Table of Contents

List of Tables

3.11 WILDLIFE: TERRESTRIAL AND AQUATIC SPECIES

Management of terrestrial and aquatic species and habitat, and maintenance of a diversity of animal communities, is an important part of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on National Forest System (NFS) lands are planned and implemented so that they do not jeopardize the continued existence of threatened or endangered species or lead to a trend toward listing or loss of viability of Forest Service Sensitive species. In addition, management activities are designed to maintain or improve habitat for Management Indicator Species to the degree consistent with multiple-use objectives established in each Forest LRMP. Management decisions related to motorized travel can affect terrestrial species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Gaines et al. 2003, Trombulek and Frissell 2000, USDA 2000). It is Forest Service policy to minimize damage to vegetation, avoid harassment to wildlife, and avoid significant disruption of wildlife habitat while providing for motorized use on NFS lands (FSM 2353.03(2)). Therefore, management decisions related to motorized travel on NFS lands must consider effects to wildlife and their habitat.

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

Direction relevant to the proposed action as it affects terrestrial and aquatic biota includes:

Endangered Species Act (ESA): The Endangered Species Act of 1973 (16 USC 1531 et seq.) requires that any action authorized by a federal agency not be likely to jeopardize the continued existence of a threatened or endangered (TE) species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the ESA, as amended, requires the responsible federal agency to consult the USFWS and the National Marine Fisheries Service concerning TE species under their jurisdiction. It is Forest Service policy to analyze impacts to TE species to ensure management activities are not be likely to jeopardize the continued existence of a TE species, or result in the destruction or adverse modification of habitat of such species that is determined to be critical. This assessment is documented in a Biological Assessment (BA) and is summarized or referenced in this Chapter.

Forest Service Manual and Handbooks (FSM/H 2670): Forest Service Sensitive (FSS) species are species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on National Forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a significant trend toward federal listing or loss of viability. This assessment is documented in a Biological Evaluation (BE) and is summarized or referenced in this Chapter.

Sierra Nevada Forest Plan Amendment (SNFPA): The Record of Decision (ROD) for the 2004 SNFPA identified the following standards and guidelines applicable to motorized travel and terrestrial biota, which will be considered during the analysis process:

- Wetland and Meadow Habitat (S&G 70): see Section 3.10, Watershed Resources.
- California Spotted owl and Northern Goshawk: Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb nest sites (S&G 82).
- Fisher and Marten: Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites (S&Gs 87 and 89).
- Riparian Habitat (S&G 92): See Section 3.10, Watershed Resources.

- Bog and Fen Habitat (S&G 118): Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles.
- Water Temperatures (S&G 96): Ensure that management activities do not adversely affect water temperatures necessary for local aquatic and riparian dependent species assemblages.
- Vegetative Management (S&G 114): Ensure that vegetative management activities including fuels reduction actions within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic/riparian dependent species. As appropriate, assess and document aquatic conditions following the Regional Stream Condition Inventory protocol prior to implementing ground disturbing activities within suitable habitat for California red-legged frog, Cascades frog, Yosemite toad, foothill and mountain yellow-legged frogs, and northern leopard frog.

Applicable direction from the Stanislaus Land and Resources Management Plan (LRMP) are identified in Appenidx C and species-specific S&Gs are identified under the species specific effects analysis. Compliance with LRMP direction is discussed in the Compliance section. Furthermore, a detailed analysis of project alternatives compliance with the Riparian Conservation Objectives (RCO) is provided in the project record and is herein incorporated by reference.

Effects Analysis Methodology

The use of a variety of motorized wheeled vehicles has become an increasingly popular form of recreation on National Forest lands. As it has become more popular, vast improvements in technology have also been incorporated into the sport resulting in more powerful vehicles that are capable of cross-country travel in more areas. Large increases in the number of users and improved vehicles have resulted in the proliferation of routes throughout many National Forests, including the Stanislaus. Route proliferation and the use of motorized wheeled vehicles have a broad range of direct and indirect effects on terrestrial and aquatic wildlife. The direct and indirect effects of motorized use on wildlife can be placed in three general categories: 1) human-caused mortality, 2) changes in behavior, and 3) habitat modification (Gaines et al. 2003). These categories were further broken down into specific effects that were documented in the literature (Table 3.11-1).

Human-caused Mortality: Death or injury from a vehicle hitting or running over an animal is well documented and affects the vast majority of terrestrial species, though to varying degrees (Trombulak and Frissell 2000). In general, road mortality increases with traffic volume and speed. Road mortality on native surface forest roads is generally not significant for large mammals (USDA 1998). Small mammals and herpetofauna (reptiles and amphibians) are more vulnerable because individuals are inconspicuous and slow-moving. Amphibians may be especially vulnerable to road mortality because their life histories often involve migration between wetland and upland habitats (Trombulak and Frissel 2000, USDA 1998). Raptors may also be vulnerable to collisions on forest roads due to their foraging behaviors, however, the most substantial documented mortality has been along highways.

Changes in Behavior (displacement or avoidance, impacts on breeding behavior, and physiological impacts): Walther (1969) in Frid and Dill (2002) assumed that wildlife exhibit a predator avoidance response when they become non-lethally disturbed by humans. When a motorized vehicle or human triggers a predator avoidance response in an individual, it may directly or indirectly affect that individual's fitness. Direct effects of disturbance to an individual's fitness are commonly measured through increases in stress hormone levels. Significant increases in stress hormone levels have been found to reduce reproductive success of individuals of some species. The indirect effects of disturbance are commonly displayed through changes in an individual's time and energy budget. As a vehicle or human approaches an individual, the most obvious and common disturbance response is for that individual to avoid the threat and seek cover. After an individual exhibits the disturbance response, a period of time will elapse until that individual resumes pre-disturbance behavior. Since this change in an individual's time budget may result in less time feeding or resting (fitness-enhancing activities), the disturbance may result in changes to the individual's energy budget and potentially impact their fitness. If an individual is repeatedly disturbed in an area, they may eventually avoid the area; essentially being displaced from the habitat.

Table 3.11-1 Road and Trail Factors with Documented Effects on Wildlife Species and Group

	Road and Trail Associated Factors	Effects of the Factors	Wildlife Group Affected
Human-Caused Mortality	Collisions	Mortality or injury from a motorized vehicle running over or hitting an animal.	Wide-ranging Carnivores Late-successional Riparian Ungulates
Changes in Behavior	Displacement or Avoidance	Spatial shifts in individuals or populations of animals away from human activities on or near roads or trails.	Wide-ranging Carnivore Late-successional Riparian Ungulates
	Disturbance at a Specific Location	Displacement of individual animals from a specific location that is being used for reproduction and rearing of young.	Wide-ranging Carnivores Late-successional Riparian Ungulates
	Physiological Response	Increase in heart rate or stress hormones (which may decrease survivorship or productivity) when near a road or trail.	Ungulates Late-successional
Habitat Modification	Habitat Loss and Fragmentation	Loss and resulting fragmentation of habitat due to the establishment or use of roads or trails and associated human activities.	Wide-ranging Carnivores Late-successional Riparian Ungulates Cavity Dependent
	Edge Effects	Changes to habitat microclimates associated with the edge induced by roads or trails.	Late-successional
	Snag or Down Log Reduction	Reduction in density of large snags and downed los owing to their removal near roads to remove hazards and as fuelwood.	Cavity Dependent Late-successional Riparian
	Route for Competitors and Predators	Providing access or greater hunting success for competitors or predators than would otherwise have existed.	Wide-ranging Carnivores Late-successional Riparian Cavity Dependent
	Movement Barrier	Interference with dispersal or other movements due to either the road itself or by human activities on or near roads or trails.	Wide-ranging Carnivores Late-successional Riparian Ungulates

Gaines et al. (2003) reviewed literature on road- and trail-associated effects upon wildlife and found that alteration of use of habitats in response to roads or road networks was the most common interaction reported. Fifty to sixty percent of the 29 focal species reviewed were impacted in this manner (Gaines et al. 2003). Studies have documented shifts in an animal's home range area, shifts in foraging patterns, and disturbance of nesting or breeding behaviors caused by motorized road or trail use and its associated increased human recreation activity facilitated by motorized access (Foppen and Reijnen 1994, Johnson et al. 2000, Rost and Bailey 1979). Recreation activities (hiking, camping, fishing, shooting, etc.) that are associated with the access provided by motorized routes, result in indirect disturbance and displacement effects that often exceed the direct influence of the roads and trails. Many species avoid areas in proximity to roads or trails, or exhibit flight behavior within a certain distance of route use, though studies documenting the magnitude and duration of behavioral responses are limited. Road usage by vehicles has a significant role in determining animal's road avoidance behavior. Black bear, for example, crossed roads with low traffic volume more frequently than roads with high traffic volume, and almost never crossed interstate highways (Brody and Pelton 1989). Perry and Overly (1977) documented displacement of deer up to 800 meters from major roads, and from 200 to 400 meters from secondary and primitive roads. Van Dyke et al. (1986) documented that mountain lions avoided improved native surface roads and surfaced roads, and selected home range areas with lower road densities than the study area average. Activities that create elevated sound levels or result in close visual proximity of human activities at sensitive locations (e.g., nest trees), have the potential to disrupt normal behavior patterns. Studies of the effects of human disturbance upon wildlife have revealed that the immediate postnatal period in mammals and the breeding period in birds are time periods when individuals are most vulnerable to disturbance.

Intrusion-induced behaviors such as nest abandonment and decreased nest attentiveness have led to reduced reproduction and survival in species that are intolerant of intrusion (Knight and Gutzwiller 1995). Foppen and Reijnen (1994), for example, found that the reproductive success of forest bird species declined in areas fragmented by roads. Anthony and Isaacs (1989) found that the mean productivity of bald eagle nests was negatively correlated with their proximity to main logging roads, and the most recently used nests were located in areas farther from all types of roads and recreational facilities when compared to older nests in the same territory. Wasser et al. (1997) found that stress hormone levels were significantly higher in male northern spotted owls (but not females) when they were located less than 0.25 miles from a major logging road compared to spotted owls in areas greater than 0.25 miles from a major logging road. Chronic high levels of stress hormones may have negative consequences on reproduction or physical condition of birds, though these effects are not well understood.

Habitat Modification (habitat loss, fragmentation, edge effects, snag and down log reduction, routes for competitors, movement barriers): Road and trail networks remove habitat but also have a broader effect than just the conversion of a small area of land to route surfaces. 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. One study determined that the total landscape area affected by roads was 2.5 to 3.5 times the actual area occupied by the road feature, assuming a 50 meter influence along the road's edge (Reed et al. 1996). A decrease in interior forest patch size results in habitat loss and greater distance between suitable interior forest patches for sensitive species like the California spotted owl and American marten. As roads and trails break up forest patches, increased exposure may increase nest predation and parasitism rates by species such as jays or cowbirds (Miller et al. 1998), or provide increased access for generalist competitors or predators, such as coyotes (Buskirk and Ruggiero 1994).

Additional habitat modification occurs as an indirect effect of managing roads or trails for public wheeled motor vehicle use. Trees posing a potential safety hazard ("hazard trees") are removed along 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 200 to 300 feet from a road's edge, also affecting the recruitment of large down wood within this zone. Few hazard trees are typically removed along trails.

Major highways are known to create movement barriers for a number of wildlife species, particularly wide-ranging carnivores and ungulates, and are suspected of being a major factor in the decline of some forest carnivores, such as fisher and marten (Brody and Pelton 1989, USDA 2001a). The slower speed and lower traffic volume roads and trails that are being evaluated in the project Alternatives are less likely to create barriers to movement. However, the extent to which denser networks of roads and trails might result in barriers to movement for some wildlife species is unknown (USDA 2001a).

The project alternatives may result in the above listed effects through five types of actions:

- The prohibition of cross-country travel,
- Adding facilities (presently unauthorized roads, trails, and/or areas) to the NFTS,
- Changing the type of use on an existing NFTS route,
- Changing the season of use on the NFTS,
- Implementation of mitigation measures.

Assumptions Specific to Terrestrial and Aquatic Species

1. The Risk – Disturbance Hypothesis: Animals respond to non-lethal human disturbance similarly to how they respond to predation (Hediger 1934, cited in Walther 1969).
2. All vehicle classes result in the same amount of disturbance effects to wildlife, unless there is local information enabling a separate analysis by vehicle class.
3. Location of a trail is equal to disturbance effects from that trail (i.e., assume all trails provide the same level of disturbance), unless local data or knowledge indicate otherwise.
4. Habitat is already impacted in the short-term. In the long-term, habitat will remain the same on added trails, and will increase to at least some degree on non-added trails with ban of cross-country travel and subsequent passive restoration.
5. Without a prohibition on cross-country travel route proliferation would continue to occur. Alternative 2 would not prohibit cross-country travel; therefore, route proliferation would likely occur over the short and long-term throughout project area. Since it is largely unknown where route proliferation may occur over the long-term, it is assumed that individuals of many species may be adversely impacted by this Alternative.
6. Aquatic species spend all or significant portions of their life cycles either in or moving through riparian habitats.
7. Although hazard tree sales result in the reduction of snags along NFTS roads within the project area, snags are not actively removed along NFTS trails.

Data Sources

1. GIS layers with the following information: routes; habitats; and ‘designated’ or important wildlife areas.
2. Site-specific surveys/assessment of any local sensitive wildlife habitats with routes proposed to be added to the NFTS.

Terrestrial and Aquatic Species Methodology by Action

1. Direct and indirect effects of the prohibition of cross country motorized vehicle travel

Rationale: Studies have documented that motorized travel can affect wildlife species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Gaines et al. 2003, Trombulek and Frissell 2000, USDA 2000).

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Methodology: GIS analysis of existing unauthorized routes in relation to wildlife habitat.

2. *Direct and indirect effects of adding facilities to the NFTS including identifying seasons of use and vehicle class*

Rationale: Literature indicates that placement of routes in relation to habitat can affect wildlife species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Gaines et al. 2003, Trombulek and Frissell 2000, USDA 2000).

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Indicator(s): (1) Density of motorized routes; (2) Miles of motorized routes; (3) Miles of Maintenance Level 1 roads converted to trails (4) Number of sensitive sites for TES species (e.g., Protected Activity Centers, nest sites, winter roost areas) within ¼ mile of an added route or area; (5) The proportion of a species (or species group's) habitat that is affected by motorized routes.

Methodology: GIS analysis of added routes in relation to habitat and important/sensitive wildlife biota areas.

3. *Direct and indirect effects of changes to the existing NFTS including identifying vehicle class*

Rationale: Literature indicates that placement of routes in relation to habitat can affect wildlife species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Gaines et al. 2003, Trombulek and Frissell 2000, USDA 2000). Changing the vehicle class on NFTS routes may also result in adverse impacts to wildlife. For instance, when routes that have historically been managed as Maintenance Level 1 (ML1) roads are changed to trails they then become open to public use. Opening these roads for public use would essentially result in the same direct effects to wildlife as adding a route to the system.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Indicator(s): (1) Miles of ML1 road converted to trail within occupied wildlife habitat; (2) Miles of ML1 road converted to trail within suitable, preferred, and emphasis wildlife habitat; (3) Miles of ML1 road converted to trail near or within sensitive sites.

Methodology: GIS analysis of converted routes in relation to habitat and important/sensitive wildlife biota areas.

4. *Direct and indirect effects of changes to the existing NFTS including identifying seasons of use*

Rationale: Limiting the seasons of use may provide beneficial effects to wildlife species and their habitat.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Indicator(s): (1) Amount of wildlife habitat receiving protection from seasonal closures; (2) Number/Percentage of sensitive areas receiving protection from seasonal closures.

Methodology: GIS analysis of seasonal closures in relation to wildlife habitat.

5. Direct and indirect effects of implementing the mitigation measures

Rationale: The implementation of mitigation measures may result in various types of short-term adverse effects to wildlife species.

Short-term timeframe: 1 year.

Long-term timeframe: 5 years.

Spatial boundary: Forest.

Indicator(s): (1) Number of mitigation measures proposed in occupied habitat; (2) Number of mitigation measures proposed in suitable, preferred, emphasis habitat.

Methodology: GIS analysis of proposed mitigation measures in relation to habitat and important/sensitive wildlife biota areas.

6. Cumulative Effects

Rationale: Literature indicates that placement of routes in relation to habitat can affect wildlife species by increasing human-caused mortality, changing behavior due to disturbance, and modifying habitat (Gaines et al. 2003, Trombulek and Frissell 2000, USDA 2000).

Short-term timeframe: not applicable; cumulative effects analysis will be done only for the long-term time frame.

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Methodology: GIS analysis of past/current, added, and future routes in relation to habitat and important/sensitive terrestrial areas and in context of other past/current and future management actions affecting terrestrial habitat.

Affected Environment – General Wildlife

The Stanislaus National Forest (STF) provides habitat for numerous species of birds, mammals, amphibians, and reptiles. There are currently 6 terrestrial and aquatic wildlife species listed as Endangered or Threatened under the ESA and 21 species listed as Forest Service Sensitive (Table 3.11-2). These species and their habitats on the STF are described in detail in the Stanislaus National Forest Motorized Travel Management EIS Biological Assessment/Evaluation (BA/BE) (Pyron 2008, project record), which can be found in the project record and is herein incorporated by reference. Species-specific information is summarized below within the species specific analysis. In addition, there are 12 Management Indicator Species (MIS) on the STF (Table 3.11-2). These species and their habitats are described in detail in the Stanislaus National Forest Motorized Travel Management Project MIS Report (Pyron, January, 2009), which can be found in the project record and is herein incorporated by reference. Species-specific information is summarized below within the species specific analysis.

Some of these species are currently being affected by cross-country motorized use of the Stanislaus National Forest. Literature describing the effects of motorized roads and trails upon wildlife have often grouped or categorized species in various ways to describe these effects (Knight and Gutzwiller, ed. 1995, Gaines et al. 2003, Wisdom et al 2000). Gaines et al. (2003) categorized species into groups based upon a combination of their biology and interactions with road- and motorized trail-associated factors; the following groups are used to assess potential impacts from motorized use on the STF: (1) old forest associated (or late-successional forest associated) species; (2) ungulates; (3) riparian-associated species; and(4) aquatic species (Table 3.11-3).

The following species were considered, but will not be analyzed any further within this document because they are not known to occur within the analysis area and would not be affected by the project alternatives: the delta smelt, central valley steelhead, hardhead, California tiger salamander, and the Swainson's hawk. Endangered, and Forest Service designated "sensitive species" (TES) and STF MIS likely to be affected by motorized road or trail use, fall into these categories as shown in Table 3.11-3.

Table 3.11-2 Special Status Terrestrial and Aquatic Wildlife Species

Common Name	Scientific Name	Status
Invertebrates		
Valley Elderberry Longhorn Beetle	Desmocerus californicus dimorphus	T
Aquatic Macroinvertebrates	Numerous Species	MIS
Fish		
Delta Smelt	Hypomesus transpacificus	T
Lahontan Cutthroat Trout	Oncorhynchus clarki henshawi	T
Central Valley Steelhead	Oncorhynchus mykiss	T
Hardhead	Mylopharodon conocephalus	S
Reptiles and Amphibians		
California Red-legged Frog	Rana aurora draytonii	T
California Tiger Salamander	Ambystoma californiense	T
Relictual (Hell Hollow) Slender Salamander	Batrachoseps (diabolicus) relictus	S
Limestone Salamander	Hydromantes brunus	S
Yosemite Toad	Bufo canorus	S
Foothill Yellow-legged Frog	Rana boylii	S
Mountain (Sierra Nevada) Yellow-legged Frog	Rana (sierrae) muscosa	S
Western Pond Turtle	Clemmys marmorata	S
Pacific Tree (Chorus) Frog	Pseudacris regilla	MIS
Birds		
Bald Eagle	Haliaeetus leucocephalus	S
California Spotted Owl	Srix occidentalis occidentalis	S, MIS
Great Gray Owl	Strix nebulosa	S
Northern Goshawk	Accipiter gentilis	S
Swainson's Hawk	Buteo swainsoni	S
Peregrine Falcon	Falco peregrinus	S
Willow Flycatcher	Epidonax traillii	S
Sooty (Blue) Grouse	Dendragapus obscurus	MIS
Mountain Quail	Oreortyx pictus	MIS
Black-backed Woodpecker	Picoides arcticus	MIS
Hairy Woodpecker	Picoides villosus	MIS
Fox Sparrow	Passerella iliaca	MIS
Yellow Warbler	Dendroica petchia	MIS
Mammals		
Mule Deer	Odocoileus hemionus	MIS
American Marten	Martes americana	S, MIS
Pacific Fisher	Martes pennanti pacifica	S
California Wolverine	Gulo gulo luteus	S
Sierra Nevada Red Fox	Vulpes vulpes necator	S
Northern Flying Squirrel	Glaucomys sabrinus	MIS
Townsend's Big-eared Bat	Corynorhinus townsendii	S
Western Red Bat	Lasiurus blossevillii	S
Pallid Bat	Antrozous pallidus	S

The project BA/BE report contains the analysis of the effects of all project alternatives (Alternatives 1, 2, 3, 4 and 5) to all TES species. Analysis of the effects of the project alternatives in these reports indicated that the following species would not be affected by the action alternatives (Alternatives 1, 4 and 5); therefore, they are not analyzed in detail in this document: valley elderberry longhorn beetle, limestone salamander, relictual (Hell Hollow) slender salamander, Lahontan cutthroat trout, Townsend's big-eared bat, western red bat, pallid bat, willow flycatcher, peregrine falcon, California wolverine, and Sierra Nevada red fox. For further disclosure of the effects of the project alternatives to the afore mentioned species refer to the project BA/BE, which can be found in the project record.

The project MIS report contains the analysis of the effects of the project alternative (Alternatives 1, 2, 3, 4, and 5) to all MIS species. Analysis of the effects of the project alternatives in this report indicated that the following MIS species habitat would be unimpacted by the action alternatives (Alternatives 1, 4, and 5) at the bioregional scale: Pacific tree frog, black-backed woodpecker, and the hairy woodpecker. Analysis of the effects of the project alternatives in this report indicated that the following MIS species habitat would be nominally impacted by the action alternatives (Alternatives 1, 4, and 5) at the bioregion scale: macroinvertebrates, fox sparrow, yellow warbler, mountain quail, sooty (blue) grouse, and northern flying squirrel. Therefore, these species will not be discussed further within this document. For further disclosure of the effects of the project alternatives to the above mentioned species refer to the project MIS report (Pyron 2009, project record).

Table 3.11-3 Wildlife group and terrestrial and aquatic species within groups

Wildlife Group	Species
Late-successional forest associated species	American marten, Pacific fisher, California spotted owl, northern goshawk
Ungulates	Mule deer
Riparian-associated species	Bald eagle, great gray owl
Aquatic-associated species	California red-legged frog, foothill yellow-legged frog, mountain yellow-legged frog, western pond turtle, Yosemite toad

Terrestrial Biota

Late-Successional Forest Species

American Marten – Affected Environment

Species and Habitat Account

The American marten is a wide-ranging member of the Mustelidae family. Marten are widely distributed throughout the coniferous habitats of North America and currently occupy much of their historic range in California (Kucera and Zielinski 1995). Incidental observations of marten have been recorded throughout the higher elevations of the STF. Marten are morphologically adapted to be mobile in deep snow, and typically inhabit higher elevations receiving snow depths greater than 23 centimeters per winter month (Krohn et al. 1997). Numerous mesocarnivore surveys have been completed on the STF with the use of baited camera stations and track plates. Results of these surveys further indicate that marten use higher elevations within the project area. Marten were not found at survey stations below 5,000 feet in elevation and the majority of them were above 7,000 feet. Although the presence of marten has been documented within the project area, there are no known den sites on STF.

Martens typically prefer late seral coniferous forests above 5,000 feet in elevation that have moderate-to-high canopy closure interspersed with riparian areas and meadows (Freel 1991, Zeiner et al. 1990). These habitats typically contain an abundance of snags and downed logs needed to provide the coarse woody debris that is necessary for effective winter foraging (Sherburne and Bissonette 1994). Important habitat attributes are: vegetative diversity, with predominately mature forest; snags; dispersal cover; and large woody debris (Allen 1987). Martens selected stands with 40 to 60 percent canopy closure for both resting and foraging and avoided stands with less than 30 percent canopy closure (Spencer et al. 1983). Martens generally avoid habitats that lack overhead cover, presumably because these areas do not provide protection from avian predators (Allen 1982, Bissonette et al 1988, Buskirk and Powell 1994, Spencer et al. 1983). Although martens tend to spend the majority of their time in mature forests, meadows are important components of foraging habitat. Spencer et al. (1983) found that marten preferred areas within 60 meters of meadows and were rarely found further than 400 meters from a meadow. For the purposes of this analysis, preferred marten habitat on the STF has been mapped as: CWHR types PPN, SMC, WFR, RFR; classes 5 and 6; canopy closures M and D (USDA 2007b).

American Marten – Environmental Consequences

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to marten. Although thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Miles of routes added to the NFTS within preferred marten habitat.
- Miles of ML1 roads converted to trails within preferred marten habitat.
- Miles of routes added to the NFTS within meadows.
- Miles of ML1 roads converted to trails within meadows
- Existing density (mi/mi2) of NFTS routes within preferred marten habitat (outside wilderness areas).
- Density (mi/mi2) of NFTS routes within preferred marten habitat (outside wilderness areas) with proposed designated routes.
- Percentage of preferred marten habitat occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails.

Direct and Indirect Effects

General - All Alternatives

The project alternatives could result in direct and indirect effects to marten by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on marten through: human-caused mortality, changes in behavior, and habitat modification.

Human-Caused Mortality: Opening routes to public use would improve access to marten habitat. Improving access to these habitats may result in increased instances of collisions with vehicles or incidental trapping. Marten are widely known for their vulnerability to trapping (Ruggerio et al. 1994). Since the State of California banned the use of body-gripping traps in 1998, the incidental loss of marten to trapping has been greatly reduced. Collisions with vehicles have been identified as a potentially significant source of marten mortality (Buskirk and Ruggerio 1994, Ruggerio et al. 1994). Collisions typically occur along well maintained roadways that allow high rates of travel. Routes proposed for designation within the project alternatives are native surfaced routes that allow much slower rates of travel. These types of routes result in far fewer collisions than highways or paved routes.

Changes in Behavior: Types of changes in behavior that may result from the project alternatives include: displacement or avoidance or disturbance at a specific location. The use of motorized vehicles in marten habitat may result in disturbance to martens that are foraging or denning. Robitaille and Aubrey (2000) studying marten in an area of low road density and low traffic (primarily logging roads), found that marten use of habitat within 300 and 400 meters of roads was significantly less than habitat use 700 or 800 meters distance. However, in a study conducted in northern California, Zielinski (2007) found that marten occupancy or probability of detection did not change in relation to the presence or absence of motorized routes and OHV use when the routes (plus a 50 meter buffer) did not exceed about 20 percent of a 50 square kilometer area, and traffic did not exceed one vehicle every 2 hours. The study did not, however, measure behavioral changes or changes in use patterns and the study authors caution that application of their results to other locations would apply only if OHV/OSV use at the other locations is no greater than reported in their study.

Therefore, it did not appear that within the study area OHV activity resulted in changes to the foraging behavior of martens. While there is little research disclosing the specific effects of disturbance to marten den sites, other forest carnivores have been shown to abandon the den site upon human disturbance (Copeland 1996). Wet meadows have been shown to be particularly important foraging areas for marten (USDA 2001). Routes added to the NFTS near and through meadows may increase disturbance within the meadow, thereby reducing the meadow's value as a foraging habitat for martens.

Habitat Modification: Roads and trails modify marten habitat by directly removing it or indirectly by reducing its quality. While simple habitat loss is the most obvious, roads and trails also reduce habitat quality through fragmentation. Since marten have been found to be sensitive to changes in overhead cover, clearings associated with routes may reduce habitat quality near routes for foraging and may reduce marten movement between habitats that are separated by routes (Buskirk and Powell 1994, Hargis et al. 1999).

Hazard tree removal along NFTS roads has the potential to reduce downed logs and suitable resting and denning sites for marten. Hazard tree removal is typically conducted along Maintenance Level 2, 3, 4 and 5 roads (not Maintenance Level 1 roads or trails). The project alternatives primarily propose actions on trails and maintenance level (ML) 1 roads. Changing use, converting roads to trails, and road closures that are proposed on ML 1 and 2 roads within any of the project alternatives would result in a net reduction in miles of road on which hazard trees may be removed. These actions will provide a benefit to wildlife through snag and woody downed log retention. Therefore, the minor amounts of impact that the project alternatives may have on future hazard tree removal would be beneficial to marten habitat.

Wet meadows have been shown to be particularly important foraging areas for marten (USDA 2001). Meadow habitat quality may be affected numerous different ways by motorized travel. The most obvious way motorized vehicles may impair meadow quality is through direct mechanical damage (rutting). Since soil typically has lower bulk density and can be more easily penetrated when it is wet, mechanical damage often occurs in meadows that are naturally wet, in dry meadows after significant rainfall, or immediately following the retreat of the snow at higher elevations. When roads or trails are created in meadows they may intercept surface and subsurface flow (Kattelmann 1996). When flows are intercepted and redirected, meadow drying occurs, resulting in changes to the fauna and flora associated with it.

Changing the faunal community within meadows may impact their value as foraging areas for marten. Microtus species have been noted as being important prey items to martens at all times of the year (Zielinski et al. 1983). Winter (1982) found that Microtus were associated with moist areas that had good grass cover. Therefore, slight shifts in meadow hydrology caused by motorized travel may impact suitable habitat for mictrotines; thereby, adversely affecting the marten prey source.

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within preferred marten habitat and near meadows. This would reduce the risk of direct and indirect effects to martens from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 1, several analyses were completed (Table 3.11-4). Actions proposed in this alternative would not likely result in any human-caused mortality, but would likely increase disturbance to some marten within the project area. Although there are no documented den sites within the project area, it is assumed that they occur. Since den sites are specifically selected and there are ample suitable denning locations throughout the project area, the addition of these routes would not likely result in disturbance to den sites. Increases in disturbance to foraging martens may reduce some individual's fitness, but, since only about 11% of the habitat would be subject to this increased disturbance (Table 3.11-4), these impacts would not result in any population level impacts to the marten.

Actions proposed in this alternative would result in some indirect effect through habitat modification. The addition of routes to the NFTS within preferred marten habitat and near meadows would result in minor amounts of habitat fragmentation. Since the majority of these routes are narrow native surfaced routes they will only result in minor reductions in overhead cover and would not significantly reduce marten movement between habitat patches. Field surveys were completed on all routes that were proposed to be added to the NFTS within meadows. The purpose of the field surveys was to determine whether the route would have the potential to affect hydrology within the meadow. Field surveys indicated that the routes that were proposed to be added within meadows would not significantly alter their hydrology. Although this alternative would result in some indirect effects to marten through habitat modification, these impacts are minor and would not be extensive enough to result in impacts to marten populations within the project area.

Season of Use: Marten typically inhabit higher elevations with greater amounts of snow; therefore, preferred habitat primarily falls within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Although the exact timing may vary, marten typically have their young in the spring. Therefore, these closures would reduce disturbance to denning and foraging martens. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and would protect meadows from mechanical damage.

Mitigation Measures: The types of mitigation measures that would be implemented within preferred marten habitat include: tread hardening, drain dips, fence/log/rock barriers, and hardened stream crossings. Implementation of these mitigation measures would include hand tool and machine work that would result in short-term disturbance to individual marten within the project area. This amount of disturbance would not likely reduce any individual marten's fitness and would not result in any population level impacts within the project area.

