Aquatic Biota

Introduction

Management of aquatic-dependent species and habitat and maintenance of a diversity of animal communities, is an important part of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on National Forest System (NFS) lands must be planned and implemented so that they do not jeopardize the continued existence of threatened or endangered species or lead to a trend toward listing or loss of viability of Forest Service Sensitive species. In addition, management activities should be designed to maintain or improve habitat for Management Indicator Species to the degree consistent with multiple-use objectives established in each Forest Land and Resource Management Plan (LRMP). Management decisions related to motorized travel can affect aquatic species by increasing human-caused mortality, causing changes in behavior due to disturbance and habitat modification (Gaines et al. 2003, Trombulek and Frissell 2000, USDA FS 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 public 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 (LRMP) and Other Direction

Direction relevant to the proposed action as it affects 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.

Management Indicator Species - NFMA and the Secretary of Agriculture's implementing regulations (36 CFR 219) require selection of management indictor species (MIS) and evaluation of effects of alternatives on the viability and diversity of plant and animal communities. The effects of the project on MIS are to be assessed during the preparation of NEPA documents prior to project implementation to determine if project modifications are necessary to reduce potential negative effects (FSM 2534.1). MIS are addressed in a separate report (Strand and Sanchez 2009).

The Sierra National Forest Land and Resource Management Plan (LRMP) (USDA-FS 2001, 2004) forestwide standard and guidelines (S/G) that were not superseded by the 2001 or 2004 amendments applicable to the Travel Management DEIS for aquatic species and habitats include:

- Establish a 200-foot zone on each side of all reaches of the tributaries to Portuguese Creek and Cow Creek where Lahontan cutthroat trout currently occur on all Class I, II and III tributaries above those reaches. Apply the following standards for this project within this zone:
    - No motor vehicles will be allowed off permanent roads except as authorized by permit or contract;
    - Ephemeral channels may only be crossed with equipment after consultation with a fisheries biologist (S/G #39)
- Give primary management emphasis in riparian areas to protect and enhance the riparian ecosystem, riparian vegetation, water quality, soils, fish and wildlife resources. (S/G #69)
- Streamside Management Zone determination will be based on methods described in FSH 2509.22, Sierra Supplement 1 which gives specific direction for width determinations. (S/G #70)
- When on-site project evaluations identify the need to afford protection to intermittent and/or ephemeral drainages, the protection zone widths will be defined in accordance with the Forest Streamside Management Zone determination process as described in the FSH 2509.22, Sierra Supplement 1. (S/G #72)
- Maintain or enhance productivity of SNF meadows to accommodate wildlife and range resources. (S/G #75)
- Protect streamside zones by locating new roads outside of riparian areas, except at stream crossings (S/G #77).
- Avoid constructing new roads within the perimeter of meadows and other riparian areas where opportunities exist to relocate or obliterate existing roads (S/G #78).
- When existing routes through riparian areas and meadows are not compatible with riparian dependent resources, consider re-routing (S/G #79).
- Applicable to All Dispersed Recreation Analysis Area in Management Areas 2 and 11: Designate four-wheel drive and trailbike route termini at popular lake and stream locations. These termini will normally be a minimum of 300 feet to a maximum of ¼-mile from the attraction and will have parking facilities with vehicle controls (S/G #306).

Sierra Nevada Forest Plan Amendment (SNFPA). The Forestwide management standards and guidelines (S&G) in the Record of Decision (ROD) (USDA-FS 2004a pages 62 – 66) for the 2004 Sierra Nevada Forest Plan Amendment applicable to motorized travel management and aquatic species and habitat include (also refer to the project's Riparian Conservation Objectives and Consistency Report (J. Gott, S. Barnes, J. Tuitele-Lewis, 2009) which can be found in the Travel Management DEIS – Appendix J):

Wetland and Meadow Habitat

- To protect watershed resources, meet the following standards for road construction, road reconstruction and road relocation: (1) design new stream crossings and replacement stream crossings for at least the 100-year flood, including bedload and debris; (2) design

stream crossings to minimize the diversion of streamflow out of the channel and down the road in the event of crossing failure; (3) design stream crossings to minimize disruption of natural hydrologic flow paths, including minimizing diversion of streamflow and interception of surface and subsurface water; (4) avoid wetlands or minimize effects to natural flow patterns in wetlands and (5) avoid road construction in meadows. See Water Resources section (Standard and Guideline 70, Pg. 59).

Riparian Habitat:

- Designate riparian conservation area (RCA) widths as described in Part B (SNFPA ROD p. 42). The RCA widths displayed in Part B may be adjusted at the project level if a landscape analysis has been completed and a site specific RCO analysis demonstrates a need for different widths. (S&G 91)
- Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives at the project level and the Aquatic Management Strategy (AMS) goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species. See Water Resources section. (S&G 92)
- As part of project-level analysis, conduct peer reviews for projects that propose ground-disturbing activities in more than 25 percent of the RCA or more than 15 percent of a CAR. (S&G 94)

Water Quality and Temperatures

- For waters designated as "Water Quality Limited" (Clean Water Act Section 303(d)), participate in the development of Total Maximum Daily Loads (TMDLs) and TMDL Implementation Plans. Execute applicable elements of completed TMDL Implementation Plans (S&G 95).
- Ensure that management activities do not adversely affect water temperatures necessary for local aquatic- and riparian-dependent species assemblages. (S&G 96)

Species Habitat Viability and Watershed Condition

- Maintain and restore the hydrologic connectivity of streams, meadows, wetlands and other special aquatic features by identifying roads and trails that intercept, divert or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity. (S&G 100)
- Ensure that culverts or other stream crossing do not create barriers to upstream or downstream passage for aquatic-dependent species. Locate water drafting sites to avoid adverse effects to in stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability and duration of floodplain inundation and water table elevation in meadows, wetlands and other special aquatic features. (S&G 101)
- Prior to activities that could adversely affect streams, determine if relevant stream characteristics are within the range of natural variability. If characteristics are outside the range of natural variability, implement mitigation measures and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs. (S&G 102)

- Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock, motor vehicles and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites, sites authorized under Special Use Permits and designated motor vehicle routes. (S&G 103)
- At either the landscape or project-scale, determine if the age class, structural diversity, composition and cover of riparian vegetation are within the range of natural variability for the vegetative community. If conditions are outside the range of natural variability, consider implementing mitigation and/or restoration actions that will result in an upward trend. Actions could include restoration of aspen or other riparian vegetation where conifer encroachment is identified as a problem. (S&G 105)
- Identify roads, trails, motor vehicle trails and staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits and day use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic and riparian-dependent species. At the project level, evaluate and consider actions to ensure consistency with standards and guidelines or desired conditions. (S&G 116)
- 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. Criteria for defining bogs and fens include, but are not limited to, presence of: (1) sphagnum moss (*Spagnum* spp.), (2) mosses belonging to the genus Meessia and (3) sundew (*Drosera* spp.) Complete initial plant inventories of bogs and fens within active grazing allotments prior to re-issuing permits. (S&G 118)
- Recommend restoration practices in: (1) areas with compaction in excess of soil quality standards, (2) areas with lowered water tables or (3) areas that are either actively down cutting or that have historic gullies. Identify other management practices, for example, road building, recreational use, grazing and timber harvests, which may be contributing to the observed degradation. (S&G 122)

Effects Analysis Methodology

The Effects Analysis Methodology section describes assumptions specific to aquatic biota, resource indicators with justifications, information sources used to support the analysis, timeframes for effects (short and long term) and the special boundaries of the effects analysis.

Area of Effect for Aquatic Resources / Analysis Area

The spatial boundary for the effects analysis is the project boundary as it relates to the HUC6 level (3,800 to 115,000 acres). The project boundary does not include wilderness, however, since HUC6 boundaries cross into designated wilderness, indirect and cumulative effects to aquatic biota carry into wilderness and will be discussed accordingly.

The project area is broken into Analysis Units for the affected environment discussion. Cumulative watershed effects and aquatic species impacts are analyzed at the Forest and the HUC8 (500-3,000 acres) watershed scale (HUC7s have not been delineated on the SNF).

Specific areas requiring analysis include hydrologically sensitive areas, inventoried unauthorized routes and NFTS roads for with proposed changes in season of use or vehicle class. Hydrologically sensitive areas include all designated riparian protection areas as defined in the Sierra LRMP (1991) and SNFPA ROD (2001, 2004):

a. Riparian Management Areas (RMAs),

b. Streamside Management Zones (SMZs),

c. Critical Aquatic Refuges (CARs) and

d. Riparian Conservation Areas (RCAs),

Examples of hydrologically sensitive areas include streams, springs, lakes, reservoirs, fens, meadows and marshes. All areas of perennial and seasonal standing or running surface water and areas of perennially or seasonally saturated soil are included within these areas. RMAs and SMZs are contained within RCAs, which are the designated area used for GIS analysis of hydrologically sensitive areas.

In general RCAs for the project area were delineated based on using the current SNF stream layer ("snfstrm982ar" GIS layer – dated September 17, 2002) and the Strahler (1957) method of stream orders. The assumptions on how RCAs and SMZs were delineated for the project area are described below:

1. All order 1 stream channels are ephemeral, but lack annual scour or deposition and are considered ephemeral rather than seasonal streams under the Sierra Nevada Forest Plan Amendment (USDA-FS 2001, 2004).
2. All order 2-3 channels are intermittent or seasonal streams with annual scour or deposition. Drainages below meadows are included under this category, unless they are already associated with an order 4 system or greater.
3. Perennial streams begin at order 4 channels and include all channels order 4 and higher. It is recognized that there would be some variation by elevation.
4. Springs, lakes and meadows on the SNF GIS coverage are correct. Project-level analysis would improve the accuracy of this assumption.
5. RCA widths are considered as:

Table 206. RCA Widths

Feature Type	Corresponding GIS Stream Order or Layer	RCA Width (feet)
Perennial streams	Order 4+	300 ft Each side of the stream, measured from the bank full edge of the stream
Seasonally flowing streams	Order 2 - 3	150 ft Each side of the stream, measured from the bank full edge of the stream

Feature Type	Corresponding GIS Stream Order or Layer	RCA Width (feet)
Ephemeral streams	Order 1	150 ft (each side of the stream, measured from the bank full edge of the stream) if associated with spring or meadow, otherwise none
Streams in inner gorge	Stream order varies	To top of inner gorge (at least 300 ft)
Special Aquatic Features (fens, bogs, springs, seeps, lakes, ponds, wetlands, etc)	Corresponding GIS layer or identified in the field	300 ft
Perennial streams with riparian conditions extending more than 150 feet from edge of streambank	Either mapped as 'meadows' or identified in the field	300 ft
Seasonally flowing streams with riparian conditions extending more than 50 feet from edge of streambank	Either mapped as 'meadows' or identified in the field	300 ft

Assumptions Specific to the Aquatic Biota Analysis

A listing of general assumptions is provided at the beginning of Chapter 3. The following lists assumptions that are specific to aquatic wildlife and habitat:

1. All vehicle types (both greater than and less than 50" vehicle types) result in the same amount of disturbance effect to aquatic/riparian species and habitat, unless there is local information enabling a separate analysis by vehicle type. For percent of habitat directly impacted, 8 feet was assigned for an estimated average route width.
2. Proposals to reclassify existing system roads as motorized trails will have no effect on aquatic systems and will not be considered further in this analysis.
3. Habitat is already impacted in the short term. In the long-term, available habitat will remain the same on routes added to the NFTS, but will increase to at least some degree on routes not added to the NFTS and subsequent passive restoration.
    a. See soils analysis for further assumptions.
    b. See definitions for duration of effects in the Effects Analysis Methodology section.
4. Springs, lakes and meadows on the SNF GIS coverage are correct. Project-level analysis would improve the accuracy of this assumption.
5. Aquatic/riparian species spend all or significant portions of their life cycles either in or moving through aquatic or riparian habitats.
6. Aquatic/riparian species occupy perennial (stream order 4 and greater) and/or intermittent (stream order 3) water type habitats. Stream order 2 channels are used in the development of the RCA analysis. They do not provide suitable habitat for aquatic/riparian species. Ephemeral channels (stream order 1) were not considered for aquatic/riparian species habitat, but were considered in cumulative effects for habitat impacts related to sediment transport into downstream perennial and intermittent channels.

