forest emphasis areas generally resemble pre-settlement conditions. High levels of horizontal and vertical diversity exist at the landscape-scale (roughly 10,000 acres). Stands are composed of roughly even-aged vegetation groups, varying in size, species composition, and structure. Individual vegetation groups range from less than 0.5 to more than 5 acres in size. Tree sizes range from seedlings to very large diameter trees. Species composition varies by elevation, site productivity, and related environmental factors. Multi-tiered canopies, particularly in older forests, provide vertical heterogeneity. Dead trees, both standing and fallen, meet habitat needs of old-forest-associated species. Forest structure and function generally resemble pre-settlement conditions (see Figure 1).

The desired future condition of forest carnivore connectivity corridor (FCCC) is to provide habitat connectivity for forest carnivores, linking Yosemite National Park and the North Mountain inventoried roadless area west to the Clavey River. For habitat connectivity, a future forested area is desired with a minimum of 50 percent of the forested area having at least 60 percent canopy cover. Higher than average levels of large snags and large down woody material is also desired (as in USDA 2004). Habitat structures are important to retain that may constitute rest sites as described in Freel 1991 and Lofroth et al. 2010 (e.g. see plate 7.7 and 7.8).

ENVIRONMENTAL CONSEQUENCES

The project alternatives could result in direct and indirect effects to the fisher through the following activities:

1. Salvage of fire-killed trees.

2. Salvage of roadside hazard trees.

3. New permanent and temporary road construction, road reconstruction and maintenance

4. Fuels treatments.

5. Use of material sources and water sources.

These activities may have direct and indirect effects on fisher through the following:

- Project related death, injury or disturbance.
- Project related modifications to habitat quantity or quality.

Death, injury, or disturbance:

Death or injury from project related activities would be unlikely to occur given the mobility of this species. However, there is the potential for death or injury if a den or rest tree were felled while being used by fisher.

Project activities, especially loud noise, could result in disturbance that may impair essential behavior patterns of the fisher related to denning, resting, or foraging. Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. The location of fisher within the analysis area is uncertain following the Rim Fire, a large-scale disturbance event; conducting surveys to identify areas being used is a way to address this uncertainty. Temporary avoidance of the project site or displacement of individuals is expected during project implementation. Any displacement or avoidance would be of short duration and would subside shortly after project implementation activities. LOPs in place for spotted owls, goshawks, great gray owls, and bald eagles would afford protection to individual fisher in these areas during parturition, kit rearing, and subsequent breeding (March-August). The potential risk to individual fisher is considered low because of the lack of documented fisher occurrence within or near the analysis area and length of exposure expected given the accelerated timeframe of this project and implementation.

Habitat Modification:

Salvage logging and the removal of hazard trees along level 2 roads in and near suitable fisher habitat would modify suitable fisher habitat by reducing its quality in both the short term (10-20 years) and in the long term (20-50 years).

Short term, retaining snags within and near suitable fisher habitat would provide denning and resting sites (Freel 1991, Thompson et al. 2011, Zielinski et al. 2004). The number of snags and downed logs available across a fisher's home range affects the quality of that habitat for foraging and breeding. Resting and denning structures are likely the most limiting habitat elements within fisher home ranges (Zielinski et al. 2004). While there is no research available regarding fisher use of high severity burn areas in the first few years after fire, male fishers may venture several hundreds of yards into openings while female fishers would be much more cautious (Thompson pers. comm.). Hanson et al (2013) looked at fisher use in burned versus unburned habitat in the McNally and Manter fire footprints 10-12 years post-fire in an area that was not salvage logged. They found that fishers were using habitat that burned at moderate and high severity greater than 500 meters from the edge of unburned forest habitat 10-12 years post-fire. The vegetative conditions at the time of this research does not mimic the existing condition within the Rim Fire area because we are looking at vegetative conditions up to one year post-fire, not 10-12 years post-fire. Snags retained away from forest cover are not likely to benefit fisher until vegetation becomes re-established.

Prey species that tolerate disturbance or open conditions are known to be abundant in post fire environments, such as mice, rats, chipmunks, and squirrels (Amacher et al. 2008 and Diffendorfer et al. 2012). Structural elements such as snags and downed logs, when combined with the flush of shrubs, forbs and grasses expected post-fire, will provide habitat suitable for prey and foraging habitat for fisher within a few years post-fire.

Long term, large snags and large downed logs are considered biological legacies in a post fire environment and play important roles in the structure of future forest (Lindenmayer et al. 2008). Large snags and downed logs may take hundreds of years to develop, emphasizing the need to retain these elements across the landscape. Because large snags and large downed logs are regularly used by fisher it is not only important to retain these structural elements during project implementation, but it is imperative that recruitment of large snags and large downed logs occur over time to maintain habitat suitability in the long term.

Snags remain standing for decades depending upon the species of tree and other environmental factors (Cluck and Smith 2007 and Ritchie et al. 2013). For example, Ritchie and others (2013) found that snag fall rates and decay rates vary considerably by species. When snags eventually fall, they are incorporated as large downed logs, another critical structural element important for fisher and prey species (Freel 1991, Zielinski et al. 2004a).

Roads modify fisher habitat by directly removing it or indirectly reducing its quality, resulting in both short and long term effects. Gaines and others (2003) studied the response of several focal species, including fisher, related to roads and trails. Fishers in this study were displaced, shifting use of habitat away from human activities on or near roads or trails. Andren (1994) suggested that, as landscapes become fragmented, the combination of increasing isolation and decreasing patch size of suitable habitat is negatively synergistic, compounding the effects of simple habitat loss. In particular, species associated with old forest habitats may be impacted by such effects. Reductions in interior forest patch size results in loss of habitat and greater distances between suitable interior forest patches for Sensitive species like the fisher. New construction, temporary road construction and reconstruction would result in increased habitat fragmentation as well as a reduction in potential resting and denning structures.

Additional habitat modification occurs as an indirect effect of new road construction, temporary road construction, and reconstruction. Trees posing a potential safety hazard ("hazard trees") are removed along these new, temporary, and reconstructed roads. These trees are typically snags that are within a tree-height distance from the road. This safety policy results in a "snag free" zone of about 200 feet from each side of a road's edge, also affecting the recruitment of large downed wood within this zone. Habitat quality is reduced within this corridor.

Reducing fuel loads across the analysis area was identified as an essential first step in longer term fire and fuels management within the Rim Fire area (Crook et al. 2013). Removal of smaller material, less than 20" dbh, would not directly affect habitat suitability for fisher. However, it may indirectly contribute to a more resilient landscape and less risk of further loss of remaining suitable habitat in the face of the next wildfire. Because the risk of habitat loss to wildfire is one of the greatest risks facing fishers and other old forest associated species today, creating a more resilient landscape in the long-term by salvage logging and accepting the associated short-term impacts, is an essential first step in protecting the remaining suitable habitat within this landscape.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the fisher and to determine how well project alternatives comply with Forest Plan Direction and the species' conservation strategies.

1. Amount of moderate and high capability habitat altered.

2. Habitat connectivity

3. Amount of large legacy snags and downed logs in OFEA, HRCA, and FCCC units.

4. Road density (miles/square mile) in moderate and high capability and dispersal habitat

These criteria were chosen based on the best available scientific literature which focuses on various aspects of fisher ecology and life history requirements. These criteria focus on those life history aspects, or habitat elements, considered most limiting to fisher persistence across their range and where project effects are expected.

Effects common to all action alternatives

Direct and Indirect Effects

Indicator 1. Because there is small difference in the amount of acres proposed for treatment in moderate and high quality suitable habitat under all action alternatives, the effects are expected to be similar and are therefore analyzed together.

Under the action alternatives, habitat quality would be reduced across a portion of the remaining moderate and high capability habitat within the analysis area as a result of removing snags and hazard trees. Areas of suitable habitat being treated include those areas that burned at less than 50% basal area mortality, which contain fire-killed trees. These areas are subject to partial salvage and hazard tree removal and would be impacted by proposed treatments. Between 71% and 72% of the remaining suitable habitat is not proposed for treatment. Proposed treatments would not exacerbate the lack of connectivity between large contiguous blocks of suitable habitat in the analysis area already created by the fire. Snag retention requirements vary by alternative and would serve to mitigate some of the negative effects expected to result from implementation of the action alternatives and is discussed in more detail under each alternative. Table 62 displays the proposed types of treatments and the proportion of moderate and high capability habitat affected under each alternative for comparison.

Table. 62. Proposed Treatments in Fisher Moderate and High Capability Habitat by Alternative

Alternative	Salvage (acres)	Hazard Tree Removal (acres)	Total (acres)	Percent of Suitable Habitat Treated
Alternative 1	6,221	6,677	12,898	29%
Alternative 3	6,266	6,562	12,828	29%
Alternative 4	5,724	6,632	12,356	28%

Although a reduction in quality is expected, some treated areas would continue to offer denning, resting, and foraging habitat. Trees that are in decline and not subject for removal under this project would, over time, be incorporated as potential resting or denning structures and habitat for prey species. Effects may result in impacts to some individuals' fitness, but because there are no documented occurrences within the analysis area this risk is considered low.

Indicator 4. To analyze effects of road density, it is necessary to include more than the current suitable fisher habitat because roads can be somewhat permanent features on the landscape and will affect the habitat suitability for fisher not only in the short term, but long term as well. Thus, land allocations that are managed for old forest associated species (OFEA and HRCA), the proposed forest carnivore connectivity corridor, and pre-fire moderate and high capability habitat were used to calculate road density for fisher within the analysis area. Small disjunct patches of habitat not contributing to the core area as defined here were omitted. This potential fisher habitat area is about 88,000 acres and can support fisher in part today and into the future based on the desired conditions outlined in the Stanislaus National Forest, Forest Plan (USDA 2010). Therefore, this is considered a logical approach to analyze project related road density and effects to fisher. Analysis is discussed further under each alternative.

Alternative 1 – (Proposed Action)

Direct and Indirect Effects

Indicator 1. Please see discussion under effects common to all action alternatives.

Indicator 2. Habitat connectivity across the landscape is important to fisher as it provides a means for dispersal, linkages between suitable habitat patches or core habitat areas, and genetic exchange. Spencer and Rustigan-Romsos (2012) provide recommendations for the conservation of rare carnivores such as the fisher in California. They used spatially explicit, empirical landscape level models to identify large

areas of existing suitable habitat and dispersal corridors connecting those areas. Suitable fisher habitat core areas greater than 2,500 acres were identified as a part of this effort and occurred in the north, east, southeast portions of the analysis area on the Stanislaus National Forest before the Rim Fire in 2013. We used finer scale data including the STF vegetation database and CWHR to identify smaller areas that provided suitable fisher habitat pre-fire that weren't identified in the landscape level modeling that was conducted by Spencer and Rustigan –Ramos (2012). The Rim Fire resulted in the loss of suitable fisher habitat and connectivity between occupied habitat in Yosemite National Park and suitable habitat on the Stanislaus National Forest has been further reduced.

A forest carnivore connectivity corridor (FCCC) is proposed to focus management activities associated with this project on re-establishing that connectivity so that fisher can disperse into and utilize the available suitable habitat on the Stanislaus National Forest. Portions of this corridor would also overlap important critical winter deer range. This corridor, shown in figure 6, spans from Yosemite National Park and the North Mountain roadless area, encompassing the Tuolumne River canyon west toward the Clavey River canyon and includes the following proposed salvage units managed for old forest emphasis: L02, L05, M1 through M10, M12, M13, M15, M16, M18, M19, and N1. This corridor was identified based on the following: landscape level modeling presented in Spencer and Rustigan-Romsos (2012), potential natural vegetation (pre-fire suitable fisher habitat), on the ground knowledge of habitat suitable for fisher, ownership, and other management priorities. The FCCC and pre-fire habitat conditions are displayed in figure 6 to illustrate the connectivity that was present before the Rim Fire and the potential for this area to provide connectivity in the future.

Objectives for this corridor include salvaging to provide for future management opportunities that may include re-establishing forested conditions suitable for fisher and other old forest associated species by planting. The return of forested habitat would be accelerated under active management such as planting of conifers. Management objectives in this corridor would complement OFEA and HRCAs management objectives at the larger landscape scale. Desired conditions for this area include managing this corridor for a range of vegetative conditions, including a minimum of 50 percent of forested areas having at least 60 percent canopy cover. Other areas within this corridor supported chaparral and montane hardwood communities pre-fire which were interspersed with patches of higher quality habitat. While the entire corridor is not capable of supporting moderate and high quality fisher habitat, a heterogeneous corridor with chaparral, montane hardwood, and coniferous forest would allow for fisher movement through and use of this habitat in the long-term. Because a portion of this corridor is within a designated fuels SPLAT, it is necessary to manage for heterogeneity, combining some denser forested conditions with less dense vegetation to allow for effective fuels and fire management. Additional biomass removal proposed in critical winter deer range would contribute to breaking up fuel continuity across the analysis area, increasing the defensibility of forest carnivore connectivity units in the long term. This corridor would benefit fisher and other old forest associated species such as the spotted owl and northern goshawk over the long term as forested conditions return whether by natural recovery or active management practices such as planting.

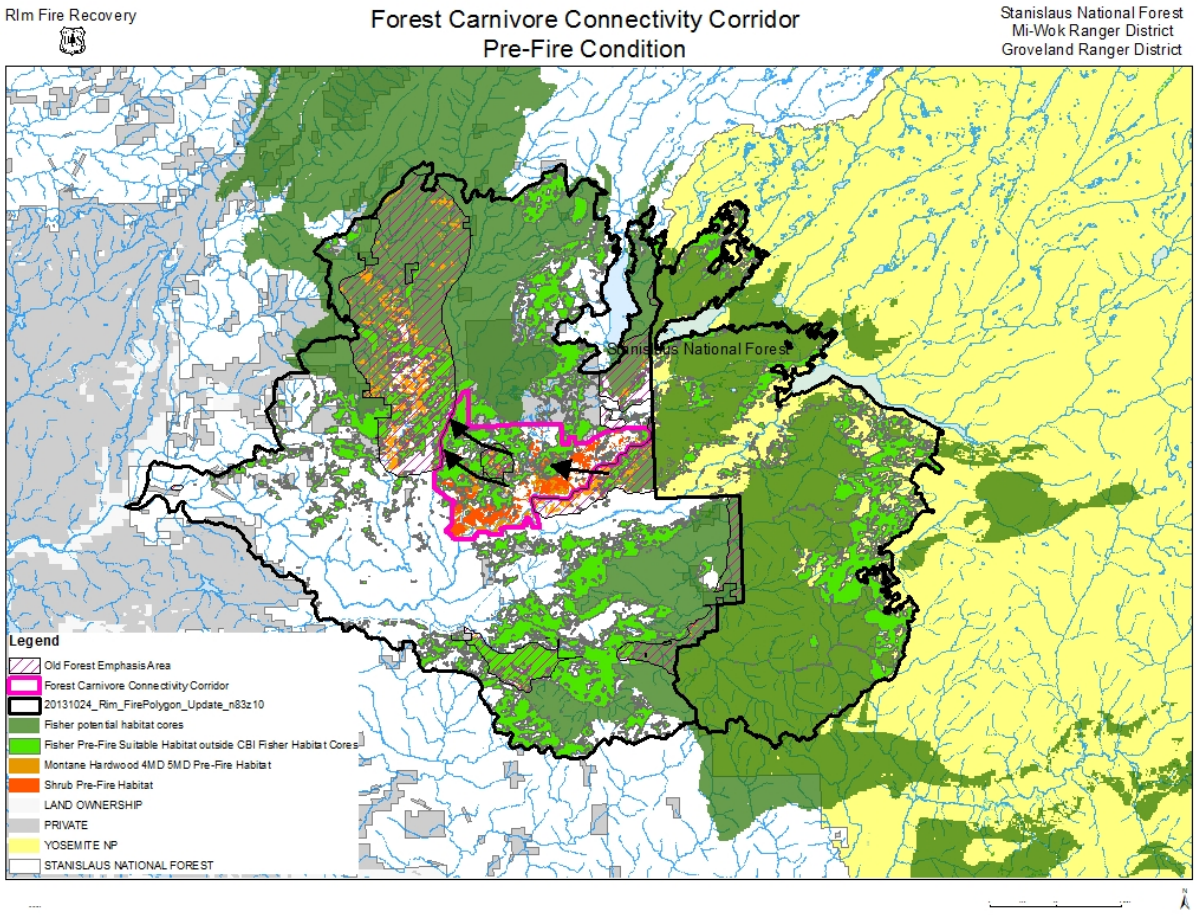

Figure 6. Proposed Forest Carnivore Connectivity Corridor.

Indicator 3. Under alternative 1, conifer snags would be retained at the rate of 4 per acre in the largest size class available, which is considered the management standard and the minimum snag retention required in the Forest Plan (USDA 2010). Table 63 displays the acres affected by the snag retention requirements within potential fisher habitat proposed under this alternative. Potential fisher habitat is defined as land allocations that are managed for old forest associated species (OFEA, HRCA, and FCCC) and potential suitable habitat between 3,000 and 9,000' elevation.

Table 63. Acres of conifer snags retained in salvage units within potential fisher habitat under Alternative 1

12ft²/acre* General Forest Average	30ft²/acre (OFEA, HRCA, FCCC) Above Average	100-120ft²/acre (PSW Research) Above Average
28,140	0	0

* Converted from 4snags/ac for comparison; assuming retention of 24" dbh snags.

Retaining snags at a rate of 12 square feet per acre across the 28,140 acres proposed for treatment would provide less than half of that documented to occur in occupied fisher habitat. For example, occupied fisher habitat within the Kings River Fisher Project area contains an average of 24 square feet per acre basal area of snags in a variety of size classes (Thompson pers.comm.). Zielinski et al. (2004) reports an

average of 44suqare feet per acre basal area of snags present in the immediate vicinity of fisher rest sites. Although retaining snags at this level is not optimal for fisher, those retained would provide some potential resting and denning sites as well as habitat for prey sought by fishers.