Table 3.11-4 Alternative 1 - Direct and Indirect Effects Indicators (American marten)

Indicators	
Miles of routes added to the NFTS within preferred marten habitat	27.63
Miles of ML1 roads converted to trails within preferred marten habitat	10.26
Miles of routes added to the NFTS within meadows	1.27
Miles of ML1 roads converted to trails within meadows	0.48
Existing density (mi/mi2) of routes under STF jurisdiction within preferred marten habitat	2.48
Density (mi/mi2) of routes under STF jurisdiction within preferred marten habitat with proposed designated routes (additional density)	2.6 (.12)
Percentage of preferred marten habitat occurring within a 400 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	11.39

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. Therefore, it is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of disturbance to marten and increased fragmentation/modification of their habitat. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by the continued proliferation of routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although any seasonal closures implemented within this alternative would reduce potential disturbance to marten, these seasonal closures would not adequately protect all meadows from mechanical damage that may occur since cross-country travel would be allowed. Therefore, it may be assumed that hydrology within some meadows may be affected and that it may result in impacts to marten prey base.

Mitigation Measures: There would not be any mitigation measures implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within preferred marten habitat and near meadows. This would reduce the risk of direct and indirect effects to marten from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any motorized routes to the NFTS, nor would it change the type of use on any current NFTS routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to marten.

Mitigation Measures: There would not be any mitigation measures implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within preferred marten habitat and near meadows. This would reduce the risk of direct and indirect effects to martens from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-5). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a slight increase from Alternative 1 in the number of routes added to the system or converted to a trail within preferred marten habitat and within meadows, there would be a slight increase in the direct and indirect effects to marten within the project area. Although these increases would result in more individuals being impacted, these increases, which would impact a total of about 13% of preferred marten habitat (Table 3.11-5), would not likely be significant enough to result in impacts to marten populations within the project area.

Season of Use: Marten typically inhabit higher elevations with greater amounts of snow; therefore, preferred habitat primarily falls within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Although the exact timing may vary, marten typically have their young in the spring. Therefore, these closures would reduce disturbance to denning and foraging martens.

Furthermore, the closure of routes during the wet weather season reduces soil perturbation and would protect meadows from mechanical damage.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-5 Alternative 4 - Direct and Indirect Effects Indicators (American marten)

Indicators	
Miles of routes added to the NFTS within preferred marten habitat	33.17
Miles of ML1 roads converted to trails within preferred marten habitat	11.78
Miles of routes added to the NFTS within meadows	1.69
Miles of ML1 roads converted to trails within meadows	0.48
Existing density (mi/mi2) of routes under STF jurisdiction within preferred marten habitat	2.48
Density (mi/mi2) of routes under STF jurisdiction within preferred marten habitat with proposed designated routes (additional density)	2.63 (.15)
Percentage of preferred marten habitat occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	12.75

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within preferred marten habitat and near meadows. This would reduce the risk of direct and indirect effects to martens from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-6). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a significant decrease from Alternative 1 in the number of routes added to the system or converted to a trail within preferred marten habitat and within meadows, there would be a significant decrease in the direct and indirect effects to marten within the project area. Since these impacts would affect a very small percentage of marten habitat (Table 3.11-6), these actions would likely impact some individuals but would not likely result in impacts to populations within the project area over the short or long-term.

Season of Use: Marten typically inhabit higher elevations with greater amounts of snow; therefore, preferred habitat primarily falls within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Although the exact timing may vary, marten typically have their young in the spring. Therefore, these closures would reduce disturbance to denning and foraging martens. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and would protect meadows from mechanical damage.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-6 Alternative 5 - Direct and Indirect Effects Indicators (American marten)

Indicators	
Miles of routes added to the NFTS within preferred marten habitat	2.65
Miles of ML1 roads converted to trails within preferred marten habitat	1.03
Miles of routes added to the NFTS within meadows	0.20
Miles of ML1 roads converted to trails within meadows	0
Existing density (mi/mi2) of routes under STF jurisdiction within preferred marten habitat	2.48
Density (mi/mi2) of routes under STF jurisdiction within preferred marten habitat with proposed designated routes (additional density)	2.49 (.01)
Percentage of preferred marten habitat occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	1.6%

CUMULATIVE EFFECTS

In 2001 and 2004, the Forest Service amended 11 Sierra Nevada Forest Plans to better address the needs of old forest-associated species (USDA 2001 and 2004). In this assessment, the following key risk factors were identified for marten in the Sierra Nevada: (1) habitat alteration, particularly the removal of overhead cover, large diameter trees, or coarse woody material; (2) livestock grazing and other activities that might reduce the availability of prey in meadows; and (3) the use of roads and associated human access. Appendix B provides a list and description of past, present, and reasonably foreseeable vegetation and fuels management projects on NFS lands and private lands within the STF boundary. Some, but not all, of these activities have contributed to effects on marten and have the potential to impact marten in the near future.

On the STF, several activities have influenced these risk factors for marten. Past timber harvest and more recent fuels reduction treatments have reduced important habitat components in marten habitats. Between 2000 and 2008, vegetation/fuels thinning treatments on NFS lands have occurred within less than 5% of marten habitat. These vegetation treatments have reduced habitat quality for marten by reducing canopy cover, structural complexity, and coarse woody material within treated units. At the larger landscape scale, these treatments may affect the size and connectivity of patches of high quality habitat. Vegetation/fuels reduction projects will continue to be one of the primary activities affecting marten habitat on the STF (Appendix B). These projects will likely occur on an estimated 3,500 acres per year, based upon the acreage treated in 2006. Some, but not all of the projects will affect marten habitat. Over time, fuels treatments are expected to alter 20 to 30 percent of the landscape, with a resulting expectation that the amount of habitat removed by stand replacing wildfires will be reduced in response to these treatments (USDA 2004).

The California Department of Forestry and Fire Protection currently lists approximately 2,365 acres of private land within the STF administrative boundary for which timber harvest plans have been submitted. The portion of these projects occurring within the marten's range has not been determined. Timber harvest on private lands is generally more intensive and does not typically provide suitable habitat for marten.

Livestock grazing occurs on 35 active grazing allotments on the STF, totaling approximately 792,042 acres of NFS and private lands. In some meadows, livestock grazing has reduced the suitability of meadow vegetation for microtine rodents and other marten prey (USDA 2001). On the STF, the impacts of livestock grazing on meadows has been steadily decreasing as fewer allotments are grazed and as forage utilization levels are being reduced by stricter standards established by the Sierra Nevada Forest Plan Amendment. These past and present effects contribute to the effects of the project Alternatives upon meadow habitat and condition.

Recreation use has increased and is expected to continue to increase on the STF (see 3.04, Recreation), resulting in greater likelihood and magnitude of human disturbance to wildlife. OHV use has been increasing at an even more rapid pace than other forms of recreation, based upon State figures for OHV sales (see 3.04, Recreation). The project alternatives would contribute to these past and current conditions with added displacement from noise and human activity, and fragmentation of habitat. Because Alternative 2 does not prohibit cross-country travel, there is a high degree of uncertainty about future route proliferation and associated cumulative impacts upon marten. The action alternatives do not result in a loss of habitat (no route construction), but noise and traffic disturbance would influence habitat use and availability where marten may be present. This influence, combined with fuels treatments and increasing recreation activity, could affect marten and their habitat on the STF. In the future, there is approximately 5 miles of new trail construction that is proposed to be added to the NFTS as well as numerous short route segments for dispersed camping access. These trails are proposed to provide "connector routes" between existing NFTS routes and motorized access to historical dispersed camping opportunities.

Unauthorized motorized routes that are prohibited to motorized use may receive non-motorized use (hiking, mountain bicycling, equestrian). It is generally considered that non-motorized use would result in fewer disturbances to marten. The extent and magnitude of non-motorized use is unknown. However, it is expected that over time, unauthorized routes that are prohibited to motorized use will eventually become revegetated and recover either through active or passive restoration means.

Direct and indirect effects of the project alternatives, as described previously, cumulatively contribute to each of the risk factors identified for marten. Because Alternative 2 does not prohibit cross-country travel, there is a high degree of uncertainty about future route proliferation and associated cumulative impacts upon marten. Alternative 3 would prohibit cross-country travel and would not add any routes to the NFTS, therefore the effects of this alternative would be beneficial. Alternatives 1, 4 and 5 contribute cumulatively to the disturbance and habitat alteration from fuels treatments and habitat alteration from livestock grazing in meadows. Alternatives 4, 1, and 5 would result in progressively lower risk to martens due to the amount of motorized routes being added to the system. These alternatives do not result in a loss of habitat (no route construction), but may influence marten habitat. This influence, combined with fuels treatment and livestock grazing effects upon marten habitat, would likely impact individuals throughout the project area. Inventoried Roadless Areas and adjacent wilderness areas may become increasingly important as the cumulative effect of fuels treatment activities expand within other portions of marten habitat. Considering the proportion of marten habitat influenced by motorized routes and projections for future increases in recreation uses and OHV activity, the alternatives could result in cumulative impacts when combined with other factors affecting marten habitat (Zielinski et al. 2008). Although the action alternatives may result in cumulative impacts, they are very minor in comparison to existing road densities and other potentially significant impacts (fire, fuels/vegetation treatments).

Table 3.11-7 Ranking of Alternative Indicators (American marten)

Indicators	Rankings of Alternatives for Each Indicator[1]				
	1	2	3	4	5
Miles of routes added to the NFTS within preferred marten habitat	3	1	5	2	4
Miles of ML1 roads converted to trails within preferred marten habitat	3	1	5	2	4
Miles of routes added to the NFTS within meadows	3	1	5	2	4
Miles of ML1 roads converted to trails within meadows	3	1	5	3	4
Density (mi/mi2) of routes under STF jurisdiction within preferred marten habitat with proposed designated routes	3	1	5	2	4
Percentage of preferred marten habitat occurring within a 400 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Average	**3**	**1**	**5**	**2.16**	**4**

[1] A score of 5 indicates the alternative has the least impact for terrestrial biota related to the indicator; A score of 1 indicates the alternative has the most impact for terrestrial biota related to the indicator. If both Alternatives were equal they were both given the same (higher of the two) ranking.

Summary of Effects

The American marten occupies most of its historic range in the Sierra Nevada and is well distributed on the STF, though trends in populations or habitat are not well known (Kucera et al. 1995). With the exception of Alternative 3, which would have beneficial impacts to the American marten, the direct and indirect effects of the project alternatives (1, 2, 4 and 5) combined with the cumulative effects are not likely to result in a trend toward Federal listing or a loss of viability for this species. Based on the small proportion of late seral closed canopy coniferous forest habitat that is directly, indirectly and cumulatively affected (0% to 3% of Sierra Nevada habitat) by the alternatives within a 200-meter zone of influence of proposed motorized route additions, the STF Motorized Travel Management Project will not alter existing trend in the habitat, nor will it lead to a change is the distribution of

American marten across the Sierra Nevada bioregion. For further discussion of the effects analysis and determinations, see the project MIS and BA/BE reports (Pyron 2009, see project record).

Pacific Fisher – Affected Environment

Species and Habitat Account

The fisher is a wide-ranging forest mustelid that historically occurred throughout much of the Sierra Nevada. Currently, they occupy a very small portion of their historical range in California and are isolated in two remnant populations (Zielinski et al. 1995, Zielinski et al. 2004). One of these populations is located in the southern Sierras, currently south of the STF. Numerous mesocarnivore surveys have been completed on the STF with the use of baited camera stations and track plates, but there have been no recent detections or verified sightings of fisher on the STF. Although there are currently no known populations of fisher within the project area, over the long-term they may become naturally re-established from known populations located south of the project area.

The fisher typically occupies mature forests with relatively high canopy closure, significant amounts of downed woody debris and snags, and adequate habitat connectivity. Green et al. (submitted) provide detailed discussions and an overview of the existing literature pertaining to the Pacific fisher. Suitable habitat for the fisher is located throughout the Forest, but there are no known den sites on the STF. For the purposes of this analysis, preferred fisher habitat on the STF has been mapped as: CWHR types ASP, PPN, JPN, MHC; classes 4, 5 and 6; canopy closures M and D.

Pacific Fisher – Environmental Consequences

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to fisher. Although thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Miles of routes added to the NFTS within preferred fisher habitat.
- Miles of ML 1 roads converted to trails within preferred fisher habitat.
- Existing density (mi/mi2) of NFTS routes within preferred fisher habitat.
- Density (mi/mi2) of NFTS routes within preferred fisher habitat with proposed designated routes.

DIRECT AND INDIRECT EFFECTS

General - All Alternatives

The project alternatives could result in direct and indirect effects to fisher by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on fisher through: human-caused mortality, changes in behavior, and habitat modification.

Human-Caused Mortality: Based upon a review of the literature, fisher were found to likely be affected by the same road and motorized trail-associated direct effects as marten. Refer to the previous discussion for marten.

Changes in Behavior: Based upon a review of the literature, fisher were found to likely be affected by the same road and motorized trail-associated direct effects as marten. Refer to the previous discussion for marten.

Habitat Modification: Roads and trails modify fisher habitat by directly removing it or indirectly by reducing its quality. While simple habitat loss is the most obvious, roads and trails also reduce habitat quality through fragmentation. Since fisher have been found to be sensitive to changes in overhead cover, clearings associated with routes may reduce habitat quality near routes for foraging and may reduce fisher movement between habitats that are separated by routes (Buskirk and Powell 1994, Hargis et al. 1999).

Hazard tree removal along NFTS roads has the potential to reduce downed logs and suitable resting and denning sites for fisher. Hazard tree removal is typically conducted along Maintenance Level 2, 3, 4 and 5 roads (not Maintenance Level 1 roads or trails). The project alternatives primarily propose actions on trails and maintenance level (ML) 1 roads. Changing use, converting roads to trails, and proposing closures that are proposed on ML 1 and 2 roads within any of the project alternatives would result in a net reduction in miles of road on which hazard trees may be removed. These actions will provide a benefit to wildlife through snag and woody downed log retention. Therefore, the minor amounts of impact that the project alternatives may have on future hazard tree removal would be beneficial to fisher habitat.

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within preferred fisher habitat. This would reduce the risk of direct and indirect effects to fisher from motorized travel over the long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 1, several analyses were completed (Table 3.11-8). Actions proposed in this alternative would not likely result in any human-caused mortality, but would likely increase disturbance to some fisher within the project area over the long-term (if re-established). Since fisher are not known to currently occupy the STF, there are no documented fisher den sites within the project area. Therefore, this alternative would not have the potential to disturb fisher den sites. Potential increases in disturbance to foraging fisher may reduce some individual's fitness over the long-term (if re-established), but these impacts would not likely result in any population level impacts.

Actions proposed in this alternative would result in some indirect effects through habitat modification. The addition of routes to the NFTS within preferred fisher habitat would result in minor amounts of habitat fragmentation. Since the majority of these routes are narrow native surfaced routes they would only result in minor reductions in overhead cover and would not significantly reduce fisher movement between habitat patches.

Season of Use: Preferred fisher habitat is primarily located throughout mid-elevations within the project area. Therefore, motorized use would be seasonally restricted in approximately 50% of preferred fisher habitat. These closures would reduce disturbance to foraging fisher over the long-term (if re-established).

Mitigation Measures: The types of mitigation measures that would be implemented within preferred fisher habitat include: tread hardening, drain dips, fence/log/rock barriers, and hardened stream crossings. Implementation of these mitigation measures would include hand tool and machine work that would result in short-term disturbance to individual fisher within the project area (if re-established). This amount of disturbance would not likely reduce any individual fisher's fitness and would not result in any population level impacts within the project area.

Table 3.11-8 Alternative 1 - Direct and Indirect Effects Indicators (Pacific fisher)

Indicators	
Miles of routes added to the NFTS within preferred fisher habitat	22.13
Miles of ML1 roads converted to trails within preferred fisher habitat	6.28
Existing density (mi/mi2) of routes under STF jurisdiction within preferred fisher habitat	1.58
Density (mi/mi2) of routes under STF jurisdiction within preferred fisher habitat with proposed designated routes (additional density)	1.69 (0.11)

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. Therefore, it is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of disturbance to fisher (if re-established) and increased fragmentation/modification of their habitat. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by the continued proliferation of routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to fisher (if re-established).

Mitigation Measures: There would not be any mitigation measures implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within preferred fisher habitat. This would reduce the risk of direct and indirect effects to fisher from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any motorized routes to the NFTS, nor would it change the type of use on any current NFTS routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to fisher (if re-established).

Mitigation Measures: There would not be any mitigation measures implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within preferred fisher habitat. This would reduce the risk of direct and indirect effects to fisher from motorized travel over the long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-9). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a slight increase from Alternative 1 in the number of routes added to the system or converted to a trail within preferred fisher habitat, there would be a slight increase in the direct (if re-established) and indirect effects to fisher within the project area. Although these increases would result in more individuals being impacted, these increases would not likely be significant enough to result in impacts to fisher populations within the project area.

Season of Use: Preferred fisher habitat is primarily located throughout mid-elevations within the project area. Therefore, motorized use would be seasonally restricted in approximately 50% of preferred fisher habitat. These closures would reduce disturbance to foraging fisher over the long-term (if re-established).

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-9 Alternative 4 - Direct and Indirect Effects Indicators (Pacific fisher)

Indicators	
Miles of routes added to the NFTS within preferred fisher habitat	25.43
Miles of ML1 roads converted to trails within fisher habitat	11.15
Existing density (mi/mi2) of routes under STF jurisdiction within preferred fisher habitat	1.58
Density (mi/mi2) of routes under STF jurisdiction within preferred fisher habitat with proposed designated routes (additional density)	1.70 (0.12)

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within preferred fisher habitat. This would reduce the risk of direct and indirect effects to fisher from motorized travel over the long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-10). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a significant decrease from Alternative 1 in the number of routes added to the system or converted to a trail within preferred fisher habitat, there would be a significant decrease in the direct (if re-established) and indirect effects to fisher within the project area. These decreases would result in fewer individuals being impacted and less habitat being fragmented, and this alternative is unlikely to result in impacts to fisher populations within the project area.

Season of Use: Preferred fisher habitat is primarily located throughout mid-elevations within the project area. Therefore, motorized use would be seasonally restricted in approximately 50% of preferred fisher habitat. These closures would reduce disturbance to foraging fisher over the long-term (if re-established).

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-10 Alternative 5 - Direct and Indirect Effects Indicators (Pacific fisher)

Indicators	
Miles of routes added to the NFTS within preferred fisher habitat	4.27
Miles of ML1 roads converted to trails within fisher habitat	0.16
Existing density (mi/mi2) of routes under STF jurisdiction within preferred fisher habitat	1.58
Density (mi/mi2) of routes under STF jurisdiction within preferred fisher habitat with proposed designated routes (additional density)	1.60 (0.02)

CUMULATIVE EFFECTS

In 2004, the USFWS determined that listing of the West Coast population of the fisher was warranted, and identified the following primary threats from activities on NFS lands: (1) loss and fragmentation of habitat due to timber harvest and hazardous fuels reduction; (2) increased predation resulting from canopy cover reductions; (3) mortality from vehicle collisions; and (4) increased human disturbance. Appendix B provides a list and description of past, present, and reasonably foreseeable projects on the STF and private lands within the Forest boundary.

On the STF, past timber harvest and more recent hazardous fuels reduction projects have reduced large trees, canopy cover, structural complexity, and coarse woody material within treated units. Between 2000 and 2008, vegetation/fuels thinning treatments on NFS lands have occurred within less than 4% of fisher habitat. These vegetation treatments have reduced habitat quality for fisher by reducing canopy cover, structural complexity, and coarse woody material within treated units. At the larger landscape scale, these treatments may affect the size and connectivity of patches of high quality habitat. Vegetation/fuels reduction projects will continue to be one of the primary activities affecting fisher habitat on the STF (Appendix B). These projects will likely occur on an estimated 3,500 acres per year, based upon the acreage treated in 2006. Some, but not all of them will affect fisher habitat. Over time, fuels treatments are expected to alter 20 to 30 percent of the landscape, with a resulting expectation that the amount of habitat removed by stand replacing wildfires will be reduced in response to these treatments (USDA 2004).

Recreation use has increased and is expected to continue to increase on the STF (see Recreation section Affected Environment), resulting in greater likelihood and magnitude of human disturbance to wildlife. OHV use has been increasing at an even more rapid pace than other forms of recreation, based upon State figures for OHV sales (see Recreation section). If fisher were to recolonize or to be reintroduced on the STF, project alternatives would contribute to these past and current conditions with added displacement from noise and human activity, and fragmentation of habitat. Because Alternative 2 does not prohibit cross-country travel, there is a high degree of uncertainty about future route proliferation and associated cumulative impacts upon fisher. The action alternatives do not result in a loss of habitat (no route construction), but noise and traffic disturbance would influence habitat use and availability where fisher may be present (if re-established). In the future, there is approximately 5 miles of new trail construction that is proposed to be added to the NFTS as well as numerous short route segments for dispersed camping access. These trails are proposed to provide “connector routes” between existing NFTS routes and motorized access to historical dispersed camping opportunities.

In addressing the effects of roads upon fisher, the USFWS concluded that, road-related effects on low density carnivores like fishers “are more severe than most other wildlife species due to their large home ranges, relatively low fecundity, and low natural population density.” Alternative 3 would result in beneficial impacts to fisher (if re-established) within the project area. Since routes proposed within the action alternatives are native surfaced routes that do not generally have high rates of travel, these road-related effects are expected to be minimal. The greatest influence upon fisher habitat occurs under Alternative 2 and progressively lower levels of impact occur under Alternatives 4, 1 and 5. Thus, the combined effect of the project alternatives and current levels of hazardous fuels reduction treatments may result in adverse cumulative effects (if re-established). These effects could potentially have minor impacts on the ability or likelihood for fisher to re-occupy suitable habitat on the STF. Although the action alternatives may result in cumulative impacts, they are very minor in comparison to existing road densities and other potentially significant impacts (fire, fuels/vegetation treatments).

SUMMARY OF EFFECTS

The Pacific fisher has a limited distribution in the Sierra Nevada of California and is not known to occur within the project area. With the exception of Alternative 3, which would have beneficial impacts to suitable Pacific fisher habitat, the direct and indirect effects (if re-established) of the project alternatives (1, 2, 4 and 5) combined with the cumulative effects are not likely to result in a loss of viability for this species that has been found warranted for federal listing. For further discussion of the effects analysis and determinations, see the project BA/BE (project record).

Table 3.11-11 Ranking of Alternative Indicators (Pacific fisher)

Indicators	Rankings of Alternatives for Each Indicator[1]				
	1	2	3	4	5
Miles of routes added to the NFTS within preferred fisher habitat	3	1	5	2	4
Miles of ML1 roads converted to trails within preferred fisher habitat	3	1	5	2	4
Density (mi/mi2) of routes under STF jurisdiction within preferred fisher habitat with proposed designated routes	3	1	5	2	4
Average	3	1	5	2	4

[1] A score of 5 indicates the alternative has the least impact for terrestrial biota related to the indicator; A score of 1 indicates the alternative has the most impact for terrestrial biota related to the indicator.. If both Alternatives were equal they were both given the same (higher of the two) ranking.

California Spotted Owl – Affected Environment

Species and Habitat Account

The California spotted owl is one of three recognized subspecies of spotted owls. They are currently found throughout most of their historic range, which primarily occurs on the west side of the Sierra Nevada Mountains of California. The STF is located in the central portion of their range, and they are dispersed throughout the Forest. Surveys for spotted owls have been conducted on the Forest for approximately 20 years. Although these surveys have not covered the Forest in its entirety, they have covered a large majority of it. Protected Activity Centers (PACs) and Home Range Core Areas (HRCAs) are comprised of the best available habitat adjacent to known spotted owl pairs or territorial singles, encompassing approximately 300 and 700 acres, respectively. Based on systematic surveys and incidental sightings, there are currently 218 documented Protected Activity Centers (PACs) on the STF. Spotted owls inhabit a wide variety of forest types generally characterized by dense forest, high canopy closure, high structural diversity, large residual trees, and downed woody debris (Call et al. 1992, Moen and Gutierrez 1997). For the purposes of this analysis, preferred California spotted owl habitat on the STF has been mapped as: CWHR types PPN, SMC, WFR, RFR; classes 5 and 6; canopy closures M and D.

California Spotted Owl – Environmental Consequences

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the California spotted owl. Although thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Miles of routes added to the NFTS within PACs
- Miles of ML1 roads converted to trails within PACs
- Number of PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area)
- Miles of routes added to the NFTS within 400 meters of Activity Centers
- Miles of ML1 roads converted to trails within 400 meters of Activity Centers
- Number of Activity Centers occurring within 400 meters routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area)
- Number of Activity Centers occurring within 60 meters of routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area)

- Percentage of spotted owl PACs (total acres) occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails
- Percentage of preferred spotted owl habitat occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails

DIRECT AND INDIRECT EFFECTS

General - All Alternatives

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

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on spotted owls through: human-caused mortality, changes in behavior, and habitat modification.

Human-Caused Mortality: Allowing cross-country travel or adding routes to the NFTS may result in collisions with spotted owls. Although it may not be as prevalent in spotted owls as some other bird species, it has been documented. The Cascade Raptor Center (2007) reported that collisions with vehicles were one of the most common problems in northern spotted owls. Collisions with vehicles typically occur along well maintained roadways that allow high rates of travel. Routes proposed for designation within the project alternatives are native surfaced routes that allow much slower rates of travel. These types of routes would result in far fewer, if any collisions.

Changes in Behavior: Types of changes in behavior that may result from the project alternatives include: displacement or avoidance, disturbance at a specific location, or physiological response. The use of motorized vehicles in spotted owl habitat may result in disturbance to owls that are roosting or foraging. The Forest Service, Region 5, has generally assumed that activities (including road and trail use) occurring farther than 0.25 miles from California spotted owl nest sites have little potential to affect owl nesting (USDA 2004). Delaney et al. (1999) found that Mexican spotted owls were found to show an alert response to chainsaws at distances less than 0.25 miles.

Available literature indicates that the likelihood of owls flushing from a nest is greater when disturbance occurs within 60 meters (Delaney et al. 1999, Swarthout and Steidl 2001). Although it is unclear whether these levels of disturbance would result in high levels of stress, Mara and Holberton (1998) found that chronic high levels of stress hormone may have negative effects on reproduction. A study by Wasser et al. (1997) found that stress hormone levels were significantly higher in male northern spotted owls (but not females) when they were located <0.41 km from a major logging road compared to spotted owls in areas >0.41 km from a major logging road. Preliminary study results on a Northern spotted owl study in northern California, indicated that spotted owls did not flush from nest or roost sites when motorcycles were greater than 105 meters away during the post-fledgling period (Delaney and Grubb 2001). In addition, Delaney and Grubb (2003) found that spotted owl responses to motorcycle noise depended upon an array of complex factors including, sound level and frequency distribution, stimulus distance and event duration, motorcycle type and condition, frequency of motorcycle events, number of motorcycles per group, trail slope, topography, road substrate and condition, and microphone position relative to sound source. In general, motorcycle noise did not appear to affect reproductive success. However, this study is ongoing and the impacts of motorcycle noise on spotted owls is not conclusive at this point. Without further research, this analysis will assume that effects from motorized activities within 60 meters of an activity center will result in negative effects to reproduction over the short-term. Over the long-term, spotted owls that were experiencing significant disturbance at their current nest site would likely move to another suitable nest site within the PAC.

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

Hazard tree removal along NFTS roads has the potential to reduce canopy closure and increase habitat fragmentation for spotted owls. Hazard tree removal is typically conducted along Maintenance Level 2, 3, 4 and 5 roads (not Maintenance Level 1 roads or trails). The project alternatives primarily propose actions on trails and maintenance level (ML) 1 roads. Changing use, converting roads to trails, and proposing closures that are proposed on ML 1 and 2 roads within any of the project alternatives would result in a net reduction in miles of road on which hazard trees may be removed. These actions will provide a benefit to wildlife through snag and woody downed log retention. Therefore, the minor amounts of impact that the project alternatives may have on future hazard tree removal would be beneficial to spotted owl habitat.

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near spotted owl activity centers, PACs, and preferred habitat. This would reduce the risk of direct and indirect effects to the spotted owl from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 1, several analyses were completed (Table 3.11-12). Standards and guidelines in the Stanislaus National Forest LRMP direct that impacts be mitigated where there is documented evidence of disturbance to the nest site from existing road or motorized trail use. The Forest has not monitored spotted owl nest sites in proximity to roads or trails and has not documented specific instances of disturbance. Actual nest locations are often difficult to locate and may move around from year-to-year within a PAC. Therefore, actual nest locations remain unknown for many of the PACs and those nests that have been located may have moved since it was last located. Furthermore, it is not well known why owls choose certain nest sites from year-to-year but it is likely that the nest sites will continue to move within the PAC over the long-term. Therefore, activity centers may be defined as a nest site, a pair roost location, or a territorial single located within the PAC. In the absence of recent nest site locations for every PAC, the relative risk of project alternatives resulting in disturbance to nesting spotted owls is evaluated by considering: 1) the number of spotted owl activity centers occurring within 400 meters of proposed routes, 2) the number of spotted owl activity centers occurring with 400 meters of ML1 roads that are being converted to trails, 3) the miles of routes that are being added to the NFTS within PACs, and 4) the miles of ML1 roads that are being converted to trails within PACs (Table 3.11-12).

Since routes proposed within this alternative are native surface routes with slower rates of travel, they would not likely result in any human-caused mortality, but would likely increase disturbance to some roosting owls within the project area. Although actual disturbance effects will be largely influenced by site-specific factors, it is assumed that all routes within a PAC may result in disturbance to roosting owls. Therefore, this alternative would result in some level of disturbance within approximately 24% of the spotted owl PACs in the project area. As mentioned above, it is assumed that activities greater than 400 meters away have little potential to affect spotted owls. Under this alternative, approximately 15.74% of spotted owl PACs (% of total acres) and 9.83% of preferred spotted owl habitat would occur within the 400 meter “zone of influence”. Disturbance resulting from these actions is likely to result in increased flushing from roosts or perches, increased alarm responses, and increased stress hormone levels in individual spotted owls.

In the absence of further field review, it is assumed that motorized use along all routes within 400 meters of activity centers would result in some disturbance to nesting owls. Therefore, it is assumed that approximately 14% of activity centers would receive some disturbance. Without further research, this analysis will assume that effects within 60 meters of an activity center will result in negative effects to reproduction over the short-term. Therefore, this alternative would result in an increased amount of disturbance and affect reproduction at approximately 1% of the nest sites within the project area. Although these effects would impact individuals and some reproducing pairs over the short-term, they would not result in impacts to populations within the project area over the short or long-term.

Actions proposed in this alternative would result in some indirect effect through habitat modification. The addition of routes to the NFTS within preferred spotted owl habitat and within PACs would result in minor amounts of habitat fragmentation. Since the majority of these routes are narrow native surfaced routes they would only result in minor reductions in overhead cover and would not significantly reduce SPOTTED OWL movement between habitat patches.

Season of Use: Although the exact timing may vary, California spotted owls may start nesting in early March. Seasonal closures for Zone 2 and Zone 3 (as identified for each route in Appendix I) would overlap the beginning of the nesting period. Since approximately 80% of the PACs would be within these Zones, these closures would reduce disturbance to those individuals during the early nesting period.

Mitigation Measures: The types of mitigation measures that would be implemented within PACs include: tread hardening, drain dips, fence/log/rock barriers, and hardened stream crossings. The types of mitigation measures that would be implanted within 400 meters of an activity center include: tread hardening, drain dips, and fence/log/rock barriers. Implementation of these mitigation measures would include hand tool and machine work that may result in short-term disturbance to individual foraging or roosting owls within the project area. To prevent potential disturbance to nesting owls, machine work on routes through PACs or within 400 meters of activity centers would not be completed until the end of the nesting season. Disturbance to foraging and roosting owls outside of the nesting season would not likely reduce any individual owl's fitness and would not result in any population level impacts within the project area.