7. The focus of this analysis is on suitable aquatic/riparian species habitat. If protocol level surveys could not be completed to determine habitat suitability or species occupancy, perennial and/or intermittent stream, meadow, spring and lake/pond habitat were assumed occupied.
8. Appropriate species dispersal corridors using the California Wildlife Habitat Relationship program (CDFG 2005) were calculated for Threatened, Endangered and Sensitive species. Habitat within that corridor were considered occupied habitat.
9. All proposed additions to the NFTS would be brought up to the appropriate forest road/trail maintenance standards following site specific mitigation measures outlined in the Route Cards (located in the project record). Project mitigation measures outlined in the Hydrologist report that are identified to account for aquatic/riparian species habitat protection will be implemented before the route is available for use. The determinations for Threatened, Endangered and Forest Service Sensitive species are made based on these mitigation measures being implemented.
10. Additional aquatic/riparian species mitigation measures for any proposed site specific work needed to bring routes up to standard by other disciplines (ex. Hydrology, soils) would be applied separately for aquatic/riparian species protection and can not change the determinations for species. The determinations for Threatened, Endangered and Forest Service sensitive species are made based on all mitigation measures being implemented.
11. Research has concluded that sediment from roads can result in adverse effects to streams and aquatic habitats (Dissmeyer 2000; Gucinski and others 2001; Meehan 1991).
12. The overall effect of roads to aquatic habitats is related to the amount of sediment movement from road surfaces and is highly variable within and among surface types and is related to levels of maintenance and road drainage and type of use of the road (Clinton and Vose 2003; Maholland 2002; Maholland and Bullard 2005).
13. All ML1 roads analyzed for a change in use to ML2 roads were currently being used and appeared as a ML2 road on the ground. Therefore, no real change in use or road condition would take place, no further action would need to be taken on the ground and therefore should not change the affects to aquatic/riparian species.
14. Change in vehicle use classes on existing Forest Service System roads from single to multiple-use will not affect aquatic habitat or species if use levels stay the same.
15. Passive recovery: The density of roads and trails at the watershed scale will not substantially change as a result of any of the action alternatives for at least the next 20 years. All of the action alternatives involve the closure of unauthorized routes to vehicle use by the public without barrier, signs or active restoration of the roads. This leaves most unauthorized routes unobstructed for use by motorists. Without active restoration this type of passive restoration would take an undetermined amount of time for vegetation to re-colonize roadbeds and stabilize unconsolidated soils. Adverse effects of route use by motor vehicles include long-term damage to soil and water resources due to soil compaction, alteration of drainage patterns and destruction of vegetation. However, routes closed within the influence of riparian areas should recover more quickly than upland sites due to availability of water for plant growth and could increase potential habitat.
16. Season of use: The elimination of vehicle traffic on a road with hydrologically sensitive stream areas during periods of wet road conditions will result in less sediment being delivered from the road to the stream.

17. Season of use: The elimination of vehicle traffic in or near meadows during periods of wet road conditions will result in minimizing resource damage to meadow habitat including: rutting, alteration of the water pathways into meadow or streams associate with meadows and also will eliminate noise disruption during species breeding as well as initial species dispersal.

Data Sources

1. GIS layers with the following information:
    - Global Position Satellites (GPS) Route locations,
    - Habitats of Threatened, Endangered and Sensitive species,
    - Designated aquatic areas (i.e. CAR, RCA).
2. Site specific surveys/assessment of any localized sensitive wildlife habitats with routes proposed to be added to the NFTS.
3. Site specific field review of proposed routes in relation to aquatic/riparian habitat and condition.

Aquatic Biota Methodology by Action

The analysis methodologies for each of the three actions that make up the alternatives are described below.

1. Direct/Indirect effects of the prohibition of cross-country motor vehicle travel.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Project boundary as it relates to the HUC6 level

Indicators:

1) Miles of routes/areas open for motor vehicle use within (i.e. stream crossings) or adjacent (RCA) to aquatic resources, including meadows and streambanks;

2)Miles of routes/areas open for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources;

3) Density of routes open for motor vehicle use potentially affecting aquatic TES;

4) Number of routes/areas open for motor vehicle use within habitats of known occupied or potential habitat for TES species.

Methodology: GIS analysis of existing unauthorized routes and open areas in relation to aquatic species and habitat and interpretation based on observations and literature review.

Rationale: Literature indicates that location of routes in relation to habitat can affect aquatic species through mortality, disturbance and habitat modification (Moyle and Randall 1996, Trombulek and Frissell 2000, USDA FS 2000). Studies have documented that motorized travel can affect aquatic species by increasing human-caused mortality, changing behavior due to disturbance and modifying habitat (Gaines et al. 2003, Trombulek and Frissell 2000, USDA FS 2000).

2. Direct/Indirect Effects of adding facilities (presently unauthorized roads, trails and/or areas) to the NFTS, including identifying seasons of use and vehicle class.

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Dependant on indicator.

Indicators:

1) Miles of routes/areas open for motor vehicle use within (i.e. stream crossings) or adjacent (RCA) to aquatic resources, including meadows and streambanks;

2) Miles of routes/areas open for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources;

3) Density of routes open for motor vehicle use potentially affecting aquatic TES;

4) Number of routes/areas open for motor vehicle use within habitats of known occupied or potential habitat for TES species.

Methodology: GIS analysis of added routes in relation to habitat and hydrologically sensitive aquatic areas. For aquatic/riparian species habitat protection in relation to sediment, additional information through the hydrology analysis uses GIS analysis of the added features, combined with field data (California State OHV Commission green, yellow, red monitoring protocol, additional data collected at stream crossings) and known information about the affected environment (stream channel sensitivity, etc). Interpretation based on observations and literature review.

Rationale: Literature indicates that placement of routes in relation to habitat can affect aquatic species through mortality, disturbance and habitat modification (Moyle and Randall 1996, Trombulek and Frissell 2000, USDA FS 2000)

3. Changes to the existing NFTS (changing season of use and year round prohibitions).

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Dependant on indicator.

Indicators:

1) Number of routes/areas open/closed for motor vehicle use within habitats of known or historically occupied by TES herpafauna during seasonal closure;

2) Miles of roads open/closed for season closure period within hydrologically sensitive areas;

3) Acres of RCA protected during seasonal closure in relation to hydrologically sensitive areas;

4) Number/Percentage of sensitive areas being protected;

Methodology: GIS analysis of seasonal closures in relation to aquatic/riparian habitat. GIS analysis of changes to seasonal restrictions and year round prohibitions. Interpretation based on observations and literature review.

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

Species: Changes in breeding can occur for some amphibians due to noise levels. (Brattstrom and Bondello 1983, Karlstrom 1962). Roadside populations showed reduction in reproductive efficiency as the water-logged ground in a meadow readily

transmits vibrations (Karlstrom 1962; Grinnell and Storer 1924). Traffic density has been related to population density on local frog and toad breeding chorus (Fahrig et al. 1995).

Sediment: Traffic on native surface roads during the rainy season generally results in elevated sediment production. Ziegler and others (2001) found that motorcycle passes during rainfall simulation caused elevated sediment production; they also cite another study that found a more marked result from truck traffic. They attribute the increased sediment production to the amount of loose material on the road surface that is available for transport, because the spike in sediment transport gets smaller with each successive vehicle pass; however, they note that if the new routes had become incised by flowing water, the erosion would have been more persistent.

Even in coarse-grained soils that do not develop rutting as a result of wet-weather use, more subtle surface deformation occurs that eventually renders the design shape of the road (crowning, drainage dips, etc) ineffective and leads to increased road surface erosion.

Focusing on roads in RCAs and stream crossings should highlight those segments that are more likely to have impacts to streams and riparian areas.

4. Cumulative Effects

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

Long-term timeframe: 20 years.

Spatial boundary: Project boundary as it relates to the HUC6 level including all HUC8s on the SNF that contain documented unauthorized routes and/or areas were included in the analysis. The HUC8s are referred to as 'subdrainages'. Over threshold HUC8s are discussed at the HUC6 scale as well.

Indicator(s):

1) Miles of routes/areas open for motor vehicle use within (i.e. stream crossings) or adjacent (RCA) to aquatic resources, including meadows and streambanks;

2) Miles of routes/areas open for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources;

3) Density of routes open for motor vehicle use potentially affecting aquatic TES;

4) Number of routes/areas open for motor vehicle use within habitats of known occupied or potential habitat for TES species.

5) Equivalent Roaded Acres (Baseline CWE Assessment- hydrology)

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

The Detailed CWE Analysis includes interpretation of the risk of CWEs in the over TOC subdrainages, based on data sources 2, 3 and 5.

Rationale: Literature indicates that placement of routes in relation to habitat can affect aquatic species through mortality, disturbance and habitat modification (Moyle and Randall 1996, Trombulek and Frissell 2000, USDA FS 2000).

Affected Environment

Affected Environment – Forestwide

The SNF provides a diverse range of aquatic and riparian habitat types, ranging from low elevation ponds in chaparral woodland to glacial tarns near granitic alpine ridgelines. Elevations on the SNF range from about 1,000 to over 12,000 feet in elevation, thus representing habitat for a wide variety of aquatic/riparian species. Human activities such as dam building, water diversions, grazing, forest vegetation projects and mining have altered riparian and stream systems within the SNF. The Sierra Nevada Ecosystem Project (SNEP 1996) noted that across the Sierra Nevada bioregion, aquatic/riparian systems are the most altered and impaired habitats. In some instances these activities have altered water temperatures, water volume, stream-flow patterns, nutrient input and cycling, streambank stability and other characteristics important to healthy stream and lake dynamics. Herpetofauna populations have severely declined throughout the Sierra Nevada at all elevations.

Roads, motorized trails and motor vehicle use areas can affect stream channels, riparian areas and water quality. While erosion and localized changes to surface runoff can occur across the landscape, the risk of effects to streams, riparian areas and surface water quality are low if the use is far from hydrologically sensitive areas. Increased levels of sediment can reduce the amount and quality of aquatic habitat. On the Forest, surface water and riparian areas are protected by Riparian Conservation Areas (RCAs), thus RCAs provide a dual role in buffering streams from overland sediment transport and providing species habitat.

Aquatic Habitat

The Forest's approximate 1,300,000 acres drain to the San Joaquin River system via the Merced, Chowchilla, Fresno and Kings Rivers, along with the mainstem San Joaquin. Aquatic habitat includes an estimated 2,000 miles of perennial streams and rivers, along with 21,800 acres of lakes and ponds. The SNF aquatic systems provide habitat for 31 species of fish, with approximately 1,580 miles of stream occupied by fish (USDA-FS 1992). Perennial waters also provide potential habitat for a variety of amphibian and reptile species, as well as benthic macroinvertebrates. Additionally, there are 8,200 miles of intermittent or seasonal streams, some of which also provide habitat for fish, benthic macroinvertebrates and amphibians.

The Forest is within the Sacramento-San Joaquin zoogeographic province as described by Moyle (2002). Eight of the fish species occurring in the Forest are native, with most Forest waters barren of fish prior to man's transplanting activities starting in the late 19th Century. Moyle (1996, 2002) identifies much of the west slope of the Sierra Nevada range above 5,000 feet as being historically fishless due to glaciation during the Pleistocene and steep topography. However, it is noted that trout may have occurred up to 7200 feet in the Middle Fork of the Kings River (Moyle et al 1996). The fish communities represented on the SNF include the "rainbow trout" and "pikeminnow-hardhead-sucker" assemblages for the zoogeographic province described by Moyle (2002). Elevations on the Forest above approximately 2500 feet are within the rainbow trout (*O. mykiss*) assemblage. Habitats are characterized as having more riffle than pools, with water temperatures seldom exceeding 70 degrees Fahrenheit (21 degrees Celsius). Elevations less than 2500 feet are generally part of the pikeminnow-hardhead-sucker assemblage described by Moyle (2002) as occurring within Sierra Nevada foothill streams. Water temperatures within this transitional area may exceed 70 degrees Fahrenheit (21 degrees Celsius) during the summer, especially during "dry and critically dry" water years. Trout species may persist within these areas, but water temperatures limit the populations and introduced centrachids (sunfish family) are better adapted to these habitat conditions.

Riparian Habitat

The SNF also provides a variety of riparian habitats associated with streams (both perennial and seasonal), meadows, springs and lakes. Riparian areas are high in biodiversity due to the water, relative humidity, cooler temperatures and complex cover provided. They also serve as important corridors for species dispersal. There are an estimated 15,750 acres of meadow on the Forest and 465,000 acres of Riparian Conservation Areas (RCA) (USDA-FS 2001 and 2004), associated with streams, meadows, springs and lakes.