Retaining snags at 12 square feet per acre would result in the lowest retention of snags to contribute to the structural complexity and diversity within recovering forested stands. As vegetative cover returns, only minor beneficial effects on habitat quality for fisher are expected.

Hardwoods occur irregularly across the analysis area and have not been mapped. Hardwoods are critically important structures and are selected by fisher for resting and denning sites (R. Sweitzer unpublished data, Thompson et al. 2011, and Truex et al. 1998). Because all hardwood snags would be retained under this alternative, no change in the number of hardwood snags available is expected as a result of implementation of this alternative.

Over time, retained snags would decay and fall and become incorporated as large downed logs. Large downed woody debris provides important habitat elements utilized by fisher and their prey. Considering fisher utilize habitat that contains higher rates of large snags and large downed woody debris, the rate of snag retention proposed under this alternative is not adequate to maintain the highest habitat capability within the treated areas. However, snags retained are expected to contribute and provide suitable habitat, although of lower quality in the short term. In the long term these snags would be incorporated as large downed woody material, critical structural elements needed within a recovering forest.

Downed woody debris retention at 10-20 tons per acre, if available in larger size classes, would provide habitat structure important for fisher and their prey. In most areas, large downed woody material is lacking, making snag retention and eventual recruitment as downed logs even more critical. Fuels treatments that result in the removal of smaller downed woody material may result in a more diverse understory including more herbaceous and shrub vegetation that would benefit fisher and their prey.

Indicator 4. Under Alternative 1 new permanent road construction, temporary road construction, and road reconstruction are proposed (Rim EIS Transportation Report). Table 64 displays the miles of each type of road related treatment and the resulting miles per square mile under Alternative 1.

Table 64. Miles of Road Treatments Proposed within Potential Fisher Habitat Under Alternative 1.

New Permanent Road Construction	Road Reconstruction (currently designated for motor vehicle travel)	Road Reconstruction (currently NOT designated for motor vehicle travel)	Temporary Road Construction	Roads Added for Project use During Implementation (mi/mi²)	Total Road Density Existing plus Additional for Project (mi/mi²)
5.4	215.8	30.9	18.2	+ 0.3	1.9

The new road construction and temporary road construction proposed under this alternative would result in an increase of 0.3 miles per square mile of road, effectively increasing the road density from 1.6 miles per square mile to 1.9 miles per square mile during project implementation. Minor negative effects to habitat quality are expected under Alternative 1. This may slightly increase the potential for road related mortality during project implementation while the roads are open and being used regularly. Because there are no documented occurrences within the analysis area this risk is considered low. New permanent road construction would be designated as blocked Maintenance Level 1 or Level 2 gated year round. This would alleviate the risk of road related mortality after project implementation because the roads would only be used intermittently for management purposes. The new permanent road construction would result in habitat fragmentation in the long term because habitat would be removed as a result of the road construction and the road would additionally be subject to hazard tree removal within 200 feet of the roads edge in the long term reducing the quality of habitat adjacent to those new roads. All temporary

roads would be obliterated and blocked and over time vegetation would become reestablished and all roads that were non-motorized before project implementation would be returned to the pre-project specifications.

Cumulative Effects

This analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions reflect the aggregate impact of all prior human actions and natural events that affected the environment and might contribute to cumulative effects (Appendix B, Rim EIS).

In making the determination for this alternative, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered. A list of the actions considered can be found in Appendix B, Rim EIS. The Forest queried its databases, including the Schedule of Proposed Actions (SOPA) to determine past, present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands. Some, but not all of these actions have or may contribute cumulatively to effects on fishers.

Risk factors potentially affecting fisher abundance and distribution have been identified and include habitat fragmentation and lack of or removal of coarse woody debris. The following evaluation criterion was used as a relative measure of cumulative effects from this alternative to fisher: habitat modification.

Habitat Modification

Federal Lands: Past, present, and foreseeable future timber harvests and hazard tree removal sales on public lands have and will likely affect habitat suitability for fisher through the removal of large trees, reduction in canopy cover, and potential loss of snags and downed woody debris from prescribed fire operations. Truex and Zielinski (2005) suggest that a reduction in habitat suitability does not necessarily equate to loss of suitability. Present actions within the analysis area include: The Twomile Ecological Restoration Vegetation Management Groovy and Funky timber sales and the Soldier Creek timber sale are scheduled to treat about 2,045 acres through commercial thinning, biomass removal, mastication, and prescribed fire treatments. GTR 220 (North et al. 2009) was used as a guide when designing these projects including maintaining elements important to fisher (large trees, snags, downed wood, areas of dense canopy cover). In addition, Yosemite National Park is currently removing hazard trees on about 816 acres, which would have negligible effects on fisher and their habitat.

Foreseeable future actions on federal lands include: Reynolds Creek Ecological Restoration involving meadow and aspen restoration. These types of projects generally include the removal of encroaching trees. Two mile-Campy, Looney, and Thommy timber sales and Reynolds Creek timber sale are scheduled to occur over the next few years and will result in treatment of about 3,798 acres through commercial thinning, biomass removal, mastication, and prescribed fire. As a result of the Rim Fire, the Rim Fire Hazard Tree removal project proposed to remove hazard trees along 10,262 acres of level 3, 4, and 5 roads, is currently out for public comment and is scheduled for implementation in the summer of 2014.

The ecological restoration projects will reduce habitat quality in the short term for fisher, but are designed to have long term benefits, such as improved forest health and reduced future fire intensity. Hazard tree removal will reduce habitat quality in the short and long term because the objective and priority in these areas, especially on Maintenance Level 3, 4, and 5 roads is public safety.

Roads and trails modify habitat suitability for fishers by reducing habitat or degrading quality through fragmentation. Roads and trails also improve human access, and potentially result in the displacement of individuals. Twomile Transportation, a foreseeable future action, will result in a slight reduction in motorized routes, essentially removing 11.4 miles by gating, decommissioning, or closing to Maintenance Level 1 roads used only for administrative purposes. Reynolds Creek Motorized Routes project will

decommission 3.5 miles of unauthorized routes in the near future as well. The Mi-Wok OHV Restoration project proposes to block and restore 11.6 miles of unauthorized OHV routes. This reduction of about 26.5 miles of motorized roads and trails across the analysis area would improve habitat quality by reducing fragmentation and human access while increasing the amount of interior habitat available.

Private Lands: As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acre is presently being salvage logged. Post salvage, the areas may provide short term foraging habitat for fisher as understory vegetation becomes established; however, these benefits are expected to be limited in space and time based on typical reforestation efforts.

Wildfire: Wildfires can affect habitat in varying degrees, depending on the intensity of the fire. Wildfires can create snags, which may be used as den or rest sites by fisher. Wildfires that burn at high severity such as the Rim Fire result in eliminating habitat. Treatments in green forest (past, present, future) are designed to reduce fire intensity and spread, thus reducing the risk of habitat loss. It is expected that wildfire will continue to occur on the landscape.

Alternative 1 Contribution/Summary: The proposed action is expected to contribute cumulatively to short and long term effects on fisher. Disturbance and potential displacement of individuals may occur during project implementation and would likely be temporary. No recent occurrences of fishers within the analysis area are documented; however, the analysis area is in close proximity to the nearest known populations occurring on the Sierra National Forest and Yosemite National Park. Reduction in the quality of moderate and high capability habitat on about 12,898 acres (15% of the remaining suitable habitat within the analysis area) is expected from implementation of this alternative. Snag retention requirements under this alternative are less than under the other action alternatives. Habitat quality would be reduced based on the reduction of denning and resting sites. There are also 5.4 miles of new permanent road construction proposed within potential fisher habitat under this alternative, which would have negative effects on fisher and their habitat. Treatments would likely occur over the next two to three years and may coincide with other projects, particularly Groovy, Funky, and Soldier Creek. The combination of past Forest Service and private timber harvests, and wildfire has cumulatively reduced the amount of late succession habitat available across the analysis area. This and other Forest Service projects were and continue to be designed to prevent additional, large scale loss of mature forest from wildfires such as the Rim. These projects are designed to retain and improve key habitat components such as retention of large trees, defect trees, snags, downed wood, while focusing on releasing black oaks and pines. Habitat suitability within the analysis area is predicted to improve in the long-term for fisher. The cumulative contribution under this alternative is not expected to affect the viability of this species.

Alternative 2 (No Action)

Direct and Indirect Effects

Under Alternative 2, death, injury or disturbance would not be an issue because no active management would occur.

Under Alternative 2, no indirect effects are expected because no active management would occur; however, there may be consequences under this alternative primarily related to the influence no action may have on future wildfires and how future wildfires may impact fisher habitat. Wildfire has been documented as one of the biggest risks to fisher persistence across their range (USDA 2001). At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and fisher habitat given the numerous factors involved over time. Potential fire behavior may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuel pools, potential fire behavior may be expected to increase (Rim EIS Fuels Report) and ultimately affect the amount of mature forest habitat available for fisher denning and resting. Specifically, Alternative 2 is likely to result in excessive fuel loads that could

inhibit future fire and fuels management (i.e. inability to safely or effectively construct holding lines) and result in severe effects to forest soils on large scales (i.e. from landscape scale and long residency times of future fire). Excessive fuel loads are likely to result under the No Action Alternative because within 10 years, as trees fall over, surface fuels are projected to average 42 tons per acre, and within 30 years, surface fuels are projected to average 78 tons per acre, and could range as high as 280 tons per acre (Rim EIS Fuels Chapter).

Indicator 1. Under Alternative 2, habitat quality within currently suitable moderate and high capability habitat would not be altered.

Within the areas that burned at high severity, herbaceous and shrub vegetation is expected to be established within 3-5 years (Gray et al. 2005 and Moghaddas et al. 2008) and would be suitable for fisher movement and potentially as foraging habitat. These beneficial effects would be expected in the short term. Because the ability of forests to regenerate after stand replacing fire is highly dependent on seed sources, forested conditions are likely to re-establish only within mixed severity burn patches and the edges of high severity patches (Crotteau et al. 2013). It is likely that areas that burned at high severity would be dominated by herbaceous and shrub vegetation and shade tolerant conifer species such as white fir and incense cedar in the future. A consequence of shrub dominance is the reduced likelihood that forested conditions would return naturally for many decades. As mentioned previously, not removing fire-killed trees would result in additional difficulties related to future management, such as planting conifers that could help accelerate the establishment of forest conditions. Thus, suitable denning and resting habitat would be delayed under this alternative resulting in long term negative effects to fisher.

When wildfire returns to this landscape, the remaining moderate and high capability habitat adjacent to or near areas that burned at high severity may be at increased risk of loss. As mentioned previously, within 10 years, the fuel loading is predicted to be four to eight times higher (78 tons/acre) than the desired condition (Rim EIS Fuels Report). This would significantly increase the risk of fire suppression activities when wildfire occurs in the future. The negative long term effects on habitat for fisher from this alternative outweigh the short term beneficial effects.

Indicator 2. Under Alternative 2, no forest carnivore connectivity corridor would be proposed. The connectivity would not be re-established between large areas of suitable habitat lacking connectivity after the Rim Fire. Benefits described under the action alternatives would not be realized under this alternative.

Indicator 3. Under Alternative 2, all snags and downed logs would be retained. In the short term fisher and their prey would benefit from the availability of more snags and downed logs within an adjacent to remaining suitable habitat, as discussed under the action alternatives. Remaining suitable habitat would be at higher risk of loss in the long term when wildfire returns to this landscape, see Indicator 1 above. The potential for recovery of forested conditions across areas that burned at high severity would also be delayed, see Indicator 1 above.

Indicator 4. Under Alternative 2, no new permanent road construction, temporary road construction, reconstruction, or maintenance would occur. This alternative would provide the greatest benefit to fisher because there would be no increase in road density across the analysis area and no potential increase of road related mortality in the short or long term.

Cumulative Effects

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. Under the No Action alternative, there would be no direct cumulative effect expected because no active management would occur.

Alternative 2 Contribution/Summary: The cumulative contribution under this alternative would not complement the treatments that have occurred in the past, thus increasing the risk of loss of remaining

suitable habitat to wildfire in the long-term. The short-term beneficial impacts to fisher such as retention of snags for denning and resting sites would be outweighed by the increased risk of additional habitat loss in the next wildfire.

Alternative 3

Direct and Indirect Effects

Indicator 1. Discussed under effects common to all action alternatives.

Indicator 2. Under Alternative 3 the Stanislaus National Forest Land and Resource Management Plan would be amended to establish the connectivity corridor as a land allocation (old forest emphasis area) prioritizing future management objectives, not just those associated with this project, within this connectivity corridor to benefit old forest associated species, particularly forest carnivores. The effects to fisher under this alternative are the same as discussed under Alternative 1 but would be realized in the long-term because the proposed corridor, approximately 10,000 acres, would be changed from General Forest to Old Forest Emphasis Area. This land allocation change would prioritize management emphasis in this corridor to benefit old forest associated species into the future.

Indicator 3. Under Alternative 3, in general forest, conifer snags would be retained at a rate of 4 snags per acre (12 square feet per acre) in the largest size class available, averaged across each unit, which is considered the management average. In OFEA, HRCA, and FCCC, conifer snags would be retained at a rate of 30 square feet per acre or 100 to 120 square feet per acre, averaged across each unit, which is considered greater than the management standard and above average snag retention.

Table 65 displays the acres affected by the snag retention requirements within potential fisher habitat proposed under this alternative. Potential fisher habitat is defined as land allocations that are managed for old forest associated species (OFEA, HRCA, and FCCC) and potential suitable habitat between 3,000 and 9,000' elevation.

Table 65. Acres of conifer snags retained in salvage units within potential fisher habitat under Alternative 3.

12ft²/acre* General Forest Average	30ft²/acre (OFEA, HRCA, FCCC) Above Average	100-120ft²/acre (PSW Research) Above Average
14,691	13,436	2,089

* Converted from 4snags/ac for comparison; assuming retention of 24" dbh snags.

Under Alternative 3, all snag retention areas occur within suitable or potential future fisher habitat. Snags retained at a rate of 12 square feet per acre would provide less than half of the snags documented to occur in occupied fisher habitat. Snags retained at the rate of 100 to 120 square feet per acre would provide almost three times the snags documented to occur in occupied fisher habitat. Snag retention at the rate of 30 square feet per acre would provide a supply of snags within the range found in occupied fisher habitat. Occupied fisher habitats within the Kings River Fisher Project area contain an average of 24square feet per acre basal area of snags in a variety of size classes (Thompson pers. comm.). Zielinski et al (2004) reports an average of 44square feet per acre basal area of snags present in the immediate vicinity of fisher rest sites. Units with snag retention at the rate of 30 or 100 to 120 square feet per acre would provide higher quality habitat for fisher post treatment than those with only 12 square feet per acre.

Areas with above average snag retention would provide the most snags to contribute to structural complexity and diversity within recovering forested stands. Areas that occur within a few hundred yards from suitable fisher habitat not proposed for treatment are expected to be used by fisher in the near future as vegetative cover returns, providing fisher protection from predators. Areas with average snag retention would provide some elements to contribute to the structural complexity and diversity within recovering forested stands.

Hardwoods occur irregularly across the analysis area and have not been mapped. Hardwoods are critically important structures and are selected by fisher for resting and denning sites. Because all hardwood snags would be retained under this alternative, no change in habitat quality is expected as a result of implementation of this alternative.

The rate of snag retention proposed under this alternative is adequate to maintain the moderate and high capability habitat or fisher on about 50% of the area proposed for treatment under this alternative. The remaining 50% would have fewer snags than is documented in occupied fisher habitat, but, the snags retained are expected to provide some habitat elements for resting, denning and prey in the short term, and in the long term as large downed woody debris.

Downed woody debris retention at 15-20 tons per acre, if available in larger size classes, would provide habitat important for fisher and their prey. In most areas, there is a lack of sufficient large downed woody material, making snag retention and eventual recruitment as downed logs even more critical. Fuels treatments that result in the removal of smaller downed woody material may result in a more diverse understory including more herbaceous and shrub vegetation that would benefit fisher and their prey.

Indicator 4. Under Alternative 3 new permanent road construction, temporary road construction, and road reconstruction are proposed (Rim EIS Transportation Report). Table 66 displays the miles of each type of road related treatment and the resulting miles per square mile under Alternative 3.

Table 66. Miles of Road Treatments Proposed within Potential Fisher Habitat Under Alternative 3

New Permanent Road Construction (miles)	Road Reconstruction (currently designated for motor vehicle travel)	Road Reconstruction (currently NOT designated for motor vehicle travel)	Temporary Road Construction	Roads Added for Project Use During Implementation (mi/mi²)	Total Road Density- Existing Plus Additional for Project (mi/mi²)
1.0	216.6	31.0	28.9	+ 0.4	2.0

The new road construction and temporary road construction proposed under Alternative 3 would result in an increase of 0.4 miles per square mile of road, effectively increasing the road density from 1.6 miles per square mile to 2.0 miles per square mile during project implementation. This would have a slightly greater negative effect on habitat quality in the short term than under the proposed action, but effects are still expected to be minor. This may slightly increase the potential for road related mortality during project implementation while the roads are open and being used regularly. Because there are no documented occurrences within the analysis area this risk is considered low. New permanent roads would be designated as blocked level 1 or level 2 gated year round. This would alleviate the risk of road related mortality because the roads would only be used intermittently for management purposes. They would however result in habitat fragmentation in the long term because not only would you have habitat removed as a result of the road construction, the road would be subject to hazard tree removal within 200 feet of the roads edge in the long term reducing the quality of habitat adjacent to those new roads. All temporary roads would be obliterated and blocked and over time vegetation would become reestablished and all roads that were non-motorized before project implementation would be returned to the pre-project specifications. These effects would be less than under the proposed action because there are 4.4 fewer miles of new permanent road proposed under this alternative.