Table 3.11-12   Alternative 1 - Direct and Indirect Effects Indicators (California spotted owl)

Indicators	
Miles of routes added to the NFTS within PACs	20.34
Miles of ML1 roads converted to trails within PACs	4.23
Number of PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area)	53 (24%)
Miles of routes added to the NFTS within 400 meters of Activity Centers	6.67
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	1.47
Number of Activity Centers occurring within 400 meters routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area)	30 (14%)
Number of Activity Centers occurring within 60 meters of routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area)	2 (1%)
Percentage of spotted owl PACs (total acres) occurring within a 400 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	16%
Percentage of preferred spotted owl habitat occurring within a 400 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	10%

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. It is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. It is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of direct and indirect effects to spotted owls. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by continued route proliferation.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to spotted owls.

Mitigation Measures: There would not be any mitigation measures implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near spotted owl activity centers, PACs, and preferred habitat. This would reduce the risk of direct and indirect effects to the spotted owl from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any motorized routes to the NFTS, nor would it change the type of use on any current NFTS routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to spotted owls.

Mitigation Measures: There would not be any mitigation measures implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near spotted owl activity centers, PACs, and preferred habitat. This would reduce the risk of direct and indirect effects to the spotted owl from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-13). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. For further discussion regarding those effects please see discussion above. In the absence of further field review, it is assumed that motorized use along all routes within 400 meters of activity centers would result in some disturbance to nesting owls. Therefore, it is assumed that approximately 16% of nest sites would receive some disturbance. Without further research, this analysis will assume that effects within 60 meters of an activity center will result in negative effects to reproduction over the short-term. Therefore, this alternative would result in an increased amount of disturbance and affect reproduction at approximately 1% of the activity centers within the project area. Since there is a slight increase from Alternative 1 in the number of routes added to the system or converted to a trail within PACs, near activity centers, and within preferred habitat, there would be a slight increase in the direct and indirect effects to individual spotted owls within the project area. Although these effects would impact individuals and some reproducing pairs over the short-term, they would not result in impacts to populations within the project area over the short or long-term.

Season of Use: Although the exact timing may vary, California spotted owls may start nesting in early March. Therefore, seasonal closures for Zone 2 and Zone 3 (as identified for each route in Appendix I) would overlap the beginning of the nesting period. Since approximately 80% of the PACs would be within these Zones, these closures would reduce disturbance to those individuals during the early nesting period.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-13 Alternative 4 - Direct and Indirect Effects Indicators (California spotted owl)

Indicators	
Miles of routes added to the NFTS within PACs	24.56
Miles of ML1 roads converted to trails within PACs	6.21
Number of PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area)	58 (27%)
Miles of routes added to the NFTS within 400 meters of Activity Centers	8.02
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	1.81
Number of Activity Centers occurring within 400 meters of routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area)	34 (16%)
Number of Activity Centers occurring within 60 meters routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area)	3 (1%)
Percentage of spotted owl PACs (total acres) occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	18%
Percentage of preferred spotted owl habitat occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	11%

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near spotted owl activity centers, PACs, and preferred habitat. This would reduce the risk of direct and indirect effects to the spotted owl from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-14). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. For further discussion regarding those effects please see discussion above. In the absence of further field review, it is assumed that motorized use along all routes within 400 meters of activity centers would result in some disturbance to nesting owls. Therefore, it is assumed that approximately 2% of nest sites would receive some disturbance. Without further research, this analysis will assume that effects within 60 meters of an activity center will result in negative effects to reproduction over the short-term. This alternative would not result in increased amounts of motorized use within 60 meters of any activity centers. Since there is a decrease from Alternative 1 in the number of routes added to the system or converted to a trail within PACs, near activity centers, and within preferred habitat, there would be a decrease in the direct and indirect effects to individual spotted owls within the project area. Although these effects would impact individuals over the short-term, they would not result in impacts to populations within the project area over the short or long-term.

Season of Use: Although the exact timing may vary, California spotted owls may start nesting in early March. Therefore, seasonal closures for Zone 2 and Zone 3 (as identified for each route in

Appendix I) would overlap the beginning of the nesting period. Since approximately 80% of the PACs would be within these Zones, these closures would reduce disturbance to those individuals during the early nesting period.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-14 Alternative 5 - Direct and Indirect Effects Indicators (California spotted owl)

Indicators	
Miles of routes added to the NFTS within PACs	0.43
Miles of ML1 roads converted to trails within PACs	0.09
Number of PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area)	4 (2%)
Miles of routes added to the NFTS within 400 meters of Activity Centers	0.03
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	0
Number of Activity Centers occurring within 400 meters of routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area)	1 (<1%)
Number of Activity Centers occurring within 60 meters routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area)	0 (0%)
Percentage of spotted owl PACs (total acres) occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	2%
Percentage of preferred spotted owl habitat occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	1%

CUMULATIVE EFFECTS

In its Notice of Finding on a petition to list the California spotted owl, the USFWS identified that loss of habitat to stand replacing fires and habitat modification for fuels reduction were the primary risk factors to California spotted owls occurring on NFS lands (USFWS 2006). Appendix B provides a list and description of past, present, and reasonably foreseeable projects on the STF and private lands within the STF boundary. Some, but not all, of these activities will contribute to effects upon California spotted owls.

Based on GIS analysis, 14 wildfires have burned through 17 or 8% of spotted owl PACs affecting approximately 971acres or 2% of those PACs since 2000. Forest vegetation/fuels thinning projects (designed to reduce the risk of additional habitat loss to wildfires) have treated within approximately 1,410 acres or 2% of spotted owl PACs between 2000 and 2008. CDF currently lists a total of 2,365 acres of private land within the STF administrative boundary for which timber harvest plans have been submitted. Timber harvest on private lands is generally more intensive and does not typically maintain habitat suitability for spotted owls. These wildfires and fuels treatment projects have resulted in reduction in the amount and quality of spotted owl habitat on the STF.

Vegetation/fuels reduction projects will continue to be the primary activity affecting spotted owl habitat on the STF (see Appendix B). These projects will likely occur on an estimated 3,500 acres per year, based upon the acreage treated in 2006. Although these treatments will degrade habitat, it is anticipated that over time, the amount of habitat removed in stand replacing wildfires will be reduced as a result of these treatments (USDA 2004b).

The effect of open motorized routes on spotted owl populations or habitats was not identified as a significant risk factor by either the Forest Service (USDA 2004b) or the USFWS (2006). However, given the proportion of spotted owl nest sites and habitat potentially affected, and considering the projections for future increases in recreation uses and OHV activity, Alternative 2 may, over time, contribute to cumulative effects upon spotted owl populations. Because Alternative 2 does not restrict vehicles to designated routes, there is a high degree of uncertainty about where future route proliferation in owl habitat may occur and which may have disturbance and habitat effects beyond the effects of routes open to motorized use. Alternative 2 presents the greatest risk of contributing to adverse cumulative effects upon spotted owl habitat and populations because there would not be a prohibition on cross-country travel. Alternative 3 contributes the least to cumulative effects because cross-country travel would be prohibited, open route densities in spotted owl habitat are lowest, and no motorized routes would be designated. Alternatives 4, 1, and 5 would result in progressively lower risk to spotted owls due to the amount of motorized routes being added to the system. Considering the proportion of spotted owl habitat influenced by motorized routes and projections for future increases in recreation uses and OHV activity, the alternatives may result in minor cumulative impacts when combined with other factors affecting spotted owl habitat. Although the action alternatives may result in cumulative impacts, they are very minor in comparison to existing road densities and other potentially significant impacts (fire, fuels/vegetation treatments).

Table 3.11-15 Ranking of Alternative Indicators (California spotted owl)

Indicators	Rankings by Alternatives [1]				
	1	2	3	4	5
Miles of routes added to the NFTS within PACs	3	1	5	2	4
Miles of ML1 roads converted to trails within PACs	3	1	5	2	4
Number of PAC's intersected by routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Miles of routes added to the NFTS within 400 meters of Activity Centers	3	1	5	3	4
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	3	1	5	2	4
Number of Activity Centers occurring within 60 meters of routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Percentage of CSO PAC's (total acres) occurring within a 400 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Percentage of preferred CSO habitat occurring within a 400 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Average	**3**	**1**	**5**	**2**	**4**

[1] A score of 5 indicates the alternative has the least impact for terrestrial biota related to the indicator; A score of 1 indicates the alternative has the most impact for terrestrial biota related to the indicator. If both Alternatives were equal they were both given the same (higher of the two) ranking.

SUMMARY OF EFFECTS

The California spotted owl is widespread throughout the Sierra Nevada and the project area. With the exception of Alternative 3, which would have beneficial impacts to the California spotted owl, the direct and indirect effects of the project alternatives (1, 2, 4 and 5) combined with the cumulative effects are not likely to result in a trend toward Federal listing or a loss of viability for this species. Based on the small proportion of late seral closed canopy coniferous forest habitat that is directly, indirectly and cumulatively affected (0% to 3% of Sierra Nevada habitat) by the alternatives, the STF Motorized Travel Management Project will not alter existing trend in the habitat, nor will it lead to a change is the distribution of California spotted owl across the Sierra Nevada bioregion. For further discussion of the effects analysis and determinations, see the project MIS and BA/BE reports (Pyron 2009, see project record).

Northern Goshawk – Affected Environment

Species and Habitat Account

The northern goshawk is a large raptor that is found throughout forested habitats of the western United States (Squires and Reynolds 1997). Although goshawks remain widely distributed throughout their historic range, current sampling techniques are inadequate to determine population status or trends of this species (63 FR 35183). It is estimated that there are around 600 known goshawk territories on National Forest System lands in the Sierra Nevada (USDA 2001). Surveys for goshawks have been conducted on the Forest for approximately 20 years. Although these surveys have not covered the Forest in its entirety, they have covered a large majority of it. Protected Activity Centers (PACs) are comprised of the best available habitat encompassing approximately 200 acres adjacent to goshawk detections. Based on systematic surveys and incidental sightings, there are currently 76 documented PACs on the STF.

Suitable goshawk habitat in the Sierra Nevada consists of dense, multi-layered mature forested stands with dense canopy cover for nesting, and dense to moderately open overstories, and open understories interspersed with meadows, shrub patches, riparian area, or other openings for foraging. Goshawks use nest-sites with greater canopy cover, greater basal area, greater numbers of large diameter trees, and lower shrub/understory cover relative to random sites. High canopy cover is the most consistent structural feature similar across studies of northern goshawk nesting habitat. Goshawks typically nest in stands with canopy cover between 60% and 80% (Keane 1999, Maurer 2000).

Northern Goshawk – Environmental Consequences

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the northern goshawk. Although thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Miles of routes added to the NFTS within PACs.
- Miles of ML1 roads converted to trails within PACs.
- Number of PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area).
- Miles of routes added to the NFTS within 400 meters of Activity Centers.
- Miles of ML1 roads converted to trails within 400 meters of Activity Centers.
- Number of Activity Centers occurring within 400 meters routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area).
- Percentage of goshawk PACs (total acres) occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails.

DIRECT AND INDIRECT EFFECTS

General – All Alternatives

The project alternatives could result in direct and indirect effects to the northern goshawk by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on goshawks through: changes in behavior and habitat modification.

Changes in Behavior: Types of changes in behavior that may result from the project alternatives include: displacement or avoidance, disturbance at a specific location, or physiological response. Critical times for human disturbance are through the nesting and post fledging period (February 15 through September 15). Because goshawks initiate breeding when the ground is still covered with snow and roads and trails are not in use, nests are sometimes directly located along roads and trails that provide flight access. Following meltout these sites can be prime candidates for conflict as humans begin using the roads and trails (USDA 2001). Northern goshawks are aggressive nest defenders that will attack humans that venture into active nest stands. The potential for negative human interactions increases where motorized routes or dispersed campsites are in proximity to goshawk nest stands (USDA 2001).

The Forest Service, Region 5, has generally assumed that activities (including road and trail use) occurring farther than 0.25 miles from a goshawk nest site have little potential to affect goshawk nesting (USDA 2004). Grubb et al. (1998) reported that vehicle traffic from roads caused no discernable behavioral response by goshawks at distances greater than 400 meters (0.25 miles) from nests. Little information is available on disturbance distances for goshawks but, as with other raptors, the risk of flushing from the nest or even nest abandonment is likely to increase as the disturbance distance decreases.

Habitat Modification: Northern goshawks may be affected by edge effects from roads when roads and trails fragment suitable habitat. Several studies indicate that goshawks are sensitive to changes in forest canopy closure and habitat fragmentation that could result from a network of roads (Beir and Drennan 1997, Daw and DeStefano 2001). Roads and trails can result in a reduction in interior forest patch size which decreases the amount of habitat available and increases the distance between suitable interior forest patches for late-successional species such as the goshawk.

Hazard tree removal along NFTS roads has the potential to reduce canopy closure and increase habitat fragmentation for goshawks. Hazard tree removal is typically conducted along Maintenance Level 2, 3, 4 and 5 roads (not Maintenance Level 1 roads or trails). The project alternatives primarily propose actions on trails and maintenance level (ML) 1 roads. Changing use, converting roads to trails, and proposing closures that are proposed on ML 1 and 2 roads within any of the project alternatives would result in a net reduction in miles of road on which hazard trees may be removed. These actions will provide a benefit to wildlife through snag and woody downed log retention. Therefore, the minor amounts of impact that the project alternatives may have on future hazard tree removal would be beneficial to goshawk habitat.

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near goshawk activity centers, PACs, and preferred habitat. This would reduce the risk of direct and indirect effects to goshawks from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 1, several analyses were completed (Table 3.11-16). Standards and guidelines in the Stanislaus National Forest LRMP direct that impacts be mitigated where there is documented evidence of disturbance to the nest site from existing road or motorized trail use. The Forest has not monitored goshawk nest sites in proximity to roads or trails and has not documented specific instances of disturbance. Actual nest locations are often difficult to locate and may move around from year-to-year within a PAC. Therefore, actual nest locations remain unknown for many of the PACs and those nests that have been located may have moved since it was last located. Furthermore, it is not well known why goshawks choose certain nest sites from year-to-year but it is likely that the nest sites will continue to move within the PAC over the long-term. Activity centers may be defined as a nest site, a pair roost location, or a territorial single located within the PAC. In the absence of recent nest site locations for every PAC, the relative risk of project alternatives resulting in disturbance to nesting goshawks is evaluated by considering: 1) the number of goshawk activity centers occurring within 400 meters of proposed routes, 2) the number of goshawk activity centers occurring with 400 meters of ML1 roads that are being converted to trails, 3) the miles of routes that are being added to the NFTS within PACs, and 4) the miles of ML1 roads that are being converted to trails within PACs (Table 3.11-16).

Since routes proposed within this alternative are native surface routes with slower rates of travel, they would not likely result in any human-caused mortality, but would likely increase disturbance to some roosting goshawks within the project area. Although actual disturbance effects will be largely influenced by site-specific factors, it is assumed that all routes within a PAC may result in disturbance to some goshawks. Therefore, this alternative would result in some level of disturbance within approximately 12% of the goshawk PACs in the project area. As mentioned above, it is assumed that activities greater than 400 meters away have little potential to affect goshawks. Under this alternative, approximately 10% of goshawk PACs (% of total acres) would occur within the 400 meter “zone of influence”. Disturbance resulting from these actions is likely to result in increased flushing from roosts or perches, increased alarm responses, and increased stress hormone levels in some individual goshawks.

In the absence of further field review, it is assumed that motorized use along all routes within 400 meters of activity centers would result in some disturbance to nesting goshawks. It is assumed that approximately 9% of nest sites would receive some disturbance. Although these effects would impact individuals and some reproducing pairs over the short-term, they would not result in impacts to populations within the project area over the short or long-term.

Actions proposed in this alternative would result in some indirect effect through habitat modification. The addition of routes to the NFTS within and near PACs would result in minor amounts of habitat fragmentation. Since the majority of these routes are narrow native surfaced routes they would only result in minor reductions in overhead cover and would not significantly reduce goshawk movement between habitat patches.

Season of Use: Although the exact timing may vary, goshawks may start nesting in February. Therefore, seasonal closures for Zone 2 and Zone 3 (as identified for each route in Appendix I) would overlap the beginning of the nesting period. Since approximately 96% of the goshawk PACs would be within these Zones, these closures would reduce disturbance to most goshawks during the early nesting period.

Mitigation Measures: The types of mitigation measures that would be implemented within PACs and within 400 meters of activity centers include: tread hardening, drain dips, and fence/log/rock barriers. Implementation of these mitigation measures would include hand tool and machine work that may result in short-term disturbance to individual foraging or roosting goshawks within the project area. To prevent potential disturbance to nesting goshawks, machine work on routes through PACs or within 400 meters of activity centers would not be completed until the end of the nesting season. Disturbance to foraging and roosting goshawks outside of the nesting season would not likely reduce any individual goshawk’s fitness and would not result in any population level impacts within the project area.

Table 3.11-16 Alternative 1 - Direct and Indirect Effects Indicators (northern goshawk)

Indicators	
Miles of routes added to the NFTS within PACs	0.94
Miles of ML1 roads converted to trails within PACs	0.91
Number of PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area)	9 (12%)
Miles of routes added to the NFTS within 400 meters of Activity Centers	0.61
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	0.99
Number of Activity Centers occurring within 400 meters of routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area)	7 (9%)
Percentage of PACs (total acres) occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	10%

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. Therefore, it is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of direct and indirect effects to goshawks. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by the continued proliferation of routes.

Season of Use: The seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to goshawks.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near goshawk activity centers, PACs, and preferred habitat. This would reduce the risk of direct and indirect effects to goshawks from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any motorized routes to the NFTS, nor would it change the type of use on any current NFTS routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to goshawks.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near goshawk activity centers, PACs, and preferred habitat. This would reduce the risk of direct and indirect effects to goshawks from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-17). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. For further discussion regarding those effects please see discussion above. In the absence of further field review, it is assumed that motorized use along all routes within 400 meters of activity centers would result in some disturbance to nesting goshawks. Therefore, it is assumed that approximately 13% of nest sites would receive some disturbance. Since there is a slight increase from Alternative 1 in the number of routes added to the system or converted to a trail within PACs, near activity centers, and within preferred habitat, there would be a slight increase in the direct and indirect effects goshawks within the project area. Although these effects would impact individuals and some reproducing pairs over the short-term, they would not result in impacts to populations within the project area over the short or long-term.

Actions proposed in this alternative would result in some indirect effects through habitat modification. The addition of routes to the NFTS within and near goshawk PACs would result in minor amounts of habitat fragmentation. Since the majority of these routes are narrow native surfaced routes they would only result in minor reductions in overhead cover and would not significantly reduce goshawk movement between habitat patches.

Season of Use: Although the exact timing may vary, goshawks may start nesting in February. Therefore, seasonal closures for Zone 2 and Zone 3 (as identified for each route in Appendix I) would overlap the beginning of the nesting period. Since approximately 96% of the goshawk PACs would be within these Zones, these closures would reduce disturbance to most goshawks during the early nesting period.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-17 Alternative 4 - Direct and Indirect Effects Indicators (northern goshawk)

Indicators	
Miles of routes added to the NFTS within PACs	1.51
Miles of ML1 roads converted to trails within PACs	2.16
Number of PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area)	13 (17%)
Miles of routes added to the NFTS within 400 meters of Activity Centers	1.49
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	1.81
Number of Activity Centers occurring within 400 meters of routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area)	10 (13%)
Percentage of PACs (total acres) occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	13%

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near goshawk activity centers, PACs, and preferred habitat. This would reduce the risk of direct and indirect effects to goshawks from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-18). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. For further discussion regarding those effects please see discussion above. In the absence of further field review, it is assumed that motorized use along all routes within 400 meters of activity centers would result in some disturbance to nesting goshawks. Therefore, it is assumed that approximately 1% of nest sites would receive some disturbance. Since there is a significant decrease from Alternative 1 in the number of routes added to the system or converted to a trail within PACs, near activity centers, and within preferred habitat, there would be a significant decrease in the direct and indirect effects goshawks within the project area. This alternative would result in very minor amounts of habitat fragmentation that would not have any measurable effects to goshawks. Although these effects would impact individuals and some reproducing pairs over the short-term, they would not result in impacts to populations within the project area over the short or long-term.

Table 3.11-18 Alternative 5 - Direct and Indirect Effects Indicators (northern goshawk)

Indicators	
Miles of routes added to the NFTS within PACs	0.19
Miles of ML1 roads converted to trails within PACs	0
Number of PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area)	2 (3%)
Miles of routes added to the NFTS within 400 meters of Activity Centers	0.03
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	0
Number of Activity Centers occurring within 400 meters of routes added to the NFTS or ML1 roads converted to trails (Percentage of all Activity Centers in Project Area)	1 (1%)
Percentage of PACs (total acres) occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	1%

Season of Use: Although the exact timing may vary, goshawks may start nesting in February. Therefore, seasonal closures for Zone 2 and Zone 3 (as identified for each route in Appendix I) would overlap the beginning of the nesting period. Since approximately 96% of the goshawk PACs would be within these Zones, these closures would reduce disturbance to most goshawks during the early nesting period.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

CUMULATIVE EFFECTS

In 2001and 2004 the Forest Service amended 11 Sierra Nevada Forest Plans to better address the needs of old forest-associated species (USDA 2001a and 2004b,c). During this assessment, the following risk factors were identified for northern goshawks in the Sierra Nevada: (1) changes to the amount and quality of goshawk habitat from timber harvest and fuels treatments; (2) loss of breeding territories due to stand replacing fires; and (3) breeding site disturbance from vegetation treatments, human recreation, or falconry harvest. Fuels reduction treatments and wildfire effects are identified as the predominant effectors of goshawk habitat. Appendix B provides a list and description of past, present, and reasonably foreseeable projects on the STF and private lands within the forest boundary. Some, but not all, of these activities will contribute to effects upon northern goshawks.

Based on GIS analysis, 3 wildfires have burned through 3 goshawk PACs (4%) affecting approximately 28 acres or less than 1% of those PACs since 2000. Forest vegetation/fuels thinning projects (designed to reduce the risk of additional habitat loss to wildfires) have treated approximately 788 acres or 5% of goshawk PACs between 2000 and 2008. CDF currently lists a total of 2,365 acres of private land within the STF administrative boundary for which timber harvest plans have been submitted. Timber harvest on private lands is generally more intensive and does not typically maintain habitat suitability for spotted owls. These wildfires and fuels treatment projects have resulted in reduction in the amount and quality of spotted owl habitat on the STF.

Vegetation/fuels reduction projects will continue to be the primary activity affecting goshawk habitat on the STF (Appendix B). These projects will likely occur on an estimated 3,500 acres per year, based upon the acreage treated in 2006. Although these treatments will degrade habitat, it is anticipated that over time, the amount of habitat removed in stand replacing wildfires will be reduced as a result of these treatments (USDA 2004b).

The effect of open motorized routes on goshawk populations or habitats was not identified as a significant risk factor by the Forest Service, but breeding site disturbance from human recreation was addressed (USDA 2001a and 2004b,c). Given the proportion of goshawk nest sites and habitat potentially affected, and considering the projections for future increases in recreation uses and OHV activity, Alternative 2 may, over time, contribute to cumulative effects upon goshawk populations. Because Alternative 2 does not restrict vehicles to designated routes, there is a high degree of uncertainty about future route proliferation in goshawk habitat which may have disturbance and habitat effects beyond the effects of routes open to motorized use. Alternative 3 contributes the least to cumulative effects because cross-country travel would be prohibited, open route densities in goshawk habitat are lowest, and no motorized routes would be designated. Alternatives 4, 1, and 5 would result in progressively lower risk to goshawks due to the amount of motorized routes being added to the system.

Since human disturbance has been recognized as a significant risk factor, non-motorized recreation (hiking, cycling, and equestrian use) may result in additional disturbance to nesting and foraging goshawks. Non-motorized recreation occurs along an additional 394 miles of summer trails. Human disturbance from use of non-motorized routes contributes to the direct and indirect effects of the project alternatives.

Considering the proportion of goshawk habitat influenced by motorized routes and projections for future increases in recreation uses and OHV activity, the alternatives may result in minor cumulative impacts when combined with other factors affecting goshawk habitat. Although the action alternatives may result in cumulative impacts, they are fairly minor in comparison to existing road densities and other potentially significant impacts (fire, fuels/vegetation treatments).

Table 3.11-19 Ranking of Alternative Indicators (northern goshawk)

Indicators	Rankings by Alternatives for [1]				
	1	**2**	**3**	**4**	**5**
Miles of routes added to the NFTS within PACs	3	1	5	2	4
Miles of ML1 roads converted to trails within PACs	3	1	5	2	4
Number of PAC's intersected by routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Miles of routes added to the NFTS within 400 meters of Activity Centers	3	1	5	3	4
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	3	1	5	2	4
Number of Activity Centers occurring within 400 meters of routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Percentage of PACs (total acres) occurring within a 400 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Average	**3**	**1**	**5**	**2**	**4**

[1] A score of 5 indicates the alternative has the least impact for terrestrial biota related to the indicator; A score of 1 indicates the alternative has the most impact for terrestrial biota related to the indicator. If both Alternatives were equal they were both given the same (higher of the two) ranking.

SUMMARY OF EFFECTS

The northern goshawk is widespread throughout the western United States and the project area. With the exception of Alternative 3, which would have beneficial impacts to the northern goshawk, the direct and indirect effects of the project alternatives (1, 2, 4 and 5) combined with the cumulative effects are not likely to result in a trend toward Federal listing or a loss of viability for this species. For further discussion of the effects analysis and determinations, see the project BA/BE (project record).

Ungulates

Mule Deer – Affected Environment

Species and Habitat Account

The mule deer is found throughout the western United States and is the only large ungulate that inhabits STF. Mule deer populations throughout the western United States, including the Sierra Nevada of California, reached their peak in the middle of the 20th century and have since declined (Beck 1999, Salwasser et al. 1978). More recently, mule deer populations (estimated by buck harvest and winter range counts) within the project area have been stable to slightly decreasing and below management objectives (Maddox 1980, King 1981, Maddox 1984).

It is generally agreed that mule deer within the project area exhibit two different life history strategies: migrational and resident. Resident deer spend the majority of their lives at lower elevations, exhibiting little or no seasonal movement between elevational habitat types. Although it has been recognized since the mid 20th century that these two life history strategies are exhibited, there has been little to no research focused on resident deer (Leopold et al. 1951). It is possible that an individual may exhibit both life history strategies over the course of their lives (i.e. an adult doe may migrate to summer range one year and not the next), and it is generally recognized and assumed that individuals expressing either strategy regularly coexist and interbreed on the winter range and during the rut. Since resident deer are closely associated with human development near the Forest boundary, this analysis will focus on the effects to the migrant deer herds within the project area. The migrant deer move down the western slopes of the Sierra Nevada to lower elevations with the onset of the rut and first snowfalls. After completing the rut and spending the winter at lower elevations, they follow “spring green-up” and migrate back to higher elevations where does will typically fawn and spend the summer. Historically, migrant mule deer within the project area have been considered to be associated with four main deer herds: Railroad Flat, Stanislaus, Tuolumne, and Yosemite.

Mule deer are a habitat generalist, found throughout numerous plant communities within the project area, but are primarily dependent on early successional vegetation types. In general, there are three key habitats that migrating mule deer depend on to complete their life history: winter range, summer range, and migration corridors. The 2001 SNFPA, further delineated summer and winter range habitat as follows: general winter range (309.6 mi2), winter concentration areas (164.91 mi2), critical winter range (55.12 mi2), summer concentration areas (187.33 mi2), and critical summer range (24.71 mi2) (USDA 2001). Since individuals of all herds of mule deer within the project area coexist and interbreed, this analysis focuses on the effects to delineated summer (concentration and critical) and winter (concentration and critical) range habitats.

Mule Deer – Environmental Consequences

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the mule deer. Although thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

DIRECT AND INDIRECT EFFECTS

General – All Alternatives

The project alternatives could result in direct and indirect effects to the mule deer by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on mule deer through: human-caused mortality or changes in behavior.

Human-Caused Mortality: In general, types of human-caused mortality that have been identified for the mule deer include collisions. Adding routes to the NFTS would improve human access into all types of mule deer habitat and may result in increased rates of collisions. Collisions with motorized vehicles may have a significant impact on mule deer mortality (Romin and Bissonette 1996, Jalkotzy et al. 1997). Collisions are typically associated with well maintained roads that allow high rates of travel (e.g. highways). Routes proposed for designation within the project alternatives are native surfaced routes that allow much slower rates of travel. These types of routes result in far fewer collisions than highways or paved routes and would likely have an insignificant impact on mule deer mortality within the project area.

Changes in Behavior: The types of changes in behavior that have been identified for the mule deer include displacement or avoidance and disturbance at a specific location. Deer responses to recreational uses have not been studied in detail, making it difficult to make reliable inferences (Barrett et al. 2004). In general, however, studies show that mule deer will move away from, or flush, from an approaching person and will usually allow a person in or on a vehicle to get closer than a person on foot (Freddy et al. 1986, Wisdom et al. 2005). Wisdom et al. (2005) found that mule deer showed little measurable flight response to experimental OHV treatments but cautioned that deer may well be responding with fine-scale changes in habitat use (i.e. avoidance), rather than substantial increases in movement rates and flight responses. Although several studies have found that mule deer avoid areas in proximity to roads, Boroski and Mossman (1998) found that human disturbance did not impede mule deer use of water sources.

Road density has traditionally been used as an indicator for habitat effectiveness models (Overly and Perry 1977, Thomas, et al. 1979). These models indicate that as open road density increases, deer use declines (Thomas et al. 1979, Witmer et al 1985). Deer avoid primary roads more than secondary or tertiary roads and also avoid roads more in open habitats as opposed to areas with vegetative or topographic cover (deVos et al. 2003). The displacement distances vary between 200 and 800 meters in various studies, depending upon the road type and traffic level, and the surrounding habitat (Perry and Overly 1977, Rost and Bailey 1979, Johnson et al. 2000, Livezey 1991). Main roads were found to reduce deer use up to 0.5 miles (800 m), whereas secondary and primitive roads reduced deer densities from between 200 to 400 meters in these studies. Additional variables such as the amount and frequency of traffic, and the spatial distribution of roads in relation to deer use, influence the degree of negative effects that roads have on deer use in forested habitats (Perry and Overly 1977, Johnson et al. 2000, deVos et al. 2003).

Changes in behavior, expressed through flight response or changes in habitat use may reduce the fitness of individuals within a herd (Yarmoloy et al. 1988). Adverse effects to fitness may be measured through reduced fat or energy reserves. Adverse effects to energy reserves are typically the most significant during the winter when mule deer may already be experiencing low energy reserves and reduced food availability (Livezey 1991). If an individuals energy reserves are depleted to low enough levels on the winter range they may die (starvation) or experience reduced reproductive success the following spring. Therefore, if disturbance from motorized vehicles was having a significant impact on mule deer populations within the winter range it would likely result in malnutrition or mortality from starvation.

Numerous cases of large winter die-offs, caused by starvation, have been documented throughout the western United States (Leopold et al. 1947). Herds may be particularly prone to large scale die-offs from starvation when: 1) snow depths are great and deer are unable to migrate to lower elevations (below the snow level) or 2) herd size exceeds winter range carrying capacity. Winter habitat within the project area extends over a broad elevational range, which typically allows mule deer to move down the slope and below significant snow depths. Although there are historic records of large-scale winter die-offs within the project area (Leopold et al. 1951), literature and anecdotal evidence do not indicate that starvation is a significant or limiting factor to mule deer herds on the STF (CDFG 1980, CDFG 1981, CDFG 1984).