Special Status Aquatic/Riparian Species

Aquatic/riparian species to be evaluated under the Travel Management DEIS, include SNF species that have been determined to be threatened, endangered or proposed under the ESA (USDI – Fish and Wildlife Service (USFWS 2008) or are on the Pacific Southwest Region USDA Forest Service Sensitive Species list (USDA-FS 1998). Table 207 represents a complete list of aquatic/riparian species that may occur or have habitat on the SNF (USDI – USFWS 2008). Some of these species may not occur or have habitat within the project area for the Travel Management DEIS. Effects from Travel Management on aquatic/riparian species are evaluated in the Environmental Consequences section of this document and in the Aquatic Species Biological Assessment/Evaluation for the Draft EIS for the SNF Travel Management Plan (Barnes and Strand 2009) located in the project record.

Table 207. Special Status Species that may Occur or Have Habitat on the Sierra National Forest

Common Name	Scientific Name	Status	Addressed in this Analysis
Invertebrates			
Conservancy fairy shrimp[1]	*Branchinecta conservatio*	Endangered	No
Aquatic Macroinvertebrate habitat	Numerous Species	Management Indicator Species	Yes
Fish			
Central Valley Steelhead1	*Oncorhynchus mykiss*	Threatened	No
Delta Smelt[1]	*Hypomesus transpacificus*	Threatened	No
Hardhead minnow[1]	*Mylopharodon conocephalus*	Forest Service Sensitive	No
Lahontan Cutthroat Trout	*Oncorhynchus clarki henshawi*	Threatened	Yes
Owens tui chubb[1]	*Gila bicolor snyderi*	Endangered	No
Paiute cutthroat trout[1]	*Oncorhynchus (=Salmo) clarki seleniris*	Threatened	No
Reptiles and Amphibians			
California Red-legged Frog	*Rana aurora draytonii*	Threatened	Yes
California Tiger Salamander[1]	*Ambystoma californiense*	Threatened	No
Foothill Yellow-legged Frog	*Rana boylii*	Forest Service Sensitive	Yes
Giant garter snake[1]	*Thamnophis gigas*	Threatened	No
Relictual Slender Salamander	*Batrachoseps relictus*	Forest Service Sensitive	Yes

Common Name	Scientific Name	Status	Addressed in this Analysis
Limestone Salamander[1]	*Hydromantes brunus*	Forest Service Sensitive	No
Mountain (Sierra Nevada) Yellow-legged Frog	*Rana (sierrae) muscosa*	Forest Service Sensitive, USFWS Candidate	Yes
Pacific Tree (Chorus) Frog habitat	*Pseudacris regilla*	Management Indicator Species	Yes
Western Pond Turtle	*Clemmys marmorata*	Forest Service Sensitive	Yes
Yosemite Toad	*Bufo canorus*	Forest Service Sensitive, USFWS Candidate	Yes

[1] Considered, but will not be analyzed any further within this document because they are not known to occur within the project area and/ or would not be affected by the project alternatives.
Source: USDI - USFWS

Existing Conditions in the Analysis Units

The project area consists of 10 analysis units draining to the Merced, Chowchilla, San Joaquin and Kings Rivers. The analysis units are included within 37 6th code Hydrologic Units (HUC6s). The HUC6 drainages vary between 3,800 and 115,000 acres in size. The analysis units drain approximately 800,000 acres via nearly 4,900 miles of perennial and intermittent stream system (Table 208). The perennial streams represent potential habitat for fish, amphibians, reptiles and benthic macroinvertebrates, while segments of the intermittent streams additionally provide seasonal habitat. For this analysis the potential habitat evaluated consists of perennial streams (1,084 miles) and third order (intermittent) streams (1,155 miles) for a total of approximately 2,235 miles. Order 2 intermittent channels (2,635 miles) have a defined stream channel, but generally flow for limited periods of time and are less likely to retain seasonal pools that might be utilized by fish, amphibians, reptiles or benthic macroinvertebrates. Ephemeral channels typically flow during response to storm events or snowmelt. While they do not provide aquatic/riparian habitat, they can indirectly and cumulatively effect habitat through sediment contribution. The analysis units also include a variety of riparian habitats associated with streams (both perennial and seasonal), meadows, springs and lakes. There are an estimated 6,850 acres of meadow within the analysis units and 260,010 acres of Riparian Conservation Areas (RCA) (USDA-FS 2001 and 2004), associated with streams, meadows, springs and lakes.

Miles in Table 208 are approximated based on GIS sorting of stream orders: >= 4 representing perennial streams, while stream orders 2 and 3 represent intermittent streams. Stream order 1 streams are considered ephemeral. Riparian acres were calculated for meadow habitat per analysis unit as well as total Riparian Conservation Areas (RCAs) for all aquatic habitat including streams, meadows, lakes, ponds and springs. Total percent of the analysis unit located in an RCA was also calculated.

Table 208. Miles of Stream by Analysis Unit

Analysis Unit	Streams (mi)			Lakes (ac)	Meadow (ac)	Total RCA acres	Percent of Analysis Unit in RCA
	Perennial (order 4+)	Intermittent (order 2-3)	Ephemeral † (order 1)				
SFM	102	308	781	26	678	22150	31%
WES	113	441	873	1068	918	26780	32%
GLO	142	391	758	79	1545	31899	35%
GAG	89	404	885	87	459	24970	29%
MAM	97	281	650	873	136	21776	40%
SSB	104	337	765	2009	563	22868	27%
EKP	18	33	74	2847	174	3432	26%
JCH	56	229	527	354	20	21444	46%
TAD	141	467	879	4947	1475	36398	32%
DNK	223	826	1659	99	887	48291	31%
TOTAL:	**1,084**	**3,789**	**7,851**	**12,389**	**6,854**	**260,008**	**33%**

There are also Critical Aquatic Refuges (CARs) in the project area. CARs are subdrainages containing populations of threatened, endangered, sensitive, rare or highly vulnerable aquatic/riparian species (USDA – FS 2001; 2004a). The location of the CARs with respect to analysis units is shown in Table 212. The West Fork Portuguese Creek CAR extends outside of the analysis units, but the area outside of the analysis unit is upstream, so no impacts from within the project area will affect stream channel conditions in that portion. These areas are also located in wilderness.

Table 209. Critical Aquatic Refuges by Analysis Unit (AU); Acres within AU, Percent of Total CAR Acres

Analysis Unit	Acres of CARs in AU (acres)	CAR Name				
		Cow Cr acres / %	Jose Basin acres / %	Lower San Joaquin acres / %	Snow Corral acres / %	WF Portuguese acres / %
SFM	0	0	0	0	0	0
WES	0	0	0	0	0	0
GLO	1199	0	0	0	0	1199 / 100%
GAG	478	0	0	478 / 2 %	0	0
MAM	10632	0	0	10632 / 52%	0	0
SSB	5	0	0	5 / 0%	0	0
EKP	0	0	0	0	0	0
JCH	26350	0	16847 / 87%	9502 / 46%	0	0
TAD	6135	4403 / 100%	148 / 1 %	0	1584 / 100%	0
DNK	2352	0	2352 / 12%	0	0	0
TOTAL:	**47151**	**4403**	**19347**	**20618**	**1584**	**1199**

Stream Channel Surveys

Segments of Forest streams have been surveyed for stream channel characteristics and stability between 1989 and 2008. Channels and riparian areas were evaluated using various

methodologies, including Rosgen channel typing, Pfankuch channel stability ratings, Stream Condition Inventory plots and Proper Functioning Condition.

Rosgen Channel Typing: Channel reach types (Rosgen 1996) were determined based on channel attributes such as width/depth ratio; gradient; sinuosity; and substrate, along with sediment and transport characteristics. Approximately 560 miles of stream channel have been evaluated within the analysis units. Stream reaches with low sensitivity are bedrock/boulder (Rosgen channel types A1-2, B1-3, C1-2, F1-2 and G1-2) and represent approximately 50 percent of the streams evaluated. These channel types are considered inherently stable and are not significantly influenced by land management activities. However, sediment build-up can occur in these channels if upstream stream channels degrade. Effects to aquatic habitat focuses on those Rosgen channel types considered as sensitive, degraded or unstable (sensitivity of moderate and high in Table 213).

Pfankuch channel stability ratings: The Pfankuch channel stability rating (USDA-FS 1975) was developed to evaluate the stream channel condition and stability from within the floodplain and stream channel. This method utilizes observation of attributes from the upper banks, lower banks and channel bottom. Channels are categorized into three ratings of poor, fair or good. Table 210 indicates the Modified Pfankuch streambank stability condition. Channel types were evaluated in terms of sensitivity to disturbance as presented by Rosgen (1996), which varies by channel gradient and size of substrate. The Modifications proposed by Rosgen evaluate each channel type separately in terms of vegetative bank cover, stream bank cutting, channel bottom deposition, channel bottom scour and deposition and percent stable material. Under Rosgen's (1996) modified approach, channels are evaluated considering sensitivity to disturbance, recognizing channel characteristics rather than evaluating all channels against a common metric.

While approximately 90 percent of the naturally unstable channel types had at least Fair channel stability, 53 percent of the moderately sensitive channels were indicated to have Poor channel stability under the Modified Pfankuch approach. Table 210 displays the channel stability conditions for sensitive, degraded or naturally unstable within the analysis units.

Table 210. Stream Channel Sensitivity by Analysis Unit Based on Rosgen Channel Types

Analysis Unit	Rosgen Sensitivity (mi)			Modified Pfankuch Ratings Moderate sensitivity reaches (mi)			Modified Pfankuch Ratings High sensitivity reaches (mi)		
	Low	Moderate	High	Good	Fair	Poor	Good	Fair	Poor
SFM	1.8	0.0	4.5	0.0	0.0	0.0	3.8	0.7	0.0
WES	25.0	6.2	20.1	1.1	0.3	4.8	11.9	5.8	2.3
GLO	80.5	29.5	50.1	8.6	10.6	10.3	34.9	12.9	2.4
GAG	60.2	26.7	38.5	2.7	5.7	18.3	26.2	8.9	3.3
MAM	18.0	2.9	16.7	0.1	0.5	2.3	7.0	8.4	1.2
SSB	17.3	4.0	8.8	0.5	0.3	3.2	3.1	4.4	1.3
EKP	ND	ND	ND	ND	ND	ND	ND	ND	ND
JCH	12.4	0.8	2.2	0.0	0.2	0.6	2.0	0.1	0.0
TAD	46.5	8.8	16.0	3.3	2.4	3.1	6.1	4.7	5.3
DNK	42.3	2.2	19.3	0.5	1.1	0.6	9.5	4.2	5.5
TOTAL:	304.0	81.1	176.1	17	21	43	105	50	21

Stream Condition Inventory: Thirty-three Stream Condition Inventory (SCI) (Frazier et al. 2005) plots are located across the SNF (Table 211). SCI consists of stream features or attributes,

that are useful in classifying channels, evaluating the condition of stream morphology and aquatic habitat and making inferences about water quality. Data on particle distribution and channel geometry information, large woody debris, bank configuration, shade, channel stability and limited water chemistry information was collected. Reaches are monumented to reduce variability when survey measurements are repeated

Table 211. Stream Segments and/or Tributaries that have had SCI Surveys Conducted

Analysis Unit	SCI Reaches (#)	Locations
SFM	0	ND
WES	7	Big Cr, Lewis Fork (3), Westfall tributary, Nelder Creek, California Creek
GLO	6	Jackass Cr, Big Cr (Trib), White Chief Branch, WF Portuguese Cr, SF Willow Cr, Big Creek
GAG	3	SF Willow Cr (Trib), Camino Cr, Grizzly Cr
MAM	1	ND
SSB	0	Deer Cr
EKP	1	ND
JCH	1	Jose Creek
TAD	4	Glen Meadow Cr., .Laurel Cr, Cow Cr, SF Tamarack Cr (Trib)
DNK	11	Big Cr, Summit Cr, Glen Meadow Cr, Rush Cr, Oak Flat Cr, Bull Cr, Laurel Cr, Cow Cr, Oak Flat Cr, Bull Cr, Cottonwood Springs Cr, Duff Cr.
TOTAL:	**33**	

SCI survey data are available in the project file. ND = No Data

Ten of the SCI plots include macroinvertebrate sampling. Four of the samples were collected from within the GLO analysis unit, with the remaining six within the WES analysis unit. Benthic Macroinvertebrates (BMI) have been demonstrated to be very useful as indicators of water quality and aquatic habitat condition (Resh and Price 1984; Hughes and Larsen 1987; Resh and Rosenberg 1989). They are sensitive to changes in water chemistry, temperature and physical habitat. BMI are an important component of the foodweb, providing a food source for birds, mammals, amphibians, reptiles and fish. The samples associated with the SCI plots were collected between 2006 and 2007 and processed by Utah State University. Samples were evaluated using biotic indices from Hilsenhoff (1987) and Winget et al. (1979). Table 212 displays information for the samples, including metric results from the Hilsenhoff (HB Index); Community Tolerance Quotient (CTQ: predicted and determined); and Biotic Community (BCI) indices for aquatic macroinvertebrates. Benthic macroinvertebrate data indicates water quality is at these sites ranges from fair to excellent (Vinson 2008).