Cumulative Effects

The cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands, refer to this discussion. The cumulative contribution of Alternative 3 would be less than those described under Alternative 1 because there are slightly fewer acres proposed for treatment within moderate and high capability habitat, snag retention would be higher

within OFEA, HRCA, and FCCC units, and there would be 4.4 miles less new permanent road construction under this alternative. The cumulative contribution under this alternative would affect fisher and their habitat in the short and long term but is not expected to affect the viability of this species.

Alternative 4

Direct and Indirect Effects

Indicator 1. Discussed under effects common to all action alternatives.

Indicator 2. Under Alternative 4 the Stanislaus National Forest Land and Resource Management Plan would be amended to establish the connectivity corridor as a land allocation (old forest emphasis area) prioritizing all future management objectives, not just those associated with this project, within this connectivity corridor to benefit old forest associated species, particularly forest carnivores. The effects to fisher under this alternative are the same as discussed under Alternative 1 but would be realized in the long-term because the proposed corridor, approximately 10,000 acres, would be changed from General Forest to Old Forest Emphasis Area. This land allocation change would prioritize management emphasis in this corridor to benefit old forest associated species into the future.

Indicator 3. Under Alternative 4, the snag retention guidelines are the same as outlined under Alternative 3, only the amount of area proposed for treatment has changed. Table 67 displays the acres affected by the snag retention requirements proposed under this alternative. While percentages vary slightly between Alternatives 3 and 4, effects from Alternative 4 are expected to be the same as under Alternative 3, please see detailed analysis under Alternative 3.

Table 67. Acres of Conifer Snags Retained in Salvage Units within Potential Fisher Habitat Under Alternative 4.

12ft²/acre* General Forest Average	30ft²/acre (OFEA, HRCA, FCCC) Above Average	100-120ft²/acre (PSW Research) Above Average
13,278	12,279	2,089

* Converted from 4snags/ac for comparison; assuming retention of 24" dbh snags.

Indicator 4. Under Alternative 4 temporary road construction, and road reconstruction are proposed (Rim EIS Transportation Report). Table 68 displays the miles of each type of road related treatment and the resulting miles per square mile under this alternative.

Table 68. Miles of Road Treatments Proposed within Potential Fisher Habitat Under Alternative 4

New Permanent Road Construction (miles)	Road Reconstruction (currently designated for motor vehicle travel)	Road Reconstruction (currently NOT designated for motor vehicle travel)	Temporary Road Construction	Roads Added for Project Use During Implementation (mi/mi²)	Total Road Density- Existing Plus Additional for Project (mi/mi²)
0	211.2	30.9	27.3	+ 0.4	2.0

The new road construction and temporary road construction proposed under Alternative 4 would result in an increase of 0.4 miles per square mile of road, effectively increasing the road density from 1.6 miles per square mile to 2.0 miles per square mile during project implementation. Although the road density is slightly above the proposed action, there is no new permanent road construction proposed. Thus, no long term habitat fragmentation is expected under this alternative. This may slightly increase the potential for road related mortality during project implementation while the roads are open and being used regularly. All temporary roads would be obliterated and blocked and over time vegetation would become reestablished and all roads that were non-motorized before project implementation would be returned to

the pre-project specifications. Because there are no documented occurrences within the analysis area this risk is considered low.

Cumulative Effects

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands, refer to this discussion. The cumulative contribution of Alternative 4 would be the least of all the action alternatives as described under Alternatives 1 and 3 because there are the least amount of acres proposed for treatment within moderate and high capability habitat, snag retention would be higher within OFEA, HRCA, and FCCC units, and there would be no new permanent road construction under this alternative. The cumulative contribution under this alternative would affect fisher and their habitat in the short and long term but is not expected to affect the viability of this species.

SUMMARY OF EFFECTS ANALYSIS ACROSS ALL ALTERNATIVES:

Indicator 1. Table 69 shows the amount of moderate and high capability fisher habitat proposed for treatment is very similar for all alternatives. Alternative 1 would affect the most habitat and Alternative 4 would affect the least amount of habitat. Alternative 2 would not affect suitable habitat.

Table 69. Summary of proposed treatments within moderate and high capability fisher habitat by alternative.

Alternative	Salvage (acres)	Hazard Tree Removal (acres)	Total (acres)	Percent of Suitable Habitat Treated
Alternative 1	6,221	6,677	12,898	29%
Alternative 2	0	0	0	0%
Alternative 3	6,266	6,562	12,828	29%
Alternative 4	5,724	6,632	12,356	28%

Indicator 2. Alternatives 3 and 4 incorporate a Forest Plan Amendment to change the land allocation within the forest carnivore connectivity corridor to Old Forest Emphasis Area. Alternative 1 does not incorporate a Forest Plan Amendment. Under Alternative 2, no connectivity corridor or Forest Plan Amendment would be proposed.

Indicator 3. As shown in Table 70, the acres of areas managed for old forest objectives with higher than average levels of large snags and higher than average levels of large down woody material are highest in Alternatives 3 and 4. In contrast, Alternative 1 manages no acres for higher than average levels of large snags. For retention of large down woody material, all action alternatives manage to a standard of 10 – 20 tons/acre, but Alternatives 3 and 4 emphasize retention at the higher end (i.e. 20 tons/ac) and Alternative 1 does not. Alternative 4 manages for an additional 2,571 acres under full retention of snags and down woody material.

Table 70. Summary of large snag retention by alternative.

Alternative	12ft²/acre General Forest Average	30ft²/acre (OFEA, HRCA, FCCC) Above Average	100-120ft²/acre (PSW Research) Above Average	Full Retention
Alternative 1	28,140	0	0	0
Alternative 2	0	0	0	29,103*
Alternative 3	14,691	13,436	2,089	0
Alternative 4	13,278	12,279	2,089	2,571

* represents maximum number of potential unit acres in all land allocations.

Indicator 4. Of the action alternatives, proposed miles of new permanent road construction is highest under Alternative 1 and lowest under Alternative 4. Increases to road density are similar among all action alternatives, but long term effects related to road density are greatest under Alternative 1 because of the amount of new permanent road construction.

Table 71. Summary of road treatments proposed by alternative.

Alternative	New Permanent Road Construction	Road Reconstruction (currently designated for motor vehicle travel)	Road Reconstruction (currently NOT designated for motor vehicle travel)	Temporary Road Construction	Roads Added for Project use During Implementation (mi/mi²)	Total Road Density Existing plus Additional for Project (mi/mi²)
Alternative 1	5.4	215.8	30.9	18.2	+ 0.3	1.9
Alternative 2	0	0	0	0	0	1.6
Alternative 3	1.0	216.6	31.0	28.9	+ 0.4	2.0
Alternative 4	0	211.2	30.9	27.3	+ 0.4	2.0

Determination

Alternative 1.

It is our determination that Alternative 1 may affect individuals, but is not likely to contribute to the need for Federal listing or result in loss of viability for the fisher in the analysis area.

Our determination for Alternative 1 is based on the following rationale:

- Habitat quality would be reduced across 29 percent of currently moderate and high capability habitat on NFS lands and across 15 percent of the entire Rim Fire area.
- Snag retention in suitable habitat at 12 square feet basal area per acre would maintain low to moderate habitat suitability for foraging.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the potential risk of further habitat modification or loss from future wildfires.
- 5.4 miles of new road construction would reduce habitat quality and increase fragmentation in localized areas.

Alternative 2.

It is our determination that Alternative 2 may affect individuals, but is not likely to contribute to the need for Federal listing or result in loss of viability for the fisher in the analysis area.

Our determination for Alternative 2 is based on the following rationale:

- With no removal of dead trees, remaining suitable habitat would be at greater risk of modification or loss from future wildfires.
- Quality of currently moderate and high capability habitat would not be affected in the short-term.
- No new permanent road construction would occur.

Alternative 3.

It is our determination that Alternative 3 may affect individuals, but is not likely to contribute to the need for Federal listing or result in loss of viability for the fisher in the analysis area.

Our determination for Alternative 3 is based on the following rationale:

- Habitat quality would be reduced across 29 percent of currently moderate and high capability habitat on NFS lands and across 15 percent of the entire Rim Fire area.
- Snag retention in suitable habitat at 12 square feet basal area per acre would maintain low to moderate habitat suitability for foraging.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the long term risk of further habitat modification or loss from future wildfires.
- 1.0 miles of new road construction would reduce habitat quality and increase fragmentation in localized areas.

Alternative 4.

It is our determination that Alternative 4 may affect individuals, but is not likely to contribute to the need for Federal listing or result in loss of viability for the fisher in the analysis area.

Our determination for Alternative 4 is based on the following rationale:

- Habitat quality would be reduced across 29 percent of currently moderate and high capability habitat on NFS lands and across 15 percent of the entire Rim Fire area.
- Snag retention in suitable habitat at 12 square feet basal area per acre would maintain low to moderate habitat suitability for foraging.
- Habitat connectivity would be retained.
- Removal of dead trees would reduce the long term risk of further habitat modification or loss from future wildfires.
- 0 miles of new road construction are proposed, thus no localized fragmentation would occur.

COMPLIANCE WITH FOREST PLAN AND OTHER DIRECTION:

Applicable Forest Plan Direction:

USDA 2010 p. 43: Assess the potential impact of projects on the connectivity of habitat for old forest associated species.

USDA 2010 p. 44: General guidelines for large snag retention are as follows: 1) in westside mixed conifer and ponderosa pine types – four of the largest snags per acre, and 2) in red fir forest type – six of the largest snags per acre.

USDA 2010 p. 44: When some snags are expected to be lost due to hazard removal or the effects of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels.

Forest Plan Compliance

Alternative 1:

Alternative 1 manages for a connectivity corridor to re-establish connectivity between large areas of suitable fisher habitat.

Alternative 1 manages for the minimum amount of snag retention as per general guidelines in forest plan direction and does not take into account potential losses due to hazard removal of the effects of prescribed fire.

Alternative 1 does not manage for higher than average levels of snags and down woody material within the FCCC or land allocations managed for old forest objectives.

Alternatives 3 and 4:

Alternatives 3 and 4 manage for a connectivity corridor to re-establish connectivity between large areas of suitable fisher habitat.

Alternatives 3 and 4 manage for higher than average levels of snags and down woody material within the FCCC or land allocations managed for old forest objectives, and accounts for potential losses due to hazard removal or the effects of prescribed fire.

PALLID BAT & FRINGED MYOTIS

AFFECTED ENVIRONMENT

Species and Habitat Accounts

The pallid bat (*Antrozous pallidus*) is a Region 5 Forest Service Sensitive species and is designated as a Species of Special Concern by CDFW (USDA 2013). They occur in arid regions of western North America from British Columbia to Mexico and east to Wyoming (Hermanson and O'Shea 1983). They are usually found in low to mid elevation habitats below 6,000 feet; however, they have been documented up to 10,000 feet in the Sierra Nevada (USDA 2001). Considered yearlong residents, they inhabit vegetation types such as Blue Oak Woodland, Mixed Chaparral, and coniferous forests (CDFW 2014a, M. Baumbach pers. obs.).

The fringed myotis (*Myotis thysanodes*) is a Region 5 Forest Service Sensitive species and is designated as a Species of Special Concern by CDFW. The fringed myotis occurs from southern British Columbia south through the western United States and most of Mexico (O'Shea and Bogan 2003). In California, it occurs from near sea level at the coast to elevations of at least 6,400 feet in the Sierra Nevada and in a variety of habitats from low desert scrub to high-elevation conifer forest (Philpott 1997). The fringed myotis is a widely distributed species, but it is considered rare (Ibid). Although this species occurs in netting and night roost surveys in a number of localities, it is always one of the rarest taxa (Pierson et al. 1996).

The status of this species is not well researched, but North American pallid bat populations have declined over the past 50 years (O'Shea and Bogan 2003), and data from California suggest population declines associated with desert and oak woodland habitat loss due to urban expansion (USDA 2001).

Population estimates and trends for fringed myotis are unavailable, but the limited data that is available suggests the population is declining (Macfarlane and Angerer *draft*). Not only have historic maternity colonies disappeared, but those remaining appear to contain fewer individuals.

Bat surveys have been conducted in and near the analysis area. Pallid bats have been documented on the North Fork Merced River and along Cottonwood Creek (Gellman 1994, Stanislaus National Forest survey records). Fringed myotis have been documented at Fahey Pond and the Hetch Hetchy adit at the end of road 1N45 (Stanislaus National Forest survey records, CNDDB). They have also been documented just outside the analysis area in the lower Tuolumne River and a bridge over the South Fork Tuolumne River. Suitable roosting and foraging habitat is present for both species throughout the project area and presence is assumed.

Pallid bats are common in open, dry habitats including grasslands, shrublands, woodlands, and coniferous forests. They roost in a variety of locations such as bridges, buildings, caves, rock crevices, mines, and trees (Hermanson and O'Shea 1983). This species can be found singly but is gregarious and can often be found roosting in groups. They are sensitive to roost site disturbance which may lead to roost abandonment. Suitable habitat is present throughout the project area. There are no barriers precluding movement (dispersal, seasonal, etc.) of this species both within and in close proximity to the project area.

In California, the fringed myotis occurs in valley foothill hardwood, hardwood conifer, and coniferous forested habitats. In mist netting surveys, they are found on secondary streams and ponds (Stanislaus National Forest survey records). They roost in caves, buildings, mineshafts, rock crevices and bridges (O'Farrell and Studier 1980). Studies conducted in California, Oregon, and Arizona, have documented that fringed myotis roosts in tree hollows, particularly in large conifer snags (Chung-MacCoubrey 1996, Rabe et al. 1998, Weller and Zabel 2001, Pierson et al. 2006). Most of the tree roosts were located within the tallest or second tallest snags in the stand and were surrounded by reduced canopy closure (Ibid). They are gregarious and can be found roosting with other bat species, such as the long eared myotis (M. Baumbach pers. obs.). They exhibit high roost site fidelity, sometimes in different trees but within a small area (O'Farrell and Studier 1980, Weller and Zabel 2001). Fringed myotis are highly sensitive to roost site disturbance (Ibid).

Pallid bats breed in the fall with delayed implantation occurring in the spring. Females form maternity colonies in April that may contain up to 100 individuals (Zeiner et al. 1990b). Males sometimes roost in or near to maternity colonies. Horizontally-oriented rock crevices are preferred diurnal roost sites in the summer, which coincides with maternity colony selection and use (Hermanson and O'Shea 1983).

Fringed myotis also breed in the fall, with delayed implantation occurring in the spring. Females give birth to one young per year typically from May to July (Philpott 1997). Maternity colonies may contain up to several hundred individuals. In California in recent years smaller colonies of 25-50 are more typical.

Pallid bats forage in open canopied woodlands, riparian areas, and grassland or meadow habitat. They are maneuverable on the ground and commonly forage between one and five feet above the ground for prey such as Jerusalem crickets, longhorn beetles, scorpions, and occasionally large moths and grasshoppers (USDA 2001, Zeiner et al. 1990). They readily use roads, meadows, oak woodlands and other open areas to hunt.

Individual fringed myotis emerge from roost sites to forage approximately 1-2 hours after sunset. They forage in and among vegetation along forest edges and in the overstory canopy. They feed on a variety of insect prey, including small beetles, moths, and fly larvae caught in flight or gleened from vegetation (Ibid). Fringed myotis often forage in meadows and along secondary streams, in fairly cluttered habitat. (Pierson et al. 2001). They are known to fly during colder temperatures and precipitation (Hirshfeld and O'Farrell 1976). Even snow does not appear to affect emergence (O'Farrell and Studier 1975, M. Baumbach pers. obs.). Keinath (2004) found that travel distances from roosting to foraging areas may be up to five miles.

Dispersal patterns in pallid bats aren't known. Pallid bats are not known to migrate long distances. They are relatively inactive and either hibernate or enter extended periods of torpor during the winter (Hermanson and O'Shea 1983).

Dispersal patterns are also unknown for fringed myotis. Although known to migrate, little is known regarding the species movement (O'Farrell and Studier 1980). Fringed myotis are year-round residents in California and are known to hibernate but are also capable of periodic winter activity (Philpott 1997).

Risk Factors:

1. *White Nose Syndrome*- The largest emerging threat to all cave-roosting species is the fungal disease white-nose syndrome (WNS). Massive die-offs result once a colony is infected. Because pallid bats and fringed myotis readily uses caves for roosting, they are considerd highly susceptible to contracting WNS. Although not yet documented in California, the disease is moving to the west.
2. *Timber Harvest and loss of snags as roosting sites* - The loss of large diameter snags and live trees for roosts due to fire or harvest activities can affect roost availability. In some forested settings, the fringed myotis appears to rely heavily on tree cavities and crevices as roost sites (Weller and Zable 2001), and may be threatened by certain timber harvest practices that result in the removal of snags. Retention of existing large trees and management of forested habitat will provide short and long-term habitat.
3. *Fire Suppression*- Pallid bats are at risk from loss of open foraging habitat from fire suppression may reduce foraging habitat in the long-term.
4. *Mining*- The resurgence of gold mining in the West potentially threatens mine dwelling bat species such as pallid bats and fringed myotis (Macfarlane and Angerer *draft*). Recreational mining exploration has resulted in an increase in roost disturbance and abandonment. Closure of old mines for hazard abatement or safety can reduce habitat availability if mines aren't closed using bat friendly gates.
5. *Rangeland management*- Pallid bats frequently forage in open areas such as oak woodlands. Fringed myotis frequently forage along riparian corridors or over meadows. Overgrazing and trampling may alter meadow hydrology or riparian ecosystems, resulting in reduced insect diversity, productivity, and reducing foraging success (Macfarlane and Angerer *draft*, Ferguson and Azerrad 2004).