Another way, by which mule deer populations may be impacted by reduced fat or energy reserves, is through reduced reproductive fitness or fawn production. Yarmoloy et al. (1988) found significant reductions in fawn production from does which were intentionally harassed by ATVs. Although it is not well understood how harassment causes reduced fawn production, a mature doe that is successfully bred during the rut may not to successfully carry the fawn full term due to stress or inadequate nutrition. Low fawn recruitment is the factor that likely caused declines in the latter part of the 20th century throughout the Sierra Nevada and the factor that is currently attributed to limiting herd growth within the project area (Salwasser et al. 1978, Maddox 1984). Annual fall deer count data and recent findings from a radio telemetry study conducted within the project area indicate results similar to mortality factors discussed by Maddox (1984); a low proportion of fawns are surviving through the summer and making it onto winter range (Annual Deer Count Data - project record, CDFG 2007). Results from this study and spring deer counts further showed that seasonal fawn mortality was similar to that found on the Kings River deer herd by Salwasser et al. (1978); indicating that significant fawn mortality occurs within the first few months following birth and that winter fawn mortality was minor (Ibid.). CDFG (2007) reported that 50% of early fawn losses were attributed to predation from bears, while the other 50% “were found dead with no apparent cause”. Furthermore, they concluded that early fawn mortality was likely underestimated since captured fawns were more than a week old. Although early fawn mortality may have a significant impact on recruitment and mule deer populations within the project area, the causes for these losses maybe numerous and are largely unknown.

Summer Concentration Areas

- Miles of routes added to the NFTS within summer concentration areas.
- Miles of ML1 roads converted to trails within summer concentration areas.
- Existing density (mi/mi2) of routes under STF jurisdiction within summer concentration areas.
- Density (mi/mi2) of routes under STF jurisdiction within summer concentration areas with proposed designated routes (additional density).
- Percentage of summer concentration areas within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails.

Critical Summer Range

- Miles of routes added to the NFTS within critical summer range.
- Miles of ML1 roads converted to trails within critical summer range.
- Existing density (mi/mi2) of routes under STF jurisdiction within critical summer range.
- Density (mi/mi2) of routes under STF jurisdiction within critical summer range with proposed designated routes (additional density).
- Percentage of critical summer range within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails.

Winter Concentration Areas

- Miles of routes added to the NFTS within winter concentration areas.
- Miles of ML1 roads converted to trails within winter concentration areas.
- Existing density (mi/mi2) of routes under STF jurisdiction within winter concentration areas.
- Density (mi/mi2) of routes under STF jurisdiction within winter concentration areas with proposed designated routes (additional density).
- Percentage of winter concentration areas within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails.

Critical Winter Range

- Miles of routes added to the NFTS within critical winter range.
- Miles of ML1 roads converted to trails within critical winter range.
- Existing density (mi/mi2) of routes under STF jurisdiction within critical winter range.
- Density (mi/mi2) of routes under STF jurisdiction within critical winter range with proposed designated routes (additional density).
- Percentage of critical winter range within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails.

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within all types of mule deer habitat. This would reduce the risk of direct and indirect effects to mule deer from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 1, several analyses were completed (Table 3.11-20). Actions proposed in this alternative would not likely result in measurable increases in human-caused mortality, but would likely increase disturbance to some mule deer within the project area. Increases in road densities and percentages of habitat influenced by motorized vehicles on summer and winter range would likely result in increased disturbance to some individuals. Increases on summer range are minor and would influence a very small portion of available habitat. Although these increases may result in disturbance to some individuals, they would not likely have a measurable impact to populations. Mule deer within the project area are generally in fairly good condition on the winter range and starvation is not currently a significant factor impacting mule deer populations. Current levels of motorized use on the winter range are not likely having a significant impact on mule deer populations through malnutrition or starvation and early fawn losses are poorly understood. Although increased amounts of disturbance on 7.42% of winter concentration areas and 8.87% of critical winter range would increase disturbance to some individuals, this disturbance would not likely result in impacts to mule deer populations within the project area.

Season of Use: Mule deer spend a significant portion of the year at lower elevations and may be particularly prone to disturbance on winter range. This alternative would result in seasonal closures (as identified for each route in Appendix I) on approximately 73% of winter concentration areas and 73% of critical winter range. These closures would reduce disturbance to deer; therefore, providing beneficial impacts to individuals within the project area.

Mitigation Measures: The types of mitigation measures that would be implemented within mule deer habitat include: tread hardening, drain dips, fence/log/rock barriers, and hardened stream crossings. Implementation of these mitigation measures would include hand tool and machine work that would result in short-term disturbance to individual deer within the project area. This amount of disturbance would not likely reduce any individual deer's fitness and would not result in any population level impacts within the project area.

Table 3.11-20 Alternative 1 - Direct and Indirect Effects Indicators (mule deer)

Indicators	
Summer Concentration Areas	
Miles of routes added to the NFTS within summer concentration areas	9.99
Miles of ML1 roads converted to trails within summer concentration areas	1.15
Existing density (mi/mi2) of routes under STF jurisdiction within summer concentration areas	0.97
Density (mi/mi2) of routes under STF jurisdiction within summer concentration areas with proposed designated routes (additional density)	1.03 (0.06)
Percentage of summer concentration areas occurring within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	2.27%
Critical Summer Range	
Miles of routes added to the NFTS within critical summer range	0
Miles of ML1 roads converted to trails within critical summer range	1.36
Existing density (mi/mi2) of routes under STF jurisdiction within critical summer range	0.72
Density (mi/mi2) of routes under STF jurisdiction within critical summer range with proposed designated routes (additional density)	0.72 (0.0)
Percentage of critical summer range occurring within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	1.64%
Winter Concentration Areas	
Miles of routes added to the NFTS within winter concentration areas	31.64
Miles of ML1 roads converted to trails within winter concentration areas	17.87
Existing density (mi/mi2) of routes under STF jurisdiction within winter concentration areas	2.56
Density (mi/mi2) of routes under STF jurisdiction within winter concentration areas with proposed designated routes (additional density)	2.76 (0.2)
Percentage of winter concentration areas occurring within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	7.42%
Critical Winter Range	
Miles of routes added to the NFTS within critical winter range	15.39
Miles of ML1 roads converted to trails within critical winter range	5.66
Existing density (mi/mi2) of routes under STF jurisdiction within critical winter range	2.33
Density (mi/mi2) of routes under STF jurisdiction within critical winter range with proposed designated routes (additional density)	2.61 (0.28)
Percentage of critical winter range occurring within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	8.87%

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. Therefore, it is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of direct and indirect effects to mule deer. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by the continued proliferation of routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to mule deer.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within mule deer habitat. This would reduce the risk of direct and indirect effects to fisher from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any motorized routes to the NFTS, nor would it change the type of use on any current NFTS routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to mule deer.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within mule deer habitat. This would reduce the risk of direct and indirect effects to mule deer from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-21). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a slight increase from Alternative 1 in the number of routes added to the system or converted to a trail within summer and winter range habitat, there would be a slight increase in the direct and indirect effects to mule deer within the project area. Although these increases would result in more individuals being impacted, these increases would not likely be significant enough to result in impacts to mule deer populations within the project area.

Season of Use: Mule deer spend a significant portion of the year at lower elevations and may be particularly prone to disturbance on winter range. This alternative would result in seasonal closures (as identified for each route in Appendix I) on approximately 73% of winter concentration areas and

73% of critical winter range. These closures would reduce disturbance to deer; therefore, providing beneficial impacts to individuals within the project area.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-21 Alternative 4 - Direct and Indirect Effects Indicators (mule deer)

Indicators	
Summer Concentration Areas	
Miles of routes added to the NFTS within summer concentration areas	11.52
Miles of ML1 roads converted to trails within summer concentration areas	1.67
Existing density (mi/mi2) of routes under STF jurisdiction within summer concentration areas	0.97
Density (mi/mi2) of routes under STF jurisdiction within summer concentration areas with proposed designated routes (additional density)	1.0 (0.07)
Percentage of summer concentration areas occurring within a 200 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	2.60%
Critical Summer Range	
Miles of routes added to the NFTS within critical summer range	0.43
Miles of ML1 roads converted to trails within critical summer range	1.36
Existing density (mi/mi2) of routes under STF jurisdiction within critical summer range	0.72
Density (mi/mi2) of routes under STF jurisdiction within critical summer range with proposed designated routes (additional density)	0.74 (0.02)
Percentage of critical summer range occurring within a 200 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	2.06%
Winter Concentration Areas	
Miles of routes added to the NFTS within winter concentration areas	35.41
Miles of ML1 roads converted to trails within winter concentration areas	28.61
Existing density (mi/mi2) of routes under STF jurisdiction within winter concentration areas	2.56
Density (mi/mi2) of routes under STF jurisdiction within winter concentration areas with proposed designated routes (additional density)	2.78 (0.22)
Percentage of winter concentration areas occurring within a 200 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	9.74%
Critical Winter Range	
Miles of routes added to the NFTS within critical winter range	16.1
Miles of ML1 roads converted to trails within critical winter range	6.53
Existing density (mi/mi2) of routes under STF jurisdiction within critical winter range	2.33
Density (mi/mi2) of routes under STF jurisdiction within critical winter range with proposed designated routes (additional density)	2.62 (0.29)
Percentage of critical winter range occurring within a 200 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	9.67%

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within mule deer habitat. This would reduce the risk of direct and indirect effects to mule deer from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-22). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a significant decrease from Alternative 1 in the number of routes added to the system or converted to a trail within winter and summer range habitat, there would be a significant decrease in the direct and indirect effects to individual mule deer within the project area. Although these impacts would have adverse effects on some individuals, they would not likely be significant enough to result in impacts to mule deer populations within the project area.

Season of Use: Mule deer spend a significant portion of the year at lower elevations and may be particularly prone to disturbance when concentrated on winter range. This alternative would result in seasonal closures (as identified for each route in Appendix I) on approximately 73% of winter concentration areas and 73% of critical winter range. These closures would reduce disturbance to deer; therefore, providing beneficial impacts to individuals within the project area.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-22 Alternative 5 - Direct and Indirect Effects Indicators (mule deer)

Indicators	
Summer Concentration Areas	
Miles of routes added to the NFTS within summer concentration areas	2.36
Miles of ML1 roads converted to trails within summer concentration areas	0.36
Existing density (mi/mi2) of routes under STF jurisdiction within summer concentration areas	0.97
Density (mi/mi2) of routes under STF jurisdiction within summer concentration areas with proposed designated routes (additional density)	0.98 (0.01)
Percentage of summer concentration areas occurring within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	<1%
Critical Summer Range	
Miles of routes added to the NFTS within critical summer range	0
Miles of ML1 roads converted to trails within critical summer range	0
Existing density (mi/mi2) of routes under STF jurisdiction within critical summer range	0.72
Density (mi/mi2) of routes under STF jurisdiction within critical summer range with proposed designated routes (additional density)	0.72 (0.0)
Percentage of critical summer range occurring within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	0%
Winter Concentration Areas	
Miles of routes added to the NFTS within winter concentration areas	10.57
Miles of ML1 roads converted to trails within winter concentration areas	3.66
Existing density (mi/mi2) of routes under STF jurisdiction within winter concentration areas	2.56
Density (mi/mi2) of routes under STF jurisdiction within winter concentration areas with proposed designated routes (additional density)	2.63 (0.07)
Percentage of winter concentration areas occurring within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	1.80%
Critical Winter Range	
Miles of routes added to the NFTS within critical winter range	1.74
Miles of ML1 roads converted to trails within critical winter range	0
Existing density (mi/mi2) of routes under STF jurisdiction within critical winter range	2.33
Density (mi/mi2) of routes under STF jurisdiction within critical winter range with proposed designated routes (additional density)	2.36 (0.03)
Percentage of critical winter range occurring within a 200 meter "zone of influence" of routes added to the NFTS or ML1 roads converted to trails	1.02%

CUMULATIVE EFFECTS

Appendix B provides a list and description of past, present, and reasonably foreseeable projects on the STF and private lands within the Forest boundary. Some, but not all, of these activities will contribute to effects upon mule deer. CDFG (1998) identified the following primary factors influencing deer populations in the Central Sierra Nevada: (1) reduced forage availability resulting from fire exclusion; (2) reduced forage and cover resulting from logging, forest thinning, and/or herbicide treatments; (3) reduced forage and cover resulting from livestock grazing in meadows; and (4) loss of habitat to private land development.

Within the project area, hazardous fuels reduction and associated timber harvest have occurred on approximately 25,410 acres of NFS land since 2000 (Appendix B). These treatments are anticipated to be the primary activity that will alter forest vegetation within deer ranges over the next several years. These projects will likely occur on an estimated 3,500 acres per year, based upon the acreage treated in 2006. Poor forage condition has largely attributed to fire suppression and changing forest management practices on public and private land (forest thinning treatments, rather than clearcutting and group selection timber harvest) (CDFG 1982, CDFG 1998). Thinning and mastication can benefit deer by removing dense overstory vegetation thereby encouraging the growth of young brush, grasses, and forbs in the understory, which is preferred by deer for forage. Thinning of conifers also releases the remaining oaks and encourages new oak sprouts. The benefit of thinning on deer habitat has been questioned, however, due to concern that the treatments remove hiding and thermal cover over large acreages and may result in a decline in forage in the short term (Kucera and Barrett 1995 In CDFG 1998, Barrett et al. 2004). Although these treatments will reduce deer hiding cover and may reduce forage for several years, forage values are expected to improve in the long-term, especially where followed by additional prescribed burning treatments.

Fire suppression has also resulted in decreasing forage availability for deer. Since 2000, approximately 103,000 acres of NFS land have burned in wildfires. These fires have likely increased forage availability across the broad landscape, but the intensity and large size of the fires did not result in optimum distribution of openings and cover. Within the project area, prescribed burning has occurred on about 22,500 acres between 2000 and 2008. Prescribed burning can help offset the negative effects of fire suppression and is widely accepted as a valuable tool to enhance deer habitat (CDFG 1998). Burning enhances many plants favored by deer for forage by stimulating new growth on sprouting species, germinating seeds in fire-adapted species, thinning understory vegetation to allow more light to the forest floor, and consuming part of the duff layer to enhance the seedbed.

Table 3.11-23 Ranking of Alternative Indicators (mule deer)

Indicators	Rankings by Alternatives [1]				
	1	2	3	4	5
Summer Concentration					
Miles of routes added to the NFTS within summer concentration areas	3	1	5	2	4
Miles of ML1 roads converted to trails within summer concentration areas	3	1	5	2	4
Density (mi/mi2) of routes under STF jurisdiction within summer concentration areas with proposed designated routes (additional density)	3	1	5	2	4
Percentage of summer concentration areas occurring within a 200 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Critical Summer					
Miles of routes added to the NFTS within critical summer range	4	1	5	3	4
Miles of ML1 roads converted to trails within critical summer range	3	1	5	3	4
Density (mi/mi2) of routes under STF jurisdiction within critical summer range with proposed designated routes (additional density)	4	1	5	3	4
Percentage of critical summer range occurring within a 200 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Winter Concentration					
Miles of routes added to the NFTS within winter concentration areas	3	1	5	2	4
Miles of ML1 roads converted to trails within winter concentration areas	3	1	5	2	4
Density (mi/mi2) of routes under STF jurisdiction within winter concentration areas with proposed designated routes (additional density)	3	1	5	2	4
Percentage of winter concentration areas occurring within a 200 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Critical Winter					
Miles of routes added to the NFTS within critical winter range	3	1	5	2	4
Miles of ML1 roads converted to trails within critical winter range	3	1	5	2	4
Density (mi/mi2) of routes under STF jurisdiction within critical winter range with proposed designated routes (additional density)	3	1	5	2	4
Percentage of critical winter range occurring within a 200 meter “zone of influence” of routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Average	**3.13**	**1**	**5**	**2.19**	**4**

[1] score of 5 indicates the alternative is the best for terrestrial biota related to the indicator; A score of 1 indicates the alternative is the worst for terrestrial biota related to the indicator. If both Alternatives were equal they were both given the same (higher of the two) ranking.

CDF currently lists a total of 2,365 acres of private land within the STF administrative boundary for which timber harvest plans have been submitted. On private timberlands, harvest methods include selective thinning and regeneration (clearcut) and then are reforested using herbicides to suppress competing vegetation. Clearcut harvest can benefit deer by promoting early succession vegetation that deer prefer, but the benefit to foraging habitat is limited in quality, quantity, and duration by reforestation efforts (CDFG 1998, deVos et al. 2003). Early succession habitat is available to deer for

8 to 12 years under these conditions as opposed to up to 30 years under natural regeneration (deVos et al. 2003).

Livestock grazing, particularly within meadows and aspen stands, has reduced the quality of fawning and foraging habitats for deer. Monitoring of the condition and trend of Sierra montane meadows indicates that meadow condition across the bioregion shows a slight upward trend (Green 2003). Livestock grazing occurs on 35 active grazing allotments on the STF, totaling approximately 792,042 acres of NFS and private lands. On the STF, the impacts of livestock grazing on meadows is variable between years, but has been steadily decreasing as forage utilization levels are being reduced by stricter standards established by the Sierra Nevada Forest Plan Amendment.

Although mule deer populations “ultimately are limited by habitat quality and quantity,” other stressors can exacerbate decline, particularly in poor habitat conditions (deVos et al. 2003, Barrett et al. 2004). At present, livestock grazing influences the quality of meadow habitat used by all mule deer in the project area, and fuels treatments may be reducing cover or forage in localized areas (though forage may be improving in areas treated more than five to ten years ago). Existing roads influence a considerable portion of deer habitat and surfaced roads (e.g. highways) also result in increased mortality from collisions. Other types of recreation, including hiking and equestrian use along 394 miles maintained as non-motorized trails, result in disturbance and displacement effects that may be similar to those described for the motorized routes in the project Alternatives. The combined effects of forest uses and management actions upon deer and their habitat is complex (deVos et al. 2003).

SUMMARY OF EFFECTS

Mule deer populations are stable to slightly decreasing throughout the project area (CDFG 1980, CDFG 1981, CDFG 1984). With the exception of Alternative 3, which would have beneficial impacts to the mule deer, the direct and indirect effects of the project alternatives (1, 2, 4 and 5) combined with the cumulative effects would likely result in impacts to some individuals but would not likely impact populations within the project area. As described in the project MIS report, project alternatives may affect habitat quality but will not alter the existing habitat trend, nor will it lead to a change in the distribution of mule deer across the Sierra Nevada bioregion (Pyron 2009, see project record).

Riparian Associated Species

Bald Eagle – Affected Environment

Species and Habitat Account

The bald eagle is a large raptor that is found throughout North America. Down listed from Endangered to a Sensitive species, the bald eagle has experienced range wide population increases since a nationwide ban on the use of DDT, a pesticide which causes eggshell thinning and low reproduction success. Bald eagles are strongly associated with large riparian areas since their primary prey species are waterfowl and fish. On the STF, bald eagles are commonly seen wintering along numerous bodies of water including: Beardsley Reservoir, Cherry Lake, and Lyons Lake. The STF has four bald eagle management areas and two known nest sites. Neither of the nest sites are within the designated bald eagle management areas, but are located near the bald eagle management areas on the shores of Beardsley Reservoir and Cherry Lake. Two other areas that may provide suitable nesting habitat for bald eagles are Salt Springs Reservoir and Lyons Lake. Bald eagles have been observed at both of these locations, but despite numerous surveys nesting has never been documented.

Bald Eagle – Environmental Consequences

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the bald eagle. Although thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Miles of routes added to the NFTS within Designated Territories.
- Miles of ML1 roads converted to trails within Designated Territories.
- Miles of routes added to the NFTS within 660 feet of nest sites.
- Miles of ML1 roads converted to trails within 660 feet of nest sites.
- Miles of routes added to NFTS within 400 meters of lakes/reservoirs used for foraging.
- Miles of ML1 roads converted to trails within 400 meters of lakes/reservoirs used for foraging.

DIRECT AND INDIRECT EFFECTS

General – All Alternatives

The project alternatives could result in direct and indirect effects to the bald eagle by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on bald eagles through: human-caused mortality, changes in behavior, and habitat modification.

Human-Caused Mortality: In general, the road and trail-associated factors that have been identified for the bald eagle include poaching, disturbance at specific site (nests and roost sites), and avoidance and displacement (Skagen et al. 1991, Stalmaster and Newman 1978).

Changes in Behavior: In general, the road and trail-associated factors that have been identified for the bald eagle include poaching, disturbance at specific site (nests and roost sites), and avoidance and displacement (Skagen et al. 1991, Stalmaster and Newman 1978).Individuals will show different thresholds of tolerances for disturbance, but are particularly vulnerable during the breeding season. Several studies reported that eagles avoid or are adversely affected by human disturbance during the breeding period and may result in nest abandonment and reproductive failure (Stalmaster and Newman 1978, Andrew and Mosher 1982, Fraser 1985, Fraser et al. 1985, Knight and Skagen 1988, Buehler et al. 1991, Grubb and King 1991, Grubb et al. 1992, Chandler et al. 1995, Grubb 1995, Trombulak and Frissell 2000). Although disturbance has been shown to adversely affect nesting bald eagles, individual pairs of bald eagles may be more tolerant to disturbance. For example, the Tahoe National Forest documented a bald eagle nest, in 2005, near a County road that was used to access a popular reservoir. A similar case has been documented on the Stanislaus National Forest where the pair continues to successfully reproduce.

Adding routes to the NFTS or converting ML1 roads to trails may result in increased disturbance to nesting or foraging bald eagles. To reduce disturbance to nesting bald eagles, land management agencies typically implement restrictions on certain activities within a specified distance (buffer) of nests. Recommended buffers around nests have typically varied between 100 and 800 meters (Anthony and Isaacs 1989, Fraser et al. 1985, McGarigal 1988, Stalmaster 1987, USFWS 2007). Latest recommendations from USFWS (2007) suggest 660 feet where there is increased visibility and exposure to noise. To minimize disturbance to foraging bald eagles routes motorized vehicles use should be minimized or not allowed between nesting or roosting sites and foraging areas (USFWS 2007).

Habitat Modification: Travel management and motorized activity may also indirectly affect bald eagles through impacts to potentially suitable roost or nest trees and to their prey base. Forest policy requires that hazard trees are removed along roads for public safety, often resulting in a reduction of snags within a 60 meter zone along both sides of some NFTS roads. Hazard tree removal along NFTS roads has the potential to reduce potential nest and roost sites for bald eagles. Hazard tree removal is typically conducted along Maintenance Level 2, 3, 4 and 5 roads (not Maintenance Level 1 roads or trails). The project alternatives primarily propose actions on trails and maintenance level (ML) 1 roads. Changing use, converting roads to trails, and proposing closures that are proposed on ML 1 and 2 roads within any of the project alternatives would result in a net reduction in miles of road on which hazard trees may be removed. These actions will provide a benefit to wildlife through snag and woody downed log retention. Therefore, the minor amounts of impact that the project alternatives may have on future hazard tree removal would be beneficial to bald eagle habitat.

Although bald eagles are opportunistic foragers, their primary prey base is fish. Roads and trails may contribute sediment to nearby streams, thereby reducing the quantity and quality of fish spawning habitat. Although the action alternatives would result in some sedimentation to select drainages within the project area, the primary foraging areas for bald eagles in the project area are lakes and reservoirs. These lakes and reservoirs contain abundant populations of fish, which provide an adequate prey base for bald eagles. Sedimentation resulting from the action alternatives will result in an immeasurable decrease in fish populations associated with bald eagle foraging.

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within Designated Territories, near nest sites, and near foraging areas. This would reduce the risk of direct and indirect effects to bald eagles from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 1, several analyses were completed (Table 3.11-24). Actions proposed in this alternative would not likely result in any human-caused mortality, but would likely increase disturbance to bald eagles within the project area. This alternative would add approximately 0.79 miles of unauthorized routes to the NFTS and would convert approximately 0.93 miles of ML1 road to trail within 400 meters of bald eagle foraging areas. These changes would likely result in disturbance to some individual eagles.

Actions proposed in this alternative would not likely result in any indirect effects to bald eagles through habitat modification. These actions would not result in any adverse impacts to available roost or nest sites nor would they measurably impact the bald eagles’ prey base.

Season of Use: Although the exact timing may vary, bald eagles may start nesting in late winter into early spring. Bald eagle nest sites and foraging areas are located within Zone 2 and Zone 3 (as identified for each route in Appendix I) of the seasonal closure. These closures would reduce disturbance to over-wintering individuals and bald eagle pairs during the early portion of their nesting season.

Mitigation Measures: Mitigation measures would not be implemented near any bald eagle nest sites or within any Designated Territories. The only types of mitigation measures that would be implemented near reservoirs used for foraging are tread hardening and drain dips. Implementation of these mitigation measures would include hand tool and machine work that may result in short-term disturbance to individual foraging eagles within the project area. This amount of disturbance would not likely reduce any individual bald eagles fitness and would not result in any population level impacts within the project area.

Table 3.11-24 Alternative 1 - Direct and Indirect Effects Indicators (bald eagle)

Indicators	
Miles of routes added to the NFTS within Designated Territories	0
Miles of ML1 roads converted to trails within Designated Territories	0
Miles of Routes added to the NFTS within 660 feet of nest sites	0
Miles of ML1 roads converted to trails within 660 feet of nest sites	0
Miles of routes added to the NFTS within 400 meters of lakes/reservoirs used for foraging	0.79
Miles of ML1 roads converted to trails within 400 meters of lakes/reservoirs used for foraging	0.93

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. Therefore, it is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of direct and indirect effects to bald eagles. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by the continued proliferation of routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to bald eagles.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within Designated Territories, near nest sites, and near foraging areas. This would reduce the risk of direct and indirect effects to bald eagles from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any motorized routes to the NFTS, nor would it change the type of use on any current NFTS routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to bald eagles.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within Designated Territories, near nest sites, and near foraging areas. This would reduce the risk of direct and indirect effects to bald eagles from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-25). Direct and indirect effects of the actions proposed in this alternative would be the same as those discussed in Alternative 1.

Season of Use: Although the exact timing may vary, bald eagles may start nesting in late winter into early spring. Bald eagle nest sites and foraging areas are located within Zone 2 and Zone 3 (as identified for each route in Appendix I) of the seasonal closure. These closures would reduce disturbance to over-wintering individuals and bald eagle pairs during the early portion of their nesting season.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-25 Alternative 4 - Direct and Indirect Effects Indicators (bald eagle)

Indicators	Miles
Miles of routes added to the NFTS within Designated Territories	0
Miles of ML1 roads converted to trails within Designated Territories	0
Miles of Routes added to the NFTS within 660 feet of nest sites	0
Miles of ML1 roads converted to trails within 660 feet of nest sites	0
Miles of routes added to the NFTS within 400 meters of lakes/reservoirs used for foraging	0.79
Miles of ML1 roads converted to trails within 400 meters of lakes/reservoirs used for foraging	0.93

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes within Designated Territories, near nest sites, and near foraging areas. This would reduce the risk of direct and indirect effects to bald eagles from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-26). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a decrease from Alternative 1 in the number of routes added to the system or converted to a trail near foraging habitat, there would be a decrease in the direct effects to bald eagles within the project area. Since these impacts would affect a very small percentage of suitable and occupied habitat (Table 3.11-26), these actions would likely impact some individuals but would not likely result in impacts to populations within the project area over the short or long-term.

Season of Use: Although the exact timing may vary, bald eagles may start nesting in late winter into early spring. Bald eagle nest sites and foraging areas are located within Zone 2 and Zone 3 (as identified for each route in Appendix I) of the seasonal closure. These closures would reduce disturbance to over-wintering individuals and bald eagle pairs during the early portion of their nesting season.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-26 Alternative 5 - Direct and Indirect Effects Indicators (bald eagle)

Indicators	Miles
Miles of routes added to the NFTS within Designated Territories	0
Miles of ML1 roads converted to trails within Designated Territories	0
Miles of Routes added to the NFTS within 660 feet of nest sites	0
Miles of ML1 roads converted to trails within 660 feet of nest sites	0
Miles of routes added to the NFTS within 400 meters of lakes/reservoirs used for foraging	0.56
Miles of ML1 roads converted to trails within 400 meters of lakes/reservoirs used for foraging	0

CUMULATIVE EFFECTS

Appendix B provides a list and description of past, present, and reasonably foreseeable projects on the STF and private lands within the Forest boundary. Some, but not all, of these activities will contribute to effects upon bald eagles. The primary risks to the bald eagles have been identified as: (1) ingestion of poisonous substances; (2) collision with stationary or moving structures or objects; (3) degradation of wintering or breeding habitat through human development or habitat alteration; and (4) disturbance at nest and roost sites (Birds of North America).

On the STF, increasing recreation use and associated disturbances at reservoirs, and habitat alteration associated with fuels reduction projects, are the primary factors influencing bald eagles or their habitat. Recreation disturbance at known nest locations has been limited through the use of area closures, but boating and campground activity may result in some degree of habitat avoidance by foraging eagles, or may result in avoidance of potential nesting habitats. Reservoirs on the STF vary in size, but typically provide large areas of undisturbed habitat due to the surrounding topography. Since fuels reduction projects are not removing large trees or snags, they are generally not reducing the quality of nesting habitat, and treatments are expected to make habitat more sustainable in the event of a wildfire.

The direct and indirect effects of the project alternatives contribute to two of the four risk factors described above. Alternative 2 has the greatest potential to result in disturbance to nesting and foraging bald eagles since cross-country travel would not be prohibited and vehicles could potentially gain access near foraging areas and nest sites. Since the three action alternatives would only result in small amounts of route near foraging areas and no routes near nest sites, they would only have very minor impacts to individual foraging bald eagles within the project area. The effects of the action alternatives when combined with the effects of current and future recreation activities may result in minor adverse cumulative effects to some individuals and would not likely measurably impact populations.

SUMMARY OF EFFECTS

Bald eagle populations are estimated to be increasing range-wide (USDA 2007). With the exception of Alternative 3, which would have beneficial impacts to the bald eagle, the direct and indirect effects of the project alternatives (1, 2, 4 and 5) combined with the cumulative effects are not likely to result in a trend toward Federal listing or a loss of viability for this species. For further discussion of the effects analysis and determinations, see the project BA/BE (project record).

Table 3.11-27 Ranking of Alternative Indicators (bald eagle)

Indicators	Rankings by Alternatives [1]				
	1	2	3	4	5
Miles of routes added to the NFTS within Designated Territories	4	1	5	4	4
Miles of ML1 roads converted to trails within Designated Territories	4	1	5	4	4
Miles of routes added to the NFTS within 660 feet of nest sites	4	1	5	4	4
Miles of ML1 roads converted to trails within 660 feet of nest sites	4	1	5	4	4
Miles of routes added to the NFTS within 400 meters of lakes/reservoirs used for foraging	3	1	5	3	4
Miles of ML1 roads converted to trails within 400 meters of lakes/reservoirs used for foraging	3	1	5	3	4
Average	**3.66**	**1**	**5**	**3.66**	**4**

[1] score of 5 indicates the alternative is the best for terrestrial biota related to the indicator; A score of 1 indicates the alternative is the worst for terrestrial biota related to the indicator. If both Alternatives were equal they were both given the same (higher of the two) ranking.

Great Gray Owl – Affected Environment

Species and Habitat Account

The great gray owl is a large nocturnal owl that is not easily observed. It is found in the boreal climatic zones of North America from Alaska to central California (Collins 1980, Mikkola 1983). The population that inhabits California represents the southern extent of its range (van Riper III and Wagtendonk 2006). Yosemite National Park and the STF currently represent the core range of the great gray owl in California. There are currently 21 documented great gray owl PACs on the STF, which are primarily located on the southern portion of the Forest. Great gray owl PACs are defined as "at least 50 acres of the highest quality nesting habitat available in the forested area surrounding nests and the meadow or meadow complex that support a prey base for the nesting owls" (USDA 2004). Although there are 21 designated PACs within the project area, activity centers have only been designated for 12 of them. PACs that do not currently have a designated activity center have not had any documented activity for a significant period of time. Activity centers for the PACs may not necessarily be nest sites, but may be the location of a roost site or territorial call. This data may vary in its accuracy, but it is currently considered the best available information and provides a means by which to evaluate the relative impacts of each of the project alternatives.

Great gray owls are found in mixed conifer forests, but are highly dependent upon meadows for foraging habitat (Winter 1981). A radio telemetry study in and around Yosemite National Park found that over 80% of the owl relocations were within 200 meters of meadows (Winter 1982). For this analysis, great gray owl emphasis habitat will be defined as meadows greater than 15 acres that are within 5 miles of existing PACs. Since great gray owls have been found to prefer areas within 200 meters of meadows, a 200 meter buffer will be applied to these meadows and included in the emphasis habitat. The results of this habitat delineation indicated that there are approximately 3,077 acres of meadows and a total of approximately 13,971 acres of emphasis habitat (includes buffer acres) within the project area.