Table 212. Metrics for Benthic Macroinvertebrates Collected from Several SCI Plots

Subws. (HUC8)	Analysis Unit	HB Index	Indication	CTQp	CTQd	BCI	Indication
501.0000	GLO	3.56	Slight organic enrichment	50	57	88	Excellent
501.5005	GLO	4.14	Moderate organic enrichment	80	57	140	Excellent
501.5006	GLO	4.09	Moderate organic enrichment	50	59	85	Excellent
501.5053	GLO	4.13	Moderate organic enrichment	50	58	86	Excellent
503.0010	WES	4.14	Moderate organic enrichment	50	61	82	Good
503.0011	WES	4.6	Moderate organic enrichment	80	67	119	Excellent
503.0055	WES	3.27	Slight organic enrichment	60	53	113	Excellent
503.0055	WES	3.14	Slight organic enrichment	50	50	100	Excellent
503.3001	WES	3.76	Slight organic enrichment	50	65	77	Fair
503.3002	WES	1.25	Little organic enrichment	53	23	230	Excellent

SNF sub-watershed number, analysis units samples were collected in, HB Index, Indication, CTQp, CTQd, BCI and water quality indication.

Proper Functioning Condition: The Proper Functioning Condition (PFC) protocol was developed as a qualitative method for assessing the condition of riparian-wetland areas. A stream reach is in Proper Functioning Condition (PFC) when physical processes are providing resilience to disturbances and characteristics are present to: dissipate energy during high flows (reducing erosion); filter sediment; improve flood-water retention and ground-water recharge; develop root masses that protect streambanks from erosion; provide habitat for fish, wildlife and support other beneficial uses; and support biodiversity (USDI 1998). None of the assessed segments in the project area have rated Non-Functional. Table 213 lists the stream segments where PFC surveys have been completed.

Table 213. For each Analysis Units, the Total Number of Proper Function Condition (PFC) Assessments Completed and Associated Ratings

Analysis Unit	Total # PFC Assessments	PFC	FAR-UT	FAR-TU	FAR-DT
SFM	0	0	0	0	0
WES	1	1	0	0	0
GLO	5	1	2	1	1
GAG	6	3	3	0	0
MAM	5	3	1	1	0
SSB	0	0	0	0	0
EKP	0	0	0	0	0
JCH	2	1	0	1	0
TAD	2	0	1	1	0
DNK	10	7	1	2	0
TOTAL:	**31**	**16**	**8**	**6**	**1**
PFC = Proper function condition, FAR-UT = Functional at risk with an upward trend, FAR-TU = Functional at risk with trend unknown and FAR-DT = Functional at risk with a downward trend					

Existing Roads and Other Motorized Routes

The existing roads and inventoried routes present within the analysis units are an important component in understanding the effects of the alternatives being analyzed for this project. Although the effects of existing road system are not included in the direct or indirect effects of these alternatives, they are relevant to the affected environment (and to cumulative effects, since their effects are similar to the effects of the actions being considered).

Road density is often used as an indicator of the risk for roads to affect stream flow and sediment contribution, which can result in alteration of aquatic habitat. Table 214 displays the densities of existing authorized roads, inventoried routes and the total motorized route density (the sum).

Table 214. Existing Road Miles (All Roads Located on SNF Regardless of Jurisdiction), Inventoried Routes and Their Associated Density by Analysis Unit

Analysis Unit	Existing Roads Miles (mi) / Density (mi/mi2)	Inventoried Routes Miles (mi) / Density (mi/mi2)	Total Motorized Routes Miles (mi) / Density (mi/mi2)
SFM	156 / 1.42	23 / 0.20	179 / 1.62
WES	382 / 2.89	113 / 0.85	495 / 3.74
GLO	353 / 2.40	65 / 0.46	418 / 2.94
GAG	327 / 2.40	83 / 0.61	410 / 3.01
MAM	182 / 2.15	38 / 0.46	221 / 2.60
SSB	322 / 2.41	18 / 0.14	340 / 2.55
EKP	45 / 2.18	21 / 1.02	66 / 3.20
JCH	193 / 2.65	22 / 0.30	215 / 2.95
TAD	413 / 2.34	109 / 0.62	522 / 2.96
DNK	551 / 2.29	59 / 0.25	610 / 2.54
TOTAL / AVERAGE	**2924 / 2.34**	**552 / 0.44**	**3476 / 2.78**

Total motorized route miles include all roads and inventoried routes in each analysis unit (Gott 2009).

The highest density of existing roads and total motorized routes occurs in WES, which also has the second highest inventoried route density. Density in EKP is high, largely because the analysis unit was drawn as a corridor around the roads. GAG also has a relatively high density of both existing roads and inventoried routes.

Table 215 shows the densities within RCAs. As previously noted, RCAs are areas of high species biodiversity and affects to these areas can directly affects species and indirectly affect aquatic/riparian habitat.

Table 215. Miles of Roads and Inventoried Routes Located in RCAs with the Associated Density by Analysis Unit

Analysis Unit	Within RCAs		
	Existing NFTS Roads Miles (mi) / Density (mi/mi^2)	Inventoried Routes Miles (mi) / Density (mi/mi^2)	Total Motorized Routes Miles (mi) / Density (mi/mi^2)
SFM	47 / 1.36	7 / 0.21	54 / 1.58
WES	134 / 3.19	36 / 0.85	170 / 4.05
GLO	134 / 2.19	27 / 0.53	161 / 3.22
GAG	104 / 2.67	24 / 0.62	128 / 3.29
MAM	64 / 1.89	17 / 0.51	81 / 2.40
SSB	91 / 2.55	4 / 0.12	95 / 2.67
EKP	17 / 3.17	8 / 1.49	25 / 4.66
JCH	92 / 2.79	10 / 0.31	102 / 3.07
TAD	149 / 2.61	31 / 0.54	180 / 3.16
DNK	176 / 2.34	15 / 0.28	191 / 2.53
TOTAL / AVERAGE	**1008 / 2.48**	**179 / 0.44**	**1187 / 2.92**

Total motorized route miles include all roads and inventoried routes in each analysis unit (Gott, 2009)

Another factor that is relevant to the affected environment is the prevalence of roads and other motor vehicle routes crossing streams (called 'stream crossings' or 'crossings'). Crossings are locations where the route may be hydrologically connected to the drainage network. This may result in a risk of contributing sediment directly to the drainage network, thus the number of crossings is a good indicator for potential effects to aquatic habitat. The numbers of stream crossings made by existing authorized roads, unauthorized routes and the totals are displayed in Table 216. These numbers include crossings of all stream orders.

Table 216. Stream Crossing Numbers and Densities (Existing Road Systems / Inventoried routes / Total) by Analysis Unit

Analysis Unit	Existing Roads		Inventoried Routes		All Motorized Routes	
	Number of crossings (#)	Crossing Density (# / mi^2)	Number of crossings (#)	Crossing Density (# / mi^2)	Number of crossings (#)	Crossing Density (# / mi^2)
SFM	717	6.5	134	1.2	851	7.7
WES	1,884	14.3	573	4.3	2,457	18.6
GLO	1,666	11.7	265	1.9	1,931	13.5
GAG	1,787	13.1	395	2.9	2,177	16.0
MAM	910	10.8	236	2.8	1,146	13.5
SSB	1,596	12.0	65	0.5	1,661	12.4
EKP	211	10.3	89	4.3	300	14.6
JCH	1,033	14.2	108	1.5	1,141	15.6
TAD*	1,687	9.6	406	2.3	2,093	11.9
DNK	3,125	13.0	223	0.9	3,348	13.9
TOTAL / AVERAGE	**Total 14,611**	**Average 11.7**	**Total 2,494**	**Average 2.0**	**Total 17,105**	**Average 13.7**

These include all potential crossings on perennial, intermittent and ephemeral streams and are over-estimates based on the knowledge that unscoured swales appear in the GIS layer as order 1 streams (Gott 2009)

Note that the crossing densities in WES and GAG are the highest, while densities in SFM are relatively low.

Cumulative Watershed Effects Analysis

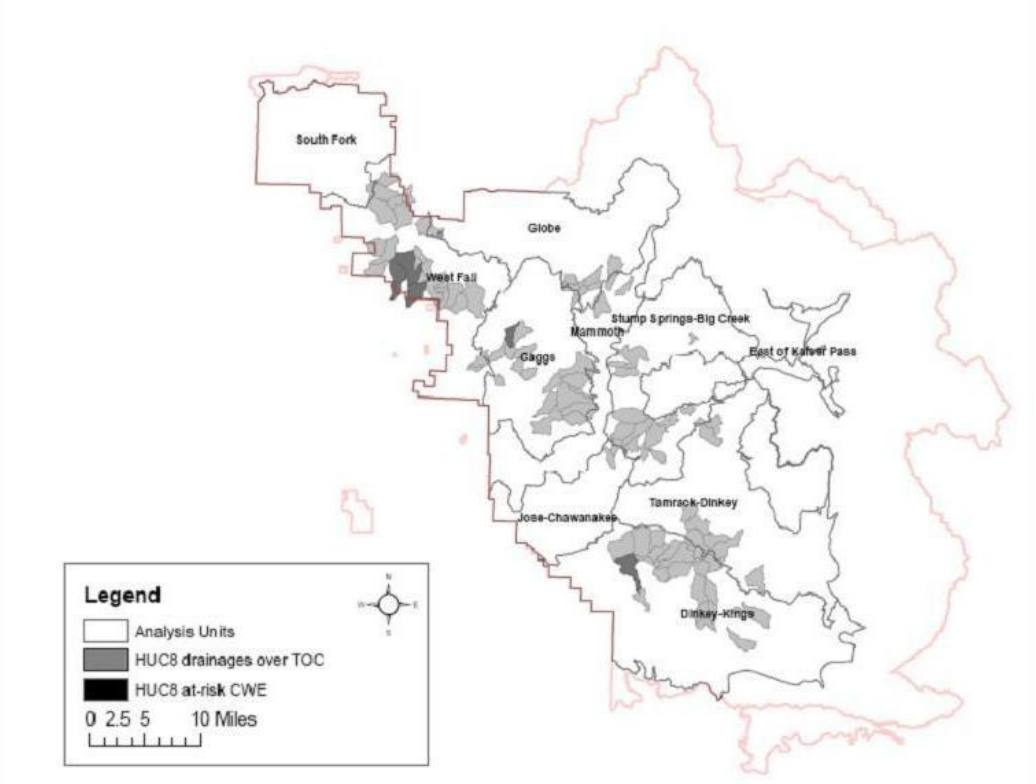
A cumulative watershed effects (CWE) assessment was conducted for the SNF Travel Management DEIS following the direction set forth in FSH 2509.22 (Gallegos 2009) to determine the potential for cumulative watershed effects in the affected watersheds in the proposed project area. A cumulative watershed effect would result in habitat degradation for aquatic/riparian species. The CWE model is based on a premise that watersheds will respond to effects of disturbance when that sub-watershed reaches a geomorphic and hydrologic threshold, referred to as the Threshold of Concern (TOC). Cumulative watershed effects from the proposed action include potential changes in peak flows and/or increased sedimentation from accelerated erosion. An indicator of a cumulative watershed effect response could be one or more of the following: ERA values above the lower TOC value, excessive filling of channel pools with fine sediment; unstable channel banks; and/or poor aquatic habitat.

The project analysis units are located within 37 6th code Hydrologic Units (HUC6s). Each of these HUC basins is further divided into HUC7s and HUC8s. The Pacific Southwest Region Cumulative Watershed Analysis (CWE) was conducted at the HUC8 scale, which ranges from 200 to 2,900 acres in the project area. The analysis includes the routes currently occurring within the SNF, along with past, present and reasonably foreseeable actions. Within the analysis units there are 96 HUC8 subdrainages that currently exceed the identified lower TOC (Gallegos 2009). The TOC serves as an indicator for drainages that may either be incurring a Cumulative Watershed Effect (CWE) or have an elevated risk of triggering a CWE. The number of subdrainages and potentially affected acres are summarized by analysis unit in Table 217 and displayed in Figure 20.