Management Direction

The pallid bat and fringed myotis are both Region 5 Forest Service Sensitive species. The Forest Plan does not contain specific direction for the management of these species; however, it provides general guidance for management of Forest Service Sensitive species. This includes managing to ensure conservation or enhancement of these species' populations and habitats to prevent a trend towards Federal listing or a loss of viability. In addition, general direction in the Forest Plan to retain dead trees (snags) protects potential roosting and breeding habitat components, particularly for bats.

Environmental Consequences

The project action alternatives could result in direct and indirect effects to the pallid bats or fringed myotis through the following activities:

1. Salvage of fire-killed trees.

2. Salvage of roadside hazard trees.

3. Fuels treatments.

4. Use of water sources.

These activities may have direct and indirect effects on pallid bats or fringed myotis through the following:

- Project related death, injury or disturbance.
- Project related modifications to habitat quantity or quality.

Death, injury, or disturbance:

Death or injury from project related activities would be unlikely to occur given the mobility of this species. However, there is the potential for death or injury if a day roost tree were felled while being used by pallid bats or fringed myotis .

Project activities, especially loud noise, could result in disturbance to day roosting pallid bats and fringed myotis. Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. Smoke from pile burning may also impact bats that are roosting in close proximity to burning activities. The location of pallid bats and fringed myotis within the analysis area is uncertain. While both species are susceptible to disturbance at roost sites that may lead to roost abandonment, it is unlikely that females would abandon their young due to their ability to carry pups from roost to roost during normal roost-switching behavior. The tendency for bats to switch roosts under normal circumstances would preclude this from causing negative effects to reproduction. If a maternity roost is discovered, an LOP from April 1 through August 1 would be applied within 300 feet surrounding the site. LOPs in place for spotted owls, goshawks, great gray owls, and bald eagles would afford protection to bats roosting in these areas during pup rearing in the spring and summer months. Foraging behavior would not be affected due to their nocturnal foraging behavior.

Habitat Modification:

Salvage logging and the removal of hazard trees along level 2 roads would result in reduced habitat quality for both pallid bats and fringed myotis . There would be a reduction in the number of potential roosting sites for pallid bats and fringed myotis in both the short term (10-20 years) and in the long term (20-50 years). However, many snags including all hardwoods snags would be retained across the treatment units that would continue to provide roosting sites.

Indicators

The following indicator was chosen to provide a relative measure of the direct and indirect effects to the pallid bats and fringed myotis and to determine how well project alternatives comply with Forest Plan Direction.

Amount of habitat altered.

This criterion was chosen based on the best available scientific literature which focuses on various aspects of pallid and fringed myotis ecology and life history requirements. This criterion focuses on those life history aspects, or habitat elements, considered most limiting to pallid bats and fringed myotis persistence across their range and where project effects are expected.

Effects Common to all Action Alternatives (Alternatives 1, 3 & 4)

Direct & Indirect Effects

Indicator 1. Because there is a small difference in the amount of acres proposed for treatment within suitable habitat for pallid bats and fringed myotis under all action alternatives, the effects are expected to be similar and are therefore analyzed together.

Trees or snags with existing cavities or furrowed bark provide roosting habitat for pallid bats and fringed myotis (Pierson 1996 and Pierson et al. 2006). Trees with existing cavities, that aren't deemed hazardous, are less likely to be removed because there is little to no economic value associated with them. The large coniferous snags with deep furrowed bark preferred by fringed myotis may have economic value associated with them. The removal of snag and hazard trees within treatment units and along level 2 roads would result in a reduction in roost site availability. There are an estimated 8 snags per acre greater than or equal to 24"dbh within coniferous habitat that burned at low to moderate severity (<50% basal area mortality). There are an estimated 21 snags per acre greater than or equal to 24"dbh within coniferous habitat that burned at moderate to high severity (>50% basal area mortality). Most treatment units are within the higher severity burned areas and these snags would have less value as roosting sites. Hazard tree removal would occur across all burn severities and would have a greater effect on suitable coniferous habitats than salvage units.

All hardwood snags greater than or equal to 12" dbh would also be retained unless they pose a safety hazard. Snags would be retained at different rates under the action alternatives and range from 4 per acre

to 6 per acre, if snags greater than or equal to 24" dbh are available for retention. The largest size class available would have the highest priority for retention and snags retained would be averaged across each unit. The table below displays the estimated number of snags per acre greater than or equal to 24" dbh and the minimum number of snags that would be retained within suitable forested habitat under the action alternatives.

Snag densities were estimated using common stand exam data downloaded from the Natural Resources Management Natural Resource Information System (NRM NRIS) Field Sampled Vegetation Database (FSVeg). All data were collected between 2005 and 2013 (prior to the 2013 Rim Fire). A total of 1,183 plots were processed using the Western Sierras variant of the Forest Vegetation Simulator (FVS) (Dixon 2002). Plots are assumed to be representative of the CWHR classes within the Rim Fire perimeter. Post-fire information was achieved by simulating fire with the following basal area mortalities: 0% (representing pre-fire conditions and/or post-fire conditions with no mortality), 10%, 25%, 50%, 75%, 90%, and 100%. Though models are never 100% accurate, the simulation results are the best available information for this project. Snag densities were averaged for each basal area loss category less than or equal to 50% basal area mortality.

Table 72. Minimum Number of Snags Retained Across Treatment Units and Within Suitable Conifer Forest Habitat by Alternative.

Alternative	Total Acres Proposed For Treatment in Suitable Habitat (Salvage & Hazard Tree*)	Estimate of Snags per Acre ≥24" DBH in Low to Moderate Burn Severity Suitable Habitat (Pre-Treatment)	Minimum Snags per Acre Retained Within Treatment Units Within Suitable Habitat** (Post-Treatment)
Alternative 1	10,732	35,624	17,812
Alternative 3	10,690	36,464	18,232
Alternative 4	10,346	33,344	16,672

* No snags would be retained within the hazard tree removal area.
**Based on the minimum requirement of 4 snags per acre retained across all treatment units and the assumption that snags retained would be at least 24" dbh.

While there would be a short term reduction in snags available within treated areas, many would be retained and would continue to offer potential roosting sites. Trees that are declining and not subject to removal under this project would provide for long term snag recruitment, being most pronounced in areas that burned at low to moderate severity. Areas outside treatment units would also continue to offer potential roosting structures. It is unknown how many snags in a given area are used or required by pallid bats and fringed myotis, but it is assumed that the snags retained would maintain habitat quality for use by these species. About 77% of mid to late seral coniferous forest within the analysis area would remain untreated on Stanislaus National Forest System Lands.

Hardwoods occur irregularly across the analysis area and have not been mapped. Oak woodland habitat is highly suitable for pallid bats. Cavities in hardwoods are known to be important to and utilized by roosting pallid bats as well. Because all hardwood snags would be retained under this alternative unless deemed hazardous, no significant change in the number of hardwood snags available is expected as a result of implementation of the action alternatives.

Pallid and fringed myotis may travel several miles to their preferred foraging locations. Pallid bats forage mainly in open areas with lesser canopy cover and in meadows and grasslands. Fringed myotis forage in and among vegetation, along forest edges, and in overstory canopies. Both species utilize riparian corridors for foraging and travel. The treatments would result in more open conditions within which herbaceous and shrub vegetation would regrow quickly providing more foraging habitat for pallid bats. Forest edges, where the low to moderate burned forest meets the high severity burned forest, may be modified by treatments but they would still be present throughout the analysis area and would continue to

provide suitable foraging conditions for fringed myotis . The action alternatives would have negligible effects on foraging habitat and foraging success for these bats.

Cumulative Effects

This analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions reflect the aggregate impact of all prior human actions and natural events that affected the environment and might contribute to cumulative effects (Appendix B Rim EIS).

In making the determination for these alternatives, the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered. A list of the actions considered can be found in Appendix B, Rim EIS. The Forest queried its databases, including the Schedule of Proposed Actions (SOPA) to determine past, present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands. Some, but not all of these actions have or may contribute cumulatively to effects on pallid bats and fringed myotis.

Risk factors potentially affecting the abundance and distribution of pallid bats and fringed myotis has been identified and include loss of snags as roosting sites and human disturbance at roost sites. The following evaluation criterion was used as a relative measure of cumulative effects from the action alternatives to pallid bats and fringed myotis: Habitat modification resulting in loss of roost sites and Human disturbance at roost sites.

Habitat Modification:

Federal Lands: Past, present, and foreseeable future timber harvests and hazard tree removal sales on public lands have and will result in a decrease in roosting habitat availability. Present actions within the analysis area include: The Two mile Ecological Restoration Vegetation Management Groovy and Funky timber sales and the Soldier Creek timber sale are scheduled to treat about 2,045 acres through commercial thinning, biomass removal, mastication, and prescribed fire treatments. While management requirements are in place to retain all or most snags greater than or equal to 15" dbh, some inevitably will be removed for safety and operability, reducing available roosting sites for bats. In addition, Yosemite National Park is currently removing hazard trees on about 816 acres, which will result in a decrease in roosting sites for bats.

Foreseeable future actions on federal lands include: Reynolds Creek Ecological Restoration involving meadow and aspen restoration. These types of projects generally include the removal of encroaching trees. Twomile-Campy, Looney, and Thommy timber sales and Reynolds Creek timber sale are scheduled to occur over the next few years and will result in treatment of about 3,798 acres through commercial thinning, biomass removal, mastication, and prescribed fire. As a result of the Rim Fire, the Rim Fire Hazard Tree removal project proposed to remove hazard trees along 10,262 acres of level 3, 4, and 5 roads and is scheduled for implementation beginning in the summer of 2014. These foreseeable future projects will reduce roosting site availability.

Private Lands: As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acre is presently being salvage logged. These salvage activities are generally considered more intensive than Forest Service projects and are expected to affect roost site availability for bats.

Disturbance:

Federal Lands: There are several sources of noise disturbance that occur throughout the forest and include activities such as timber harvest, mastication, prescribed fire operations, and recreation. These activities have occurred in the past and will continue into the future (Twomile, Reynolds, Rim Fire Hazard Trees) whether or not this project is implemented. Mechanized equipment such as feller-bunchers, skidders, and chippers are used to accomplish vegetation treatments, while more manpower in the form of lighters,

holders and fire engines with hose lays are used to accomplish prescribed fire operations. Under normal winter weather years, access to a large portion of the project area is restricted until late spring or early summer. This past winter, there has been almost no restrictions on access in virtually the entire Rim Fire area. Vegetation, salvage, hazard tree removal, and prescribed fire treatments could occur during the pup rearing period, potentially affecting maternity colonies. Recreation disturbance likely occurs as soon as access to an area is opened and continues to some degree until access to the area is restricted by snow in the fall or early winter. Recreation disturbance would consist of OHVs, camping, hiking, cycling, wood cutting, and passenger car driving. These effects vary in intensity, duration and scope with weekends typically being a higher use time than weekdays.

Private Lands: Noise disturbance on private lands will primarily consist of salvage logging operations, which involve feller bunchers, skidders, chippers, and logging trucks. This winter, access was only restricted on a few occasions because of snow.

Action Alternatives Contribution/Summary: The action alternatives are expected to contribute cumulatively to effects on pallid bats and fringed myotis. Removal of large fire-killed trees and hazard trees would result in fewer roost sites. Removal of biomass sized trees is expected to open up the understory. Because pallid bats forage in open areas, the treatments proposed would likely improve foraging opportunities for this species. Disturbance at roost sites is possible and may result in displacement of individuals or groups of roosting bats, including roost abandonment. LOPs in place near day roosts would afford protection to roosting bats, as their pup rearing season overlaps with the breeding seasons for spotted owls, goshawks, great gray owls, and bald eagles. The action alternatives would result in cumulative effects on about 4% of the analysis area. Thus, the cumulative contribution to effects on pallid bats and fringed myotis is considered negligible and is not expected to affect the viability of this species.

Alternative 2 (No Action)

Direct and Indirect Effects

Under No Action, death, injury or disturbance would not be an issue because no active management would occur.

Under Alternative 2, no indirect effects are expected because no active management would occur; however, there may be consequences under this alternative primarily related to the influence no action may have on future wildfires and how future wildfires may impact pallid bat and fringed myotis habitat. At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and pallid bat and fringed myotis habitat given the numerous factors involved over time. Potential fire behavior may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuel pools, potential fire behavior may be expected to increase (Rim EIS Fuels Report) and ultimately affect the amount of suitable habitat available for pallid bats and fringed myotis.

Indicator 1. Within the areas that burned at high severity, herbaceous and shrub vegetation is expected to be established within 3-5 years and would be suitable as foraging habitat for pallid bats. Edge habitat would also remain in the short term, providing foraging habitat for fringed myotis.

When wildfire returns to this landscape, the remaining suitable forested habitat adjacent to or near areas that burned at high severity may be at increased risk of loss. One of the greatest risks to these bats is the loss of snags as roosting habitat. Within 30 years, the fuel loading is predicted to be four to eight times higher (78 tons/acre) than the desired condition as described in the Stanislaus National Forest, Forest Plan (Rim EIS Fuels Report). This would significantly increase the risk of fire suppression activities when the next wildfire occurs. The negative long term effects on forested habitat for pallid bats and fringed myotis from this alternative outweigh the short term beneficial effects.

Cumulative Effects

The Cumulative effects discussion under the action alternatives outlines those present and foreseeable future activities scheduled on public and private lands. Under the No Action alternative, there would be no direct cumulative effect expected because no active management would occur.

No Action Alternative Contribution/Summary: The cumulative contribution under this alternative would not complement the treatments that have occurred in the past, thus increasing the risk of loss of remaining suitable habitat to wildfire in the long-term. The short-term beneficial impacts to pallid bats and fringed myotis such as retention of snags for roosting sites would be outweighed by the increased risk of additional habitat loss in the next wildfire.

SUMMARY OF EFFECTS ANALYSIS ACROSS ALL ALTERNATIVES:

Indicator 1. Of the action alternatives, Alternative 3 would result in the highest level of snag retention within treatment units. While Alternative 1 has the second highest level of snag retention, followed by Alternative 4. Because Alternative 4 has the least amount of suitable habitat acres proposed for treatment it is expected to provide the greatest benefit to pallid bats and fringed myotis.

Table 73. Summary of the minimum number of snags retained by alternative.

Alternative	Total Acres Proposed For Treatment in Suitable Habitat (salvage & hazard tree)	Estimate of Snags per Acre ≥24" DBH in Low to Moderate Burn Severity Suitable Habitat* (Pre-Treatment)	Minimum Snags per Acre Retained Within Treatment Units Within Suitable Habitat** (Post-Treatment)
Alternative 1	10,732	35,624	17,812
Alternative 2	0	357,080	357,080
Alternative 3	10,690	36,464	18,232
Alternative 4	10,346	33,344	16,672

* No snags would be retained within the hazard tree removal area.
**Based on the minimum requirement of 4 snags per acre retained across all treatment units and the assumption that snags retained would be at least 24" dbh. Alternatives 3 and 4 would likely have more snags than is displayed.

Determination

Alternative 1.

It is our determination that Alternative 1 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the pallid bat or the fringed myotis.

Our determination for Alternative 1 is based on the following rationale:

- Snag retention would result in maintaining roosting structures throughout the treated areas.
- Foraging habitat would be maintained.

Alternative 2.

It is our determination that Alternative 2 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the pallid bat or the fringed myotis.

Our determination for Alternative 2 is based on the following rationale:

- With no removal of dead trees, the remaining suitable habitat would be at greater long term risk of loss from future wildfires.
- Quality of currently suitable habitat would not be affected in the short-term.

Alternative 3.

It is our determination that Alternative 3 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the pallid bat or the fringed myotis.

Our determination for Alternative 3 is based on the following rationale:

- Snag retention would result in maintaining roosting structures throughout the treated areas.
- Foraging habitat would be maintained.

Alternative 4.

It is our determination that Alternative 4 may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the pallid bat or fringed myotis.

Our determination for Alternative 4 is based on the following rationale:

- Snag retention would result in maintaining roosting structures throughout the treated areas.
- Foraging habitat would be maintained.

COMPLIANCE WITH FOREST PLAN AND OTHER DIRECTION:

Applicable Forest Plan Direction:

USDA 2010 p. 44: General guidelines for large snag retention are as follows: 1) in westside mixed conifer and ponderosa pine types – four of the largest snags per acre, and 2) in red fir forest type – six of the largest snags per acre.

USDA 2010 p. 44: When some snags are expected to be lost due to hazard removal or the effects of prescribed fire, consider these potential losses during project planning to achieve desired snag retention levels.

Forest Plan Compliance

Alternative 1:

Alternative 1 manages for the minimum amount of snag retention as per general guidelines in forest plan direction and does not take into account potential losses due to hazard removal of the effects of prescribed fire.

Alternative 1 does not manage for higher than average levels of snags within the FCCC or land allocations managed for old forest objectives.

Alternatives 3 and 4:

Alternatives 3 and 4 manage for higher than average levels of snags within the FCCC or land allocations managed for old forest objectives, and accounts for potential losses due to hazard removal or the effects of prescribed fire.

BLACK-BACKED WOODPECKER

AFFECTED ENVIRONMENT

Species and Habitat Account

The black-backed woodpecker (*Picoides arcticus*) is not designated as a Region 5 Forest Service Sensitive species. They are currently listed as a Management Indicator Species (MIS) representing the ecosystem component of snags in burned forests, as described in the Rim Fire Recovery MIS report available in the project record.