Great Gray Owl – Environmental Consequences

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the great gray owl. Although thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Miles of routes added to the NFTS within great gray owl PACs
- Miles of ML1 roads converted to trails within great gray owl PACs
- Great gray owl PACs intersected by routes added to the NFTS or ML1 roads converted to trails (number of PACs)
- Great gray owl PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area)
- Miles of routes added to the NFTS within 400 meters of documented great gray owl activity centers
- Miles of ML1 roads converted to trails within 400 meters of documented great gray owl activity centers
- Miles of routes added to the NFTS within great gray owl emphasis habitat
- Miles of ML1 roads converted to trails within great gray owl emphasis habitat

Direct and Indirect Effects

General – All Alternatives

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

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on owls through: human-caused mortality, changes in behavior, and habitat modification.

Human-Caused Mortality: Collisions with motor vehicles have been documented in several locations and have been a significant source of trauma and mortality in some areas (Lopes et al. 2007, USDA 2004). The Cascades Raptor Center (2007) reported that collisions with vehicles “was the greatest cause of mortality” in great gray owls. There have been at least two reported collisions near the project area on Highways 120 and 140. Collisions with vehicles typically occur along well maintained roadways that allow high rates of travel. Routes proposed for designation within the project alternatives are native surfaced routes that allow much slower rates of travel. These types of routes would result in far fewer, if any collisions.

Changes in Behavior: Although there is very little documented information regarding disturbance from human activity to great gray owls, it will be assumed that great gray owls would respond to noise and human disturbance in much the same way as other owls. Therefore, changes in behavior are anticipated to be similar to those disclosed in the California spotted owl analysis. The Forest Service, Region 5, has generally assumed that activities (including road and trail use) occurring farther than 0.25 miles from California spotted owl nest sites have little potential to affect owl nesting (USDA 2004). The miles of routes that will be added to the NFTS with 0.25 miles of activity centers will be determined for each of the alternatives. Although activity centers have not been documented for each of the PACs and all of the activity centers may not be known nest sites, this analysis will serve as an indicator of the amount of disturbance that may occur to nest sites.

Habitat Modification: The use of meadows for nest sites or foraging is likely affected by the quality of the meadow habitat. Meadow habitat quality may be affected numerous different ways by motorized travel. The most obvious way motorized vehicles may impair meadow quality is through direct mechanical damage (rutting). Since soil typically has lower bulk density and can be more easily penetrated when it is wet, mechanical damage often occurs in meadows that are naturally wet or in dry meadows after significant rainfall or immediately following the retreat of the snow at higher elevations. When roads or trails are created in meadows they may intercept surface and subsurface flow (Kattelmann 1996). When flows are intercepted and redirected, meadow drying occurs, changing the fauna and flora associated with it.

Changing the faunal community within meadows may impact quantity and quality of great gray owl foraging. Two species that have been noted as being important prey items to great gray owls are microtines and pocket gophers (Franklin 1988, Winter 1981, Winter 1982). Winter (1981) and (1982) found that microtines may be a preferred prey item for great gray owls in the Sierra Nevada area and may be essential for successful reproduction. He further suggested that Microtus were also associated with moist areas that had good grass cover. Therefore, slight shifts in meadow hydrology caused by motorized travel may impact suitable habitat for mictrotines; thereby potentially adversely affecting the quantity and quality of great gray owl prey.

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near great gray owl activity centers, PACs, and emphasis habitat. This would reduce the risk of direct and indirect effects to the great gray owl from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct effects from adding routes to the NFTS, two analyses were completed: 1) miles of routes that would be added to the NFTS within great gray owl PACs and, 2) miles of routes that would be added to the NFTS within 400 meters of documented great gray owl activity centers (Table 3.11-28). Alternative 1 would result in the addition of 0.56 miles of motorized routes to 2 separate great gray owl PACs (Crocker Meadow and Ackerson 3) and 0.28 miles of routes within 400 meters of one Activity Center (Table 3.11-28). Although the Crocker Meadow and Ackerson 3 PACs have not had any recently documented activity, great gray owls use the entire Ackerson meadow complex and the addition of these routes may increase disturbance to some individual great gray owls within the project area. Increases in disturbance resulting from the addition of these routes would not likely be significant enough to reduce any individual owl's fitness; therefore, it would not result in any population level impacts to the great gray owl.

To determine the relative risk of the indirect effects of adding routes to the NFTS, two analyses were completed: 1) miles of routes that would be added to the NFTS within great gray owl PACs and, 2) miles of routes added to the NFTS within great gray owl emphasis habitat. Field surveys were completed on the routes that proposed to be added to the NFTS within the PACs. The route that was proposed to be added within the Crocker Meadow PAC does not cross any streams nor does it enter the meadow. Therefore, the addition of this route to the NFTS would not have significant impacts to the hydrology of the meadow. One of the routes that were proposed to be added to the NFTS within the Ackerson 3 PAC crosses a small unnamed tributary to Ackerson Creek. The route and the crossing are not within the meadow. The addition of this route would not likely result in significant impacts to the hydrology of the meadow complex. If GIS analysis indicated that a route within great gray owl emphasis habitat crossed a stream, a field survey was completed on the route. The GIS analysis indicated that there were two routes (FR98514 and FR98486) within great gray owl emphasis habitat that crossed streams. After completing field surveys on these routes it was determined that they would not result in any adverse impact to the hydrology of the meadows.

Season of Use: Although the exact timing may vary, great gray owls start nesting near the month of March. Since seasonal closures for Zone 2 and Zone 3 (as identified for each route in Appendix I) would overlap the beginning of the nesting period and approximately 90% of the great gray owl PACs would be within these Zones, these closures would reduce disturbance to those individuals returning to their breeding territories and starting to nest.

Mitigation Measures: The only type of mitigation measure that would be implemented within PACs is no-dig barriers. There would not be any mitigation measures implemented within 400 meters of activity centers. The installation of no-dig barriers would be completed with hand tools and would not likely result in any disturbance to owls within the PAC.

Table 3.11-28 Alternative 1 - Direct and Indirect Effects Indicators (great gray owl)

Indicators	
Miles of routes added to the NFTS within PACs	0.56
Miles of ML1 roads converted to trails within PACs	0.24
PACs intersected by routes added to the NFTS or ML1 roads converted to trails (number of PACs)	3
PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area)	14
Miles of routes added to the NFTS within 400 meters of Activity Centers	0.28
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	0
Miles of routes added to the NFTS within emphasis habitat	1.63
Miles of ML1 roads converted to trails within emphasis habitat	1.16

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. Therefore, it is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of direct and indirect effects to great gray owls. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by the continued proliferation of routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to great gray owls.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near great gray owl activity centers, PACs, and preferred habitat. This would reduce the risk of direct and indirect effects to the great gray owl from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any motorized routes to the NFTS, nor would it change the type of use on any current NFTS routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to great gray owl.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near great gray owl activity centers, PACs, and emphasis habitat. This would reduce the risk of direct and indirect effects to the great gray owl from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-29). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. The only exception is that there would be an additional 0.08 miles of routes added to the NFTS within great gray owl emphasis habitat. GIS analysis indicated that this route would not cross any streams nor would it impact the hydrology of the meadow.

Season of Use: Although the exact timing may vary, great gray owls start nesting near the month of March. Since seasonal closures for Zone 2 and Zone 3 (as identified for each route in Appendix I) would overlap the beginning of the nesting period and approximately 90% of the great gray owl PACs would be within these Zones, these closures would reduce disturbance to those individuals returning to their breeding territories and starting to nest.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-29 Alternative 4 - Direct and Indirect Effects Indicators (great gray owl)

Alternative 4 - Great Gray Owl - Direct and Indirect Effects Indicators	
Miles of routes added to the NFTS within PACs	0.56
Miles of ML1 roads converted to trails within PACs	0.24
PACs intersected by routes added to the NFTS or ML1 roads converted to trails (number of PACs)	3
PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area)	14
Miles of routes added to the NFTS within 400 meters of Activity Centers	0.28
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	0
Miles of routes added to the NFTS within emphasis habitat	1.71
Miles of ML1 roads converted to trails within emphasis habitat	1.19

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near great gray owl activity centers, PACs, and emphasis habitat. This would reduce the risk of direct and indirect effects to the great gray owl from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-30). This Alternative would not result in the addition of any routes to the NFTS within great gray owl PACs or within 400 meters of Activity Centers. Therefore, this Alternative would not likely result in any direct effects to the great gray owl. This Alternative would result in the addition of 0.53 miles of routes to NFTS within emphasis habitat. GIS analysis indicated that this route would not cross any streams nor would it impact the hydrology of the meadow. This Alternative would not result in any adverse impacts to great gray owl emphasis habitat; therefore, it would not likely have any indirect effect to the great gray owl.

Season of Use: Although the exact timing may vary, great gray owls start nesting near the month of March. Since seasonal closures for Zone 2 and Zone 3 (as identified for each route in Appendix I) would overlap the beginning of the nesting period and approximately 90% of the great gray owl PACs would be within these Zones, these closures would reduce disturbance to those individuals returning to their breeding territories and starting to nest.

Mitigation Measures: There would not be any mitigation measures implemented as part of this alternative.

Table 3.11-30 Alternative 5 - Direct and Indirect Effects Indicators (great gray owl)

Indicators	
Miles of routes added to the NFTS within PACs	0
Miles of ML1 roads converted to trails within PACs	0
PACs intersected by routes added to the NFTS or ML1 roads converted to trails (number of PACs)	0
PACs intersected by routes added to the NFTS or ML1 roads converted to trails (Percentage of all PACs in Project Area)	0
Miles of routes added to the NFTS within 400 meters of Activity Centers	0
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	0
Miles of routes added to the NFTS within emphasis habitat	0.53
Miles of ML1 roads converted to trails within emphasis habitat	0

CUMULATIVE EFFECTS

Appendix B provides a list and description of past, present, and reasonably foreseeable projects on the STF and private lands within the Forest boundary. Some, but not all, of these activities will contribute to effects upon great gray owls. Factors responsible for low numbers of great gray owls breeding in the Sierra Nevada are not fully known. During the past century, the widespread removal of large trees from mature and oldgrowth forest has reduced the abundance of potential nest trees, fire suppression has allowed meadow foraging habitats to decrease in size, and livestock grazing altered meadow hydrology, potentially reducing prey abundance (Verner 1994).

Livestock grazing occurs on 35 active grazing allotments on the STF, totaling approximately 792,042 acres of NFS and private lands. In some meadows, livestock grazing has reduced the suitability of meadow vegetation for microtine rodents and other great gray owl prey (USDA 2001). On the STF, the impacts of livestock grazing on meadows is variable between years, but has been steadily decreasing as forage utilization levels are being reduced by stricter standards established by the Sierra Nevada Forest Plan Amendment. Furthermore, some meadows within PACs are protected by grazing exclosures designed to reduce the impacts of grazing and improve cover for great gray owl prey. Although improvements have been made, livestock grazing has historically and may continue to have cumulative effects on cover for great gray owl prey within meadows in the project area.

Although human disturbance has not been recognized as a significant threat to great gray owls, the use of motorized vehicles in meadow habitats can have significant impacts to meadow hydrology and the associated flora and fauna. The greatest risk of impacts to great gray owls and their habitats is in Alternative 2 since it would not prohibit cross-country travel and meadows are often easily accessed by vehicles. Therefore, the direct and indirect effects of Alternative 2 and the effects of continued livestock grazing may have significant impacts to individuals. Although the population of great gray owls within the project area is not precisely known, it is known to be relatively small with a limited distribution. Impacts to meadows that maybe associated with unabated cross-country travel would likely impact enough individuals to result in measurable reductions to the population size within the project area.

The direct and indirect effects of motorized routes within meadows in Alternatives 1, 4 and 5, combined with the effects of past and continued livestock grazing, may adversely affect meadow habitats and associated species (as described above). Since the action alternatives would only result in disturbance to some individuals and would not impact meadow hydrology they would not likely result in impacts to any individual’s fitness or populations with the project area.

Table 3.11-31 Ranking of Alternative Indicators (great gray owl)

Indicators	Rankings by Alternatives [1]				
	1	**2**	**3**	**4**	**5**
Miles of routes added to the NFTS within PACs	3	1	5	3	4
Miles of ML1 roads converted to trails within PACs	3	1	5	3	4
Number of PACs intersected by routes added to the NFTS or ML1 roads converted to trails	3	1	5	3	4
Miles of routes added to the NFTS within 400 meters of Activity Centers	3	1	5	3	4
Miles of ML1 roads converted to trails within 400 meters of Activity Centers	3	1	5	3	4
Miles of routes added to the NFTS within emphasis habitat	3	1	5	2	4
Miles of ML1 roads converted to trails within emphasis habitat	3	1	5	2	4
Average	**3**	**1**	**5**	**2.71**	**4**

[1] score of 5 indicates the alternative is the best for terrestrial biota related to the indicator; A score of 1 indicates the alternative is the worst for terrestrial biota related to the indicator. If both Alternatives were equal they were both given the same (higher of the two) ranking.

SUMMARY OF EFFECTS

Since great gray owls have limited distribution within the project area and within the Sierra Nevada, population level impacts associated with Alternative 2 may result in a trend toward listing and may impact the viability of the species. Alternative 3 would prohibit cross-country travel and would not add any routes to the NFTS, therefore this alternative would have beneficial impacts to the great gray owl. The direct and indirect effects of the action alternatives (1, 4 and 5) combined with the cumulative effects to habitat are not likely to result in a trend toward Federal listing or a loss of viability for the great gray owl. For further discussion of the effects analysis and determinations, see the project BA/BE (project record).

Aquatic Biota

Effects Common to all Aquatic Wildlife

Due to their limited distribution on the landscape and life history requirements, most species of aquatic wildlife are similarly affected by motorized travel. Although Gaines et al. (2003) described the effects of recreation routes on "riparian species", the effects to aquatic species are very similar and can be categorized in much of the same way. Therefore, the effects of motorized travel on aquatic species may be categorized by human-caused mortality, changes in behavior, and habitat modification. Generally, site-specific studies on the species interaction with road and trail-associated factors is lacking in the literature. Where site-specific information or literature on road and trail associated factors to aquatic species is unavailable, general information on potential impacts is presented. Additional information on the effects to the aquatic environment is presented in Chapter 3.10, Watershed Resources.

Human-Caused Mortality: Allowing cross-country travel or adding routes to the NFTS may result in human-caused mortality to aquatic species in a variety of ways including: collisions, introduction of non-native species, parasites, or disease vectors. Collisions with vehicles have not only been documented in numerous different herpetofaunal species, they may even be particularly vulnerable to it (Trombulak and Frissell 2000). Mass mortalities of other species of frogs have been documented during dispersal where roads intersect natal/breeding habitat and non-breeding foraging habitat (Hine et al. 1981, Fahrig et al. 1995). Mortality from vehicles can reduce population size and reduce movement between resources and conspecific populations (Carr and Fahrig 2001).Stream crossings are areas of particular concern for collisions. Although some stream crossings have culverts or bridges, fords or low-water crossings are very typical along trails. Locations of fords vary widely, but often occur along a relatively low gradient stretch of stream. When a ford is created in these areas, it often creates a small pool where different life history stages (fingerling fish or tadpoles) of some species may congregate. Increased densities of these species may result in higher rates of collisions. Although some species may be more prone to crushing at crossings, numerous herpetofaunal species migrate from aquatic to terrestrial environments to complete their life histories. These species are even more vulnerable to motorized travel, because routes may parallel water bodies. Since herpetofaunal species tend to be slow-moving and may migrate across a motorized route that is near a water body, they may have a relatively higher risk of being crushed by vehicles.

Introduction of toxins, non-native organisms, parasites, and disease vectors are the final ways which motorized travel may result in human-caused mortality. When vehicles travel along a route near a stream or cross a stream at a ford, small amounts of toxins may be introduced to the environment. Although there is a low risk that individuals will be exposed to lethal levels of any of these toxins, small exposures may elicit immune responses within individuals. McCallum and Trauth (2007) found that male northern cricket frogs that elicited immune responses had reduced fertility rates. Therefore, introduction of toxins at low levels may result in reduced reproductive fitness of some aquatic species.

The movement and introduction of non-native organisms, parasites, and disease vectors between water bodies has been recognized as a significant threat to numerous different aquatic species. When traveling roads or trails throughout the course of a day, a vehicle may cross numerous streams. When a vehicle crosses a stream through a low-water crossing or a ford it may capture soil/debris in the tread of the tires or on the body of the vehicle. Non-native organisms, parasites, and disease vectors may be captured in the soil/debris on the vehicle. When crossing subsequent streams, soil/debris may then be deposited potentially spreading non-native organisms, parasites, and disease vectors between water bodies. The risk of adverse effects to individuals and populations is highly variable among species and will be discussed further below.

Changes in Behavior: Although it is not well documented in the literature, it is reasonable to assume that aquatic species may be affected by motorized vehicles through changes in behavior. Adding routes result in increased access of vehicles and human visitors to aquatic species habitat. As with individuals of terrestrial species, individuals of aquatic species are likely to exhibit a predator avoidance response when they become disturbed by humans. Direct effects of disturbance to an individual's fitness are commonly measured through increases in stress hormone levels. Significant increases in stress hormone levels have been found to reduce reproductive success of individuals of some species.

Indirect affects of disturbance are commonly displayed through changes in an individual's time and energy budget. As a vehicle or human approaches an individual, the most obvious and common disturbance response is for that individual to avoid the threat and seek cover. After an individual exhibits the disturbance response, a period of time will elapse until that individual resumes pre-disturbance behavior. Since this change in an individual's time budget may result in less time feeding or resting, the disturbance may result in changes to the individual's energy budget. If an individual is repeatedly disturbed in an area, they may avoid the area, essentially being displaced from the habitat. Significant changes to an individual's energy budget or displacement from its habitat may result in impacts to the individual's fitness. Rodriguez-Prieto and Fernandez-Juricic (2005) found that increases in disturbance from human-visitation resulted in significant reductions in the use of stream banks by Iberian frogs. They further concluded that disturbance from recreational activities negatively affected Iberian frogs through spatial and temporal losses in resources.

Habitat Modification: Motorized travel may result in numerous different impacts to aquatic species habitat quality and quantity. Since many of these species are amphibians, they are acutely prone to changes in aquatic and adjacent terrestrial habitats. Alterations to terrestrial habitat may include, but are not limited to: direct reductions in cover (vegetative and underground), introductions of non-native plant species, and impacts to meadow hydrology. Alterations to aquatic habitat may include, but are not limited to: reductions in shade, increased water temperatures, increased sedimentation, altered hydrology and geomorphology.

The transfer of sediment to streams and other water bodies at road crossings is a consequence of roads and trails (Richardson et al. 1975). The surfaces of unpaved roads can route fine sediments to streams, lakes, and wetlands, increasing turbidity of the water (Reid and Dunne 1984). Various studies have demonstrated that sediment delivery to stream channels in a forested environment is correlated to road surface type, physical characteristics of the adjacent areas (e.g., litter depth, coarse wood), soils (erodibility), the steepness of slope below the road, and vehicle usage (Chin and others 2004, Clinton and Vose 2003). The knowledge of the impact of increased sediment load on amphibians is limited (Gillespie 2002). However, the negative impacts of increased sediments on aquatic species, including fish, macroinvertebrates, and periphyton, are well known (Power 1990, Newcombe and MacDonald 1991, Waters 1995). High concentrations of suspended sediment may directly kill aquatic organisms and impair aquatic productivity (Newcombe and Jensen 1996). Egg survival may be impacted by roads and trails through increases in fine sediments. Increased sedimentation may also reduce availability of important food resources for tadpoles such as algae (Power 1990). Fine sediment deposits also tend to fill pools and smooth gravel beds, degrading habitats (Forman and Alexander 1998) and possibly the availability of oviposition sites or larval refugia (Welsh and Ollivier 1998). In addition, the consequences of past sedimentation are long term and cumulative, and cannot be mitigated effectively (Hagans et al. 1986).

The effects are heightened if the sediments contain toxic materials (Maxell and Hokit 1999). At least five different general classes of chemicals are transferred into the environment from maintenance and use of roads: heavy metals, salt, organic molecules, ozone, and nutrients (Trombulak and Frissell 2000). The changes to water chemistry by road runoff may affect living organisms in several ways. For example, chemicals found in road de-icers may kill (Doughtery and Smith 2006) or displace frog life stages, or they may be accumulated in plants as toxins which, in turn, can depress larval amphibian growth.

Roads can also influence both peak flows (floods) and debris flows (rapid movements of soil, sediment, and large wood stream channels) two processes which have major influences on riparian vegetation (Jones et al. 2000) as well as aquatic and riparian patch dynamics critical to stream ecosystems (Pringle et al. 1988). Numerous frog species breed in streams which can be adversely affected by fluctuations in the frequency or magnitude of peak flows, thereby, adversely affecting recruitment.

For amphibians, the species and habitat accounts below were summarized from Lannoo (2005). Additional references are cited to address specific elements of the species and habitat accounts for all species below.

California Red-legged Frog – Affected Environment

Species and Habitat Account

The California red-legged frog (CRLF) historically occurred from the California coast, throughout the Central Valley and into the Sierra Nevada foothills. Currently, the CRLF occupies approximately 70% of their historic range and are primarily located in streams and wetlands in coastal drainages (71 FR 19244). There are no recent (<40 years) occurrences of the STF (USFWS 2002); however, historic records exist in CNDDB at Jordan Pond (1967) and Woods Creek (1950). Herpetofauna surveys have occurred extensively throughout the STF, but surveys have used a generalized visual encounter method (Fellers and Freel 1995) and have not been conducted according to the most recent CRLF protocol (USFWS 2005) nor have they covered all aquatic habitat within the project area in. Between 1995 and 2005, USFWS protocol-level surveys were conducted for CRLF within the project area in the following areas: Bull Creek (in Anderson Valley), Rush Creek, Jordan Pond, Bean Creek, Smith Creek. Despite significant survey efforts, there have been no recent observations of the CRLF within the project area. Although there have not been any observations of the CRLF in the project area, all suitable habitat has not been surveyed within the last two years to the most recent protocol (USFWS 2005). Therefore, this analysis assumes that suitable habitat is occupied.

The CRLF is a highly aquatic species typically found in cold water ponds and stream pools with depths exceeding 0.7 meters and with overhanging vegetation such as willows, as well as emergent and submergent vegetation (Hayes and Jennings 1988). Suitable habitat on the forest is defined as areas on the landscape that meet the definition of a primary constituent element (PCE) as defined in Federal Register and consist of aquatic breeding habitat, non-breeding aquatic habitat, upland habitat, and dispersal habitat (71 FR 19244).

California Red-legged Frog – Environmental Consequences

Indicators

To assist with the Travel Management Planning process, Region 5 USFS entered into programmatic consultation with the United States Fish and Wildlife Service (USFWS) for motorized vehicle route designation. On December 27, 2006, the USFWS issued a Letter of Concurrence for 14 National Forests in California, including the STF. The Letter of Concurrence approved the Project Design Criteria (PDC) as outlined in the document entitled “Route Designation: Project Design Criteria for ‘No Effect’ or ‘May Affect Not Likely to Adversely Affect’ determination for TE Species – October

2006 version 1". Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the California red-legged frog. Although biological thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Number of routes that have the potential to capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog.
- Number of routes that do not avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCAs) except where necessary to cross streams.
- Number of stream crossings on unauthorized routes within suitable habitat.
- Miles of routes added to the NFTS within 300 feet of suitable habitat.
- Miles of ML1 roads converted to trails within 300 feet of suitable habitat.
- Miles of routes added to the NFTS within dispersal habitat.
- Miles of ML1 roads converted to trails within dispersal habitat.

DIRECT AND INDIRECT EFFECTS

General – All Alternatives

The project alternatives could result in direct and indirect effects to the California red-legged frog by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on California red-legged frogs through: human-caused mortality, changes in behavior, and habitat modification (see Effects Common to all Aquatic Wildlife). Furthermore, these frogs may be more or less prone to the effects of motorized travel because they utilize upland habitats, frequently considerable distances from aquatic features. Bulger et al. (2003) and Fellers and Kleeman (2007) reported terrestrial movements up to 1.7 miles before and after the breeding period as adults dispersed into other non-breeding aquatic habitats. Fellers and Kleeman (2007) also reported that a large portion of the population (35%) can move during single rainfall events and a majority of all frogs in a population migrate during the breeding season. The CRLF can also move in excess of 150 yards from aquatic habitat to seek cover in upland habitats and remain for up to three weeks (Bobzien and DiDonato 2007).

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near suitable California red-legged frog habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 1, several analyses were completed (Table 3.11-32). This alternative would result in the addition of several routes with 20 stream crossings within suitable CRLF habitat. These stream crossings would likely result in direct and indirect effects to some individuals of all CRLF life history stages. The addition of routes and conversion of roads to trails within 300 feet of suitable aquatic habitat may result in direct effects to some juvenile and adult frogs and indirect effects to all life history stages. The addition of routes and conversion of roads to trails within dispersal areas may also result in direct effects to some adults dispersing between breeding sites.

Season of Use: The CRLF primarily inhabits lower elevations throughout its range and are not known to overwinter or enter into torpor. Suitable habitat within the project area is located within Zone 1 and Zone 2 of the seasonal closures (as identified for each route in Appendix I). Since Zone 1 is open to year-round use, there would not be any beneficial impacts to the CRLF or it's habitat within this Zone. Since breeding typically occurs in late winter and early spring, restrictions on the season of use within Zone 2 would likely reduce direct effects to breeding adults and those that may be migrating between breeding sites. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and subsequent sedimentation routing into streams associated with all life history stages of the CRLF.

Mitigation Measures: Types of mitigation measures proposed on routes associated with suitable CRLF habitat include: barriers, tread hardening, drain dips, and hardened stream crossings. The installation of a hardened stream crossing would likely result in a short-term increase in sedimentation which may impact some individuals. The installation of all mitigation measures may result in short-term disturbance to some individual frogs, but will limit trail widening, reduce soil perturbation, and reduce sedimentation, providing beneficial effects over the long-term.

Table 3.11-32 Alternative 1 - Direct and Indirect Effects Indicators (California red-legged frog)

Indicators	
Number of routes which may capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog	7
Number of routes that do not avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCAs) except where necessary to cross streams	13
Number of stream crossings on proposed unauthorized routes within suitable habitat	20
Miles of routes added to the NFTS within 300 feet of suitable aquatic habitat	4.45
Miles of ML1 roads converted to trails within 300 feet of suitable aquatic habitat	0.83
Miles of routes added to the NFTS within dispersal habitat	1.65
Miles of ML1 roads converted to trails within dispersal habitat	1.06

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. Therefore, it is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of direct and indirect effects to these frogs. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by the continued proliferation of routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to individual frogs.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable CRLF habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any motorized routes to the NFTS, nor would it change the type of use on any current NFTS routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential direct and indirect effects to the CRLF.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near suitable California red-legged frog habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-33). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a slight increase from Alternative 1 in the number of routes added to the system or converted to a trail within 300 feet of suitable aquatic habitat, there would be a slight increase in the direct and indirect effects to these frogs within the project area.

Season of Use: The CRLF primarily inhabits lower elevations throughout its range and are not known to overwinter or enter into torpor. Suitable habitat within the project area is located within Zone 1 and Zone 2 of the seasonal closures (as identified for each route in Appendix I). Since Zone 1 is open to year-round use, there would not be any beneficial impacts to the CRLF or it’s habitat within this Zone. Since breeding typically occurs in late winter and early spring, restrictions on the season of use within Zone 2 would likely reduce direct effects to breeding adults and those that may be migrating between breeding sites. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and subsequent sedimentation routing into streams associated with all life history stages of the CRLF.

Mitigation Measures: The types and effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-33 Alternative 4 - Direct and Indirect Effects Indicators (California red-legged frog)

Indicators	
Number of routes which may capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog	7
Number of routes that do not avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCAs) except where necessary to cross streams	13
Number of stream crossings on proposed unauthorized routes within suitable habitat	20
Miles of routes added to the NFTS within 300 feet of suitable aquatic habitat	4.47
Miles of ML1 roads converted to trails within 300 feet of suitable aquatic habitat	2.99
Miles of routes added to the NFTS within dispersal habitat	1.65
Miles of ML1 roads converted to trails within dispersal habitat	1.32

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near suitable California red-legged frog habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-34). Routes added within this alternative would not likely result in disturbance or crushing of any individuals or contribute sediment to steams associated with the CRLF. Therefore, this alternative would not result in the addition of any routes to the NFTS that would have direct or indirect effects to the CRLF.

Season of Use: The CRLF primarily inhabits lower elevations throughout its range and are not known to overwinter or enter into torpor. Suitable habitat within the project area is located within Zone 1 and Zone 2 of the seasonal closures (as identified for each route in Appendix I). Since Zone 1 is open to year-round use, there would not be any beneficial impacts to the CRLF or it's habitat within this Zone. Since breeding typically occurs in late winter and early spring, restrictions on the season of use within Zone 2 would likely reduce direct effects to breeding adults and those that may be migrating between breeding sites. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and subsequent sedimentation routing into streams associated with all life history stages of the CRLF.

Mitigation Measures: The types and effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-34 Alternative 5 - Direct and Indirect Effects Indicators (California red-legged frog)

Indicators	
Number of routes which may capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog	0
Number of routes that do not avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCAs) except where necessary to cross streams	0
Number of stream crossings on proposed unauthorized routes within suitable habitat	0
Miles of routes added to the NFTS within 300 feet of suitable aquatic habitat	0
Miles of ML1 roads converted to trails within 300 feet of suitable aquatic habitat	0
Miles of routes added to the NFTS within dispersal habitat	0
Miles of ML1 roads converted to trails within dispersal habitat	0

CUMULATIVE EFFECTS

The California red-legged frog was once numerous and widely distributed in California. Initial declines of the California red-legged frog is attributed to over-harvesting (Jennings and Hayes 1985), and then later to the loss and alteration of habitat (USFWS 2002). Other important factors attributed to the decline of the CRLF include the introduction of non-native species (bullfrogs, centrarchid fish, crayfish) which have out-competed and predated on the CRLF and agricultural practices which modify aquatic and upland habitats (Davidson et al. 2002, USFWS 2002) . Additional stressors that may have affected the distribution and abundance of the California red-legged frog on the STF, include historic mining, livestock grazing, recreation, and water diversions (USFWS 2002). All these activities have the potential to alter California red-legged frog habitat through disturbance to vegetation, soils, and hydrology.

On the STF, a majority of the land containing suitable habitat for the CRLF is within active livestock allotments. The presence of livestock in near-stream environments can result in physical disturbance and livestock in aquatic habitats present a low risk of trampling individuals, particularly tadpoles who have lower mobility and tend to escape into fine sediments. Excessive livestock grazing can impact terrestrial habitats directly from browsing on obligate riparian vegetation that provides cover and feeding habitats for the frog. Excessive livestock grazing can affect aquatic habitats indirectly primarily through erosion and sedimentation processes if the activity occurs in near stream environments. Secondarily, the metabolic waste products may cause minor nutrient enrichment (nitrogen and phophorus) of aquatic habitats. At present, it is assumed that livestock are having negligible to minor impacts to the frog and its habitats.

Recreational mining activities (suction dredging) have the potential to adversely affect individuals directly from disturbance and possible mortality if tadpoles are entrained by the dredge. Suction dredging involves the modification of aquatic habitat directly from the movement of streambed materials and from riparian area disturbances. Suction dredging occurs in several streams that provide suitable habitat for the frog including but not limited to Bean Creek, Bull Creek, Moore Creek, Rose Creek, and Smith Creek. At present, it is assumed that recreational mining activities are having minor impacts to individuals and habitats.