Table 217. Acres of HUC8 Drainage Exceeding TOC by Analysis Unit

Analysis Unit (AU)	Total Acres	Total Acres over TOC	% AU Over TOC
SFM	70545	470	0.67%
WES	84564	30328	35.86%
GLO	91210	6672	7.31%
GAG	87192	21500	24.66%
MAM	54133	3199	5.91%
SSB	85404	14825	17.36%
EKP	13123	0	0.0 %
JCH	46668	1159	2.48%
TAD	112649	11730	10.94%
DNK	154098	29489	19.14%
TOTALS	799,586	119,372	

Figure 20. Subdrainages exceeding Threshold of Concern (TOC) within the Analysis Units



Gallegos (2009) evaluated those HUC8 subdrainages exceeding TOC and summarized potential for a CWE to occur within 25 subdrainages most likely to express an effect or having special interest aquatic/riparian biota. The evaluation considered the TOC and current known information of channel stability within the subdrainage. Five HUC8s were identified having a high risk of a cumulative watershed effect. These HUC8s are 503.50052; 503.0053; 503.0054; 504.2251; and 519.3053.

Herpetofauna Surveys

The SNF has been conducting surveys for special interest herpetofauna since the early 1990s. Spot surveys were conducted within the Forest by Canorus Ltd. during 1993 and 1994 (Martin 1995). Other surveys have been conducted by the California Academy of Sciences (1999-2000) and by contractors for Pacific Gas and Electric and Southern California Edison during the late 1990s through present as part of the relicensing and post-license studies conducted for hydroelectric projects. The majority of the surveys were conducted by Forest Service personnel (1990-current) during NEPA analysis for specific projects and as part of the forestwide surveys for Yosemite toad under the Sierra Nevada Forest Plan Amendment (USDA-FS 2001, 2004a). Forest Service surveys were done implementing the Fellers and Freel (1995) survey methodology. Portions of the Forest remain incompletely surveyed due to challenging topography, remote access or apparent limited habitat.

Aquatic Biota Affected Environment and Environmental Consequences

Effects Common to all Aquatic Wildlife

Direct and Indirect Effects

Increasing popularity in motor vehicle use has resulted in user-defined routes within the SNF. The proliferation of motorized routes across the SNF is accompanied by an increase of potential effects to aquatic/riparian biota. Some reptiles and amphibians (herpetofauna) have biphasic movement patterns associated with breeding or over-wintering sites. Species may be characterized as slow moving, small and inconspicuous subjecting them vulnerable to traffic on roads or routes. Effects to aquatic/riparian species are more confined within the landscape to stream networks and associated riparian habitat. The effects from roads on species and habitat is well documented, including transport of water and sediment (Trombulak and Frissell 2000); alteration of peak flows (Jones et al. 2000); traffic residues (metals, oil and grease); and enhancing spread of non-native species (Trombulak and Frissell 2000). Studies of effects from routes are more limited. Where site specific information or literature on road and trail associated factors to aquatic species is unavailable, general information on potential impacts is presented. General direct and indirect effects of motorized use on wildlife were summarized by Tombulak and Frissel (2000) as: 1) human-caused mortality, 2) changes in behavior and 3) habitat modification. Additional information on the effects to the aquatic environment is presented in Soil and Watershed Resources sections.

Human-Caused Mortality: Allowing cross-country travel or adding new routes to the existing NFTS could continue to result in human-caused mortality to aquatic/riparian species in a variety of ways including:

- Collisions,
- Introduction of toxins,
- Introduction of non-native species, parasites or disease vectors.

Slow moving species (such as reptiles and amphibians) are more susceptible to road mortality because their life histories often involve migration between wetland and upland habitats (Trombulak and Frissell 2000, USDA FS1998). Linear features, such as roads and routes, represent both physical barriers as well as sites of direct morality. Collisions with vehicles have been documented in numerous different aquatic and riparian dependant species and they may even be particularly vulnerable to it (Trombulak and Frissell 2000). Literature suggests that

highest road-kill rates are near wetlands and that amphibians represent the largest percent of species. Mass mortalities of 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). Some frogs and toads disperse at night due to lower temperatures and increased relative humidity. Mazerolle (2003) reported that over an 8-year period, nearly 70 percent of amphibians observed on roads during night surveys were vehicle mortalities, while Ashley and Robinson (1996) reported 92 percent of identified road-kills as amphibians in a similar study. Mortality from vehicles can reduce population size and reduce movement between resources and conspecific populations (Fahrig et al. 1995; Carr and Fahrig 2001). Bury (1977) reported declines in individuals, diversity, density and biomass related to areas of motor vehicle use. Bury and Luckenbach (2002) identified nearly four times greater number of desert tortoise and active burrows in areas not subject to motor vehicle use compared to areas of use.

Stream crossings are also areas of concern for collisions. Although some stream crossings have culverts or bridges, fords or low-water crossings are more typical along inventoried routes and may represent migration barriers (Furniss et al. 1991; Wellman et al. 2000). 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 widened pool where different life history stages (fingerling fish or tadpoles) of some species may congregate. Increased densities of these species in the ford crossing pools may result in higher rates of collisions. Although some stages of species may be more prone to crushing at crossings, numerous herpetofauna (reptiles and amphibians) species disperse from aquatic to terrestrial habitats (i.e. Riparian Conservation Areas) as part of their life history. Herpetofauna species tend to be slow-moving and may migrate across a motorized route to access habitat. Slower dispersal movements can result in having a relatively higher risk of being crushed by vehicles. Aquatic and riparian dependant species are even more vulnerable to motor vehicle travel because routes may be influencing aquatic as well as terrestrial habitats. Based on observations of toads associated with pools at crossings by motor vehicle routes, Warburton et al. (2004) hypothesized that tadpole survivorship was poor at these habitat-route intersections.

Spellerberg and Morrison (1998) identify elements such as Pb (lead), Ni (Nitrogen), Cd (Cadmium) and Zn (Zinc) as residue from petroleum products and tires. Introduction of toxins, non-native organisms, parasites and disease vectors are the final ways which motorized travel management 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 such as oil, rubber or gasoline may be introduced to the environment. Havlik (2002) projected over 10,000,000 gallons of gasoline and motor oil enters the soils and waters of public land annually from inefficient combustion of ATV engines. 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. Mahaney (1994) noted that concentrations of crankcase oil of 100 mg/l inhibited tadpole growth and prevented metamorphosis. 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 aquatic species. When traveling roads or trails throughout the course of a day, a vehicle may cross numerous streams or wet areas (i.e. springs, meadows). 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 or wet area, 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.

Changes in Behavior: Although it is not well documented in the literature, it is reasonable to assume that aquatic species may be affected by motor vehicles through changes in behavior. Examples of changes in behavior include:

- predator avoidance
- changes in breeding behavior
- changes in energy budget

Travel management may 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.

Changes in breeding behavior for some amphibians have also been observed. Brattstrom and Bondello (1983) found that Couch's spadefoot toad responded to noises at auditory levels similar to an OHV. When vehicles drove near the toad habitat a response to the vibrations, which are similar to the noises that occur during thunderstorms associated with the species breeding cycle, subjected animals to absence of water for breeding; environmental conditions not typically experienced during breeding periods; depletion from energy due to emergence; predators; and interference with breeding success. Fahrig et al. (1995) note effects from traffic on local frog and toad breeding chorus, with population density related to traffic density. On the SNF, Kaiser Pass Meadow is located within 100 feet of a NFTS road. Karlstrom (1962) noted that the approach of a car or truck half a mile distant caused Yosemite toads to cease calling abruptly and did not resume calling until several minutes after the sound of the vehicle was completely gone to human ears. Roadside populations showed reduction in reproductive efficiency as the water-logged ground in a meadow readily transmits vibrations (Karlstrom 1962; Grinnell and Storer 1924).

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. Additionally, Nash et al. (1970) reported that leopard frogs exposed to noise synonymous with motor vehicles remained immobilized for extended periods of time. Such behavior may make amphibians more vulnerable to individual road/route mortality or predators.

Habitat Modification: Habitat size, isolation and quality influence density and persistence of local populations. Travel management may result in numerous different impacts to aquatic/riparian species habitat quality and quantity such habitat loss, habitat fragmentation or increased sedimentation to stream systems. Roads or routes could alter drainage patterns resulting

in alteration of hydrologic regime and changes to aquatic habitat (Wemple et al. 1996). Jones and Grant (1996) reported increased peak flows from road densities of 2-3 km/km². Alterations to terrestrial habitat may include, but are not limited to: reductions in riparian vegetation cover, 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.

Alteration of habitat resulting from increasing road and route density results in fragmentation of habitat. Habitat fragmentation was identified as an important factor in amphibian declines (Blaustein et al. 1994). Negative effects from road density and isolation effects from the associated road network were described by Vos and Chardon (1998) as resulting in greater mortality of individuals and lower colonization rates. Bury et al. (1977) correlated severity of vegetation damage to intensity of motor vehicle use. Finally Reh and Seitz (1991) reported reduced heterozygosity within local populations resulting from separation by highways.

The transfer of sediment to streams and other water bodies at road crossings is a consequence of roads and trails. 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 et al. 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). 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.

Cumulative Effects

Appendix E provides a list and general description of past, present and reasonably foreseeable projects within the analysis units. A wide range of activities have occurred and continue to occur across the landscape, which in combination represent the potential to cumulatively effect individuals or habitat for aquatic/riparian species. These activities may occur across elevation

ranges within the project area, thus could affect aquatic/riparian habitat in a similar manner and are presented as common to all species. Activities included in the analysis include transportation management; recreation and facilities; vegetation management (including fuels reduction); fire (prescribed and wildfire); range; special uses; and private property. If a species may be subject to unique effects, those will be presented separately under the potentially affected species. Potential effects attributed to the activity from literature are described; however it does not imply that effects described are presently taking place. The Forest Service applies measures to reduce the probability of these effects. Measures include incorporation of Forest standards and guidelines (USDA-FS 1991); Best Management Practices (BMPs) (USDA-FS 2002); site specific mitigation measures; and the development of project mitigation measures to reduce effects from an action. Each project is also evaluated for consistency with Riparian Conversation Objectives (USDA-FS 2001; 2004). Cumulative effects on physical aquatic habitat from the listed activities have been evaluated under a Cumulative Watershed Effects Assessment (Gallegos 2009).

Transportation Management

A system of Federal, State and county highways has been developed to provide access to the SNF. There are approximately 2,600 miles of roads in the SNF Transportation System (NFTS). Additionally there are approximately 110 miles of private roads, 250 miles of State and county roads, 180 miles of National Forest Special Use Roads and various other roads for a total of approximately 3000 roaded miles on the Forest. Roads are distributed at all elevations across the Forest, thus potentially affect most aquatic/riparian species. Over the last 10 years there have been approximately 10 miles of new roads constructed and approximately 10 miles of road decommissioned. New road construction may be necessary related to future vegetation management/fuels reduction projects such as the Kings River Project; Sierra Nevada Adaptive Management Project; or Fish Camp Project among others.

Roads can affect habitat for aquatic/riparian species, result in direct mortality, serve as linear barriers to movement; modify animal behavior; alter the physical and chemical environments; serve as a conduit for non-native species; or fragment species habitat (Trombulak and Frissell 2000). Increasing road densities have been identified as contributing to declines of some species and aquatic habitat quality. Accelerated erosion results from new construction (Reid and Dunne 1984). Road excavation can disrupt sub-surface water transport, bringing water to the surface where flow is concentrated and velocities are much higher. Roads can also collect water and serve as an extension of the stream network, thus altering runoff and peak flows. Road crossings can serve as migration barrier to movement of aquatic species (Furniss et al. 1991) and serve as sites to introduce sediment or pollutants.

Effects from accelerated erosion are mitigated by location of new roads away from sites where sediment would be transported to a stream channel; design drainage features such as out-sloping or rolling dips; or placement of gravel along segments where native surfaces might erode into stream channels. Best Management Practices (USDA-FS 2002) are implemented to reduce effects from roads (Appendix H).

Recreation and Facilities

Within the project area there are about 100 developed campgrounds and day use sites, other developed sites (boat launches, trailheads, etc), 59 concentrated use areas and about 1300 miles of trails (hiking, cross-country skiing, snowmobiling, motor vehicle, note; these may overlap) currently included in the NFTS (SNF 2006 Business Plan). Recreation activities include (but are not limited to) hiking, camping, picnicking, fitness exercise, motorized recreation, swimming, boating, snow activities, horse use, scenery viewing, etc. Recreation projects mostly consist of rehabilitation of current facilities to update them to current universal accessibility standards.

Some recreation projects include reconstruction or reroute of an existing motorized or non-motorized trail. The only possible new trails in the reasonably foreseeable future are associated with FERC projects or the San Joaquin River Trail project.