Black-backed woodpeckers are distributed in boreal regions from south-central Alaska across Canada to Newfoundland and Nova Scotia, and south in the western United States in Montana and Washington through east-central California (Region 5 Sensitive species evaluation form for black-backed woodpecker 2012). The black-backed woodpecker is a monotypic species that occurs at elevations of 1200-3000 m (4,000-10,000 ft.) in the Siskiyou, Warner, and Shasta counties, the Sierra Nevada Mountains of California and Nevada south to the southern limits of Tulare County in Sequoia National Forest (Ibid). Black-backed woodpeckers are still distributed across their historical breeding range in California (Bond et al. 2012), Terrestrial Wildlife Biological Evaluation Appendix, binder 8. They have been documented on the Stanislaus National Forest in burned forest resulting from previous wildfires such as the Kibbie Fire, which is within the analysis area (Siegel et al. 2008, 2010).

In December 2011, the California Fish and Game Commission accepted for consideration a petition submitted by the John Muir Project and the Center for Biological Diversity (Hanson and Cummings 2010) to list the black-backed woodpecker (*Picoides arcticus*) as Threatened or Endangered under the California Endangered Species Act. The Commission's December 15, 2011 action conferred on the species the interim designation of "candidate for listing", effective January 6, 2012, and gave the California Department of Fish and Game (now California Department of Fish and Wildlife or CDFW) 12 months from that date to review the petition, evaluate the available information, and report back to the Commission whether or not the petitioned action is warranted. In May 2013, the Fish and Game Commission found listing the black-backed woodpecker as Threatened or Endangered under CESA was not warranted (Bonham 2013).

The Commissions conclusion that the black-backed woodpecker's was based on the following summary (Bonham 2013):

- The lack of an apparent range retraction or changes in distribution within the range.
- The episodic cycles of high density occurrences (i.e., prey invasion, high woodpecker productivity, prey decline, and woodpecker dispersal) and the lack of current data on the cycle's impact on the long-term viability of California's black-backed woodpecker population.
- The lack of data concerning the role of green forest on the species but its apparent use as habitat.
- The trending increase in fire frequency, size, and severity as compared to the early and mid 20th century.
- Uncertainty regarding the magnitude of the threat posed to black-backed woodpeckers by post-fire salvage logging.
- Lack of logging on approximately 80% of severely burnt USFS forest habitat since 2003 (i.e., 87,200 acres).
- The ongoing long-term monitoring of the species as an MIS.
- Black-backed woodpecker populations in California are not geographically isolated from populations in adjacent states.

Having considered these factors, the Department concluded that the best available scientific information available to the Department does not indicate that the black-backed woodpecker's continued existence is in serious danger or is threatened by any one or any combination of the following factors found in relevant regulation: present or threatened modification or destruction of black-backed woodpecker habitat, overexploitation, predation, competition, disease, or other natural ocurrences or human-related activities. (Cal. Code Regs., tit 14, § 670.1 (i)(1)(A)). Therefore, based upon the best scientific information available to the Department, listing the black-backed woodpecker as threatened or endangered is not warranted.

A consortium of environmental groups including the John Muir Project, the Center for Biological Diversity, the Blue Mountains Biodiversity Project, and the Biodiversity Conservation Alliance filed a petition (Hanson et al. 2012) to list the Oregon/California and Black Hills (South Dakota) populations of the black-backed woodpecker as Threatened or Endangered under the federal Endangered Species Act. The U.S. Fish and Wildlife Service prepared a 90-day finding indicating that the petitioned action may be warranted based on the information provided by the petitioners; therefore when funds become available, they will initiate a review of the status of the two populations to determine if listing either or both the Oregon Cascades-California population and the Black Hills population as either subspecies or Distinct Population Segments is warranted (Federal Register 2013b).

The IUCN Red List of Threatened Species evaluated the black-backed woodpecker as a species of "Least Concern" in 2012 (http://www.iucnredlist.org/details/22681181/0). IUCN provided justification for this evaluation as follows: "This species has an extremely large range, and hence does not approach the thresholds for Vulnerable under the range size criterion (Extent of Occurrence <20,000 km2 combined with a declining or fluctuating range size, habitat extent/quality, or population size and a small number of locations or severe fragmentation). The population trend appears to be stable, and hence the species does not approach the thresholds for Vulnerable under the population trend criterion (>30% decline over ten years or three generations). The population size is extremely large, and hence does not approach the thresholds for Vulnerable under the population size criterion (<10,000 mature individuals with a continuing decline estimated to be >10% in ten years or three generations, or with a specified population structure). For these reasons the species is evaluated as Least Concern".

NatureServe has ranked this species as G5 = demonstrably secure at the Global level and N4 = apparently secure at the National level (NatureServe.org).

Population trends of black-backed woodpeckers are poorly known (Bond et al. 2012). Such analyses are especially difficult for this species due to the ephemeral nature of the woodpecker's burned habitat, its tendency not to re-use nesting cavities in subsequent years, and the low density at which the species occurs in unburned forests (Ibid). Inclusion of black-backed woodpecker monitoring in the Forest Service's MIS program for 10 national forest units in California, as well as additional research, should yield trend information for the species in burned forests of the Sierra Nevada and southern Cascades in the coming years (Siegel et al. 2008, 2010, 2011, 2012, 2014a; Saracco et al. 2011). According to Siegel et al. (2014a), "at this time there is no evidence of a temporal trend in occupancy rates during the five years (2009-2013) we have been monitoring black-backed woodpeckers on National Forests in California, or of a broad-scale change in the species' distribution in California. Although the distribution of the species appears to change slightly from year to year, black-backed woodpeckers remain present across their historic range in California." MIS surveys on the Stanislaus in the past several years have confirmed black-backed woodpecker occupancy in wildfire areas such as the Kibbie, Knight, and Ramsey Fires. Trend information available from Breeding Bird Surveys (BBS) is available; however, these trend estimates were based on observations along only five BBS routes. Trends in black-backed woodpecker populations according to BBS data throughout the species range were non-significantly positive between 1966 and 2007 but significantly negative (minus 7% per year) between 1980 and 2007. Within the Sierra Nevada Physiographic Province, including most of the species range in Region 5, trends were non-

significantly negative during both 1966-2006 and 1980-2006. Thus, black-backed woodpecker trends are not well-monitored by the BBS methodology, due to its patchy distribution and low detection probability during passive point counts (Region 5 Sensitive species evaluation form for black-backed woodpecker 2012).

The number of black-backed woodpeckers occupying recent fire areas that burned from 2000 to 2010 in the Sierra Nevada appears not to exceed several hundred pairs (Bond et al. 2012). Population estimates in 'green' forests of the Sierra Nevada range from several hundred to several thousand pairs (Ibid).

The analysis area is within the current distribution of black-backed woodpeckers across the Sierra Nevada Bioregion. Prior to the Rim Fire, there were very few acres of burned forest suitable for black-backed woodpeckers within the Rim Recovery analysis area. Exact acres could not be calculated because snag retention from previous fires and the associated projects were based on numbers of snags, not acres of snag patches. However, only low snag densities were retained and many of those snags have likely fallen. Therefore it is reasonable to assume that there were very few acres, if any, of burned forest suitable for black-backed woodpeckers prior to the Rim Fire. The project contains suitable habitat for this species and presence has recently been documented near Ackerson Meadow (NRIS Wildlife database).

The black-backed woodpecker is strongly associated with burned forests, more closely than any other western bird species (Hutto1995, Hutto 2008, Bond et al. 2012). Although the black-backed woodpecker is found in unburned forested stands throughout its range, population densities in recently burned forest stands are substantially higher (Hutto 1995, Hoyt and Hannon 2002, Smucker et al. 2005, Hutto 2008, Fogg et al. 2012). During broadcast surveys for black-backed woodpeckers in burned forests throughout the Sierra Nevada, southern Cascades, and Warner mountains in 2009 and 2010, 95% of detections were between 1,461 and 2,596 m (4,793 – 8,517 ft.) above sea level (R. Siegel unpublished data). Survey stations above 2,800 m (9,186 ft.) have not been established, so the upper boundary of the range of detection may be higher than currently documented. Black-backed woodpecker home-ranges are highly variable and are shown to range from 24-304 hectares (59-751 acres) (Siegel pers. comm.; Siegel et al. 2013, 2014b, Tingley et al. 2014b). Snag basal area alone best predicted home-range size, explaining 54 to 62 percent of observed variation (Tingley et al. 2014b). As snag basal area increased, home-ranges exponentially decreased in size, strongly suggesting increased habitat quality.

Suitable black-backed woodpecker habitat is defined specifically for this project and includes the following CWHR habitat types, size classes, and densities: Douglas-fir (DFR), Jeffrey pine (JPN), lodgepole pine (LPN), ponderosa pine (PPN), red fir (RFR), subalpine conifer (SCN), Sierran mixed conifer (SMC), and white fir (WFR); size classes greater than or equal to 3; pre-fire canopy closures M and D; and basal area loss greater than or equal to 50%. Habitat criteria used in this analysis were determined from CWHR (CDFW 2008), scientific literature (e.g., Russell et al. 2007, Hanson and North 2008, Vierling et al. 2008, Bond et al. 2012, Siegel et al. 2013, Siegel et al. 2014b, and USDA Forest Service Region 5 Regional Office guidance.

Burned forest habitat is most productive for black-backed woodpeckers during the first eight years following a fire. Burned habitat on private lands is assumed to be completely removed through salvage logging. Treatments are limited on National Park Service Lands, typically consisting of minimal removal of hazardous trees along roadways. NFS lands are treated to varying degrees following a fire, typically harvesting only a small proportion of fire-killed trees in burned forest.

Suitable habitat exists outside the Rim Fire perimeter within California on NFS lands and is distributed throughout the Sierra Nevada and California, Terrestrial BE Appendix, binder 9. For example, in 2012, the Chips and Reading Fires on the Lassen and Plumas National Forests burned about 75,000 acres of NFS lands, of which about 67,000 acres of burned NFS lands remain untreated. In 2013, the American and Aspen Fires burned about 44,000 acres on NFS lands, of which about 32,000 acres of burned NFS

lands will remain untreated. On the Stanislaus National Forest wildfires have occurred in the past several years and include:

1. the Knight Fire in 2009 burned about 6,000 acres, of which zero acres were salvaged,
2. The Ramsey Fire in 2012 burned about 1,000 acres, of which 250 acres was salvaged, and
3. The Power Fire in 2013 burned about 1,000 acres, of which zero acres were salvaged.

In California from 2006-2013, approximately 21 percent of NFS lands classified as burned forest have been treated or are proposed for salvage logging or hazardous tree removal. This percentage includes the treatments proposed for the American, Aspen, and Rim fires which occurred in 2013. When combined with suitable burned forest habitat on National Park Service and private lands within California for the same timeframe (2006-2013), approximately 31 percent of burned forest has been or is proposed for salvage logging or hazardous tree removal. Conversely, approximately 69 percent (168,000 acres) of suitable habitat in burned forest remains or would remain untreated and available to black-backed woodpeckers throughout California. According to Miller and Safford (2012) and Westerling et al. (2006), large, high-severity wildfires have been increasing in frequency and duration over the past few decades and are predicted to continue into the future. Based on these reported trends, it is reasonable to assume that the availability of burned forest habitat will continue increasing into the future.

The Rim Fire burned primarily on public land in two administrative units: Stanislaus National Forest and Yosemite National Park. Most of the suitable black-backed woodpecker habitat within the Rim Fire perimeter occurs on Stanislaus National Forest. Table 74a shows the amount of suitable black-backed woodpecker habitat on public and private lands. Table 74b shows the amount of suitable black-backed woodpecker habitat on public lands only.

Table 74a. Amount of suitable black-backed woodpecker habitat in the Rim Fire area.

	Suitable Habitat (acres)	Proportion of habitat
Private Lands	6,061	12%
Public Lands (STF and YNP)	45,121	88%
Total	**51,182**	**100%**

Table 74b.

	Suitable Habitat (acres)	Proportion of habitat
Yosemite NP	17,461	39%
Stanislaus NF	27,617	61%
Total	**45,121**	**100%**

Black-backed woodpeckers are primary cavity excavators, creating holes in trees in which to lay their eggs and raise their young (Dixon and Saab 2000). The breeding season generally occurs from April through July and both sexes incubate, brood, and feed young (Bond et al. 2012). Nest cavities are usually excavated in snags but can be found in dead portions of live trees and in unburned forests. Nests are excavated in conifer trees and typically average 13-14", which corresponds to CWHR size classes 4-5. Nest trees have occasionally been documented as small as 7", which corresponds with CWHR size class 3 (Bond et al. 2012 and Seavy et al. 2012).

Black-backed woodpeckers readily forage on larvae of wood-boring beetles, engraver beetles, and mountain pine beetles found in the trunks of burned conifers (Dixon and Saab 2000). Hanson and North (2008) found preferential foraging on large snags >50 cm (20" dbh) in a study of 3 fire areas in the Sierra Nevada, which corresponds to CWHR size classes 4-6. Preliminary data from an ongoing study at two recent fire areas on Lassen National Forest suggests that black-backed woodpeckers forage on all

available size classes of snags, but they forage on snags <10 cm less than was predicted (R. Siegel unpub. data).

Black-backed woodpeckers in western North America are not known to be migratory, although limited down-slope dispersal in winter has been reported (Dixon and Saab 2000). Reliance on recently burned areas of coniferous forest for breeding necessitates some post-breeding and post-natal dispersal to colonize new burns, but dynamics of dispersal in this species are not well studied (Ibid.). Occasional irruptions of 100's of km or more have been documented in eastern North America in response to food-resource and breeding dynamics; similar irruptions in western North America have not been recorded. In the Sierra Nevada, black-backed woodpeckers frequently colonize burned forest patches and breed in them less than one year after fire; no information is available indicating how far such individuals have dispersed (Dixon and Saab 2000, Siegel et al. 2008).

Risks factors to black-backed woodpeckers have been summarized in "A Conservation Strategy for the black-backed woodpecker (*Picoides arcticus*) in California – Version 1.0":

1. *Salvage logging and other management involving post-fire snag removal*- Management activities commonly employed following wildfire include salvage logging and hazard tree removal have resulted in negative impacts such as reduced abundance and reproductive success in black-backed woodpeckers (Saab and Dudley 1998, Hutto and Gallo 2006, Saab et al. 2007, Koivula and Schmiegelow 2007, Hutto 2008, Cahall and Hayes 2009, Saab et al. 2009). Saab and Dudley (1998) and Hutto and Gallo (2006) found that nest densities were much higher in unlogged post-fire stands when compared with salvaged stands.
2. *Thinning of unburned forests*- Pre-fire forest thinning can decrease post-fire occupancy rates and nest densities of black-backed woodpeckers, and thinning or removal of medium and large snags may decrease habitat suitability in unburned forests. For example, black-backed woodpecker abundance in forests that were commercially thinned and then later burned in wildfire was lower than in burned forests that were not thinned before fire in the Rocky Mountains (Hutto 2008).
3. *Firewood cutting for personal use in recent fire areas*- Although systematic data on the effects of fuelwood cutting on nesting black-backed woodpeckers are not available, small scale harvesting of fuelwood by the public for personal use, from recent fire areas as well as unburned lodgepole pine forests, can destroy active black-backed woodpecker nests.
4. *Time since fire*- Probability of occupancy and nesting by black-backed woodpeckers in burned forest is negatively correlated with years since fire during the decade after the fire.
5. *Fire Suppression*- If fire suppression reduces the amount of mid- and high-severity post-fire habitat available for black-backed woodpecker, it may be considered a threat to the species.
6. *Climate change*- Although uncertain, climate change may affect the black-backed woodpecker through altered fire regimes and adjustments in distribution (e.g., occupying higher elevations and northern latitudes.
7.

Management Direction

The Forest Plan does not contain management direction for black-backed woodpeckers (USDA 2010). However, with regards to salvage, the Forest Plan does require the following:

- in post-fire restoration projects for large catastrophic fires (contiguous blocks of moderate to high fire lethality of 1,000 acres or more), generally do not conduct salvage harvest in at least 10 percent of the total area affected by fire (USDA 2010 p. 36-37).

Management direction for black-backed woodpecker populations and habitat, snags in burned forest, can be found in the Rim Recovery EIS Terrestrial MIS Report. Management recommendations for black-backed woodpeckers can be found in the Conservation Strategy for the black-backed woodpecker

(*Picoides arcticus*) in California. Version 1.0. The Conservation Strategy for black-backed woodpecker includes the following recommendations:

Recommendation 1.1. Within the range of the black-backed woodpecker, ensure that post-fire management occurring in new fires that burn 50 or more ha of conifer forest at moderate- to high-severity consider snag retention and other burned-forest habitat needs of the species. Where feasible, black-backed woodpeckers will likely benefit most from large patches of burned forest being retained in unharvested condition.

Recommendation 1.4. Retain high tree density in the unburned forest periphery around fire areas, to provide foraging habitat in the later post-fire years (Saab et al. 2011).

Recommendation 1.5. Avoid harvesting fire-killed forest stands during the nesting season, generally May 1 through July 31.

ENVIRONMENTAL CONSEQUENCES

This analysis is focused on the project effects related to management of burned forest, areas with documented basal area mortality greater than 50%. The project alternatives could result in direct and indirect effects to the black-backed woodpecker through the following activities:

1. Salvage of fire-killed trees.

2. Salvage of roadside hazard trees.

These activities may have direct and indirect effects on black-backed woodpeckers through the following:

- Project related death, injury or disturbance.
- Project related modifications to habitat quantity or quality.

Death, injury, or disturbance:

Death or injury from project related activities would be unlikely to occur given the mobility of this species. However, there is the potential for death or injury if a nest tree were felled while being used by black-backed woodpeckers. These potential direct effects are considered to be short term and will only affect treated areas. Harvesting of fire-killed trees would occur throughout the year including the many months that are outside the black-backed woodpecker breeding season. Retained snags in treated areas would continue to provide cavity and foraging substrates. Untreated areas that burned at high severity and are suitable black-backed woodpecker habitat would be left intact, providing nesting and foraging habitat for black-backed woodpeckers (Terrestrial Wildlife Biological Evaluation Appendix, binder 8).