Timber harvest and other vegetation management projects are occurring on private lands and on lands administered by the STF. A majority of the commercial timber lands are outside of the elevation range of the frog. Harvest on these lands has the potential to impact habitat indirectly primarily through erosion and sedimentation of aquatic habitats. Other vegetation management projects (fuel reduction) do occur within the elevation range of the frog and could affect aquatic and terrestrial habitats through sedimentation and modification of dispersal and upland habitats. Typically, activities in or near RCA are mitigated by applying best management practices (BMP) where equipment and activities are prohibited or minimal. Both public and private timber lands use herbicides for site preparation and to alleviate competition from non-desirable vegetation. The STF has developed a five year plan for managing vegetation on public lands. There are 10 to 15 projects that are planned or in planning that overlap with areas of suitable habitat. At present, vegetation management activities on private and public lands are having minor impacts to individuals and habitats.

Development of lands adjacent to the STF is also expected to elevate the potential for the introduction of non-native (exotic) species into aquatic systems. Introduced non-native aquatic predators such as centrarchid fishes, crayfish, and bullfrogs are believed to have affected herpetofauna populations in and adjacent to the Forest.

Table 3.11-35 Ranking of Alternative Indicators (California red-legged frog)

Indicators	Rankings by Alternative [1]				
	1	2	3	4	5
Number of routes which may capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog	3	1	5	3	4
Number of routes that do not avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCAs) except where necessary to cross streams	3	1	5	3	4
Number of stream crossings on proposed unauthorized routes within suitable habitat	3	1	5	3	4
Miles of routes added to the NFTS within 300 feet of suitable habitat	3	1	5	2	4
Miles of ML1 roads converted to trails within 300 feet of suitable aquatic habitat	3	1	5	2	4
Miles of routes added to the NFTS within dispersal habitat	3	1	5	3	4
Miles of ML1 roads converted to trails within dispersal habitat	3	1	5	2	4
Average	**3**	**1**	**5**	**2.57**	**4**

[1] score of 5 indicates the alternative is the best for terrestrial biota related to the indicator; A score of 1 indicates the alternative is the worst for terrestrial biota related to the indicator. If both Alternatives were equal they were both given the same (higher of the two) ranking.

SUMMARY OF EFFECTS

The California red-legged frog is not known to occur within the project area, but protocol-level surveys have not been completed in all suitable habitat (USFWS 2005). Alternative 3 would prohibit cross-country travel and would not add any routes to the NFTS, therefore this alternative would have beneficial effects to the California red-legged frog. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not comply with USFWS PDC and would likely adversely affect the California red-legged frog. Alternatives 1 and 4 would prohibit cross-country travel, but would add routes that would not comply with USFWS PDC and would likely adversely affect the California red-legged frog; therefore, consultation with FWS will have to occur for these alternatives. Alternative 5 would prohibit cross-country travel, would not add any routes that would have any direct or indirect effects, and would comply with USFWS PDC; therefore, this alternative would not affect the California red-legged frog. For further discussion of the effects analysis and determinations, see the project BA/BE (project record).

Foothill Yellow-legged Frog – Affected Environment

Species and Habitat Account

The foothill yellow-legged frog (FYLF) was historically found throughout much of California and southwestern Oregon, but currently occupies only a small portion of its historical range (Amphibiaweb 2008, Jennings and Hayes 1994). Foothill yellow-legged frogs have been extirpated from at least two thirds of their historic localities over their entire Sierran range (Jennings 1996, Lind 2005). Lind (2005) estimated FYLF populations (prior to 1980) have disappeared from approximately 51% of their historic range. Herpetofauna surveys have occurred extensively throughout the STF, but have not covered aquatic habitat within the project area in entirety. Approximately 20% of all perennial streams and 6% of all seasonal streams have been surveyed. Results from these surveys indicate that these frogs have been observed in approximately 18 separate streams throughout the STF. There are many “subpopulations” associated with multiple breeding/occupancy locales in several of these streams.

The FYLF is a highly aquatic amphibian that prefers streams with a rocky substrate. Most occurrences of the frog on the STF occur at elevations below 3,000 feet (Aquasurv 2008), though historic occurrences occurred at elevations up to 4,200 feet (CNDDB 2008). Foothill yellow-legged frogs breed at locations with substrates and channel shapes that provide suitable velocities and depths over a relatively broad range of discharge volumes (Kupferberg 1996). Locally, breeding occurs in late May or early June when water levels become stable enough to reduce the risk of stranding or scour. These frogs prefer partial shade, shallow riffles, and cobble sized or greater substrate (Hayes and Jennings 1988). Kupferberg (1996) reported adult frogs may disperse into small tributary streams with persistent water following breeding and personal observations on the STF provide support for this report. During all seasons, these frogs are rarely encountered far from permanent water, though foothill yellow-legged frogs have been observed in abandoned rodent burrows and under logs as far as 100 meters from a stream (Zeiner et al. 1988, Welsh 1994). Tadpoles typically use shallow water habitats where warmer water and food resources (diatoms, algae) are plentiful. Adults are likely to use exposed streambeds and riparian areas to forage for a variety of terrestrially- and aquatically-derived insects..

Since surveys of all aquatic habitats have not been conducted systematically for this project, suitable aquatic habitat was conservatively estimated. For the purposes of this analysis, suitable FYLF aquatic habitat has been defined and mapped as all perennial and intermittent streams within the STF below 4,500 feet in elevation. Since field surveys have not been completed on all areas adjacent to suitable aquatic habitat, this analysis assumes that all land within 30 meters of suitable aquatic habitat may provide suitable terrestrial habitat. Since the FYLF is primarily stream dwelling the potential for impacts beyond 30 meters of suitable aquatic habitat is very low and would likely result in negligible effects to the species.

Foothill Yellow-legged Frog – Environmental Consequences

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the foothill yellow-legged frog. Although biological thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Number of stream crossings (perennial and intermittent) on routes added to the NFTS within known occupied habitat.
- Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within known occupied aquatic habitat.
- Miles of routes added to the NFTS within 30 meters of known occupied aquatic habitat.

- Miles of ML1 roads converted to trails within 30 meters of known occupied habitat
- Number of stream crossings (perennial and intermittent) on routes added to the NFTS within suitable aquatic habitat.
- Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within suitable aquatic habitat.
- Miles of routes added to the NFTS within 30 meters of suitable aquatic habitat.
- Miles of ML1 roads converted to trails within 30 meters of suitable aquatic habitat.

DIRECT AND INDIRECT EFFECTS

General – All Alternatives

The project alternatives could result in direct and indirect effects to the foothill yellow-legged frog by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on foothill yellow-legged frogs through: human-caused mortality, changes in behavior, and habitat modification (see Effects Common to all Aquatic Wildlife). Furthermore, these frogs may be more or less prone to the effects of motorized travel because they are rarely found far from water, the timing and location of breeding suggests they will select a favorable breeding site in highly dynamic stream environments where localized sedimentation may be less important, and they tend to be very dispersed in their distribution within any given stream. However, recently metamorphosed individuals show a strong tendency to migrate away from the natal pool prior to the onset of winter.

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable foothill yellow-legged frog habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 1, several analyses were completed (Table 3.11-36). This alternative would result in the addition of one route with one stream crossing within occupied foothill yellow-legged frog habitat and several routes with 61 stream crossings within suitable habitat. These stream crossings would likely result in direct and indirect effects to some individuals of all FYLF life history stages. The addition of routes and conversion of roads to trails within 100 meters of occupied and suitable aquatic habitat would likely result in direct effects to a few juvenile and adult FYLF and would result in indirect effects to both aquatic and terrestrial habitat over the short and long-term. Since these impacts would affect a very small percentage of suitable and occupied habitat (Table 3.11-36), these actions would likely impact some individuals but would not likely result in impacts to populations within the project area over the short or long-term.

Season of Use: The FYLF is not known to enter into torpor, but has been found overwintering as far as 100 meters from aquatic habitat. Approximately 73% of suitable FYLF habitat is within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Therefore, this would reduce the potential direct effects to a significant portion of potential overwintering juveniles and adults. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the FYLF.

Mitigation Measures: The only type of mitigation measure proposed on routes that are associated with occupied FYLF habitat are log/rock barriers. Types of mitigation measures proposed on routes associated with suitable FYLF habitat include: barriers, tread hardening, drain dips, a hardened stream crossing, and a small bridge. The installation of a hardened stream crossing and a small bridge would likely result in a short-term increase in sedimentation which may impact some individuals. The installation of all mitigation measures may result in short-term disturbance to some individual frogs, but will limit trail widening, reduce soil perturbation, and reduce sedimentation, providing beneficial effects over the long-term.

Table 3.11-36 Alternative 1 - Direct and Indirect Effects Indicators (foothill yellow-legged frog)

Indicators	
Number of stream crossings (perennial and intermittent) on routes added to the NFTS within known occupied aquatic habitat	1
Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within known occupied aquatic habitat	0
Miles of routes added to the NFTS within 30 meters of known occupied aquatic habitat	0.28
Miles of ML1 roads converted to trails within 30 meters of known occupied habitat	0.11
Percentage of upland habitat (within 30 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%
Number of stream crossings (perennial and intermittent) on routes added to the NFTS within suitable aquatic habitat	51
Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within suitable aquatic habitat	10
Miles of routes added to the NFTS within 30 meters of suitable aquatic habitat	5.91
Miles of ML1 roads converted to trails within 30 meters of suitable aquatic habitat	1.68
Percentage of upland habitat (within 30 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. Therefore, it is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of direct and indirect effects to these frogs. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by the continued proliferation of routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to individual frogs.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable foothill yellow-legged frog habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any motorized routes to the NFTS, nor would it change the type of use on any current NFTS routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential direct and indirect effects to the FYLF.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable foothill yellow-legged frog habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-37). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a slight increase from Alternative 1 in the number of routes added to the system or converted to a trail within suitable FYLF habitat, there would be a slight increase in the direct and indirect effects to these frogs within the project area. Although these increases would result in more individuals being impacted, these increases would not likely be significant enough to result in impacts to FYLF populations within the project area.

Season of Use: The FYLF is not known to enter into torpor, but has been found overwintering as far as 100 meters from aquatic habitat. Approximately 73% of suitable FYLF habitat is within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Therefore, this would reduce the potential direct effects to a significant portion of potential overwintering juveniles and adults. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the FYLF.

Mitigation Measures: The types and effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-37 Alternative 4 - Direct and Indirect Effects Indicators (foothill yellow-legged frog)

Indicators	
Number of stream crossings (perennial and intermittent) on routes added to the NFTS within known occupied aquatic habitat	1
Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within known occupied aquatic habitat	0
Miles of routes added to the NFTS within 30 meters of known occupied aquatic habitat	0.28
Miles of ML1 roads converted to trails within 30 meters of known occupied habitat	0.18
Percentage of upland habitat (within 30 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%
Number of stream crossings (perennial and intermittent) on routes added to the NFTS within suitable aquatic habitat	53
Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within suitable aquatic habitat	21
Miles of routes added to the NFTS within 30 meters of suitable aquatic habitat	6.22
Miles of ML1 roads converted to trails within 30 meters of suitable aquatic habitat	3.31
Percentage of upland habitat (within 30 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable foothill yellow-legged frog habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Table 3.11-38 Alternative 5 - Direct and Indirect Effects Indicators (foothill yellow-legged frog)

Indicators	
Number of stream crossings (perennial and intermittent) on routes added to the NFTS within known occupied aquatic habitat	0
Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within known occupied aquatic habitat	0
Miles of routes added to the NFTS within 30 meters of known occupied aquatic habitat	0.02
Miles of ML1 roads converted to trails within 30 meters of known occupied habitat	0
Percentage of upland habitat (within 30 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%
Number of stream crossings (perennial and intermittent) on routes added to the NFTS within suitable aquatic habitat	20
Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within suitable aquatic habitat	1
Miles of routes added to the NFTS within 30 meters of suitable aquatic habitat	1.39
Miles of ML1 roads converted to trails within 30 meters of suitable aquatic habitat	0.05
Percentage of upland habitat (within 30 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-38). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a decrease from Alternative 1 in the number of routes added to the system or converted to a trail within suitable and occupied FYLF habitat, there would be a significant decrease in the direct and indirect effects to these frogs within the project area. Since these impacts would affect a very small percentage of suitable and occupied habitat (Table 3.11-38), these actions would likely impact some individuals but would not likely result in impacts to populations within the project area over the short or long-term.

Season of Use: The FYLF is not known to enter into torpor, but has been found overwintering as far as 100 meters from aquatic habitat. Approximately 73% of suitable FYLF habitat is within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Therefore, this would reduce the potential direct effects to a significant portion of potential overwintering juveniles and adults. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the FYLF.

Mitigation Measures: The types and effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

CUMULATIVE EFFECTS

Many past cumulative impacts have likely contributed to the decline in FYLF numbers and distribution. The reduction in foothill yellow-legged frog distribution and population numbers has largely been attributed to loss or alteration of habitats and increased competition/predation from introduced species. Habitat loss and alteration is associated with the following management activities on the STF: livestock grazing, mining, water development projects, vegetation management, and pesticide exposure.

Historic livestock grazing likely had a significant cumulative impact to FYLF and their habitat. Historic livestock grazing evidence indicates that heavy livestock use in the Sierra Nevada led to riparian habitat degradation across much of the Sierra Nevada. Livestock trampling has the potential to directly kill most life stages of FYLF. The mortality risk from livestock trampling is greatest for tadpoles and recently metamorphosed frogs. Tadpoles have limited mobility and have a tendency to seek cover in the spaces between streambed substrates. By seeking cover in this manner, tadpoles may be unaware of the potential peril from trampling. The risk is particularly high in intermittent streams where water resources may be limited and livestock have few options for accessing water. Risk is also higher following metamorphosis when metamorphs are concentrated along aquatic margins. Sedimentation arising from concentrated livestock use areas is considered to be the biggest impact to FYLF habitat. Ten active livestock allotments overlap known localities of the foothill yellow-legged frog, and suitable foothill yellow-legged frog habitat (no known detections) overlaps with an additional 4 allotments. Livestock grazing is considered to currently have a very minor impact on individuals and habitat on the STF.

As with the California red-legged frog, recreational gold mining activities overlap with known occupied FYLF sites and the activity has the potential to impact individuals and habitat. Tadpoles are potentially vulnerable to being sucked into the dredge and mortality or injury could result. Suction dredging also presents a physical disturbance to frogs and prolonged dredging could affect the distribution of individuals in a stream. Some of the actions involved with suction dredging include moving streambed substrates, digging into streambanks, and loss of riparian vegetation. At some locations, there has been a modification of rearing habitat resulting in the loss of shallow, warm water foraging habitat for tadpoles. Also, the rearrangement of streambed substrates has the potential to change the streamflow patterns thereby affecting the suitability of habitat for deposition of egg masses. Suction dredging occurs at six to ten of the known occupied streams. Suction dredging is considered to currently have a minor impact on individuals and to moderate impact on habitat.

Water development projects have resulted in the loss of suitable habitat and have reduced the suitability of habitat for the frog. Hydroelectric projects or impoundments are present on all major rivers on the STF with the exception of the Clavey River. The New Melones Reservoir and Don Pedro Reservoir effectively eliminated dozens of miles of suitable habitat when they were impounded. These reservoirs also effectively eliminated the potential for individuals to move between watersheds. Several impoundments located upstream of suitable habitat have modified stream discharge patterns and water temperatures. Lind et al. (1996) and Bobzien and DiDonato (2007) documented reduced breeding success downstream of dams due to releases of water that either strand or scour egg masses from their attachment sites. Reduced water temperatures may delay breeding or may delay the development of tadpoles which may affect survivorship upon metamorphosis. Water developments have had a major impact on individuals and habitat in the past. Currently, water developments are having a moderate impact on individuals and habitat.

Vegetation management activities have the potential to impact individuals and habitat if activities occur in close proximity to occupied habitat. Ground disturbing activities, including timber harvest, have the potential to result in sedimentation of habitats with primary implications for tadpole survivorship and fitness. Prescribed fire in riparian areas may result in mortality of individuals or a disturbance of behavior. Prescribed fire also has the potential to modify riparian habitats if the fire is severe enough to consume woody and herbaceous species. Modification of habitat may locally reduce the suitability of riparian habitat for refuge and foraging activities; however, fire may be beneficial in providing a diversity of conditions that may meet the needs of the frog. In general, current vegetation and fuels projects are designed to reduce potential impact on FYLF habitats and minimize disturbance to the species. Best management practices are implemented and monitored to minimize sediment delivery to streams and to prevent unexpected consequences to riparian habitats. The STF has developed a five year plan for managing vegetation on public lands and there are 10 to 15 projects that are planned or in planning that overlap with areas of occupied/suitable habitat. At present, vegetation management activities on private and public lands are having minor impacts to individuals and habitats. Historically, vegetation management and fuels reduction projects likely had minor to moderate impacts on FYLF and habitats, especially if project activities occurred in or immediately adjacent to FYLF aquatic habitats.

Exposure to a variety of pesticides has the potential to impact individuals. Pesticides are introduced into the aquatic environment either through direct application, groundwater contamination, and/or drift. Herbicides are commonly used in forestry to establish plantations and to release the growing conifers from competition. The STF and private forestry have applied herbicides extensively across the forest and in proximity to occupied and suitable habitat for the FYLF. Monitoring on the STF has shown that herbicide applications have resulted in very low concentrations of herbicide contaminating aquatic habitats in the past. One project on the STF is in the planning stage that would propose to apply herbicides for site preparation and release in close proximity to occupied FYLF habitat. Herbicides are and have been extensively used on private forest lands. Lenoir et al. (1999) and Sparling et al. (2001) showed a variety of pesticides are present in precipitation falling in the Sierra Nevada, a result of drift from agricultural applications in the Central Valley of California. The implications of this drift are poorly understood; however, Davidson et al. (2002) used spatial tests to link upwind herbicide application with the decline of the FYLF. Pesticide exposure is currently having a very minor impact on individuals, but historic applications likely had a minor to moderate impact on individuals.

Table 3.11-39 Ranking of Alternative Indicators (foothill yellow-legged frog)

Indicators	Rankings by Alternatives [1]				
	1	2	3	4	5
Number of stream crossings (perennial and intermittent) on routes added to the NFTS within known occupied aquatic habitat	3	1	5	3	4
Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within known occupied aquatic habitat	4	1	5	4	4
Miles of routes added to the NFTS within 30 meters of known occupied aquatic habitat	3	1	5	3	4
Miles of ML1 roads converted to trails within 30 meters of known occupied habitat	3	1	5	2	4
Percentage of upland habitat (within 30 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	4	1	5	4	4
Number of stream crossings (perennial and intermittent) on routes added to the NFTS within suitable aquatic habitat	3	1	5	2	4
Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within suitable aquatic habitat	3	1	5	2	4
Miles of routes added to the NFTS within 30 meters of suitable aquatic habitat	3	1	5	2	4
Miles of ML1 roads converted to trails within 30 meters of suitable aquatic habitat	3	1	5	2	4
Percentage of upland habitat (within 30 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	4	1	5	4	4
Average	**3.30**	**1**	**5**	**2.80**	**4**

[1] score of 5 indicates the alternative is the best for terrestrial biota related to the indicator; A score of 1 indicates the alternative is the worst for terrestrial biota related to the indicator. If both Alternatives were equal they were both given the same (higher of the two) ranking.

Introduced species have the potential to impact the FYLF primarily through increased competition and predation. Kupferberg (1997) showed grazing competition from bullfrog tadpoles reduced the survivorship and mass at metamorphosis of FYLF tadpoles. Kupferberg (1997) also reported foothill yellow-legged frogs were rarely encountered in areas invaded by bullfrogs, suggesting a population-level impact. Bullfrogs have been observed across the STF, typically at lower elevations (<3,000 feet) and within the range of the FYLF (Aquasurv 2008). Fellers (2005) reports non-native bullfrogs and fish (green sunfish) are predators on the FYLF. As Moyle (1973), Jennings and Hayes (1994), and Jennings (1996) suggest, water developments (dams and diversions) may be responsible for the introduction of non-native game fish and for modifying habitats that facilitate the invasion of aquatic habitats by non-native species. Non-native game fish are found below and above many low elevation impoundments on the STF. Introduced species have had a minor to moderate impact on FYLF populations in the past, and the expectation is that competition from bullfrogs will increase as this species expands its range on the forest.

SUMMARY OF EFFECTS

The FYLF was historically found throughout much of California and southwestern Oregon, but currently occupies only a small portion of its historical range (Amphibiaweb 2008, Jennings and Hayes 1994).With the exception of Alternative 3, which would have beneficial impacts to the foothill yellow-legged frog, the direct and indirect effects of the project alternatives (1, 2, 4 and 5) combined with the cumulative effects are not likely to result in a trend toward Federal listing or a loss of viability for this species. For further discussion of the effects analysis and determinations, see the project BA/BE (project record).

Mountain Yellow-legged Frog – Affected Environment

Species and Habitat Account

Historically the mountain yellow-legged frog (MYLF) was extremely abundant within high elevation aquatic ecosystems of the Sierra Nevada Mountains (Grinnell and Storer 1924, Zweifel 1955). Beginning around the 1970s, the MYLF has undergone dramatic population declines throughout the Sierra Nevada (Knapp and Matthews 2000, ranging between 50-90% decline of their historic localities (USFWS 2004). Although they are found throughout most of their historic range, many populations within their range have become extirpated (Amphibiaweb 2008). Previously the mountain yellow-legged frog in the Sierra Nevada was considered to be one species; Rana muscosa. Recent genetic studies indicate mountain yellow-legged frogs in the Sierra Nevada are comprised of two species: R. sierrae, with a distribution in the northern and central Sierra Nevada, and R. muscosa, with a distribution in the southern Sierra Nevada and southern California. The contact zone for these two newly recognized species is in the vicinity of Mather Pass and the Monarch Divide, Fresno County (Vredenburg et al. 2006). Though the Regional Forester’s list of sensitive species has not been revised to specifically address this apparent change in taxonomy, it is assumed that this analysis pertains to R. sierrae, the Sierra Nevada yellow-legged frog.

Over the last 15 years herpetofauna surveys have provided broad spatial coverage of aquatic habitat within the STF, but surveys were not systematic nor did they cover all potential FYLF habitat. Approximately 10-15% of all perennial streams, and 40-60% of lakes/ponds, within the elevational range of this species have been surveyed. Frogs have been found in at least 40 distinct sites forest-wide, most of which were located in designated wilderness areas.

Mountain yellow-legged frogs in the Sierra Nevada inhabit high mountain lakes, ponds, tarns, and streams, largely in areas that were glaciated (Zweifel 1955). These frogs occur in the Sierra Nevada from 4,500 feet to over 12,000 feet elevation (Jennings and Hayes 1994) however, local observations have all occurred above 5,400 feet and 95% of all observations are above 7,000 feet (Aquasurv 2008). Mountain yellow-legged frogs are seldom far from water, although they have been observed moving overland to disperse to other pond habitats. Typically, these frogs prefer well illuminated, sloping banks of meadow streams, riverbanks, isolated pools, and lake borders with vegetation that is continuous to the water's edge (Martin 1992, Zeiner et al. 1988).Most of the populations on the STF occur within fish-free lakes and ponds within wilderness areas and in fish-free lakes and ponds above 5,500’ in elevation, but they are known to occur within some streams as well.

Since systematic surveys of all aquatic habitats have not been conducted as a part of this project, suitable aquatic habitat was conservatively estimated. For the purposes of this analysis, suitable MYLF aquatic habitat has been defined and mapped as all perennial streams, lakes, and ponds above 5,500 feet in elevation. Since field surveys have not been completed on all areas adjacent to suitable aquatic habitat, this analysis assumes that all land within 30 meters of suitable aquatic habitat may provide suitable terrestrial habitat. Since the MYLF is highly aquatic and typically seen within one meter of the water’s edge, the potential for impacts beyond 30 meters of suitable aquatic habitat is very low and would likely result in negligible effects to the species.

Mountain Yellow-legged Frog – Environmental Consequences

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the mountain yellow-legged frog. Although biological thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Number of stream crossings (perennial) on routes added to the NFTS within known occupied habitat.
- Number of stream crossings (perennial) on ML1 roads converted to trails within known occupied aquatic habitat.
- Miles of routes added to the NFTS within 30 meters of known occupied aquatic habitat.
- Miles of ML1 roads converted to trails within 30 meters of known occupied habitat
- Number of stream crossings (perennial) on routes added to the NFTS within suitable aquatic habitat.
- Number of stream crossings (perennial) on ML1 roads converted to trails within suitable aquatic habitat.
- Miles of routes added to the NFTS within 30 meters of suitable aquatic habitat.
- Miles of ML1 roads converted to trails within 30 meters of suitable aquatic habitat.

DIRECT AND INDIRECT EFFECTS

General – All Alternatives

The project alternatives could result in direct and indirect effects to the mountain yellow-legged frog by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on mountain yellow-legged frogs through: human-caused mortality, changes in behavior, and habitat modification (see Effects Common to all Aquatic Wildlife). Furthermore, these frogs may be less prone to adverse effects from motorized travel because they are closely associated with aquatic features and less likely to be exposed to direct mortality. They presumably do not make long distance migrations outside of the breeding season, remaining close to suitable aquatic habitat. In streams, the larvae of the MYLF are typically associated with deeper pool habitats that have limited potential for direct mortality.

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable mountain yellow-legged frog habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 1, several analyses were completed (Table 3.11-40). This alternative would not result in the addition of any stream crossings within occupied mountain yellow-legged frog habitat, but would result in the addition of 8 stream crossings within suitable habitat. These stream crossings may result in direct and indirect effects to some individuals of all MYLF life history stages. The addition of routes and conversion of roads to trails within 30 meters of occupied and suitable aquatic habitat would likely result in direct effects to a few juvenile and adult MYLF and would result in indirect effects to both aquatic and terrestrial habitat over the short and long-term. Since these impacts would affect a very small percentage of suitable and occupied habitat, these actions would likely impact some individuals but would not likely result in impacts to populations within the project area over the short or long-term.

Table 3.11-40 Alternative 1 - Direct and Indirect Effects Indicators (mountain yellow-legged frog)

Indicators	
Number of stream crossings (perennial) on routes added to the NFTS within known occupied aquatic habitat	0
Number of stream crossings (perennial) on ML1 roads converted to trails within known occupied aquatic habitat	0
Miles of routes added to the NFTS within 30 meters of known occupied aquatic habitat	0
Miles of ML1 roads converted to trails within 30 meters of known occupied habitat	0.02
Percentage of upland habitat (within 30 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%
Number of stream crossings (perennial) on routes added to the NFTS within suitable aquatic habitat	2
Number of stream crossings (perennial) on ML1 roads converted to trails within suitable aquatic habitat	6
Miles of routes added to the NFTS within 30 meters of suitable aquatic habitat	1.19
Miles of ML1 roads converted to trails within 30 meters of suitable aquatic habitat	0.61
Percentage of upland habitat (within 30 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

Season of Use: The MYLF inhabits higher elevations and spends the cold winter months in torpor. All occupied and suitable MYLF habitat would be within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Since these frogs typically overwinter in aquatic habitat (mountain lakes or deep pools), the use of wheeled motor vehicles during the winter months would have very little impact on them. Although impacts are expected to be minimal during the winter, these closures may provide some additional protection prior to these frogs entering torpor in fall and after emergence in the spring. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the MYLF.

Mitigation Measures: There would not be any mitigation measures proposed on routes that are associated with occupied MYLF habitat. Types of mitigation measures proposed on routes associated with suitable MYLF habitat include: barriers, tread hardening, drain dips, and a hardened stream crossing. The installation of a hardened stream crossing would likely result in a short-term increase in sedimentation which may impact some individuals. The installation of all mitigation measures may result in short-term disturbance to some individual frogs, but will limit trail widening, reduce soil perturbation, and reduce sedimentation, providing beneficial effects over the long-term.

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. Therefore, it is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of direct and indirect effects to these frogs. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by the continued proliferation of routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to these frogs.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any miles of unauthorized routes to the NFTS and would not change the use on any NFTS routes, but there would not be any restrictions on cross-country travel.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential direct and indirect effects to the MYLF.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable mountain yellow-legged frog habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-41). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a slight increase from Alternative 1 in the number of ML1 roads converted to a trail within suitable MYLF habitat, there would be a slight increase in the direct and indirect effects to these frogs within the project area. Although these increases may result in more individuals being impacted, these increases would not likely be significant enough to result in impacts to MYLF populations within the project area.

Table 3.11-41 Alternative 4 - Direct and Indirect Effects Indicators (mountain yellow-legged frog)

Indicators	
Number of stream crossings (perennial) on routes added to the NFTS within known occupied aquatic habitat	0
Number of stream crossings (perennial) on ML1 roads converted to trails within known occupied aquatic habitat	0
Miles of routes added to the NFTS within 30 meters of known occupied aquatic habitat	0
Miles of ML1 roads converted to trails within 30 meters of known occupied habitat	0.02
Percentage of upland habitat (within 30 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%
Number of stream crossings (perennial) on routes added to the NFTS within suitable aquatic habitat	2
Number of stream crossings (perennial) on ML1 roads converted to trails within suitable aquatic habitat	7
Miles of routes added to the NFTS within 30 meters of suitable aquatic habitat	1.19
Miles of ML1 roads converted to trails within 30 meters of suitable aquatic habitat	0.63
Percentage of upland habitat (within 30 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

Season of Use: The MYLF inhabits higher elevations and spends the cold winter months in torpor. All occupied and suitable MYLF habitat would be within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Since these frogs typically overwinter in aquatic habitat (mountain lakes or deep pools) the use of wheeled motor vehicles during the winter months would have very little impact on them. Although impacts are expected to be minimal during the winter, these closures may provide some additional protection prior to these frogs entering torpor in fall and after emergence in the spring. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the MYLF.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable mountain yellow-legged frog habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-42). This alternative would not result in the addition of any stream crossings within occupied or suitable mountain yellow-legged frog habitat. The conversion of approximately 0.26 miles of roads to trails within 30 meters of suitable aquatic habitat may result in direct effects to very few juvenile and adult MYLF. The conversion of this route to trail may result in minor indirect effects to both aquatic and terrestrial habitat over the short and long-term. Since these impacts would affect a very small percentage of suitable and occupied habitat, these actions would likely impact some individuals but would not likely result in impacts to populations within the project area over the short or long-term.

Season of Use: The MYLF inhabits higher elevations and spends the cold winter months in torpor. All occupied and suitable MYLF habitat would be within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Since these frogs typically overwinter in aquatic habitat (mountain lakes or deep pools) the use of wheeled motor vehicles during the winter months would have very little impact on them. Although impacts are expected to be minimal during the winter, these closures may provide some additional protection prior to these frogs entering torpor in fall and after emergence in the spring. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the MYLF.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-42 Alternative 5 - Direct and Indirect Effects Indicators (mountain yellow-legged frog)

Indicators	
Number of stream crossings (perennial) on routes added to the NFTS within known occupied aquatic habitat	0
Number of stream crossings (perennial) on ML1 roads converted to trails within known occupied aquatic habitat	0
Miles of routes added to the NFTS within 30 meters of known occupied aquatic habitat	0
Miles of ML1 roads converted to trails within 30 meters of known occupied habitat	0
Percentage of upland habitat (within 30 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	0%
Number of stream crossings (perennial) on routes added to the NFTS within suitable aquatic habitat	0
Number of stream crossings (perennial) on ML1 roads converted to trails within suitable aquatic habitat	0
Miles of routes added to the NFTS within 30 meters of suitable aquatic habitat	0.26
Miles of ML1 roads converted to trails within 30 meters of suitable aquatic habitat	0
Percentage of upland habitat (within 30 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

CUMULATIVE EFFECTS

Many past and current cumulative impacts have contributed to the decline in mountain yellow-legged frog numbers and distribution. One factor attributed to wide-scale population declines of the mountain yellow-legged frog has been the introduction of salmonid fishes during the last century (Bradford et al. 1993, Knapp 1993, Knapp 1996). Recently, it has been determined that a chytridomycete fungus has been associated with numerous MYLF die-offs in the Sierra Nevada of California (Rachowicz 2006). Other factors that have contributed to cumulative impacts to the species includes pesticides, ultraviolet radiation; bacterial, fungal, and viral pathogens; acidification from the atmospheric deposition; nitrate deposition; livestock grazing; recreational activities; and drought have all been identified as potential factors affecting the species and its habitat (USDA 2001).