Recreation activities include use of motor vehicles and dispersed camping. These activities have the potential to affect aquatic/riparian habitat through changes in hydrologic regime; site compaction; sediment contribution; loss of vegetation; reductions in species density; or direct mortality (Bury et al. 1977). Amphibians and reptile species adjacent to campgrounds may be subject to handling; collection; consumption; or translocation (Maxwell and Hokit 1999). Handling may harm animals or in some instances handlers. Increased mortality rates may result from pets accompanying recreationists, along with increases in predators seeking refuse associated with recreational sites. Recreationists may unwittingly transport viruses, pathogens, non-native species or other pests through their movements, resulting in impacts to native biota.

Routes are currently being evaluated for developing a Travel Management Plan that would result in reduction of effects to aquatic/riparian species and habitat. Being considered are cessation of cross-country travel by motor vehicles; and adjustments to the season of use. Some approved routes would require improvements to protect resources.

Vegetation Management (including fuels projects)

Appendix E indicates over 525,000 acres of past timber harvesting and vegetation treatment. The acreage is subject to double counting, with some of the same acres having multiple treatments (planting and follow-up thinning) contributing to the overall total. The Forest estimates a timber harvest program of approximately 5-15 MBF (million board-feet) annually for the next 10 years. Currently an average of 2500 acres (at 3.5 MBF/acre) are harvested annually, which may increase to 5000 acres (at 3 Mbf/acres) annually for the next 10 years. Harvest prescriptions in the past varied from clearcutting to understory thinning, however clearcutting has not been utilized on the SNF since 2001 (60 acres). Future vegetation/fuels reduction projects may include the Kings River Project; the Sierra Nevada Adaptive Management Project; and Fish Camp among others.

Stream flow may increase as basal area (and evapotranspiration) declines and peak flows can be indirectly affected by vegetation removal (Chamberlin et al.1991; Kattleman 1996). Troendle (2001) indicated increased water yields following timber harvest, although treatments were primarily clearcuts rather than thinnings, which most current and planned projects implement. In snow-dominated areas, nearly all of the change in flows would occur during spring runoff and spring runoff may occur slightly sooner if reductions in canopy allow faster melting of the snowpack. Such changes could affect habitat for aquatic riparian species.

Individual timber/vegetation removal projects have prescribed Streamside Management Zones (SMZs) which provide buffering from upland activities, providing protection to aquatic systems and riparian habitat along streams. Under the Sierra Nevada Forest Plan Amendment (USDA-FS 2001; 2004a) Riparian Objective Consistency Analysis is prepared to evaluate whether project mitigation measures provide for aquatic/riparian habitat and species. Other applicable measures include implementation of Best Management Practices (USDA-FS 2002) as part of the project design.

Fire (underburning, suppression and rehabilitation)

Appendix E indicates there have been 40,000 acres of wildfire and 22,000 acres of underburning within the project area. Wildfire, underburning and associated suppression and rehabilitation measures sometimes require the creation of temporary roads and fuel breaks that in the past have been used by the public and resulted in inventoried routes on the forest. Aerial retardant may be applied to slow the spread or intensity of wildfire. Following fire suppression actions temporary

access routes are rehabilitated and closed to motorized travel. Other actions may occur as part of the Burned Area Emergency Rehabilitation (BAER) to protect property and resources.

Wildfires influence aquatic ecosystems both directly and indirectly. Direct effects include heating or abrupt changes in water chemistry (Minshall et al. 1989; McMahon and de Calesta 1990). Indirect effects include changes in hydrologic regime, erosion, debris flows, woody debris loading and riparian cover (Brown 1989; Megahan 1991). Riparian areas differ from upland areas in topography, microclimate, geomorphology and vegetation. Further they are characterized as having cooler air temperatures, lower daily maximum air temperatures and higher relative humidity. These characteristics may contribute to higher moisture content of live and dead fuels and riparian soils, which presumably lowers the intensity, severity and frequency of fire (Dwire and Kauffman 2003). The ecological diversity of riparian corridors is maintained by natural disturbance regimes including fire and fire-related flooding, debris flows and landslides (Dwire and Kauffman 2003). Many species have adapted life histories that are shaped by and may depend on disturbance events (Dunham et al. 2003; Bisson et al 2003; Rieman et al 2005).

Fire suppression includes a resource officer for a wildfire incident. Part of the role of the resource officer is to identify known sites for threatened, endangered, proposed or sensitive species and provide protective measures to the extent possible. When Federally listed species are affected by wildfire, emergency consultation is required. Following the fire, emergency rehabilitation may occur. Restorative actions implement BMPs (USDA-FS 2002) as part of project.

Range

Grazing allotments are authorized in most of the project area. Presently there are 28 active allotments, 17 vacant allotments. There area approximately 17,000 animal unit months (AUMs) of grazing permitted in the project area. Actual use differs annually depending on economics, weather conditions, market conditions, etc.

Cattle grazing can alter channel function, which reduces natural processes, habitat diversity and habitat complexity for aquatic or riparian animals (Elmore and Beschta 1987; Clary and Webster 1989; EPA 1991; Meehan et al. 1991; Belsky et al. 1999). Grazing can affect water quantity by changing the pattern and timing of runoff, as well as increasing sediment loads through removal of riparian vegetative cover and by trampling of streambanks. Hydrologic alteration can result in changes to channel morphology, resulting in channel downcutting, over-widening and lowering of the water table. Animal wastes can directly impair water quality through bacterial contamination and increasing nutrient levels (EPA 1991). Additionally, movement of cattle within riparian zones can lead to reductions in stream shading, compaction of stream banks and trampling of stream banks (Meehan et al. 1991; Armour et al. 1994). All of these factors can result in negative effects to habitat for aquatic/riparian species.

Forest Service standards and guidelines, along with BMPs (USDA-FS 2002) and utilization standards have been developed to improve rangeland condition, reduce effects and protect aquatic systems. Individual range management projects include installing cattle guards and fencing, etc. Administration of cattle allotment permits (implementation of actions to protect sensitive habitat and species, etc) can aid in the restoration of riparian area and other habitat.

Special Uses

The Forest has approximately 1200 special-use authorizations (permits). These include, but are not limited to: Federal Energy Regulatory Commission (FERC) hydropower licenses, apiaries, water systems, private driveways, municipal utilities, recreational residences, communications sites, recreation resorts, camps and residences, a ski resort, outfitters and guides and miscellaneous other permits. Most of these permits are geographically stationary and include

permanent facilities and infrastructure. They are located across the project area, with some permits clustered in groups adjacent to the hydropower reservoirs. The longest term authorizations are for 50 years (FERC licenses) and the shortest term is one year or less. Most permits where a road access is included are issued for 10 to 20 year terms. All authorizations are issued with specific terms and conditions.

Aquatic/riparian habitat can be greatly affected by FERC projects in particular. Most projects require the damming of perennial streams to create a reservoir, accompanied by stream bypass diversion of water from the reservoir to a powerhouse. The projects may result in migration barriers; instream flows providing less habitat; alteration of sediment transport regimes; changes in magnitude and timing of flows; sudden ramping up or down of flow; channel encroachment by riparian vegetation; and changes to water temperatures. Some of these changes may provide more favorable conditions for non-native species. The Forest has more than 130 miles of bypassed reaches associated with FERC projects. The FERC projects have completed relicensing over the past decade. The new FERC licenses include terms and conditions provided by Forest to improve habitat and stream function within the bypass reaches and make them consistent with Forest standards and guidelines.

Private Property

Because private landowners do not typically publish their long-term management plans, actions on private lands are difficult to analyze. Some new roads could be built on private lands, but are unlikely to be open to the public. Cross-country travel will likely continue across private land for general access, business and/or recreation needs. Timber production will continue on private lands and associated road construction (mostly temp roads) will likely occur, as will grazing and continued urbanization.

Timber harvesting and road development represent potential effects to aquatic/riparian habitat on adjacent or downstream Forest lands. Harvesting on private lands requires a Timber Harvest Plan (THP) that evaluates compliance with State and Federal rules and laws (CDF 2005). The Cumulative Watershed Effects portion of the THP evaluates water temperature effect and includes consideration of streamside canopy. The importance of near water vegetation is also evaluated under the biological assessment component of the THP. Mitigation measures for THPs exclude removal of trees that provide stream shading during the critical summer period.

Human Caused Mortality

Collection (museum specimens, food or pets) and fishing are other methods by which motorized routes may indirectly result in human-caused mortality. By allowing cross-country use or by adding routes to the NFTS, access may be improved to various aquatic species habitat that would otherwise be inaccessible. Since bodies of water (lakes, rivers or streams) are often destinations for numerous routes, allowing motorized access on these routes may result in increased amounts of fishing and/or collection of numerous different herpetofaunal species. Collection and handling of herpetofauna near recreational facilities could increase rates of mortality due to stress from handling or direct consumption. There could also be mortality associated with use areas from pets or predators (ravens, skunks, raccoons, coyotes or foxes) that may occur at greater frequency at these sites due to refuse.

Cumulative Watershed Effects

A cumulative watershed effects (CWE) assessment was conducted for the SNF Travel Management DEIS following the direction set forth in FSH 2509.22 (Gallegos 2009). For more information on impacts to aquatic species, refer to the Affected Environment section of this document.

Species

For amphibians, the species and habitat accounts below were summarized from Lannoo (2005) and CDFG (2005). Additional references are cited to address specific elements of the species and habitat accounts for all species below (Table 218).

Table 218. Special Status Aquatic Wildlife Species on the Sierra National Forest Discussed Further in this Analysis

Common Name	Scientific Name	Status	Species or Habitat Located in Analysis Area
Invertebrates			
Aquatic Macroinvertebrate habitat	*Numerous Species*	MIS	Yes
Fish			
Lahontan Cutthroat Trout	*Oncorhynchus clarki henshawi*	T	Yes
Reptiles and Amphibians			
California Red-legged Frog	*Rana aurora draytonii*	T	Yes
Foothill Yellow-legged Frog	*Rana boylii*	S	Yes
Relictual Slender Salamander	*Batrachoseps relictus*	S	Yes
Mountain (Sierra Nevada) Yellow-legged Frog	*Rana (sierrae) muscosa*	S	Yes
Pacific Tree (Chorus) Frog habitat	*Pseudacris regilla*	MIS	Yes
Western Pond Turtle	*Clemmys marmorata*	S	Yes
Yosemite Toad	*Bufo canorus*	S	Yes

Lahontan cutthroat trout– Affected Environment

Species and Habitat Account

Prior to the 19th century, Lahontan cutthroat trout (LCT) occurred in eleven lacustrine populations occupying about 334,000 acres of lakes and an estimated 400 to 600 fluvial populations inhabiting more than 3,600 miles of streams (Gerstung 1986). LCT historically occurred in most cold waters of the Lahontan Basin including the Humboldt, Truckee, Carson, Walker and Summit Lake/Quinn River drainages. The trout also occurred in Tahoe, Cascade, Fallen Leaf, Upper Twin, Lower Twin, Pyramid, Winnemucca, Summit, Donner, Walker and Independence lakes (Gerstung 1988). Native LCT are now extirpated from these lakes with the exception of Independence and Summit lakes (Behnke 1992). LCT has been extirpated from most of the western portion of its range in the Truckee, Carson and Walker river basins and from much of its historic range in the Humboldt basin (Gerstung 1988).

LCT currently exist in about 155 streams (10.7 percent of historic habitat) and 6 lakes or reservoirs (0.4 percent of historic habitat) in Nevada, California, Oregon and Utah. Many of the fluvial LCT populations occupy isolated stream segments of larger river systems with no opportunity for natural recolonization. Both lacustrine and fluvial forms are subject to unique high risk extinction factors (USDI-USFWS 1995). On the SNF, two populations of pure LCT presently inhabit approximately 1.6 miles in West Fork of Portuguese Creek (Madera county, GLO Analysis Unit) and one of its tributaries; and 1.89 miles along West Fork Cow Creek

(Fresno county, TAD analysis unit). Although both populations are introduced and are outside of the historical range, they are considered important sources of trout for reintroductions and refuge populations until recovery of more populations within the historical range can be achieved.

The LCT was listed by the USFWS as "endangered" in 1970 (Federal Register Vol. 35, p. 13520) and subsequently reclassified as "threatened" in 1975 (Federal Register Vol. 40, p. 29864). Critical habitat has not been designated on the SNF (USDI-USFWS 1995); however the species is managed under the recovery plan (USDI – USFWS 1995), along with terms and conditions of two U.S. Fish & Wildlife Service Biological Opinions ((BO) 1-1-94F-44 and 1-1-95-F-42). Critical Aquatic Refuges were established in the occupied subdrainages. Since 1996, the two populations have been monitored every year for population abundance and periodically (every 2 to 5 years) for stream channel condition under the terms and conditions of the USFWS BO for cattle grazing and from the LRMP (USDA-FS 1991) monitoring requirements.