Project activities, especially loud noise, could result in disturbance that may impair essential behavior patterns of the black-backed woodpeckers related to breeding or foraging. Loud noise from equipment such as chainsaws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. The location of black-backed woodpeckers within the analysis area is uncertain but expected given the increase in available suitable habitat following the Rim Fire. Temporary avoidance of the project site or displacement of individuals is expected during project implementation. Any displacement or avoidance related to noise disturbance would be of short duration and would subside shortly after project implementation activities. LOPs in place for spotted owls, goshawks, great gray owls, and bald eagles would afford protection to individual black-backed woodpeckers in these areas during the breeding season. The potential risk to individual black-backed woodpeckers is uncertain because the presence of suitable habitat is a recent development and surveys have not been conducted. The length of exposure to these disturbances is considered short-term and would primarily occur for two to three years given the accelerated timeframe of this project and implementation.

Habitat Modification:

Salvage logging and the removal of hazard trees along Maintenance Level 2 roads would degrade suitable black-backed woodpecker habitat by removing the majority of burned snags the species require for breeding and foraging. Home ranges are known to average about 89 hectares or 220 acres based on recent research (Tingley et al. 2014b). The basal area of burned snags is correlated with the home range size of black-backed woodpeckers (Ibid). Retaining large patches of burned snags, preferably greater than 220 acres and at elevations above 4,793 feet would provide high quality habitat for black-backed woodpeckers, potentially increasing the predicted bird density across the analysis area (Bond et al. 2012, Tingley et al. 2014b). Although treated areas are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, snags retained within treated areas could provide foraging and possibly nesting structures. In addition, trees that survived the fire and don't qualify for removal (i.e., they have green needles or don't qualify for removal based on the hazard tree guidelines) would remain on the landscape. Some of these trees will likely die, contributing to snag recruitment over the next several years, providing additional habitat structure for black-backed woodpeckers.

In order to compare alternatives and potential effects to black-backed woodpeckers, we used a model developed by Tingley and others (2014a) that was designed specifically for the Rim Fire area. This model presents a method for predicting black-backed woodpecker pair density that combines model-based estimates of occupancy with expected bird density given occupancy (Ibid). Some of the covariates used in the model include pre-fire canopy cover, burn severity, CWHR size class > 3, and CWHR forest class. This model allows us to compare alternatives, accounting for the expected effects to black-backed woodpeckers. The model predicts the probability that a single cell (30 m X 30 m) is occupied by a black-backed woodpecker. The developer's intent for use of this model includes using density estimates to examine the relative effects of proposed alternatives to black-backed woodpeckers. Values are relative and should scale proportionally (Ibid).

Tingley and others (2014a) report a total of 42 predicted pairs of black-backed woodpeckers within the Rim Fire area on the Stanislaus National Forest, which includes the Rim Fire Recovery Project and the Rim Fire Hazard Tree Removal Project. For analysis of direct and indirect effects associated with the Rim Fire Recovery project only, 39 was used as the maximum predicted pair density possible. The cumulative effects analysis includes the predicted pairs associated with the Rim Fire Hazard Tree Removal Project and Yosemite National Park.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to the black-backed woodpecker and to determine how consistent the project alternatives are with this species' conservation strategy recommendations.

1. Amount of suitable habitat modified.

2. Predicted pair density retained as a proportion of modeled pairs (Tingley et al. 2014a).

These criteria were chosen to supplement the information provided in the MIS report by identifying and analyzing potential effects to the black-backed woodpecker related to expected densities within the project area. While the Rim Fire Recovery MIS Report focuses on the relationship of project-level habitat impacts to bioregional scale and trend, the effects analysis here focuses on the relative value of different proposed management units by alternative within the Rim Fire area based on habitat quantity and quality (Tingley et al. 2014a). Acres in this analysis may vary slightly from those presented in the MIS report due to rounding error or to minor corrections made to continuously revised dynamic database sources.

Alternative 1 (Proposed Action)

Direct & Indirect Effects

Indicator 1. Under Alternative 1, about 17,461 acres of suitable habitat would be modified (Table 75). Snags would be retained at a rate of about 12 square feet of basal area per acre, averaged on a unit basis. While snags retained at this density are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, they would provide foraging and possibly nesting structures.

Indicator 2. Under Alternative 1, the proportion of modeled pairs retained is 41% (Table 75).

Table 75. Proposed treatments in suitable black-backed woodpecker habitat and corresponding predicted pairs retained under Alternative 1.

Alternative	Salvage (acres)	Hazard Tree Removal (acres)	Total Acres Treated	Proportion of Habitat Modified	Modeled Pairs Retained	Proportion of Modeled Pairs Retained
Alternative 1	16,099	1,362	17,461	63%	16	41%

Under Alternative 1 10,156 acres (37%) of suitable habitat would be retained, habitat distribution map available in Terrestrial Wildlife Biological Evaluation Appendix, binder 8. The remaining suitable habitat is predicted to support a density of 16 pairs of black-backed woodpeckers. Of the action alternatives, Alternative 1 results in the least amount of habitat retention for black-backed woodpeckers and the lowest predicted pair density.

Cumulative Effects

This analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions reflect the aggregate impact of all prior human actions and natural events that affected the environment and might contribute to cumulative effects (Appendix B, Rim EIS).

The impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions was considered in this analysis. A list of the actions considered can be found in Appendix B, Rim EIS. The Forest queried its databases, including the Schedule of Proposed Actions (SOPA) to determine past, present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands. Some, but not all of these actions have or may contribute cumulatively to effects on black-backed woodpeckers.

Risk factors potentially affecting black-backed woodpecker abundance and distribution have been identified and include habitat removal through salvage logging and other management involving post-fire snag removal, such as hazard tree removal. The following evaluation criterion was used as a relative measure of cumulative effects of this alternative to black-backed woodpeckers: habitat modification.

Habitat Modification:

Federal Lands: Present and foreseeable future salvage and hazard tree removal projects on federal lands include: the Rim Fire Hazard Tree project, which would affect 2,370 acres of suitable habitat and Yosemite National Park hazard tree removal, which affected about 43 acres of suitable habitat.

Private Lands: As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 6,060 acres of suitable black-backed woodpecker habitat is presently being salvage logged. These salvage activities are generally considered more intensive than Forest Service projects and are expected to result in the complete removal of suitable habitat.

Alternative1 Contribution/Summary: Alternative 1 is expected to contribute cumulatively to effects on black-backed woodpeckers. Modification of 17,461 acres (34%) of the remaining suitable habitat within the analysis area is expected from implementation of this alternative. Snags would be retained at a rate of

about 12 square feet of basal area per acre, averaged on a unit basis. While snags retained at this density are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, they would provide foraging and possibly nesting structures. The predicted pair density within the remaining suitable habitat on Stanislaus NFS lands within the Rim Fire perimeter is 16 pairs of black-backed woodpeckers. When added to other private and federal salvage and hazard tree removal projects, a total of 51% of suitable black-backed woodpecker habitat would be modified within the analysis area. The remaining suitable habitat across the analysis area is predicted to support a total of 86 pairs of black-backed woodpeckers.

Table 76. Cumulative proposed treatments in suitable black-backed woodpecker habitat and corresponding predicted pairs retained under Alternative 1.

Alternative	Salvage & Hazard Tree Removal Within Suitable Habitat on STF* (acres)	Rim Fire Hazard Tree Removal Project STF (acres)	Suitable Habitat Modified STF (acres)	Suitable Habitat Modified Pvt (acres)	Total Habitat Modified from within the Rim Fire Perimeter - STF, YNP, & Pvt (acres)	Proportion of Habitat Modified STF, YNP, & Pvt (acres)	Modeled Pairs Retained	Proportion of Modeled Pairs Retained
Alternative 1	17,461	2,370	19,831	6,061	25,892	51%	86	77%

*STF=Stanislaus National Forest

Alternative 2 (No Action)

Direct & Indirect Effects

Under No Action, death, injury or disturbance would not be an issue because no active management would occur.

The indirect effects of No Action are related to the amount of habitat retained across the Rim Fire area. Under this alternative, 27,617 acres of suitable habitat would be available to black-backed woodpeckers, habitat distribution map available in Terrestrial BE Appendix, binder 8. The predicted pair density associated with this alternative is 39. This alternative provides the most habitat and the highest predicted pair density when compared to the action alternatives. Black-backed woodpeckers would be expected to occupy the available suitable habitat for 8-10 years, which is typically the period of time burned habitat remains suitable for this species.

Cumulative Effects

The Cumulative effects discussion under Alternative 1 outlines those present and reasonably foreseeable future activities scheduled on public and private lands. Under the No Action alternative, there would be no direct cumulative effect expected because no active management would occur.

Alternative 2 Contribution/Summary: The cumulative contribution under this alternative would result in the highest retention of suitable habitat available for black-backed woodpeckers. Retention of about 27,617 acres (54% of the suitable habitat within the analysis area) is expected from implementation of this alternative. The predicted pair density within the remaining suitable habitat on Stanislaus National Forest lands is 39 pairs of black-backed woodpeckers. When added to other private and federal salvage and hazard tree removal projects, a total of 42,751 acres (84%) of suitable black-backed woodpecker habitat would be retained across the analysis area, displayed in the Terrestrial BE Appendix, binder 8. This habitat is predicted to support a total of 109 pairs of black-backed woodpeckers.

Table 78. Cumulative proposed treatments in suitable black-backed woodpecker habitat and corresponding predicted pairs retained under Alternative 2.

Alternative	Salvage & Hazard Tree Removal Within Suitable Habitat on STF (acres)	Rim Fire Hazard Tree Removal Project STF (acres)	Suitable Habitat Modified STF (acres)	Suitable Habitat Modified Pvt (acres)	Total Habitat Modified from within the Rim Fire Perimeter - STF, YNP, & Pvt (acres)	Proportion of Habitat Modified STF, YNP, & Pvt (acres)	Modeled Pairs Retained	Proportion of Modeled Pairs Retained
Alternative 2	0	2,370	2,370	6,061	8,431	16%	109	97%

Alternative 3

Direct & Indirect Effects

Indicator 1. Under Alternative 3, about 16,633 acres of suitable habitat would be modified (Table 79). Snags would be retained at a rate of about 12 square feet of basal area per acre in General Forest and about 30 square feet of basal area per acre in OFEA, FCCC, and HRCA, averaged on a unit basis. While snags retained at these densities are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, they would offer foraging and possibly nesting structures.

Indicator 2. Under Alternative 3, the proportion of modeled pairs retained is 46 % (Table 79).

Table 79. Proposed treatments in suitable black-backed woodpecker habitat and corresponding predicted pairs retained under Alternative 3.

Alternative	Salvage (acres)	Hazard Tree Removal (acres)	Total Acres Treated	Proportion of Habitat Modified	Modeled Pairs Retained	Proportion of Modeled Pairs Retained
Alternative 3	15,311	1,322	16,633	60%	18	46%

Under Alternative 3 10,984 acres (40%) of suitable habitat would be retained, habitat distribution map available in Terrestrial BE Appendix, binder 8. The remaining suitable habitat is predicted to support a density of 18 pairs of black-backed woodpeckers. Alternative 3 results in retention of an additional 800 acres of suitable habitat compared to Alternative 3 and is predicted to support an additional two pairs of black-backed woodpeckers.

Cumulative Effects

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands, which is the same under Alternative 3. Refer to this discussion above.

Alternative 3 Contribution/Summary: Alternative 3 is expected to contribute cumulatively to effects on black-backed woodpeckers. Modification of 16,633 acres (or 32%) of the suitable habitat within the analysis area is expected from implementation of this alternative. Snags would be retained at a rate of about 12 square feet of basal area per acre in General Forest and about 30 square feet of basal area per acre in OFEA, FCCC, and HRCA, averaged on a unit basis. While snags retained at these densities are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, they would offer foraging and possibly nesting structures. The predicted pair density within the remaining suitable habitat on Stanislaus NFS lands within the Rim Fire perimeter is 18 pairs of black-backed woodpeckers. When added to other private and federal salvage and hazard tree removal projects, a total of 49% of suitable black-backed woodpecker habitat would be modified within the analysis area. The remaining suitable habitat across the analysis area, displayed in the Terrestrial BE Appendix binder 8, is predicted to support a total of 88 pairs of black-backed woodpeckers.

Alternative	Salvage & Hazard Tree Removal Within Suitable Habitat on STF (acres)	Rim Fire Hazard Tree Removal Project STF (acres)	Suitable Habitat Modified STF (acres)	Suitable Habitat Modified Pvt (acres)	Total Habitat Modified from within the Rim Fire Perimeter - STF, YNP, & Pvt (acres)	Proportion of Habitat Modified STF, YNP, & Pvt (acres)	Modeled Pairs Retained	Proportion of Modeled Pairs Retained
Alternative 3	16,633	2,370	19,003	6,061	25,064	49%	88	79%

Table 80. Cumulative proposed treatments in suitable black-backed woodpecker habitat and corresponding predicted pairs retained under Alternative 3

Alternative 4

Direct & Indirect Effects

Indicator 1. Under Alternative 4, Table 81 shows 15, 261 acres of suitable habitat would be modified (Table 81). Snags would be retained at a rate of about 12 square feet of basal area per acre in General Forest and about 30 square feet of basal area per acre in OFEA, FCCC, and HRCA, averaged on a unit basis. While snags retained at these densities are not expected to provide suitable habitat that would contribute to a black-backed woodpecker home range, they would offer foraging and possibly nesting structures.

Alternative	Salvage (acres)	Hazard Tree Removal (acres)	Total Acres Treated	Proportion of Habitat Modified	Modeled Pairs Retained	Proportion of Modeled Pairs Retained
Alternative 4	13,640	1,621	15,261	55%	21	54%

Table 81. Proposed treatments in suitable black-backed woodpecker habitat and corresponding predicted pairs retained under Alternative 4.

Under Alternative 4, Table 82 shows units proposed specifically for black-backed woodpecker habitat retention.

Table 82. Units proposed for retention as black-backed woodpecker habitat under Alternative 4.

Units Retained for Black-Backed Woodpecker Habitat	Acres
A01B, A03, A04, A05A, A05B	538
D01A, D02, E01A, E01B, E02	1,229
O01, O02A, O02B, O04, O05, O12	670
R01A, R02	136
Total Acres Retained for Black-backed Woodpeckers	2,571

Using the model created by Tingley and others (2014a), patches of retention were selected that ranked among the highest predicted values per cell and associated predicted pair occupancy (see figure below and the Terrestrial Wildlife Biological Evaluation Appendix for more details).

Under Alternative 4, 45% of suitable habitat would be retained, and is displayed in the Terrestrial BE Appendix, binder 8. The remaining suitable habitat is predicted to support a density of 21 pairs of black-backed woodpeckers. Of the action alternatives, Alternative 4 results in the greatest amount of habitat retained for black-backed woodpeckers and the highest predicted pair density. Alternative 4 predicted pair density is 21, which is three more than under Alternative 3 and five more than under Alternative 1. Alternative 4 is the only action alternative that retains at least half of modeled pairs on NFS lands.

Indicator 2. Under Alternative 4, Table 81 shows the proportion of modeled pairs retained is 54%.

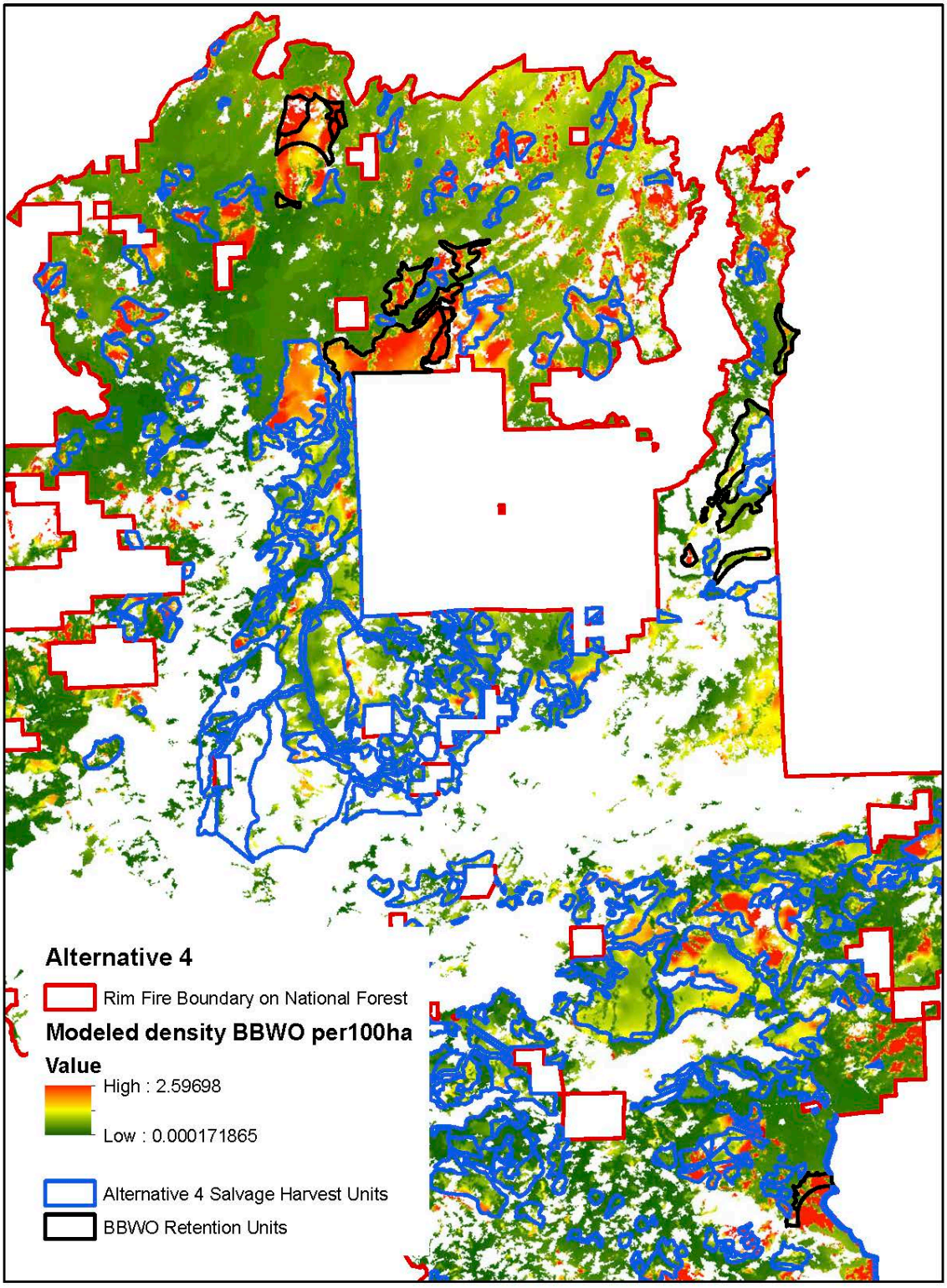

Figure 7. Modeled black-backed woodpecker density per 100 hectares (Tingley et al. 2014a). Black-backed woodpecker retention units were selected in areas of high predicted density based on the model.