Introduced trout species within high mountain lakes has severely affected mountain yellow-legged frog population trends in the Sierra Nevada including the STF. In recent years, the California Department of Fish and Game has actively addressing this issue to proactively manage for mountain yellow-legged frog restoration opportunities while still providing a recreational fisheries within high mountain lakes. Recent experimental efforts to remove introduced trout species from high mountain lakes has shown that mountain yellow-legged frog populations may positively respond. Non-native game fish are found in many high mountain lakes on the STF and have likely had a major impact on MYLF populations in the past. Although some actions are presently being taken to mitigate the impacts of introduced game fish, it is costly, labor intensive, and difficult to remove fish populations from some high mountain lakes. Therefore, they will likely continue to have significant impacts on the ability of MYLF populations to grow and expand on the STF in the future.

The chytrid fungus Batrachochytrium dendrobatidis has recently been determined to be common within MYLF populations within the Sierra Nevada and that it has likely played a significant role in population declines (Fellers et al. 2001, Rachowicz et al. 2006). Although it is well documented that this fungus may play a significant role in population declines, its dispersal ability is not currently well understood (Rachowicz 2006). Without further research, it is difficult to determine the level of risk motorized use and access may have on the dispersal of this disease.

Historic livestock grazing likely had a significant cumulative impact to this species and their habitat. Historic livestock grazing evidence indicates that heavy livestock use in the Sierra Nevada led to riparian habitat degradation across much of the Sierra Nevada. Livestock trampling has the potential to directly kill all life stages of MYLF. The greatest potential of mortality risk from livestock trampling is expected to occur when adult MYLF aggregate and lay egg masses in the early season, and during metamorphosis, when juveniles are metamorphosing along aquatic margins. Current standards and guidelines in the Sierra Nevada Forest Plan Amendment were implemented to reduce the risk of trampling by livestock (USDA 2004). Known mountain yellow-legged frog habitat sites currently overlap with 9 active livestock grazing allotments. Potential mountain yellow-legged frog habitat overlaps with approximately 18 additional allotments. Management direction including standards and guidelines for grazing should reduce potential grazing impacts from livestock grazing over the long-term.

Historic vegetation management and fuels reduction projects have likely contributed to past and present cumulative affects, especially if projects occurred adjacent to MYLF aquatic habitats. Ground disturbing activities including timber harvest and fuels treatment projects (burning and mastication projects) potentially caused direct mortality to this species which may have affected the abundance of the species on the STF. In general, current vegetation and fuels projects are designed to reduce potential impacts on MYLF habitats, and therefore, minimize disturbance to the species. However, as MYLF migrate between breeding sites, and between breeding sites and overwintering sites (usually in or very near water), there is some potential for direct impacts from being crushed or burned from vegetation and fuels projects. In general the magnitude of this happening across the range of the MYLF frog habitats on the STF should be limited given the timing of MYLF migration which is in the spring, with the exception to spring prescribed burning projects. In general, the adverse impacts of spring burning is expected to be low given the relatively low amount that occurs on the Forest within an average year.

Recreation use has increased and is expected to continue to increase on the STF (see Recreation section Affected Environment), resulting in greater likelihood and magnitude of human disturbance to aquatic wildlife. OHV use has been increasing at an even more rapid pace than other forms of recreation, based upon State figures for OHV sales (see Recreation section). The project alternatives would contribute to these past and current conditions with added displacement from noise and human activity, and indirect effects to aquatic habitat. In the future, there is approximately 5 miles of new trail construction that is proposed to be added to the NFTS as well as numerous short route segments for dispersed camping access. These trails are proposed to provide “connector routes” between existing NFTS routes and motorized access to historical dispersed camping opportunities.

Although motorized vehicle use has not been identified as one a major contributing factors to MYLF declines, the direct and indirect effects of the project alternatives would likely contribute to cumulative effects for this species. Because Alternative 2 does not prohibit cross-country travel, there is a high degree of uncertainty about future route proliferation and associated cumulative impacts upon FYLF. Alternative 3 would prohibit cross-country travel and would not add any routes to the NFTS, therefore the effects of this alternative would be beneficial. Alternatives 1, 4 and 5 contribute cumulatively to the disturbance and habitat alteration from activities described above. Alternatives 4, 1, and 5 would result in progressively lower risk to these frogs due to the amount of motorized routes being added to the system. These alternatives do not result in a loss of habitat (no route construction), but would likely influence habitat suitability. Although the action alternatives may result in additional cumulative impacts, they are very minor in comparison to other factors affecting this species.

Table 3.11-43 Ranking of Alternative Indicators (mountain yellow-legged frog)

Indicators	Rankings by Alternatives [1]				
	1	2	3	4	5
Number of stream crossings (perennial and intermittent) on routes added to the NFTS within known occupied aquatic habitat	4	1	5	4	4
Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within known occupied aquatic habitat	4	1	5	4	4
Miles of routes added to the NFTS within 30 meters of known occupied aquatic habitat	4	1	5	4	4
Miles of ML1 roads converted to trails within 30 meters of known occupied habitat	3	1	5	3	4
Percentage of upland habitat (within 30 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	3	1	5	3	4
Number of stream crossings (perennial and intermittent) on routes added to the NFTS within suitable aquatic habitat	3	1	5	3	4
Number of stream crossings (perennial and intermittent) on ML1 roads converted to trails within suitable aquatic habitat	3	1	5	2	4
Miles of routes added to the NFTS within 30 meters of suitable aquatic habitat	3	1	5	2	4
Miles of ML1 roads converted to trails within 30 meters of suitable aquatic habitat	3	1	5	3	4
Percentage of upland habitat (within 30 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	4	1	5	4	4
Average	**3.40**	**1**	**5**	**3.20**	**4**

[1] score of 5 indicates the alternative is the best for terrestrial biota related to the indicator; A score of 1 indicates the alternative is the worst for terrestrial biota related to the indicator. If both Alternatives were equal they were both given the same (higher of the two) ranking.

SUMMARY OF EFFECTS

Historically the MYLF was extremely abundant within high elevation aquatic ecosystems of the Sierra Nevada Mountains, but has recently undergone dramatic population declines throughout the Sierra Nevada (Grinnell and Storer 1924, Zweifel 1955, Knapp and Matthews 2000, USFWS 2004). With the exception of Alternative 3, which would have beneficial impacts to the mountain yellow-legged frog, the direct and indirect effects of the project alternatives (1, 2, 4 and 5) combined with the cumulative effects are not likely to result in a trend toward Federal listing or a loss of viability for this species. For further discussion of the effects analysis and determinations, see the project BA/BE (project record).

Western Pond Turtle – Affected Environment

Species and Habitat Account

The western pond turtle (WPT) is the only extant aquatic turtle native to California and ranges from Washington to southern California (Stebbins 1985, Reese and Welsh 1997). They have been found throughout lower elevations of the STF, but are primarily located on the southern portions of the project area at elevations <4,500 feet (Aquasurv 2008). While herpetofauna surveys have occurred extensively throughout the STF, surveys have not been conducted systematically as part of this project nor have they covered aquatic habitat within the project area in entirety. Approximately 20% of all perennial streams, 6% of all seasonal streams, and approximately 20% of all lakes and ponds have been surveyed. Results from these surveys and various other sources indicate that pond turtles have been observed at more than 20 locations throughout the STF.

Western pond turtles are habitat generalists, occurring in a wide variety of permanent and intermittent aquatic habitats and by using terrestrial habitats extensively. Although they may occur up to 6,000 feet in elevation, they have rarely been observed above 5,000 feet within the project area (Stebbins 1972, Aquasurv 2008). Individual western pond turtles (usually males) may have large home ranges and may wander within a given watercourse for several kilometers on a regular basis (Holland 1994, Reese and Welsh 1997). In streams, Reese (1996) found that all turtles in the study used terrestrial habitats during the course of the year. Terrestrial habitats are needed for nesting, overwintering, and for seasonal uses. Western pond turtle nests have been found as far as 435 yards from the stream (Reese and Welsh 1997) in open sunny areas on hillslopes, generally with a south to southwest facing aspect. Nest sites typically occur in open areas dominated by grasses or herbaceous annuals on dry, well-drained soils with high clay/silt content and low (less than 15 degree) slope (Holland 1994). There is some indication that most nesting excursions occur at night (Rathbun et al. 2002). Western pond turtles also move into upland slopes while overwintering or during periods when aquatic habitats become unsuitable (dry). The timing of overwintering movements is poorly understood, but generally occur within the project area from the fall (October) to early spring (April).

For the purposes of this analysis, suitable western pond turtle aquatic habitat has been defined and mapped as continuous (minimum of 200 feet) perennial and intermittent streams with less than 6% gradient and all lentic habitats below 5,000 feet in elevation. Since systematic surveys for the project were not conducted for pond turtles in all potentially suitable aquatic habitat, occupied aquatic habitat was conservatively estimated. These estimates were determined using the most current recorded sightings of pond turtles. Since locations of pond turtles were often associated with a specific point on land, all adjacent potentially suitable aquatic habitats were assumed occupied. Suitable stream habitat was assumed occupied upstream and downstream of the sighting until a reach of unsuitable (> 6% gradient) stream habitat greater than 400 meters was encountered. Further, this analysis assumes that all land within 400 meters of suitable aquatic habitat may provide suitable nesting habitat. Although pond turtles may travel further than 400 meters from aquatic habitat for overwintering purposes, these movements appear to be far less frequent. Since nesting primarily occurs within 400 meters of aquatic habitat, potential for impacts beyond 400 meters of suitable aquatic habitat is very low and would likely result in negligible effects to the species (Storer 1930, Holland 1994, Rathbun et al. 1992, Reese 1996, Reese and Welsh 1997, Rathbun et al. 2002).

Western Pond Turtle – Environmental Consequences

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the western pond turtle. Although biological thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Number of stream crossings on routes added to the NFTS within known occupied habitat.
- Number of stream crossings on ML1 roads converted to trails within known occupied aquatic habitat.
- Miles of routes added to the NFTS within 400 meters of known occupied aquatic habitat.
- Miles of ML1 roads converted to trails within 400 meters of known occupied habitat
- Number of stream crossings (perennial and intermittent) on routes added to the NFTS within suitable aquatic habitat.
- Number of stream crossings on ML1 roads converted to trails within suitable aquatic habitat.
- Miles of routes added to the NFTS within 400 meters of suitable aquatic habitat.
- Miles of ML1 roads converted to trails within 400 meters of suitable aquatic habitat.

DIRECT AND INDIRECT EFFECTS

General – All Alternatives

The project alternatives could result in direct and indirect effects to the western pond turtle by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on pond turtles through: human-caused mortality, changes in behavior, and habitat modification (see Effects Common to all Aquatic Wildlife). Furthermore, pond turtles may be more or less prone to the effects of motorized travel because essentially all individuals use terrestrial habitats extensively throughout the year and they are wary of human presence. During nesting excursions, females are very sensitive to disturbance and will abandon the nesting effort (Reese 1996, Rathbun et al. 2002). The WPT also uses upland habitats extensively as overwintering habitat (Holland 1994, Rathbun et al. 2002), a period of reduced activity partially in response to cold weather and limited availability of food resources.

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable western pond turtle habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 1, several analyses were completed (Table 3.11-44). This alternative would result in the addition of several routes and 22 stream crossings within occupied western pond turtle habitat and several routes with 38 stream crossings within suitable habitat. These routes and stream crossings would likely result in direct and indirect effects to some juvenile and adult individual western pond turtles. The addition of routes and conversion of roads to trails within 400 meters of occupied and suitable aquatic habitat may result in direct effects to adults (females) moving overland to find suitable nesting locations. Since nests are prepared in terrestrial habitat with vegetation providing some cover, it is unlikely that nests would be built directly in routes. Therefore, motorized use on routes would not likely result in the destruction of pond turtle nests. In areas where routes intersect suitable nesting habitat, hatchlings may be disturbed or crushed as they leave the nest to find suitable aquatic habitat.

The addition of routes and conversion of ML1 roads to trails would result in indirect effects to both aquatic and terrestrial habitat over the short and long-term. Indirect effects that are likely to occur to suitable and occupied habitat include: the loss of suitable nesting habitat and increased sedimentation into streams. Since these impacts would affect a very small percentage of suitable and occupied habitat, these actions would likely impact some individuals but would not likely result in impacts to populations within the project area over the short or long-term.

Season of Use: Western pond turtles generally move into upland terrestrial habitat to overwinter. Most of the occupied and suitable pond turtle habitat in the project area is within Zone 2 or Zone 3 of the seasonal closures (as identified for each route in Appendix I). Limiting the season of use would likely reduce disturbance to some individual overwintering pond turtles. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the western pond turtle.

Mitigation Measures: Types of mitigation measures proposed on routes associated with occupied pond turtle habitat include: barriers, tread hardening, and drain dips. Types of mitigation measures proposed on routes associated with suitable pond turtle habitat include: barriers, tread hardening, drain dips, hardened stream crossings, water bars, a cattle guard, and a small bridge. The installation of hardened stream crossings and a small bridge would likely result in a short-term increase in sedimentation which may impact some individuals. The installation of all mitigation measures may result in short-term disturbance to some individual pond turtles, but will limit trail widening, reduce soil perturbation, and reduce sedimentation, providing beneficial effects over the long-term.

Table 3.11-44 Alternative 1 - Direct and Indirect Effects Indicators (western pond turtle)

Indicators	
Number of stream crossings on routes added to the NFTS within known occupied aquatic habitat	22
Number of stream crossings on ML1 roads converted to trails within known occupied aquatic habitat	0
Miles of routes added to the NFTS within 400 meters of known occupied aquatic habitat	8.21
Miles of ML1 roads converted to trails within 400 meters of known occupied habitat	6.95
Percentage of upland habitat (within 400 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%
Number of stream crossings on routes added to the NFTS within suitable aquatic habitat	34
Number of stream crossings on ML1 roads converted to trails within suitable aquatic habitat	4
Miles of routes added to the NFTS within 400 meters of suitable aquatic habitat	34.1
Miles of ML1 roads converted to trails within 400 meters of suitable aquatic habitat	30.12
Percentage of upland habitat (within 400 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. Therefore, it is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of direct and indirect effects to pond turtles. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by the continued proliferation of routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to pond turtles.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable western pond turtle habitat. This would reduce the risk of direct and indirect effects to pond turtle from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any motorized routes to the NFTS, nor would it change the type of use on any current NFTS routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential direct and indirect effects to the western pond turtle.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable western pond turtle habitat. This would reduce the risk of direct and indirect effects to pond turtles from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-45). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is an increase from Alternative 1 in the number of routes added to the system or converted to a trail within occupied and suitable pond turtle habitat, there would be an increase in the direct and indirect effects to individuals within the project area. Although these increases would result in more individuals being impacted, these increases would not likely be significant enough to result in impacts to western pond turtle populations within the project area.

Table 3.11-45 Alternative 4 - Direct and Indirect Effects Indicators (western pond turtle)

Indicators	
Number of stream crossings on routes added to the NFTS within known occupied aquatic habitat	22
Number of stream crossings on ML1 roads converted to trails within known occupied aquatic habitat	4
Miles of routes added to the NFTS within 400 meters of known occupied aquatic habitat	8.6
Miles of ML1 roads converted to trails within 400 meters of known occupied habitat	15.49
Percentage of upland habitat (within 400 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%
Number of stream crossings on routes added to the NFTS within suitable aquatic habitat	34
Number of stream crossings on ML1 roads converted to trails within suitable aquatic habitat	13
Miles of routes added to the NFTS within 400 meters of suitable aquatic habitat	39.91
Miles of ML1 roads converted to trails within 400 meters of suitable aquatic habitat	43.99
Percentage of upland habitat (within 400 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

Season of Use: Western pond turtles generally move into upland terrestrial habitat to overwinter. Most of the occupied and suitable pond turtle habitat in the project area is within Zone 2 or Zone 3 of the seasonal closures (as identified for each route in Appendix I). Limiting the season of use would likely reduce disturbance to some individual overwintering pond turtles. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the western pond turtle.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable western pond turtle habitat. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-46). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a significant decrease from Alternative 1 in the number of routes added to the system or converted to a trail within suitable and occupied pond turtle habitat, there would be a significant decrease in the direct and indirect effects to individuals within the project area. Since these impacts would affect a very small percentage of pond turtle habitat (Table 3.11-46), these actions would likely impact some individuals but would not likely result in impacts to populations within the project area over the short or long-term.

Season of Use: Western pond turtles generally move into upland terrestrial habitat to overwinter. Most of the occupied and suitable pond turtle habitat in the project area is within Zone 2 or Zone 3 of the seasonal closures (as identified for each route in Appendix I). Limiting the season of use would likely reduce disturbance to some individual overwintering pond turtles. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the western pond turtle.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Table 3.11-46 Alternative 5 - Direct and Indirect Effects Indicators (western pond turtle)

Indicators	
Number of stream crossings on routes added to the NFTS within known occupied aquatic habitat	0
Number of stream crossings on ML1 roads converted to trails within known occupied aquatic habitat	0
Miles of routes added to the NFTS within 400 meters of known occupied aquatic habitat	0
Miles of ML1 roads converted to trails within 400 meters of known occupied habitat	0.36
Percentage of upland habitat (within 400 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%
Number of stream crossings on routes added to the NFTS within suitable aquatic habitat	2
Number of stream crossings on ML1 roads converted to trails within suitable aquatic habitat	1
Miles of routes added to the NFTS within 400 meters of suitable aquatic habitat	5.94
Miles of ML1 roads converted to trails within 400 meters of suitable aquatic habitat	2.06
Percentage of upland habitat (within 400 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

CUMULATIVE EFFECTS

Like the amphibians discussed above, the western pond turtle has experienced dramatic declines within its range. The Federal Register (57 FR 45761) listed habitat destruction as the primary cause for the decline of the species. Within the analysis area, livestock grazing, suction dredge mining, water developments, and vegetation management activities have impacted or have the potential to result in impacts to individuals or modification of habitat.

Grazing has the potential to affect the western pond turtle. Livestock may injure or kill individuals through trampling, particularly hatchlings in the nest or in shallow water habitats. Sediment arising from areas of high use by livestock may impact pool habitat (reduction in volume). Grazing likely does not have a major influence on upland habitat attributes, such as vegetation composition or availability of overwintering sites. When livestock access water, there is the potential that their presence will result in a physical disturbance to individual turtles and cause them to seek refuge in aquatic habitat. The consequence of this disturbance is likely very minor in that it may interrupt an activity like basking that is necessary for basic metabolism. Basking is tied to metabolism which is linked with food intake and growth. If the interruptions are occasional, then the effect on metabolism is likely to be negligible. Extended disturbance may result in dispersal from the affected area or in loss of body mass (Cadi and Joly 2003). Nine active allotments overlap known populations of WPT and six other allotments overlap suitable habitat. Historic grazing likely had a minor impact on individuals and habitats, while current livestock grazing has minor impact on individuals and habitats.

Suction dredge mining can result in disturbance to individuals and modification of habitat. The presence of people operating dredges in occupied habitat can cause physical disturbance to individuals, thereby interrupting their normal activity pattern. As noted above, if the disturbance is occasional then the effect on metabolism is assumed to be negligible; however, if the disturbance is excessive then physiological effects on growth is expected. Dredging can also alter habitats, possibly favoring the turtle. On the STF, observations have indicated that pool habitats are frequently deepened by dredging and WPT take advantage of this “improved” pool habitat. It is unlikely that dredgers unintentionally suck turtles into the dredge because they are relatively conspicuous and typically attempt to avoid capture. The impact of past and current suction dredging is minor to individuals and negligible to the aquatic habitats needed by the species.

Water developments have the potential to impact the WPT through loss and/or modification of habitat. As noted above, several impoundments have been constructed on rivers across the STF resulting in a direct loss of habitat. Holland (1994) found that large impoundments are largely unsuitable for the WPT. Indirect impacts to habitat include loss of habitat complexity and alterations in water temperatures. Reese and Welsh (1998) investigated the impacts of regulated streamflow downstream of an impoundment and found that habitat suitability was reduced in a dammed stream because there were fewer slow-velocity and warm water habitats than in an undimmed stream. The implication of reduced habitat suitability was more time spent basking for thermoregulation which increased predation risk (Reese and Welsh 1998). Dams also physically interrupt the continuity of aquatic habitats which can effectively separate populations of turtles and limit genetic dispersal. The impact of past and current water developments on the STF have had, and continue to have, moderate to major impacts on the western pond turtle and its habitats.

Vegetation management activities have the potential to impact individuals and the habitats required by the WPT. Since the turtle uses upland habitats extensively, there is the potential that timber harvest, fuel reduction activities, and prescribed fire can impact individuals directly. Mechanical operations (harvest, shredding) and prescribed fire frequently occur within 100 meters of occupied streams. These activities can injure or kill individual females attempting to nest, overwintering, or by impacting nests (eggs and hatchlings). Fuel reduction and prescribed fire have the potential to modify upland and riparian habitats directly by changing the composition and density of vegetation in upland habitats. There may be detrimental and beneficial effects associated with loss of leaf duff/overwintering habitat and increased nesting habitat, respectively. Typically, the amount of sediment arising from vegetation management projects is minor and only has small and localized impacts to aquatic habitat (reduced pool volume). There are 10 to 15 projects that are planned or in the planning phase on the STF that could affect WPT habitats. Additional vegetation management projects have and will occur on private timber lands within the analyzed landscape. Past activities likely had a greater impact (moderate) on the WPT because protections have only occurred in the last 10 years and management activities occurred close to streams. At present, mitigation measures are incorporated to minimize effects at occupied sites and the current level of impact is minor on the turtle.

SUMMARY OF EFFECTS

The western pond turtle is the only extant aquatic turtle native to California and ranges from Washington to southern California (Stebbins 1985, Reese and Welsh 1997). With the exception of Alternative 3, which would have beneficial impacts to the western pond turtle, the direct and indirect effects of the project alternatives (1, 2, 4 and 5) combined with the cumulative effects are not likely to result in a trend toward Federal listing or a loss of viability for this species. For further discussion of the effects analysis and determinations, see the project BA/BE (project record).

Table 3.11-47 Ranking of Alternative Indicators (western pond turtle)

Indicators	Rankings by Alternatives [1]				
	1	2	3	4	5
Number of stream crossings on routes added to the NFTS within known occupied aquatic habitat	3	1	5	3	4
Number of stream crossings on ML1 roads converted to trails within known occupied aquatic habitat	4	1	5	3	4
Miles of routes added to the NFTS within 400 meters of known occupied aquatic habitat	3	1	5	2	4
Miles of ML1 roads converted to trails within 400 meters of known occupied habitat	3	1	5	2	4
Percentage of upland habitat (within 400 meters of occupied aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	4	1	5	4	4
Number of stream crossings on routes added to the NFTS within suitable aquatic habitat	3	1	5	3	4
Number of stream crossings on ML1 roads converted to trails within suitable aquatic habitat	3	1	5	2	4
Miles of routes added to the NFTS within 400 meters of suitable aquatic habitat	3	1	5	2	4
Miles of ML1 roads converted to trails within 400 meters of suitable aquatic habitat	3	1	5	2	4
Percentage of upland habitat (within 400 meters of suitable aquatic habitat) directly impacted by routes added to the NFTS or ML1 roads converted to trails	3	1	5	2	4
Average	**3.20**	**1**	**5**	**2.50**	**4**

[1] score of 5 indicates the alternative is the best for terrestrial biota related to the indicator; A score of 1 indicates the alternative is the worst for terrestrial biota related to the indicator. If both Alternatives were equal they were both given the same (higher of the two) ranking.

Yosemite Toad – Affected Environment

Species and Habitat Account

The Yosemite toad is an endemic species to the state of California and is found at high elevations in the Sierra Nevada Mountains. Although they occur in habitats that are less impacted by humans, they currently only occupy approximately 50% of their historic range (Lannoo 2005). Herpetofauna surveys have occurred throughout the STF, but surveys have not been conducted systematically for this project nor have they covered Yosemite toad habitat within the project area in entirety. Approximately 55% of all wet meadows within the range of the toad have been surveyed. Results from these surveys and various other sources indicate that these toads have been observed at approximately 65-70 locations throughout the STF.

The Yosemite toad inhabits high elevation meadows that are typically associated with a water source and a willow component. Upon snowmelt, the toad moves from a hibernaculum to a breeding site typically located in a meadow. Shallow water sheeting across/through vegetation appears to be favored for breeding because water temperatures are very warm and allow for rapid development of the eggs and tadpoles. However, tadpoles have been observed in small streams in wet meadows. Females may breed once every two to three years. Following breeding, the adults move into the rest of the meadow, willow thickets, and the uplands surrounding the meadow to forage (Kagarise Sherman and Morton 1984, Martin 2008). Dispersal distance from the breeding site to foraging habitat is variable, but Martin (2008) reports movements exceeding 600 meters are possible. At the end of the season, toads seek underground refugia (ex. rodent burrows) to overwinter. Morton (1981) reported toads may overwinter up to 750 meters from the nearest breeding site. Kagarise Sherman and Morton (1984) reported a majority of activity occurred during the day; however, Martin (2008) reported most longer distance movements occurred at night. Although the elevation range of the species begins at approximately 6,400 feet, they have only been found within the project area above 7,200 feet. For the purposes of this analysis, potentially suitable Yosemite toad habitat has been defined and mapped as the Wet Willow and Wet Other CWHR types above 7,000 feet in elevation.

Yosemite Toad – Environmental Consequences

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the Yosemite toad. Although biological thresholds for these indicators have not been established, they provide general measures by which the effects of the project alternatives may be compared.

- Number of stream crossings on routes added to the NFTS within known occupied habitat.
- Number of stream crossings on ML1 roads converted to trails within known occupied habitat.
- Miles of routes added to the NFTS within known occupied habitat.
- Miles of ML1 roads converted to trails within known occupied habitat.
- Percentage of occupied habitat directly impacted by routes added to the NFTS or ML1 roads converted to trails.
- Miles of routes added to the NFTS within 100 meters of known occupied habitat.
- Miles of ML1 roads converted to trails within 100 meters of known occupied habitat.
- Miles of routes added to the NFTS within 400 meters of known occupied habitat.
- Miles of ML1 roads converted to trails within 400 meters of known occupied habitat.
- Number of stream crossings on routes added to the NFTS within known suitable habitat.
- Number of stream crossings on ML1 roads converted to trails within known suitable habitat.
- Miles of routes added to the NFTS within potentially suitable habitat.
- Miles of ML1 roads converted to trails within potentially suitable habitat.
- Percentage of suitable habitat directly impacted by routes added to the NFTS or ML1 roads converted to trails.

DIRECT AND INDIRECT EFFECTS

General – All Alternatives

The project alternatives could result in direct and indirect effects to the Yosemite toad by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities to the NFTS,
- Changing the type of use on NFTS routes,
- Changing the season of use on NFTS routes,
- Implementing mitigation measures.

These actions may have direct and indirect effects on toads through: human-caused mortality, changes in behavior, and habitat modification (see Effects Common to all Aquatic Wildlife). Furthermore, pond turtles may be more or less prone to motorized travel because breeding movements typically occur when roads near breeding sites are impassable due to snow, trails/roads are not located within meadows, and because most post-breeding movements occur in the breeding meadow or upland habitats adjacent to the breeding meadow. However, the dispersal and overwintering movements are large (exceeding 600 meters) making it possible that toads may have to cross roads to reach preferred foraging or overwintering sites.

Alternative 1 (Proposed Action)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable Yosemite toad. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 1, several analyses were completed (Table 3.11-48). This alternative would result in the addition of zero stream crossings in occupied habitat and three stream crossings within suitable habitat. These stream crossings may result in direct and indirect effects to some individuals of all Yosemite toad life history stages. Routes being added to the system within or near occupied and suitable Yosemite toad habitat may result in direct effects to some juveniles and adults and indirect effects to all life history stages of this toad. Since these impacts would affect a very small percentage of suitable and occupied habitat, these actions would likely impact some individuals but would not likely result in impacts to populations within the project area over the short or long-term.

Table 3.11-48 Alternative 1 - Direct and Indirect Effects Indicators (Yosemite toad)

Indicators	
Number of stream crossings on routes added to the NFTS within known occupied habitat	0
Number of stream crossings on ML1 roads converted to trails within known occupied habitat	0
Miles of routes added to the NFTS within known occupied habitat	0.19
Miles of ML1 roads converted to trails within known occupied habitat	0
Percentage of occupied habitat directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%
Miles of routes added to the NFTS within 100 meters of known occupied habitat	0.3
Miles of ML1 roads converted to trails within 100 meters of known occupied habitat	0
Miles of routes added to the NFTS within 400 meters of known occupied habitat	0.3
Miles of ML1 roads converted to trails within 400 meters of known occupied habitat	0
Number of stream crossings on routes added to the NFTS within potentially suitable habitat	0
Number of stream crossings on ML1 roads converted to trails within potentially suitable habitat	3
Miles of routes added to the NFTS within potentially suitable habitat	0.14
Miles of ML1 roads converted to trails within potentially suitable habitat	0.1
Percentage of suitable habitat directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

Season of Use: The Yosemite toad inhabits higher elevations and spends the cold winter months in torpor. All occupied and suitable Yosemite toad habitat would be within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Since these frogs typically overwinter in earthen cavities (rodent burrows, rock crevices) the use of wheeled motor vehicles during the winter months would have very little impact on them. Although impacts are expected to be minimal during the winter, these closures may provide some additional protection prior to these toads entering torpor in fall and after emergence in the spring. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the Yosemite toad.

Mitigation Measures: The only type of mitigation measure proposed on routes that are associated with occupied Yosemite toad habitat is a drain dip. Types of mitigation measures proposed on routes associated with suitable Yosemite toad habitat include barriers and drain dips. The installation of all mitigation measures may result in short-term disturbance to some individual toads, but will limit trail widening, reduce soil perturbation, and reduce sedimentation, providing beneficial effects over the long-term.

Alternative 2 (No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative. Therefore it is assumed that route proliferation would continue over the short and long-term and the effects would be similar to those discussed below for adding routes to the NFTS.

Additions to the NFTS or Changes to the Existing NFTS: Although this alternative would not result in the addition of any miles of unauthorized routes to the NFTS, vehicles would be allowed to use all existing motorized trails because cross-country travel would be allowed. Therefore, it is assumed that wheeled motorized vehicles will continue to use all of the documented unauthorized routes previously identified and continue to create new routes. The use of these routes and the continued proliferation of new routes would result in increasing amounts of direct and indirect effects to these toads. These effects would be similar to those discussed within Alternative 4 for the short-term, but would be exacerbated over the long-term by the continued proliferation of routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential disturbance to these toads.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 3 (Cross Country Prohibited)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable Yosemite toad. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: This alternative would not result in the addition of any motorized routes to the NFTS, nor would it change the type of use on any current NFTS routes.

Season of Use: Seasonal closures that would be implemented under this alternative are only those that currently exist (Table 2.02-7). Although they would be limited, the seasonal closures implemented within this alternative would reduce potential direct and indirect effects to the Yosemite toad.

Mitigation Measures: No mitigation measures would be implemented as part of this alternative.

Alternative 4 (Recreation)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable Yosemite toad. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 4, several analyses were completed (Table 3.11-49). Direct and indirect effects of the actions proposed in this alternative would be the same as those discussed in Alternative 1.