Optimal LCT habitat is characterized by 1:1 pool-riffle ratios; well vegetated stable stream banks; over 25 percent cover and relatively silt free rocky substrates. LCT inhabit areas with overhanging banks, vegetation or woody debris. In-stream cover (brush, aquatic vegetation and rocks) is particularly important for juveniles (Gerstung 1988). LCT are unique since they can tolerate much higher alkalinities than other trout. Adult LCT can tolerate temperatures exceeding 80 degrees Fahrenheit (27 degrees Celsius) for short periods of time and seem to survive daily temperature fluctuations of 27 to 68 degrees Fahrenheit (14-20 degrees Celsius). LCT does best in waters with average maximum water temperature of less than 72 degrees Fahrenheit (22 degrees Celsius) and average water temperatures of 55 degrees Fahrenheit (13 degrees Celsius).

For the purposes of this analysis, the perennial stream channels within the two watersheds associated with the West Fork Portuguese Creek and West Fork Cow Creek Critical Aquatic Refuges (CARs) are considered habitat for this species. More specifically, the populations monitored under the BO for the LCT are defined as the stream reaches in West Fork (WF) Portuguese and West Fork (WF) Cow Creeks and the associated perennial tributaries within their two CARs. Affected habitat for this species is considered 200 ft on either side of stream order 2 and above (class 1, 2 and 3 streams) within the 2 CARs above the migration barrier.

Lahontan cutthroat trout– Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

The project alternatives could result in direct and indirect effects to the Lahontan cutthroat trout (LCT) by:

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities (presently unauthorized roads, trails and/or use areas) to the NFTS,
- Changing the season of use on NFTS routes,
- Implementing project mitigation measures.

These actions may have direct and indirect effects on LCT through: human-caused mortality, changes in behavior and habitat modification (see Effects Common to all Aquatic Wildlife). However, these fish may be less susceptible to motorized travel management because protected stream habitats have been established on the SNF and are monitored annually for population viability and habitat condition. These two fish populations are most susceptible to habitat modification, mainly in the form of excess sediment entering the stream channels. This degrades the quality of breeding habitat and potentially the reduction in the volume of pool habitat

available (Cedarholm et al. 1981). A Programmatic Agreement (PA) (2006) with USFWS outlines Route Designation Project Design Criteria (PDC) for designating any routes to the NFTS within LCT habitat. For this analysis, the SNF will follow all PDC related to LCT for any proposed routes and use areas within the two CARs therefore further consultation with the USFWS would not be necessary for this species. If a route or use area does not meet the PDC for the LCT, it was not brought forward into an Action Alternative.

Indicators

Based upon the USFWS PA (2006), the following indicators were chosen to provide a relative measure of the direct and indirect effects to LCT. They provide general measures by which the effects of the project alternatives may be compared.

- Number of routes within the WF Portuguese and WF Cow Creek Critical Aquatic Refuges (CARs).
- Miles of proposed routes for motor vehicle use within the WF Portuguese and WF Cow Creek CARs.
- Number of routes that do not avoid Riparian Conservation Areas (RCAs) within the WF Portuguese and WF Cow Creek Critical Aquatic Refuges (CARs).
- Number of stream crossings on proposed routes within the WF Portuguese and WF Cow Creek CARs.
- Number of use areas within the WF Portuguese and WF Cow Creek Critical Aquatic Refuges (CARs).
- Acres of proposed use areas open for motor vehicle use within the WF Portuguese and WF Cow Creek CARs.
- Percentage of habitat directly impacted by routes/use areas added to the NFTS.
- Number of NFTS roads with a year round closure proposed for a season of use change within the WF Portuguese and WF Cow Creek CARs.
- Miles of NFTS roads with a year round closure proposed for a season of use change within the WF Portuguese and WF Cow Creek CARs.

Alternative 1 – No Action

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative except within areas described closed in the 1977 ORV Plan (Figure 1). Approximately 75 percent of the WF Cow Creek CAR and 30 percent of the WF Portuguese Creek CAR are located within described areas prohibiting cross-country travel. For the purpose of this analysis, route miles and use area acres (including those in prohibited cross-country travel areas) inventoried in 2005 were calculated to get an approximate base number of miles/areas that have been created as a result of cross-country travel (Table 219). As an estimate of all use that has occurred since in the 1977 ORV Plan, there are 28 routes (2.7 miles) that have been inventoried (2005) within the two CARs, 7 stream crossings and 19 use areas (1.7 acres) (Table 219). Thirteen of those routes located in prohibited to cross-country areas. Approximately 2,900 acres are open for cross-country travel within the CARs.

In the WF Cow Creek CAR the entire length of stream that is annually monitored and considered occupied with LCT is located with the area prohibited to cross-country travel. Under this alternative, cross-country travel would be prohibited in this area, which should have beneficial effects to the trout on this portion of the stream. Cross-country travel would be allowed in the

lower end of the CAR where the species may occur, but is likely hybridized and not monitored under the USFWS BO. In the WF Portuguese Creek CAR, the segment of stream occupied with trout is completely outside of the area prohibited to cross-country travel and access to habitat by cross-country travel could occur. Allowing cross-country travel in this area could have a negative affect on the trout and its habitat.

It is assumed that wheeled vehicles would continue to use all existing motorized routes inventoried, as well continue to create new routes. The use of inventoried routes and the continued proliferation of new routes would result in increasing the amount of direct and indirect effects to LCT. The short-term effects would not be expected to change, while continued proliferation of routes would be exacerbated over the long term.

Although written primarily for grazing activities, the existing Biological Opinion (BO) for the two CARs may add an additional protection measure to stream habitat within 200 feet of all tributaries to WF Portuguese and WF Cow Creeks (USDA-FS 2001; USDA-FS 2004a) which states “no motor vehicles are allowed off permanent roads”. This would help reduce some of the potential direct and indirect effects to LCT and its habitat in that limited area.

No road maintenance or improvements plans to any routes or use areas created would be applied under this alternative. Within the two CARS, vehicles would be free to access portions of the habitat outlined in the USFWS Programmatic Agreement (2006) Route Designation Project Design Criteria and would not be consistent with the Programmatic Agreement (2006). This alternative would not prohibit additional stream crossings, monitor sediment run-off or limit use areas or routes to outside of RCA’s within occupied subdrainages. It is assumed that additional user-defined routes would increase the amount of sediment, increase the number of stream crossings and could possibly increase (angler) mortality in occupied habitats.

Adding Routes or Use areas to the NFTS: There are no routes or use areas identified to add to the NFTS in Alternative 1.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are no proposed changes to the current season of use NFTS road plan. There are specific road closures outlined in the BO for the Lahontan cutthroat trout and are enforced in the current road closure plan. Closure conditions would not change therefore there should be no changes to potential direct and indirect effects to the LCT.

Project Mitigation Measures: There are no project mitigation measures implemented for this alternative because no changes are proposed to the current NFTS.

Alternative 2 – Proposed Action

Cross-Country Travel: Cross-country travel would be permanently prohibited across the Forest in this alternative. Prohibition of cross-country travel would limit motor vehicle use to current NFTS roads within the WF Portuguese and WF Cow Creek CARs (no routes or use areas were proposed for addition to the NFTS) (Table 219). Prohibition of cross-country travel within the two CARs would eliminate approximately 2,900 acres open for use in Alternative 1 (outlined in Figure 1). This would reduce direct and indirect impacts to the watershed and the LCT. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to LCT from motorized travel over the short and long term.

Adding Routes or Use areas to the NFTS: Under this alternative, there are no new routes or use areas proposed for addition to the NFTS within the LCT CARs (Table 219). This would have a beneficial effect on the species by eliminating approximately 2.7 miles of inventoried routes and 1.7 acres of use areas currently accessed under Alternative 1 and allow for their recovery.

Changes in Season of Use on Current NFTS Roads: Under this alternative, 3 NFTS roads (1.7 miles) currently closed year round are proposed to have a new seasonal closure date, but would not be open for vehicle travel until at least May 20th of each year (Table 219). This wet weather closure should give adequate protection to native surface roads and minimize direct and indirect effects (i.e. sedimentation) to the LCT and habitat. In addition, roads in the WF Cow Creek CAR identified in the BO with a year round closure date would not change.

Project Mitigation Measures: For this analysis, the USFWS Programmatic Agreement Route Designation Project Design Criteria (2006) would be implemented on any routes proposed and further consultation would not be necessary. No routes or use areas were proposed for addition to the NFTS within LCT CARs. Roads with a year round closure proposed for a season of use change would need to be monitored for impacts to perennial streams associated with LCT within the CARs.

Alternative 3

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

Adding Routes or Use areas to the NFTS: Under this alternative, there would be no new routes or use areas proposed for addition to the NFTS. Direct and indirect effects are the same as described in Alternative 2.

Changes in Season of Use on Current NFTS Roads: No changes in seasonal use are proposed under this alternative.

Project Mitigation Measures: There are no project mitigation measures to be implemented for this alternative because no routes or use areas would be proposed for addition to the NFTS.

Alternative 4

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

Adding Routes or Use areas to the NFTS: Under this alternative, there are no new routes or use areas proposed for addition to the NFTS within LCT CARs. Direct and indirect effects are the same as described in Alternative 2.

Changes in Season of Use on Current NFTS Roads: Under this alternative, 1 NFTS road (0.21 miles) currently closed year round is proposed to have a new seasonal closure date, but would not be open for vehicle travel until at least May 20th of each year. Direct and indirect effects are the same as described in Alternative 2.

Project Mitigation Measures: No routes or use areas were proposed for addition to the NFTS within LCT CARs, therefore, there are no project mitigation measures to be implemented for this alternative.

Alternative 5

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Direct and indirect effects are the same as described in Alternative 2.

Adding Routes or Use areas to the NFTS: Under this alternative, there are no new routes or use areas proposed for addition to the NFTS within LCT CARs. Direct and indirect effects are the same as described in Alternative 2.

Changes in Season of Use on Current NFTS Roads: Under this alternative, 1 NFTS road (0.21 miles) currently closed year round is proposed to have a new seasonal closure date, but would not be open for vehicle travel until at least May 20th of each year. Direct and indirect effects are the same as described in Alternative 2.

Project Mitigation Measures: There are no project mitigation measures to be implemented for this alternative because no routes or use areas would be proposed for addition to the NFTS within LCT CARs.

Table 219. Direct and Indirect Effect Indicators for Alternative 1 through 5 for the Lahontan Cutthroat Trout

Lahontan cutthroat trout- Direct and Indirect Effects Indicators	Alt. 1[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of routes within the WF Portuguese and WF Cow Creek Critical Aquatic Refuges (CARs).	28	0	0	0	0
Miles of proposed routes for motor vehicle use within the WF Portuguese and WF Cow Creek CARs	2.7	0	0	0	0
Number of routes/use areas that do not avoid Riparian Conservation Areas (RCAs) within the WF Portuguese and WF Cow Creek Critical Aquatic Refuges (CARs).	20	0	0	0	0
Number of stream crossings on proposed routes within the WF Portuguese and WF Cow Creek CARs.	7	0	0	0	0
Number of use areas within the WF Portuguese and WF Cow Creek Critical Aquatic Refuges (CARs).	19	0	0	0	0
Acres of proposed use areas open for motor vehicle use within the WF Portuguese and WF Cow Creek CARs.	1.7	0	0	0	0
Percentage of habitat directly impacted by routes/use areas added to the NFTS	0.15 %	0 %	0 %	0 %	0 %
Number of NFTS roads with a year round closure proposed for a season of use change within the WF Portuguese and WF Cow Creek CARs.	0	3	0	1	1
Miles of of NFTS roads with a year round closure proposed for a season of use change within the WF Portuguese and WF Cow Creek CARs.	0	1.7	0	0.21	0.21

[1] Alternative 1 is calculated as an estimate of the total number and miles of routes / acres of use areas that have been inventoried (2005) in cross-country travel areas in order to display a comparison between alternatives.

Cumulative Effects Unique to this Species

There are no unique cumulative effects for the LCUT regarding this project. See discussion above regarding Effect Common to All Aquatic Wildlife.

Summary of Effects Analysis Across All Alternatives

Lahontan cutthroat trout currently occupy two HUC8 subdrainages within the project area. Direct, indirect and cumulative effects from **Alternatives 2, 3, 4** and **5** *will not affect* the LCT or its habitat. (*No Effect*). **Alternative 1** would have the highest probability of negative affects in the West Fork Portuguese Creek CAR; a beneficial impact in the West Fork Cow Creek CAR; and

overall *may affect but is not likely to adversely affect* the LCT or its habitat. For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record.