Cumulative Effects

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands, which is the same under Alternative 4. Refer to this discussion above.

Alternative 4 Contribution/Summary: Alternative 4 is expected to contribute cumulatively to effects on black-backed woodpeckers. Modification of about 15,261 acres (or 30%) of suitable habitat within the analysis area is expected from implementation of this alternative. The predicted pair density within the remaining suitable habitat on Stanislaus NFS lands within the Rim Fire perimeter is 21 pairs of black-backed woodpeckers, the highest of the action alternatives. When added to other private and federal salvage and hazard tree removal projects, a total of 46% of suitable black-backed woodpecker habitat would be modified within the analysis area. The remaining suitable habitat across the analysis area, Terrestrial BE Appendix binder 8, is predicted to support a total of 91 pairs of black-backed woodpeckers.

Table 83. Cumulative proposed treatments in suitable black-backed woodpecker habitat and corresponding predicted pairs retained under Alternative 4.

Alternative	Salvage & Hazard Tree Removal Within Suitable Habitat on STF (acres)	Rim Fire Hazard Tree Removal Project STF (acres)	Suitable Habitat Modified STF (acres)	Suitable Habitat Modified Pvt (acres)	Total Suitable Modified from within the Rim Fire Perimeter STF, YNP, & Pvt (acres)	Proportion of Habitat Modified STF, YNP, & Pvt (acres)	Modeled Pairs Retained	Proportion of Modeled Pairs Retained
Alternative 4	15,261	2,370	17,631	6,061	23,692	46%	91	81%

SUMMARY OF EFFECTS ANALYSIS ACROSS ALL ALTERNATIVES

Indicator 1. The predicted pair density varies among the action alternatives (see table below). Alternative 1 would result in the lowest predicted pair density when compared with Alternatives 3 and 4. Alternative 3 would result in the second lowest predicted pair density and Alternative 4 would result in the highest predicted pair density among the action alternatives. Alternative 4 would retain over half of modeled pairs on National Forest.

Table 84. Summary of predicted pair density of black-backed woodpeckers by alternative.

Alternative	Salvage (acres)	Hazard Tree Removal (acres)	Total Acres Treated	Proportion of Habitat Modified	Modeled Pairs Retained	Proportion of Modeled Pairs Retained
Alternative 1	16,099	1,362	17,461	63%	16	41%
Alternative 2	0	0	0	0%	39	100%
Alternative 3	15,311	1,322	16,633	60%	18	46%
Alternative 4	13,640	1,621	15,261	55%	21	54%

CONSISTENCY WITH FOREST PLAN DIRECTION & CONSERVATION STRATEGY

There are no standards and guidelines or direction specific to black-backed woodpecker in the Stanislaus National Forest, Forest Plan Direction (USDA 2010). The Conservation Strategy for the Black-backed Woodpecker (*Picoides arcticus*) in California version 1.0 includes the following recommendations:

Recommendation 1.1. Within the range of the Black-backed Woodpecker, ensure that post-fire management occurring in new fires that burn 50 or more ha of conifer forest at moderate- to high-severity consider snag retention and other burned-forest habitat needs of the species. Where feasible, Black-backed Woodpeckers will likely benefit most from large patches of burned forest being retained in unharvested condition.

Recommendation 1.4. Retain high tree density in the unburned forest periphery around fire areas, to provide foraging habitat in the later post-fire years (see Saab et al. 2011).

Recommendation 1.5. Avoid harvesting fire-killed forest stands during the nesting season (generally May 1 through July 31).

The action alternatives do not specifically incorporate a limited operating period for this species to prohibit salvage harvest during the black-backed woodpecker nesting season. However, the action alternatives do incorporate limited operating periods for Sensitive species within potential black-backed woodpecker habitat, and do not propose to remove trees in unburned forest unless deemed as hazardous along Maintenance Level 2 roads. Additionally, 37 to 45 percent of existing suitable habitat would be retained under all action alternatives. Alternative 4 considers full snag retention and no harvest on 2,571 acres of high quality habitat specifically for black-backed woodpecker.

It is important to note, the Conservation Strategy for Black-backed Woodpecker (*Picoides arcticus*) in California, Bond et al. (2012) is not a legally binding or regulatory document or agency policy; moreover it was not designed to constrain the FS in its actions and activities. It seeks to summarize known information about the species, recommends management approaches for conservation, and suggests future research priorities (Bond et al. 2012). By its very nature, the Black-backed Woodpecker Conservation Strategy only considers one species. The FS has to balance multiple priorities, objectives, uses, and species in its activities as a multiple use agency. And, at times, certain management objectives are in tension, if not direct conflict, with one another. For example, through this Project, the Forest seeks to reduce fire hazard by removing burned trees; yet, the Forest also wishes to conserve burned forest habitat for the black backed woodpecker and other species. The Forest has tried to strike a reasonable balance between these two goals at the landscape level, realizing it is not possible to fully achieve both of these goals on each and every acre.

MULE DEER

AFFECTED ENVIRONMENT

Species and Habitat Account

The mule deer (*Odocoileus hemionus*) is an MIS species representing oak-associated hardwood and hardwood/conifer in the Sierra Nevada. The mule deer is also a species of conservation concern on the Stanislaus National Forest and is considered common to abundant with a wide distribution throughout the Sierra Nevada. They occur at elevations of 1,800’ to 11,800’ on the west slope of the Sierra Nevada. Summer range typically occurs above 6,500’ elevation, transition range occurs between 4,500’ to 6,500’ elevation and winter range from 1,800’ to 4,500’ elevation. Mule deer are an important game species that is hunted throughout its range in California.

Trends in the migratory deer populations on the Stanislaus National Forest have been declining since the 1970's (Maddox 1980). The Tuolumne and Yosemite herds have experienced downward population trends over the past several decades (Graveline pers. comm.).

Deer composition counts are conducted by CDFW in the spring and fall of each year in order to assess population trends. In 2009, Greg Gerstenberg, Senior Environmental Scientist with CDFW, initiated a study of the Tuolumne Mule Deer Herd to investigate exotic louse infestation, effects on individuals, potential spread, and the resulting influence on deer populations. VHF ear tag transmitters and G.P.S. collars are being used to monitor deer and gather data on over-winter survival, habitat relationships such as migration routes, summer range extent, and winter range use (Gerstenberg 2012, unpub. report). Collared deer were monitored shortly after the Rim Fire burned through the critical winter range for the Tuolumne Deer herd. Several collared individuals were lost, which indicates loss of many deer during the fire (Gerstenberg pers. comm.). Because the fire hit prior to the winter migration, most migratory deer were still on their summer ranges at higher elevations. There is a resident herd that remains in the lower country year round and these deer were much more susceptible to mortality from the Rim Fire. 80% of collared deer (n=5) are thought to have perished in the fire (Graveline pers. comm.).

The Tuolumne and Yosemite deer herds have summer, transition, and winter range within the analysis area. The Jawbone Ridge area on the Stanislaus National Forest currently supports the highest concentration of wintering California mule deer from the Tuolumne Deer Herd and much of this area burned at high severity in the Rim Fire.

Mule deer utilize a variety of vegetation types including oak woodlands, coniferous forest, meadows and grasslands, chaparral and riparian corridors. Favorable habitat conditions for deer include vegetation communities that occur in a mosaic pattern with multiple age classes represented, and where cover and forage are in close proximity to free water (Ahlborn 2006).

During project development, CDFW was consulted and changes to the critical winter range area in the Jawbone Ridge area were made based on new telemetry data which identified additional critical areas deer use during the winter months.

Mule deer are polygynous, bucks mate with multiple does. Rutting begins in the fall and dominant bucks mate with multiple does as they come into estrous. Bucks fight and displace each other establishing and re-establishing dominance throughout the season. Gestation is about six to seven months, with fawns born typically May through July on the Stanislaus National Forest.

Mule deer browse or graze, showing preferences for forbs and grasses, as well as tender new shoots on various shrub species including mazanita, ceanothus, mountain mahogany, and bitterbrush (Kufeld 1973). Forage patterns vary with season, forage quality, and availability. Acorns are a critically important fall and winter food. Fawns from the Tuolumne Herd have an average weight that is 10-15% greater with a heavy black oak acorn crop (Gerstenberg 2012, unpub. report).

Mule deer are either resident or migratory. Migratory deer travel downslope in the winter where conditions are milder and snow pack is minimal. The deer then migrate upslope in the spring and early summer after the snow melts to birth fawns and gain access to high elevation meadows and grasslands that offer herbaceous forage high in nutrients.

Risk Factors:

Risks to mule deer on the Stanislaus National Forest have been summarized by CDFW (Maddox 1980) and include:

1. *Range decadence*- Areas where shrub communities become decadent from the lack of fire or active management results in forage providing less nutrients to deer, becoming inaccessible or unavailable and may impact individual fitness.

2. *Grazing* – On the summer range, cattle and deer compete for limited forage found in meadows and grasslands. Conflicts between cattle and deer on the winter range is not known as a limiting factor for deer on the Stanislaus National Forest.
3. *Oak and shrub removal in type conversions* – Establishment of plantations in areas that would otherwise be dominated by shrub and oaks can reduce the amount of forage available to deer in a given area.
4. *Poaching*- Poaching occurs most often on the winter range and has affected not only the number of deer, but the age distribution of bucks. Poachers typically target older bucks presumably for the extensive antlers sought by many hunters; however, does are taken as well.
5. *Loss of Acorn Producing Oaks due to Catastrophic or Stand Replacing Wildfire*-Oaks take several decades to develop the capacity to produce acorns. Oaks that are lost to wildfire effectively reduce the amount of forage available and this is a critical food source in both transition and winter ranges.
6. *Loss of Meadow Habitat*- Meadows are an important component of deer habitat. Conifer encroachment threatens the viability and availability of meadows in the long term.

Management Direction

Mule deer are an MIS species representing oak woodland and are also a species of conservation concern on the Stanislaus National Forest generally associated with early seral ecosystems (Damarais and Krausman 2000). Identifying areas within critical winter deer range for salvage and non-merchantable material removal to achieve the desired forage/cover ratios was identified as one of the purpose and needs for the Rim Fire Recovery project.

The desired condition for units identified within critical winter range is to have 1) forage/cover ratios of about 70/30, 2) promote the protection and retention of hardwood (individual trees and aggregations), meadow, seep, and spring vegetation.

ENVIRONMENTAL CONSEQUENCES

The project alternatives could result in direct and indirect effects to the mule deer through the following activities:

1. Salvage of fire-killed trees.

2. Fuels Treatments.

3. New permanent and temporary road construction, road reconstruction, and maintenance.

These activities may have direct and indirect effects on mule deer through the following:

- Project related death, injury or disturbance.
- Project related modifications to habitat quantity or quality.

Death, injury, or disturbance:

Death or injury from project related activities would be unlikely to occur given the mobility of this species.

Project activities, especially loud noise, could result in disturbance that may impair essential behavior patterns of deer primarily on the winter range and transition or intermediate zones present within the analysis area. Loud noise from equipment such as chain saws or tractors is expected to occur in salvage units, project roads, and at landings, material sources, and water sources. The location of deer within the analysis area is uncertain following the Rim Fire, a large-scale disturbance event. Temporary avoidance of the project site or displacement of individuals during is expected during project implementation. Any displacement or avoidance would be of short duration and would subside shortly after project implementation activities. LOPs in place for spotted owls, goshawks, great gray owls, and bald eagles would afford protection to individual deer in these areas. The potential risk to individual deer is

considered low because of their natural avoidance behavior and length of exposure expected given the accelerated timeframe of this project and implementation.

Habitat Modification:

Salvage logging and the removal of roadside hazard trees along Maintenance Level 2 roads would result in short and long term benefits to mule deer.

Short term (10-20 years), removal of merchantable and non-merchantable material would open up areas for vegetation to reclaim the understory. Early seral vegetation, shrubs, grasses, and forbs are expected to be established within a few years and would benefit deer. Retaining large structural elements available such as snags and down woody material at small scales would provide cover for travelling or resting deer. Removing non-merchantable material within migration corridor pinch points would allow deer to continue to use traditional migration routes without obstruction. Deer would benefit by more easily being able to traverse the winter range due to the removal of non-merchantable material. Lyon and Jensen (1980) found that elk habitat use was altered when down woody debris occurred at depths greater than two feet. Because deer are smaller than elk, they may respond at depths less than those that affect elk. For example, Salwasser and others (1982) have suggested that optimal habitat structure for deer in areas of cover includes dense vegetation, but any vegetation under four feet should be sufficiently open to allow for deer movement. Removal of non-merchantable material would also improve their ability to evade predators while on the winter range or while transitioning between summer and winter ranges with young fawns (Graveline pers. comm.). Removing non-merchantable material from critical winter range would result in the release of surviving oaks and increased light penetration to re-sprouting oaks that may have been burned severely in the fire.

Long term benefits include: the ability to manage for the appropriate ratio of forage/cover, providing a more navigable landscape, and potentially reducing deer susceptibility to predation.

Roads modify deer habitat by directly removing it or indirectly reducing its quality, resulting in both short and long term effects. Gaines et al. (2003) studied the response of several focal species, including ungulates related to roads and trails. Ungulates in this study were displaced, shifting use of habitat away from human activities on or near roads or trails. In addition, increased heart rate has been documented, which may decrease survivorship or productivity (Ibid). Rost and Bailey (1979) found deer avoid areas within 200 meters of a roads edge. New construction, temporary road construction, and reconstruction would result in increased habitat fragmentation and disturbance to deer. The potential for road related mortality may increase during project implementation because there would be an increase in the amount of motorized use, particularly logging trucks.

Indicators

The following indicators were chosen to provide a relative measure of the direct and indirect effects to mule deer.

1. Amount of critical winter deer range with target forage/cover ratio of 70/30.

2. Road density (miles per square mile) in critical winter range.

3. Retention of hardwoods and hardwood aggregations, meadow and seep vegetation.

These criteria were chosen based on the best available scientific literature which focuses on various aspects of deer ecology and life history requirements. These criteria focus on those life history aspects, or habitat elements, considered most limiting to deer persistence across their range and where project effects are expected.

Alternative 1 (Proposed Action)

Direct and Indirect Effects

Indicator 1. Under this alternative, 1,064 acres were identified for removal of non-merchantable material. The table below displays units identified or created and associated non-merchantable material removal acres.

Table 85. Units with Non-Merchantable Material Removal for Mule Deer Benefit under Alternative 1.

Unit #	Non-Merchantable Material Removal Acres	Total Unit Acres
L03	31	31
L06	10	10
L07	5	5
L202	28	142
L203	265	265
L204	87	87
L205	140	140
L206	138	138
M201	35	50
O201	140	299
P201	185	185
Total	1064	1352

Deer are expected to benefit in the short and long term from the removal of non-merchantable material. Under this alternative, habitat quality would be improved on about 19% of the critical winter range, see Terrestrial Wildlife Biological Evaluation Appendix. Non-merchantable material would be removed in a mosaic pattern such that patches of surviving shrubs and small patches of surviving trees would be retained to provide forage and cover. Non-merchantable material next to or near surviving or sprouting oaks would be removed to provide growing space and greater sunlight penetration to oaks. In addition, the removal of this material would allow for the uninhibited re-establishment of herbaceous vegetation important to deer in the fall and spring on the winter range. Treatments are designed to achieve optimal forage/cover ratios.

Deer would be able to navigate the winter range more effectively if this material were removed. With the dense vegetation conditions that currently exist, deer have limited movement corridors within the winter range and are more susceptible to predation; therefore, by removing this material, habitat conditions would be improved. Proposed treatments would result in beneficial impacts on individual fitness through increased forage availability and quality, as well as the potential reduction in susceptibility to predation.

Indicator 2. Under the proposed action new permanent road construction, temporary road construction, road reconstruction, and maintenance are proposed, please see the Rim EIS Transportation Report for definitions of the road treatments related to this project. Table 86 displays the miles of each type of road related treatment in Alternative 1 and the resulting miles per square mile under this alternative.

Table 86. Miles of Road Treatments Proposed Under Alternative 1.