Table 3.11-49 Alternative 4 - Direct and Indirect Effects Indicators (Yosemite toad)

Indicators	
Number of stream crossings on routes added to the NFTS within known occupied habitat	0
Number of stream crossings on ML1 roads converted to trails within known occupied habitat	0
Miles of routes added to the NFTS within known occupied habitat	0.19
Miles of ML1 roads converted to trails within known occupied habitat	0
Percentage of occupied habitat directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%
Miles of routes added to the NFTS within 100 meters of known occupied habitat	0.3
Miles of ML1 roads converted to trails within 100 meters of known occupied habitat	0
Miles of routes added to the NFTS within 400 meters of known occupied habitat	0.3
Miles of ML1 roads converted to trails within 400 meters of known occupied habitat	0
Number of stream crossings on routes added to the NFTS within potentially suitable habitat	0
Number of stream crossings on ML1 roads converted to trails within potentially suitable habitat	3
Miles of routes added to the NFTS within potentially suitable habitat	0.14
Miles of ML1 roads converted to trails within potentially suitable habitat	0.1
Percentage of suitable habitat directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

Season of Use: The Yosemite toad inhabits higher elevations and spends the cold winter months in torpor. All occupied and suitable Yosemite toad habitat would be within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Since these frogs typically overwinter in earthen cavities (rodent burrows, rock crevices) the use of wheeled motor vehicles during the winter months would have very little impact on them. Although impacts are expected to be minimal during the winter, these closures may provide some additional protection prior to these toads entering torpor in fall and after emergence in the spring. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the Yosemite toad.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

Alternative 5 (Resources)

Cross-Country Travel: Cross-country travel would be prohibited in this alternative. Prohibiting cross-country travel would limit the proliferation of illegally created routes near occupied and suitable Yosemite toad. This would reduce the risk of direct and indirect effects to these frogs from motorized travel over the short and long-term.

Additions to the NFTS or Changes to the Existing NFTS: To determine the relative risk of the direct and indirect effects of Alternative 5, several analyses were completed (Table 3.11-50). Direct and indirect effects of the actions proposed in this alternative would be similar to those discussed in Alternative 1. Since there is a slight decrease from Alternative 1 in the amount of routes added to the system or converted to a trail within suitable habitat, there would likely be a slight decrease in the direct and indirect effects to individuals within the project area. Since these impacts would affect a very small percentage of suitable and occupied habitat (Table 3.11-50), these actions would likely impact some individuals but would not likely result in impacts to populations within the project area over the short or long-term.

Table 3.11-50 Alternative 4 - Direct and Indirect Effects Indicators (Yosemite toad)

Indicators	
Number of stream crossings on routes added to the NFTS within known occupied habitat	0
Number of stream crossings on ML1 roads converted to trails within known occupied habitat	0
Miles of routes added to the NFTS within known occupied habitat	0.19
Miles of ML1 roads converted to trails within known occupied habitat	0
Percentage of occupied habitat directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%
Miles of routes added to the NFTS within 100 meters of known occupied habitat	0.3
Miles of ML1 roads converted to trails within 100 meters of known occupied habitat	0
Miles of routes added to the NFTS within 400 meters of known occupied habitat	0.3
Miles of ML1 roads converted to trails within 400 meters of known occupied habitat	0
Number of stream crossings on routes added to the NFTS within potentially suitable habitat	0
Number of stream crossings on ML1 roads converted to trails within potentially suitable habitat	3
Miles of routes added to the NFTS within potentially suitable habitat	0.03
Miles of ML1 roads converted to trails within potentially suitable habitat	0.1
Percentage of suitable habitat directly impacted by routes added to the NFTS or ML1 roads converted to trails	<1%

Season of Use: The Yosemite toad inhabits higher elevations and spends the cold winter months in torpor. All occupied and suitable Yosemite toad habitat would be within Zone 2 and Zone 3 of the seasonal closures (as identified for each route in Appendix I). Since these frogs typically overwinter in earthen cavities (rodent burrows, rock crevices) the use of wheeled motor vehicles during the winter months would have very little impact on them. Although impacts are expected to be minimal during the winter, these closures may provide some additional protection prior to these toads entering torpor in fall and after emergence in the spring. Furthermore, the closure of routes during the wet weather season reduces soil perturbation and sedimentation into streams associated with all life history stages of the Yosemite toad.

Mitigation Measures: The effects of mitigation measures in this alternative would be similar to those discussed for Alternative 1.

CUMULATIVE EFFECTS

While the causes of decline for Yosemite toad are unclear, several past and current stressors have contributed to the decline in Yosemite toad numbers and distribution. The decline of the Yosemite toad has largely been hypothesized to include factors such as livestock grazing, disease, and pesticide drift.

Martin (2008) associated declines in Yosemite toad populations primarily to livestock grazing. Beginning in the 1860’s, high elevation meadows were heavily impacted by unrestricted, large numbers of sheep. Cattle were introduced in the early 1900’s and large numbers were allowed unrestricted access to the high elevation meadows that provide suitable habitat for the toad. Primary impacts to individuals include the trampling of tadpoles in breeding habitat, adults and subadults in upland habitats, and recent metamorphs who have limited mobility. Impacts to habitat may have been more severe, with many meadows losing hydrologic function when streams incised and widened, thereby preventing annual flood waters from inundating the meadow and lowering the water table. Lowered water tables may be important in the persistence of breeding habitat (early dessication), which is naturally vulnerable in a Mediterranean climate. Livestock have the tendency to linger in the wet habitats in late summer because these habitats frequently support palatable forage. As such, breeding habitats tend to be heavily trampled and pocked by hooves. Livestock also graze the vegetation that may be important to toads for cover, foraging, and creating a cool, moist microclimate at the ground surface. There is also some speculation that the metabolic waste products degrade breeding habitats occupied by tadpoles through exposure to nitrogen (nitrates, nitrites, ammonium) and phosphorus compounds. On the STF, livestock allotments overlap a majority of the occupied Yosemite toad habitat. Approximately 45% of the known occupied sites occur outside of livestock allotments, primarily in the Emigrant Wilderness area. Historic livestock grazing likely had major impacts to individuals and habitat. Current impacts are considered to be moderate, since livestock numbers have steadily declined over the last 80 years and because restrictions on utilization and the timing of grazing have been recently implemented.

Kagarise Sherman and Morton (1993) documented declines of Yosemite toad populations in and near Yosemite National Park. Using pathological examinations of toads collected during this die-off, Green and Kagarise Sherman (2001) indicated disease may have been critical in the declines of Yosemite toad populations within protected areas. Several diseases and parasites were detected in preserved specimens, including the chytrid fungus (Batrachochytrium dendrobatidis) suspected in many amphibian die offs (Berger et al. 1998, Lips 1998, Fellers et al. 2001, Daszak et al. 2003). This fungus is apparently widespread and has the potential to affect every population of Yosemite toad on the STF. While the past and present impact of disease on Yosemite toad populations is unknown, it is assumed that diseases (in general) and chytridiomycosis (in specific) have a major potential to impact the remaining populations on the STF.

Davidson et al. (2002) used spatial tests to determine that windborne contaminants were consistent with Yosemite toad declines because at historic sites where Yosemite toads were absent had twice as much agricultural land upwind compared to historic sites that still have toads. Fellers et al. (2004) found elevated levels of DDE and other organochlorines in frog tissues in an area upwind of extensive agriculture. Fellers et al. (2007) and Davidson and Knapp (2007) both suggest airborne agrochemical deposition in the Sierra Nevada are contributing to declines of amphibians in relatively undisturbed environments. It is not known how pesticide contamination has affected the Yosemite toad on the STF in the past or currently. It is assumed that airborne contaminants are having a minor to moderate effect on Yosemite toad populations and habitat.

SUMMARY OF EFFECTS

The Yosemite toad is an endemic species to the state of California and is found at high elevations in the Sierra Nevada Mountains. Although they occur in habitats that are less impacted by humans, they currently only occupy approximately 50% of their historic range (Lannoo 2005). With the exception of Alternative 3, which would have beneficial impacts to the Yosemite toad, the direct and indirect effects of the project alternatives (1, 2, 4 and 5) combined with the cumulative effects are not likely to result in a trend toward Federal listing or a loss of viability for this species. For further discussion of the effects analysis and determinations, see the project BA/BE (project record).

Table 3.11-51 Ranking of Alternative Indicators (Yosemite toad)

Indicators	Rankings by Alternatives [1]				
	1	2	3	4	5
Number of stream crossings on routes added to the NFTS within known occupied habitat	4	1	5	4	4
Number of stream crossings on ML1 roads converted to trails within known occupied habitat	4	1	5	4	4
Miles of routes added to the NFTS within known occupied aquatic habitat	4	1	5	4	4
Miles of ML1 roads converted to trails within known occupied habitat	4	1	5	4	4
Percentage of occupied habitat directly impacted by routes added to the NFTS or ML1 roads converted to trails	4	1	5	4	4
Miles of routes added to the NFTS within 100 meters of occupied habitat	4	1	5	4	4
Miles of ML1 roads converted to trails within 100 meters of occupied habitat	4	1	5	4	4
Miles of routes added to the NFTS within 400 meters of occupied habitat	4	1	5	4	4
Miles of ML1 roads converted to trails within 400 meters of occupied habitat	4	1	5	4	4
Number of stream crossings on routes added to the NFTS within suitable habitat	4	1	5	4	4
Number of stream crossings on ML1 roads converted to trails within suitable habitat	3	1	5	3	4
Miles of routes added to the NFTS within potentially suitable habitat	3	1	5	3	4
Miles of ML1 roads converted to trails within potentially suitable habitat	3	1	5	3	4
Percentage of suitable habitat directly impacted by routes added to the NFTS or ML1 roads converted to trails	4	1	5	4	4
Average	**3.79**	**1**	**5**	**3.79**	**4**

[1] score of 5 indicates the alternative is the best for terrestrial biota related to the indicator; A score of 1 indicates the alternative is the worst for terrestrial biota related to the indicator. If both Alternatives were equal they were both given the same ranking.

Compliance with Forest Plan, USFWS Management Guidelines and Project Design Criteria

American Marten

The American marten was identified by the Regional Forester as a Sensitive Species and Management Indicator Species (MIS) on the STF (USDA 2007a; USDA 2007b). The FSEIS amended the STF Forest Plan with updated guidelines for managing furbearers, including the marten (USDA 2004). The FSEIS removed the 1991 plan requirements for marten territories and the associated standards and guidelines.

Forest Plan Direction

1. Minimize old forest habitat fragmentation. Assess potential impacts of fragmentation on old forest associated species (particularly fisher and marten) in biological evaluations.
2. Mitigate impacts where there is documented evidence of disturbance to the den site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites.

Forest Plan Compliance

1. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not minimize old forest habitat fragmentation and would not comply with the above mentioned S&G. Alternatives 1, 3, 4, 5 would prohibit cross-country travel; therefore, they would minimize old forest habitat fragmentation and would comply with the above mentioned S&G.
2. There are no known marten den sites within the project area; therefore, all of the project alternatives would not have the potential to disturb den sites and would comply with the above mentioned S&G.

Pacific Fisher

The Pacific fisher was identified by the Regional Forester as a Sensitive Species on the STF (USDA 2007a). The FSEIS amended the STF Forest Plan with updated guidelines for managing furbearers, including the fisher (USDA 2004). The FSEIS removed the 1991 plan requirements for marten territories and the associated standards and guidelines.

Forest Plan Direction

1. Minimize old forest habitat fragmentation. Assess potential impacts of fragmentation on old forest associated species (particularly fisher and marten) in biological evaluations.
2. Mitigate impacts where there is documented evidence of disturbance to the den site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites.

Forest Plan Compliance

1. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not minimize old forest habitat fragmentation and would not comply with the above mentioned S&G. Alternatives 1, 3, 4, 5 would prohibit cross-country travel; therefore, they would minimize old forest habitat fragmentation and would comply with the above mentioned S&G.
2. There are no known fisher den sites within the project area; therefore, all of the project alternatives would not have the potential to disturb den sites and would comply with the above mentioned S&G.

California Spotted Owl

The California spotted owl was identified by the Regional Forester as a Sensitive Species and Management Indicator Species (MIS) on the STF (USDA 2007a, USDA 2007b).

Forest Plan Direction

Mitigate impacts where there is documented evidence of disturbance to the nest site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb nest sites.

Forest Plan Compliance

The STF does not monitor spotted owl nest sites for disturbance from motorized recreation; therefore, there is not any documented disturbance to spotted owl nest sites from existing recreation.

Northern Goshawk

The northern goshawk was identified by the Regional Forester as a Sensitive Species on the STF (USDA 2007a).

Forest Plan Direction

Mitigate impacts where there is documented evidence of disturbance to the nest site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb nest sites.

Forest Plan Compliance

The STF does not monitor goshawk nest sites for disturbance from motorized recreation; therefore, there is not any documented disturbance to goshawk nest sites from existing recreation.

Mule Deer

The mule deer was identified by the Regional Forester as a Management Indicator Species (MIS) on the STF (USDA 2007b?).

Forest Plan Direction

1. Deer winter concentration areas or critical winter range may be closed to motorized use from 11/15 – 4/15.
2. Deer summer concentration areas or critical summer range may be closed to motorized use from 4/15 – 8/1.

Forest Plan Compliance

1. Alternatives 2 and 3 would implement seasonal closures that are route specific and inconsistent between administrative units. Alternatives 1, 4 and 5 would implement Forest-wide winter seasonal closures for varying lengths of time (between Alternatives) that are close to the dates mentioned above on the majority of winter concentration areas and critical winter range.
2. None of the project alternatives would result in any seasonal closures on deer summer concentration areas or critical summer range.

Bald Eagle

The bald eagle was listed by the U.S. Fish and Wildlife Service (USFWS) as a federally endangered species in 1978 and was removed from the federal list of Threatened and Endangered Species on June 28, 2007. The bald eagle was identified by the Regional Forester as a Sensitive Species on the STF (USDA 2007a). Since 1978 populations have increased nationwide as well as in the Sierra Nevada (USDA 2001). Management direction for the bald eagle is now provided by the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) and the Migratory Bird Treaty Act (16 USC 703-712) of 1972. Under these acts, disturbance that is likely to cause injury, substantial interference with normal breeding, feeding or sheltering behavior, or nest abandonment is prohibited (USFWS 2007).

USFWS Management Guidelines

1. Off-road vehicle use (including snowmobiles). No buffer is necessary around nest sites outside the breeding season. During the breeding season, do not operate off-road vehicles within 330 feet of the nest. In open areas, where there is increased visibility and exposure to noise, this distance should be extended to 660 feet.
2. Minimize potentially disruptive activities and development in the eagles’ direct flight path between their nest and roost sites and important foraging areas.

USFWS Compliance

1. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent disturbance to nest sites during the breeding season and would not comply with the above mentioned management guideline. Alternatives 1, 3, 4, 5 would prohibit cross-country travel and would not add any routes within 660 feet of nest sites; therefore, these alternatives would prevent disturbance to nest sites during the breeding season and would comply with the above mentioned management guideline.
2. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not “minimize potentially disruptive activities… between the eagles’ nest and roost sites and important foraging areas” and would not comply with the above mentioned management guideline. Alternatives 1, 3, 4, 5 would prohibit cross-country travel and would not add any routes “between the eagles’ nest and roost sites and important foraging areas”; therefore, these alternatives would comply with the above mentioned management guideline.

Forest Plan Direction

1. Within Designated Territories (delineated bald eagle management areas, or additional territories, based on nesting occupancy):
   - Implement a Limited Operating Period (LOP) from January 1 through August 31.
   - Apply LOP restriction to motor vehicle activities on level 1 roads and OHV routes open to the general public.
   - Prohibit motor vehicle activity in wetlands, streamside management zones, and within 200 feet of lake shorelines that are used by bald eagles.
2. Outside Designated Territories (new active bald eagle nests outside of designated management territories):
   - From January 1 through August 31, implement the following restriction around the nest for a distance determined by the Wildlife Biologist on a site-specific basis.
   - Re-route existing OHV use to routes at a safe distance from the nest.
   - Close or detour existing roads in the proximity of the nest site.
   - Prohibit motor vehicle activities in the roost area.

Forest Plan Compliance

1. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent disturbance within Designated Territories; therefore, this alternative would not comply with the above mentioned S&G. Alternatives 1, 3, 4, 5 would prohibit cross-country travel and would not add any routes within Designated Territories; therefore, these alternatives would comply with the above mentioned S&G.
2. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent disturbance outside Designated Territories; therefore, this alternative would not comply with the above mentioned S&G. Alternatives 1, 3, 4, 5 would prohibit cross-country travel and would not add any routes near nest sites outside of Designated Territories; therefore, these alternatives would comply with the above mentioned S&G.

Peregrine Falcon

The peregrine falcon was listed as a federally endangered species from 1970 through 1999. On August 25, 1999 the final rule was published to de-list the peregrine falcon and it was then identified by the Regional Forester as a Sensitive Species on the STF (64 FR 46542, USDA 2007a).

Forest Plan Direction

Implement a limited operating period (LOP), from February 1 through July 31, on all peregrine falcon territories active within the preceding five years, for at least 0.5 miles from the nest.

- Restrict motor vehicle activities and new road construction; during this LOP, according to a management plan for the area.
- Prohibit motor vehicle activity within 200 feet of lake shorelines that are used by peregrine falcons.

Forest Plan Compliance

Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent disturbance within peregrine falcon territories; therefore, this alternative would not comply with the above mentioned S&G. Alternatives 1, 3, 4, 5 would prohibit cross-country travel and would not add any routes within peregrine falcon territories; therefore, these alternatives would comply with the above mentioned S&G.

Valley Elderberry Longhorn Beetle

On August 8, 1980, the valley elderberry longhorn beetle (VELB) was listed as a threatened species (45 FR 52803). Critical habitat was also designated at this time, but does not occur on the STF. Project Design Criteria (PDC) for route designation were determined through a programmatic consultation with the USFWS to achieve “No Effect” or “May Affect Not Likely to Adversely Affect” determinations.

USFWS Project Design Criteria

1. Staging areas are not within 100 feet of occupied VELB sites or suitable habitat of elderberry plants containing stems measuring 1.0 inches or greater in diameter at ground level.
2. Routes or areas are not within 20 feet of occupied VELB sites or suitable habitat of elderberry plants containing stems measuring 1.0 inches or greater in diameter at ground level.

Project Design Criteria Compliance

1. The project alternatives do not propose to add any staging areas; therefore, all project alternatives would be in compliance with the above mentioned PDC.
2. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of routes within 20 feet of occupied VELB sites or suitable habitat; therefore, this alternative would not comply with the above mentioned PDC. Field surveys were completed on all routes below 3000 feet in elevation that were proposed to be added within Alternatives 1, 4 and 5. Alternatives 1, 3, 4, 5 would prohibit cross-country travel and would not add any routes within 20 feet of occupied VELB sites or suitable habitat; therefore, these alternatives would comply with the above mentioned PDC.

Lahontan Cutthroat Trout

The Lahontan cutthroat trout (LCT) was listed by the USFWS as an endangered species in 1970 (35 FR 13520). The listing was reclassified to threatened status in 1975 to facilitate recovery and management efforts and authorize regulated angling (40 FR 29864). Critical Habitat has not been designated for the LCT (USFWS 1995). Project Design Criteria (PDC) for route designation were determined through a programmatic consultation with the USFWS to achieve “No Effect” or “May Affect Not Likely to Adversely Affect” determinations.

USFWS Project Design Criteria

1. Routes and areas do not cross any stream within the occupied range of LCT.
2. Route and areas are not located on active landslides and do not re-route surface water onto active landslides within watersheds that provide habitat for LCT.
3. Within watersheds that provide habitat for LCT, routes or areas do not have the potential to capture surface run-off and then deliver sediment into a stream.
4. Areas are located outside of Riparian Conservation Areas (RCAs) that are within watersheds that provide habitat for LCT.
5. Within watersheds that provide habitat for LCT, routes avoid RCAs.

Project Design Criteria Compliance

1. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of routes and stream crossings within the occupied range of LCT; therefore, this alternative would not comply with the above mentioned PDC. Alternatives 1, 3, 4, 5 would prohibit cross-country travel and would not add any routes or stream crossings within the occupied range of LCT; therefore, these alternatives would comply with the above mentioned PDC.
2. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of routes on active landslides nor would it prevent the creation of routes that could potentially divert surface water onto active landslides within watersheds that provide habitat for

LCT; therefore, this alternative would not comply with the above mentioned PDC. Alternatives 1, 3, 4, 5 would prohibit cross-country travel and would not add any routes on active landslides nor would they add any routes that could potentially divert surface water onto active landslides within watersheds that provide habitat for LCT; therefore, these alternatives would comply with the above mentioned PDC.

3. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of routes that may have the potential to capture surface run-off and then deliver sediment into a stream that provides habitat for LCT; therefore, this alternative would not comply with the above mentioned PDC. Alternatives 1, 3, 4, 5 would prohibit cross-country travel and would not add any routes that may have the potential to capture surface run-off and then deliver sediment into a stream that provides habitat for LCT; therefore, these alternatives would comply with the above mentioned PDC.
4. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of routes within RCAs that are within watersheds that provide habitat for LCT; therefore, this alternative would not comply with the above mentioned PDC. Alternatives 1, 3, 4, 5 would prohibit cross-country travel and would not add any routes within RCAs that are within watersheds that provide habitat for LCT; therefore, these alternatives would comply with the above mentioned PDC.
5. Alternative 2 would not prohibit cross-country travel; therefore, this alternative may result in the creation of routes that do not avoid RCAs within watershed that provide habitat for LCT; therefore, this alternative would not comply with the above mentioned PDC. Alternatives 1, 3, 4, 5 would prohibit cross-country travel and would not add any routes within RCAs that are within watersheds that provide habitat for LCT; therefore, these alternatives would comply with the above mentioned PDC.

California Red-legged Frog

On May 23, 1996, the California red-legged frog was listed as a threatened species (61 FR 25813). On April 13, 2006 critical habitat was designated, but does not exist on the STF (71 FR 19244). To assist with the Travel Management Planning process, the Forest Service entered into programmatic consultation with the United States Fish and Wildlife Service (USFWS) for motorized vehicle route designation. On December 27, 2006, the USFWS issued a Letter of Concurrence for 14 National Forests in California, including the STF. The Letter of Concurrence approved the Project Design Criteria (PDC) as outlined in the document entitled "Route Designation: Project Design Criteria for 'No Effect' or 'May Affect Not Likely to Adversely Affect' determination for TE Species – October 2006 version 1". Therefore, all actions proposed within a Travel Management Plan Alternatives (analyzed in detail) must comply with the PDC to reach a determination of "No Effect" or "May Affect Not Likely to Adversely Affect" for TE species.

USFWS Project Design Criteria

1. Routes or areas do not have the potential to capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog.
2. In suitable California red-legged frog habitat, routes avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCAs) except where necessary to cross streams. Crossing approaches get the riders in and out of the stream channel and riparian area in the shortest distance possible while meeting the gradient and approach length standards.
3. Routes or areas do not cross any stream or waterbody within 500 feet of known occupied sites of California red-legged frog; and route or area is not within a distance of 500 feet from wetland (i.e. springs, wet meadows, ponds, marshes).
4. In habitat occupied by California red-legged frog, routes or areas do not have the potential to capture or divert stream flow. The approaches to stream crossings are down-sloped toward the stream on both sides.

5. Areas are located outside of RR and RCAs, meadows, and wetlands, within California red-legged frog habitat.
6. No route or areas are within Critical Aquatic Refuges for California red-legged frog.

Project Design Criteria Compliance

1. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of routes that may have the potential to capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog; therefore, this alternative would not comply with the above mentioned PDC. Alternative 3 would prohibit cross-country travel and would not add any routes to the NFTS; therefore, this alternative would comply with the above mentioned PDC. Alternatives 1 and 4 would prohibit cross-country travel but would add routes that may have the potential to capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog; therefore, these alternatives would not comply with the above mentioned PDC (Table 3.11-52). Alternative 5 would prohibit cross-country travel and would not add routes that may have the potential to capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog; therefore, this alternative would comply with the above mentioned PDC (Table 3.11-52).
2. Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of routes that avoid RCAs except where necessary to cross streams in suitable California red-legged frog habitat; therefore, this alternative would not comply with the above mentioned PDC. Alternative 3 would prohibit cross-country travel and would not add any routes to the NFTS; therefore, this alternative would comply with the above mentioned PDC. Alternatives 1 and 4 would prohibit cross-country travel but would add routes that do not avoid RCAs except where necessary to cross streams in suitable California red-legged frog habitat; therefore, these alternatives would not comply with the above mentioned PDC (Table 3.11-52). Alternative 5 would prohibit cross-country travel and would not add routes that do not avoid RCAs except where necessary to cross streams in suitable California red-legged frog habitat; therefore, this alternative would comply with the above mentioned PDC (Table 3.11-52).
3. There are not any known occupied sites of California red-legged frog within the project area; therefore, all the project alternatives would comply with the above mentioned PDC.
4. There are not any known occupied sites of California red-legged frog within the project area; therefore, all the project alternatives would comply with the above mentioned PDC.
5. There are not any Critical Aquatic Refuges for California red-legged frog within the project area; therefore, all the project alternatives would comply with the above mentioned PDC.

Table 3.11-52 Routes inconsistent with USFWS PDC for the California red-legged frog

Route Number	PDC Consistency	Addition to the NFTS		
		ALT 1	ALT 4	ALT 5
17EV192	Inconsistent	Yes	Yes	No
17EV192A	Inconsistent	Yes	Yes	No
17EV192B	Inconsistent	Yes	Yes	No
17EV194	Inconsistent	Yes	Yes	No
1S17M	Inconsistent	Yes	Yes	No
FR98488	Inconsistent	Yes	Yes	No
FR98508	Inconsistent	Yes	Yes	No
FR98509	Inconsistent	Yes	Yes	No
FR98510	Inconsistent	Yes	Yes	No
FR98511	Inconsistent	Yes	Yes	No
FR98514	Inconsistent	Yes	Yes	No
FR98566	Inconsistent	Yes	Yes	No
FR98575	Inconsistent	Yes	Yes	No

Forest Plan Direction

Within 300 feet of streams or ponds that have potential suitable habitat:

- Construct new roads or trails or use off-road routes for motorized vehicles only after conducting amphibian surveys to the most recent protocol for the frog.
- Allow stream crossings only where the route, through the water, and the adjacent streamside areas are naturally resistant to tires or are hardened with rock or other materials.

Forest Plan Compliance

Table 3.11-53 Routes inconsistent with the Forest Plan for the California red-legged frog

Route Number	Forest Plan Consistency	Addition to the NFTS		
		ALT 1	ALT 4	ALT 5
17EV192	Inconsistent	Yes	Yes	No
17EV192A	Inconsistent	Yes	Yes	No
17EV192B	Inconsistent	Yes	Yes	No
17EV194	Inconsistent	Yes	Yes	No
17EV195	Inconsistent	Yes	Yes	No
17EV196	Inconsistent	Yes	Yes	No
17EV197	Inconsistent	Yes	Yes	No
1S1734A	Inconsistent	No	Yes	No
1S17E35B	Inconsistent	Yes	Yes	No
1S17M	Inconsistent	Yes	Yes	No
FR10178	Inconsistent	Yes	Yes	No
FR8516	Inconsistent	Yes	Yes	No
FR98481	Inconsistent	Yes	Yes	No
FR98488	Inconsistent	Yes	Yes	No
FR98508	Inconsistent	Yes	Yes	No
FR98509	Inconsistent	Yes	Yes	No
FR98510	Inconsistent	Yes	Yes	No
FR98511	Inconsistent	Yes	Yes	No
FR98513	Inconsistent	Yes	Yes	No
FR98514	Inconsistent	Yes	Yes	No
FR98566	Inconsistent	Yes	Yes	No
FR98575	Inconsistent	Yes	Yes	No

Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of routes or unhardened stream crossings within 300 feet of potential suitable habitat for the California red-legged frog; therefore, this alternative would not comply with the above mentioned S&G. Alternative 3 would prohibit cross-country travel and would not add any routes to the NFTS; therefore, this alternative would comply with the above mentioned S&G. Alternative 5 would prohibit cross-country travel and would not add any routes within 300 feet of potential suitable California red-legged frog habitat; therefore, this alternative would comply with the above mentioned S&G. Alternatives 1 and 4 would prohibit cross-country travel but would add routes and unhardened stream crossings within 300 feet of potential suitable habitat for the California red-legged frog (Table 3.11-53). Mitigation measures (surveys completed to protocol and hardened stream crossings) are proposed on these routes to ensure that Alternatives 1 and 4 would comply with the above mentioned S&G.

Western Pond Turtle

The western pond turtle was identified by the Regional Forester as a Sensitive Species on the STF (USDA 2007a).

Forest Plan Direction

In areas adjacent to waters with known populations of western pond turtle:

- Construct new roads or trails or use existing off-road routes for motorized vehicles only if at least ¼ mile from occupied habitat or where approved by a Wildlife Biologist.

Forest Plan Compliance

Table 3.11-54 Routes inconsistent with the Forest Plan for the western pond turtle

Route Number	Forest Plan Consistency	Addition to the NFTS		
		ALT 1	ALT 4	ALT 5
17EV192	Inconsistent	Yes	Yes	No
17EV192A	Inconsistent	Yes	Yes	No
17EV192B	Inconsistent	Yes	Yes	No
17EV194	Inconsistent	Yes	Yes	No
17EV195	Inconsistent	Yes	Yes	No
17EV196	Inconsistent	Yes	Yes	No
17EV197	Inconsistent	Yes	Yes	No
17EV197A	Inconsistent	Yes	Yes	No
17EV901	Inconsistent	Yes	Yes	No
1S1727	Inconsistent	Yes	Yes	No
1S17E35B	Inconsistent	Yes	Yes	No
1S17M	Inconsistent	Yes	Yes	No
1S1902	Inconsistent	Yes	Yes	No
1S1907A	Inconsistent	No	Yes	No
1S1929	Inconsistent	Yes	Yes	No
1S1929C	Inconsistent	Yes	Yes	No
FR10178	Inconsistent	Yes	Yes	No
FR8516	Inconsistent	Yes	Yes	No
FR8601	Inconsistent	Yes	Yes	No
FR98482	Inconsistent	Yes	Yes	No
FR98486	Inconsistent	Yes	Yes	No
FR98488	Inconsistent	Yes	Yes	No
FR98504	Inconsistent	Yes	Yes	No
FR98508	Inconsistent	Yes	Yes	No
FR98509	Inconsistent	Yes	Yes	No
FR98510	Inconsistent	Yes	Yes	No
FR98511	Inconsistent	Yes	Yes	No
FR98513	Inconsistent	Yes	Yes	No
FR98514	Inconsistent	Yes	Yes	No
FR98515	Inconsistent	Yes	Yes	No
FR98520	Inconsistent	Yes	Yes	No
FR98537	Inconsistent	Yes	Yes	No
FR98539	Inconsistent	Yes	Yes	No
FR98541	Inconsistent	Yes	Yes	No
FR98548	Inconsistent	Yes	Yes	No
FR98554	Inconsistent	Yes	Yes	No
FR98560	Inconsistent	Yes	Yes	No
FR98566	Inconsistent	Yes	Yes	No
FR98575	Inconsistent	Yes	Yes	No
FR98599	Inconsistent	Yes	Yes	No

Alternative 2 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of routes within ¼ mile of occupied pond turtle habitat and would not comply with the above mentioned S&G. Alternative 3 would prohibit cross-country travel and would not add any routes to the NFTS; therefore, this alternative would comply with the above mentioned S&G. Alternative 5 would prohibit cross-country travel and would not add any routes to the NFTS within ¼ mile of occupied pond turtle habitat; therefore, this alternative would comply with the above mentioned S&G. Alternatives 1 and 4 would prohibit cross-country travel but would add routes within ¼ mile of occupied pond turtle habitat that were not approved by a Wildlife Biologist; therefore, these routes would not comply with the above mentioned S&G (Table 3.11-54). These routes will be excepted from this S&G through a minor LRMP amendment. The effects of excepting these routes from this amendment are disclosed above under the western pond turtle section and within the BA/BE (Pyron 2009, project record).