Alternative	New Permanent Road Construction	Road Reconstruction (currently designated for motor vehicle travel)	Road Reconstruction (currently NOT designated for motor vehicle travel)	Temporary Road Construction	Roads Added for Project use During Implementation (mi/mi²)	Total Road Density Existing plus Additional for Project

						(mi/mi²)
Alternative 1	0.5	15.8	5.4	3.3	+ 0.8	4.4

The road treatments under this alternative would result in an increase of 0.8 miles per square mile of road utilized for motor vehicle traffic, effectively increasing the road density from 3.6 miles per square mile to 4.4 miles per square mile during project implementation. This may increase the potential for road related mortality during project implementation while the roads are open and regularly used. Most project activity would be accomplished during the non-winter season, and any road improved for project related activities would be blocked before the winter season. Therefore, negative effects to non-migratory deer are expected to be higher because these deer would be displaced. The effects are expected to be minor and of short duration. The new permanent road would be designated as blocked Maintenance Level 1 or Level 2 gated year round. This would alleviate the risk of disturbance during the critical winter period because the road would only be used intermittently for management purposes. All temporary roads would be obliterated and blocked and over time vegetation would become re-established and all roads that were non-motorized before project implementation would be returned to the pre-project specifications.

Indicator 3. Alternative 1 has no requirements for retention and protection of hardwood aggregates. This could result in the removal of newly sprouting hardwood aggregations of 1/10 to ½ acre if the trees aren't large enough to be protected under the retention of all hardwoods ≥ 12" dbh management requirement. Although aggregations are not mapped, a few have been observed after the fire. Under this alternative, they would not be retained.

Hardwood aggregations are important in holding areas, areas where deer "hold up" for a few days to several weeks until conditions such as weather cause them to continue on with their migration (Bertram 1977). Holding areas are often areas with a dominant hardwood component. Deer often put on significant fat reserves in these holding areas essential to help get them through the tough winter months. Hardwood aggregations on the winter range are important because the acorns provide the greatest potential to maintain fat reserves. The removal of any potential aggregations of hardwoods under this alternative would have a negative effect on deer. Because it is not known how many aggregations may be affected, the extent of adverse impacts is unknown.

Cumulative Effects

This analysis relies on current environmental conditions as a proxy for the impacts of past actions. Existing conditions reflect the aggregate impact of all prior human actions and natural events that affected the environment and might contribute to cumulative effects (Appendix B, Rim EIS).

The impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions is considered in this analysis. A list of the actions considered can be found in Appendix B, Rim EIS. The Forest queried its databases, including the Schedule of Proposed Actions (SOPA) to determine past, present and reasonably foreseeable future actions as well as present and reasonably foreseeable future actions on other public (non-Forest Service) and private lands. Some, but not all of these actions have or may contribute cumulatively to effects on mule deer.

Risk factors potentially affecting mule deer abundance and distribution has been identified and include range decadence and degradation, loss of acorn producing oaks. The following evaluation criterion was used as a relative measure of cumulative effects from this alternative to mule deer: Habitat Modification.

Habitat Modification:

Federal Lands: Past, present, and foreseeable future timber harvests and hazard tree removal sales on public lands have and will result in habitat modification to deer. Present actions within the analysis area include: The Twomile Ecological Restoration Vegetation Management Groovy and Funky timber sales, and the Soldier Creek timber sale are scheduled to treat about 2,045 acres through commercial thinning,

biomass removal, mastication, and prescribed fire treatments. These types of treatments can benefit deer through opening up the understory so herbaceous and shrub vegetation can become re-established, providing new and more palatable forage. These projects are located in general habitat areas and not critical winter or summer range. In addition, the Yosemite National Park hazard tree removal on 816 acres is expected to have a negligible effect on deer habitat and use.

Foreseeable future actions on federal lands include: Reynolds Creek Ecological Restoration involving meadow and aspen restoration. These types of projects generally include the removal of encroaching trees. These treatments are occurring in potential transition areas and would benefit deer by providing important forage during migration between summer and winter ranges. Two mile: Campy, Looney, Thommy, and Reynolds Creek timber sale are scheduled to occur over the next few years and will result in treatment of about 3,798 acres through commercial thinning, biomass removal, mastication, and prescribed fire. These treatments will benefit deer as described under present actions above. As a result of the Rim Fire, the Rim Fire Hazard Tree removal project proposed to remove hazard trees along 10,262 acres of level 3, 4, and 5 roads and is scheduled for implementation beginning in the summer of 2014, and is expected to have negligible effects on deer habitat and use.

Thirteen grazing allotments are either wholly or partially within the analysis area, resulting in a maximum number of 1,632 cow/calf pairs across the landscape. Cattle are speculated to exclude deer from important critical summer foraging areas, but this conflict does not occur on the winter range (Gerstenberg pers. comm.). Grazing practices may influence meadow hydrology and the quality of forage available for deer year round and throughout the analysis area.

Road density is known to affect deer through changes in behavior and habitat modification as discussed in this analysis. Twomile Transportation, a foreseeable future action, will result in a slight reduction in motorized routes, essentially removing 11.4 miles by gating, decommissioning, or closing to maintenance level 1 roads used only for administrative purposes. Reynolds Creek Motorized Routes project will decommission 3.5 miles of unauthorized routes in the near future as well. The Mi-Wok OHV Restoration project proposes to block and restore 11.6 miles of unauthorized OHV routes. While these route segments are not in critical winter or summer range, there are year round resident deer and deer that travel through these areas that are expected to benefit from a reduction in about 26.5 miles of motorized roads and trails across the landscape.

Private Lands: As a result of the Rim Fire, several private land owners have submitted emergency fire salvage notices to Cal Fire. A total of 18,407 acre is presently being salvage logged. These areas are expected to be replanted with herbicide application after salvage operations are complete. While this may benefit deer with a flush of new and more palatable forage, benefits on private lands are expected to be limited in space and time based on typical reforestation efforts.

Alternative1 Contribution/Summary: Alternative 1 is expected to contribute cumulatively to effects on mule deer. Removal of non-merchantable material is expected to open up the understory and provide new and more palatable forage for deer. The proposed 1,064 acres of biomass removal on the Tuolumne Deer Herds critical winter range and migration pinch points would improve habitat conditions on about 12% of the critical winter range. Fuels treatments, including biomass removal is expected to benefit deer in year round and transition habitat areas in the short term. Alternative 1 would result in an increase in road density within critical winter range, including the addition of 0.5 miles of new permanent road construction. These effects are expected to impact deer in the short term during project implementation. The cumulative contribution under Alternative 1 would provide minor benefits to deer in general habitat areas and would provide substantial benefits on the critical winter range near Jawbone Ridge.

Alternative 2 (No Action)

Direct and Indirect Effects

Under No Action, death, injury, or disturbance would not be an issue because no active management would occur.

Under Alternative 2, no indirect effects are expected because no active management would occur; however, there may be consequences under this alternative primarily related to the influence no action may have on future wildfires and how future wildfires may impact deer habitat. At the landscape scale, there is uncertainty predicting the incremental effect no action would have on future wildfires and deer habitat given the numerous factors involved over time. Potential fire behavior may be dependent on how future management actions, especially prescribed fire, are planned and implemented (Stephens and Moghaddas 2005, Stephens et al. 2009, Roberts et al. 2011, Crook et al. 2013). However, as fire-killed trees fall and contribute to surface fuel pools, potential fire behavior may be expected to increase (Rim EIS Fuels Report) and ultimately affect the amount of suitable habitat available for deer. Specifically, Alternative 2 is likely to result in excessive fuel loads that could inhibit future fire and fuels management (i.e. inability to safely or effectively construct holding lines) and result in severe effects to forest soils on large scales (i.e. from landscape scale and long residency times of future fire). Excessive fuel loads are likely to result under the No Action Alternative because within 10 years, as trees fall over, surface fuels are projected to average 42 tons per acre, and within 30 years, surface fuels are projected to average 78 tons per acre, and could range as high as 280 tons per acre (Rim EIS Fuels Chapter).

Indicator 1. Under this alternative, no removal of non-merchantable material would occur. Within areas that burned at high severity, herbaceous vegetation is expected to be established within 3-5 years (Gray et al. 2005 and Moghaddas et al. 2008) which would benefit deer in the short term. When the smaller plantation trees fall, they would likely fall together creating several jackstraw piles over hundreds of acres covering a good portion of the ground and shading out herbaceous vegetation. Not only would there be a reduction in forage availability in these areas, the jackstraw trees on the ground would be difficult for deer to navigate, further reducing the effective habitat area available to them and potentially increasing their susceptibility to predation.

Deer take the same migratory path every year (Bertram 1977). Because of this, migration pinch points that burned at high severity are at risk of becoming un-navigable by the deer that use them if the non-merchantable material were left on site. Navigation of migration corridors and pinch points would be more difficult under this alternative, especially for does travelling with young fawns. They would be forced to find a new route through unfamiliar territory and may be more susceptible to predation as a result.

When wildfire returns to this landscape, the remaining habitat adjacent to or near areas that burned at high severity may be at increased risk of loss. As mentioned previously, within 30 years, the fuel loading is predicted to be four to eight times higher (78 tons/acre) than the desired condition as described in the Stanislaus National Forest, Forest Plan (Rim EIS Fuels Report). This would significantly increase the risk of fire suppression activities when wildfire occurs in the future. Oaks that survived the Rim Fire or those that are re-sprouting would be at increased risk of loss under these conditions. The synergistic effects over time to the forage and habitat availability to deer on the winter range in particular could be devastating to the population. The negative long term effects on habitat for deer of this alternative outweigh the short term beneficial effects.

Indicator 2. Under the no action alternative, no new permanent road construction, temporary road construction, reconstruction, or maintenance would occur. This alternative would provide the greatest benefit to deer because there would be no increase in road density across the analysis area and no potential increase of road related mortality in the short or long term.

Indicator 3. Under the No Action alternative, all hardwood aggregations, meadow and seep vegetation would be retained which may have short term beneficial effects. As discussed under Indicator 1 under this alternative, the increased susceptibility to future wildfire would put these aggregations at higher risk than any of the action alternatives.

Cumulative Effects

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands. Under the No Action alternative, there would be no direct cumulative effect expected because no active management would occur.

No Action Alternative Contribution/Summary: The cumulative contribution under this alternative include: New understory vegetation would be expected to become established and provide new and more palatable forage that would benefit deer in the short term. Existing conditions consisting of dense standing dead conifers throughout the critical winter range would remain. Over time, these snags will fall and contribute to fuel loads that would potentially increase fire behavior in the future. The remaining suitable habitat would be at greater risk of loss to the next wildfire under these conditions. The short-term beneficial impacts to deer such as increased early successional habitat would be outweighed by the long term negative impacts.

Alternatives 3 & 4

Direct and Indirect Effects

Because the actions proposed under both Alternative 3 and Alternative 4 are the same as they relate to mule deer, the effects are analyzed together.

Indicator 1. Under Alternatives 3 and 4, 1,739 acres were identified for removal of non-merchantable material. Table 87 displays units identified and associated non-merchantable material removal acres.

Table 87. Units with Non-Merchantable Material Removal for Mule Deer Benefit under Alternatives 3 & 4.

Unit #	Non-Merchantable Material Removal Acres	Total Unit Acres
L03	30	30
L04	25	79
L07	5	5
L201	92	92
L202	28	142
L203	250	695
L204	340	1519
L205	475	755
L206	15	81
M201	35	74
M202	20	138
M203	20	63
M204	79	282
O201A	80	156
O201B	60	120
P201	185	185
Total	**1,739**	**4,416**

Under Alternatives 3 and 4, additional units within the critical winter range were identified for biomass removal. Deer are expected to benefit in the short and long term from the removal of non-merchantable

material. Under these alternatives, habitat quality would be improved on about 63% of the critical winter range, see Terrestrial Wildlife Biological Evaluation Appendix.

Non-merchantable material would be removed in a mosaic pattern such that patches of surviving shrubs and small patches of surviving trees would be retained to provide forage and cover. Non-merchantable material next to or near surviving or sprouting oaks would be removed to provide growing space and greater sunlight penetration to the oaks. In addition, the removal of this material would allow for the uninhibited re-establishment of herbaceous vegetation important to deer in the fall and spring on the winter range. Treatments are designed to achieve optimal forage/cover ratios.

Deer would be able to traverse the winter range more effectively if this material were removed. With the dense vegetation conditions that currently exist, deer have limited movement corridors within the winter range and are more susceptible to predation. Therefore, by removing this material, habitat conditions would be improved.

These treatments would result in beneficial impacts on individual fitness through increased forage availability and quality, as well as the potential reduction in susceptibility to predation.

Indicator 2. Under Alternatives 3 and 4, temporary road construction, road reconstruction, and maintenance are proposed (Rim EIS Transportation Report). Table 88 displays the miles of each type of road related treatment in Alternatives 3 and 4 and the resulting miles per square mile under this alternative.

Table 88. Miles of Road Treatments Proposed Under Alternatives 3 and 4.

Alternative	New Permanent Road Construction	Road Reconstruction (currently designated for motor vehicle travel)	Road Reconstruction (currently NOT designated for motor vehicle travel)	Temporary Road Construction	Roads Added for Project use During Implementation (mi/mi^2)	Total Road Density Existing plus Additional for Project (mi/mi^2)
Alternative 3	0	22.6	4.0	6.4	+ 0.9	4.5
Alternative 4	0	22.6	4	6.4	+ 0.9	4.5

Under Alternatives 3 and 4, no new permanent road construction is proposed. The temporary road construction, reconstruction and maintenance proposed under these alternatives would result in an increase of 0.9 miles per square mile of road utilized for motor vehicle traffic, effectively increasing the road density from 3.6 miles per square mile to 4.5 miles per square mile during project implementation. This may increase the potential for road related mortality during project implementation while the roads are open and being used regularly. Most project activity would be accomplished during the non-winter season, and any road improved for project related activities would be blocked before the winter season. Therefore, adverse effects to non-migratory deer are expected to be higher because these deer would be displaced. The effects are expected to be minor and of short duration. All temporary roads would be obliterated and blocked and over time vegetation would become re-established and all roads that were non-motorized before project implementation would be returned to the pre-project specifications.

Indicator 3. Under Alternatives 3 and 4, all hardwood aggregations, meadow and seep vegetation within units would be flagged and avoided. Aggregations are 1/10 to 1/2 ac groups of sprouting hardwood or of meadow/seep vegetation. Reaching in and end lining would be allowed, but ground-based equipment would be prohibited. Exceptions should be limited but may be made for operability in consultation with the sale administrator and project biologist.

Although aggregations aren't mapped, a few have been observed after the fire. Hardwood aggregations are important in holding areas, areas where deer "hold up" for a few days to several weeks until conditions such as weather cause them to continue on with their migration (Bertram 1977). Holding areas are often areas with a dominant hardwood component. Deer often put on significant fat reserves in these holding areas essential to help get them through the tough winter months. Hardwood aggregations on the winter range are important because the acorns provide the greatest potential to maintain fat reserves. Retaining the aggregations of hardwoods under these alternatives would benefit deer. Because it is not known how many aggregations may be affected, the extent of beneficial impacts is unknown.

Cumulative Effects

The Cumulative effects discussion under the Alternative 1 outlines those present and foreseeable future activities scheduled on public and private lands, and are considered in Alternatives 3 and 4. The cumulative contribution of Alternatives 3 and 4 would be greater than those described under Alternative 1 because the Tuolumne Deer Herd critical winter range would have an additional 675 acres of non-merchantable material removed, improving habitat conditions across 63% of the critical winter range. Fuels treatments, including biomass removal and pile and burning outside the critical winter range would affect 6,640 acres within treatment units and are expected to benefit deer in year-round and transition habitat areas in the short term. There would be no new permanent road construction under Alternatives 3 and 4. The cumulative contribution under Alternatives 3 and 4 would provide minor benefits to deer in general habitat areas and would provide substantial benefits on the critical winter range near Jawbone Ridge.

SUMMARY OF EFFECTS ANALYSIS ACROSS ALL ALTERNATIVES:

Indicator 1. Of the action alternatives, Alternatives 3 and 4 would improve the greatest amount of habitat by removing non-merchantable material. Alternative 1 would improve the least amount of habitat.

Table 78. Summary of proposed non-merchantable material removal by alternative.

Alternative	Units with Non-Merchantable Material Removal	Total Acres
Alternative 1	L03, L06, L07, L202-206, M201, O201, P201	1,064
Alternative 2	N/A	0
Alternative 3	L03, L04, L07, L201-206, M201-204, O201, P201	1,739
Alternative 4	L03, L04, L07, L201-206, M201-204, O201, P201	1,739

Indicator 2. Of the action alternatives, the amount of new permanent road construction is highest under Alternative 1. There is no new permanent road construction proposed under Alternatives 3 and 4. Increases to road density are similar among all action alternatives, but long term effects related to road density are greatest under Alternative 1 because of the new permanent road construction.

Table 89. Summary of road treatments proposed by alternative.

Alternative	New Permanent Road Construction	Road Reconstruction (currently designated for motor vehicle travel)	Road Reconstruction (currently NOT designated for motor vehicle travel)	Temporary Road Construction	Roads Added for Project use During Implementation (mi/mi²)	Total Road Density Existing plus Additional for Project (mi/mi²)
Alternative 1	0.5	15.8	5.4	3.3	+ 0.8	4.4
Alternative 2	0	0	0	0	0	3.6
Alternative 3	0	22.6	4.0	6.4	+ 0.9	4.5

Alternative 4	0	22.6	4	6.4	+ 0.9	4.5

Indicator 3. Hardwood aggregations, meadow and seep vegetation would be retained under Alternatives 3 and 4 and would provide the greatest beneficial effects to deer. No retention would occur under Alternative 1.

COMPLIANCE WITH FOREST PLAN DIRECTION

There are no specific Forest Plan Standards and Guidelines for mule deer applicable to this project.

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