California Red-legged Frog – Affected Environment

Species and Habitat Account

Historically, the California Red-legged frog (CRLF) was common in coastal habitats from the vicinity of Point Reyes National Seashore, Marin County, California and inland from the vicinity of Redding, Shasta County, California, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985). However, the taxon is now extirpated from 24 of these locations (USDI-USFWS 1996) and has been eliminated from 95 percent of its historic range (Jennings and Hayes 1994).

Currently only three documented populations are known to remain in the Sierra Nevada (USDI-USFWS 2002). None of these populations occur within the SNF boundary or are within 1.6 km (1 mi) of the SNF (California Natural Diversity Database (CNDDB). The nearest population location to the SNF is at Young's Creek in Calaveras County, approximately 60 air miles northwest from the SNF boundary (CNDDB 2008). The closest historic records of CRLF sighting are to the west of the SNF boundary at: Willow Creek (near O'Neals, 1952- private property); the San Joaquin Experimental Range; and Miami Creek (private property). CRLF are considered to be extirpated from these areas adjacent to the SNF, probably since the late 1960s according to herpetology expert Mark Jennings (per. comm.).

The SNF is a part of the recovery unit "Sierra Nevada Foothill and Central Valley". However, the SNF was not listed as critical habitat for the species in 2001 or 2004 critical habitat designations (66 FR 14625 and 69 FR 19619) nor were any recovery elements established for the species on the SNF in the 2002 species recovery plan (67 FR 57830; USDI-USFWS 2002).

Many of the streams with potential habitat (low gradient (<= 4 percent) perennial streams and ponds under 5000 feet elevation) across the SNF have had habitat assessments (USDI - USFWS 1997; 2005) completed and were considered non-habitat or marginal habitat for a variety of reasons. Widespread herpetological surveys throughout the Forest have been conducted on these stream channels since 1992 with no detections of the species, although most surveys did not include night visits which have been demonstrated to improve detection (Fellers and Kleeman 2006). Although there have not been any observations of the CRLF on the forest or in the project area, all suitable habitat has not been surveyed within the last two years to the most recent protocol (USDI-USFWS 2005). Therefore, this analysis assumes that suitable habitat is occupied.

The CRLF is a highly aquatic species typically found in cold-water ponds, relatively flat (< 4 percent slope) streams, with pools depths exceeding 0.7 meters (2.3 feet) and with overhanging vegetation such as willows, as well as emergent and submergent vegetation (Hayes and Jennings 1988, USDI-USFWS 2002). It is generally found in or near water, but does disperse away from water after rain storms (Martin 1992), although Alvarez (2004) reported CRLF utilizing cracks in the bottom of dried ponds.

Potential suitable breeding habitat for this species was evaluated as streams that had been identified and based on the habitat assessment, met minimal criteria for the breeding habitat. These streams included perennial streams with < =4 percent slope, 0.7 meters (2.3 feet) in depth for pools and did not have annual scour, as well as ponds and lakes below 5,000 feet in elevation with a 300 foot dispersal area (USDI – USFWS 2002) on either side of the stream or around the ponds and lakes. This analysis assumes that suitable habitat is occupied.

California Red-legged Frog – Environmental Consequences

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 (presently unauthorized roads, trails and/or areas) to the NFTS,
- Changing the season of use on NFTS routes,
- Implementing project 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 susceptible to effects from motorized travel management because they utilize upland habitats, frequently considerable distances from aquatic features. Bulger et al. (2003) and Fellers and Kleeman (2006) 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 (2006) also reported that a large portion of the population (35 percent) 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 3 weeks (Bobzien and DiDonato 2007).

Indicators

Based upon the available literature and the Programmatic Agreement (PA) with US Fish and Wildlife Service (2006), 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 within the 300 feet of potential suitable breeding habitat.
- Miles of routes proposed for motor vehicle use within 300 feet of potential suitable breeding habitat.
- Number of routes that have the potential to capture surface run-off and then deliver sediment into a stream associated with potential suitable breeding habitat.
- Number of stream crossings on proposed routes within 300 feet of potential suitable breeding habitat.
- Number of perennial stream crossings on proposed routes that crosses potential suitable breeding habitat.
- Number of routes that do not avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCAs) except where necessary to cross streams.
- Number of use areas open for motor vehicle use within 300 feet of potential suitable breeding habitat.

- Acres of use areas open for motor vehicle use within 300 feet of potential suitable breeding habitat.
- Percentage of habitat directly impacted by routes/use areas added to the NFTS.
- Number of NFTS roads with a year round closure proposed for a season of use change within 300 feet of potential suitable breeding habitat
- Miles of NFTS roads with a year round closure proposed for a season of use change within 300 feet of potential suitable breeding habitat

Alternative 1 – No Action

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1). For the purpose of this analysis, route miles and use area acres (including those inventoried in prohibited cross-country travel areas) inventoried (2005) were calculated to get an approximate base number of miles/areas that have been created as a result of cross-country travel. Within 300 feet of California red-legged frog (CRLF) potential suitable breeding habitat, approximately 89 routes (7.2 miles), 51 stream crossings (0 cross potential suitable habitat) and 107 use areas (8.6 acres) have been inventoried (Table 220). There are approximately 8,006 acres of potential suitable breeding habitat located in the project area.

It is assumed that wheeled vehicles would continue to use all existing motorized routes inventoried, as well as potentially continue to create new routes within the 8,006 acres of suitable breeding habitat in the project area. The use of inventoried routes and the continued proliferation of new routes would increase both direct and indirect effects to CRLF individuals and habitat. No road maintenance or improvement plans for any routes or use areas created would also add to increasing direct and indirect effects to the CRLF and its habitat over the long term. The short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long-term. Currently the potential direct effects affect less than 1 percent of suitable habitat analyzed (Table 220).

This alternative would not be consistent with the USFWS Programmatic Agreement (2006) and would require additional consultation to determine effects on habitat and species.

Adding Routes or Use areas to the NFTS: There are no routes or use areas identified to add to the NFTS in Alternative 1.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are no changes to the current season of use NFTS road plan.

Project Mitigation Measures: There are no project mitigation measures implemented for this alternative because no changes are proposed to the current NFTS.

Alternative 2 – Proposed Action

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, one proposed route and no unmanaged use areas within CRLF potential suitable breeding habitat in the project area. This alternative would eliminate the potential use of approximately 8,000 acres from Alternative 1 of CRLF suitable breeding habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the CRLF individuals and habitat. Implementation of Alternative 2 would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to CRLF from motorized travel over the short and long term.

Adding Routes or Use Areas to the NFTS: Under this alternative, 1 route (0.33 miles) with no potential suitable breeding habitat stream crossings, 3 seasonal stream crossings within 300 feet of potential suitable breeding habitat and no use areas are proposed for addition to the NFTS within CRLF potential suitable breeding habitat (Table 220). There are no known occupied CRLF habitats on the SNF.

There is one proposed route (SR-35z) analyzed for Route Designation Project Design Criteria consistency outlined in the USFWS PA (2006):

1. Two segments of SR-35z (0.33 miles) are also located within 300 feet of potential suitable breeding habitat along Miami Creek. There are 3 seasonal stream crossings along the route. Field data collected notes: Southern half of route is rated green - flat, graveled, but 7 culverts are plugging. In the upper section, severe gully erosion and breached waterbars, with deposition of sediment into Miami Creek is occurring. Bridge damage results in sediment entering tributary channel. Three of 5 culverts have 40 percent plugging or more. Bringing this route up to Forest standard would meet the USFWS PA for routes with potential to capture surface run-off, however this route does not avoid Riparian Reserve and Riparian Conservation Areas except where necessary to cross streams. Additional consultation with USFWS would be needed to add this route to the NFTS.

Overall, this alternative would have beneficial impacts to CRLF potential suitable breeding habitat by excluding the use of approximately 6.87 miles (95.4 percent of total miles) of inventoried routes within CRLF potential suitable breeding habitat and allow for natural recovery over the long term. Use area access would be limited to only those which are currently managed. Since stream crossings are seasonal (stream order 1 and 2), they would not likely result in direct effects to individuals CRLF. Indirect effects to habitat (sedimentation) may occur however, short term effects of adding proposed routes to the NFTS could have a beneficial impact on CRLF habitat since these routes would be brought up to Forest standards and maintained. This should reduce sediment, stabilize stream crossings and be consistent with the USFWS Programmatic Agreement for routes within 300 feet of suitable breeding habitat.

There could be continued direct and indirect effects to CRLF individuals within dispersal areas of proposed routes over the long term. The addition of routes would likely result in some direct effects to adult CRLF and result in indirect effects to both aquatic and terrestrial habitat over the short and long term.

Since there is a slight decrease in the number of routes and no use areas added to the system within suitable CRLF habitat compared to Alternative 5, there would be an incremental decrease in the direct and indirect effects to CRLF within the project area over the short and long term. Proposed routes would be located within potential suitable breeding habitat, but not known occupied habitat. CRLF may be affected; however, potential direct effects of adding these routes and use areas would affect less than 1 percent of potential suitable breeding habitat analyzed (Table 220).

Changes in Season of Use on Current NFTS Roads: Under this Alternative, 1 NFTS road (0.02 miles) currently closed year round within 300 feet of CRLF potential suitable breeding habitat is proposed for a new seasonal closure date (Table 220), but would not be open for vehicle travel until at least April 20th of each year. A wet weather closure should reduce the potential of native surface road sediment run-off into associated CRLF habitat, reduce streambank disturbance at stream crossings and minimize direct and indirect effects to aquatic and terrestrial habitat. Closure of routes during the wet weather season would likely reduce disturbance to all life stages of the CRLF and habitat.

Project Mitigation Measures: Under this alternative, project mitigation measures on the two routes within suitable CRLF habitat include: gully repair, waterbars, repair of bridge structure, cleaning culverts, mitigation for spring that emerges, pools and flows down road and maintenance of crossing pipes. Implementation of these project mitigation measures may result in short-term disturbance to some individuals, but would limit route widening, reduce soil perturbation and reduce sedimentation, providing beneficial effects over the long-term. For site specific aquatic/riparian species mitigation measures on routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record and Appendix A of this document.

Alternative 3

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only current NFTS roads (no additional routes or use areas are proposed). This would eliminate the potential use of approximately 8006 acres of potential suitable breeding CRLF habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to all life stages of the CRLF.

This alternative would have beneficial impacts on the CRLF and its habitat by excluding approximately 7.2 miles (51 stream total crossings) of inventoried routes from authorized use in potential suitable breeding habitat and allow for their natural recovery over the long term. Access to use areas would be only those that are currently managed.

Adding Routes or Use areas to the NFTS: There would be no routes or use areas proposed to be added to the NFTS in Alternative 3.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are no changes to the current season of use NFTS road plan.

Project Mitigation Measures: No routes or use areas are proposed under this alternative; therefore, there would be no project mitigation measures to be implemented.

Alternative 4

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 1 proposed route and no use areas within potential suitable breeding CRLF habitat in the project area. Direct and indirect effects are similar to those described in Alternative 2.

Adding Routes or Use Areas to the NFTS: Under this alternative, there is one route (0.03 miles), one seasonal stream crossing (outside of potential suitable breeding habitat) and no use areas proposed for addition to the NFTS within CRLF potential suitable breeding habitat (Table 220). This alternative would have beneficial effects by excluding use of approximately 7.17 miles (99.6 percent of total miles) of inventoried routes within CRLF potential suitable breeding habitat and provide for natural recovery over the long term. Use area access would be limited to only those which are currently managed.

There is one proposed route (BP111) analyzed for Route Designation Project Design Criteria consistency outlined in the USFWS Programmatic Agreement (2006):

1. A portion of BP111 (0.03 miles) is located within 300 feet of potential suitable breeding habitat along the upper portion of South Fork Willow Creek. There is one perennial stream crossing along the route. This crossing flows into potential suitable breeding habitat. Field data collected notes: Runoff is channelized along road and delivered to stream at a single point - erosion in ditch contributes sediment to SF Willow Creek. Bringing this route up to

Forest standard would meet the USFWS PA for routes with potential to capture surface run-off, however this route may not avoid Riparian Reserve and Riparian Conservation Areas except where necessary to cross streams since it ends at a gauging station at SF Willow Creek. Additional consultation with USFWS would be needed to add this route to the NFTS.

Direct and indirect effects are similar to those described in Alternative 2.

Since there is a slight decrease in the number of routes and use areas added to the system within potential suitable breeding CRLF habitat compared to Alternatives 2 and 5, there would be an incremental decrease in the direct and indirect effects to CRLF within the project area over the short and long term. Proposed routes would be located within potential suitable breeding habitat, but not known occupied habitat. CRLF may be affected; however, potential direct effects of adding these routes and use areas would affect less than one percent of potential suitable breeding habitat analyzed (Table 220).

Changes in Season of Use on Current NFTS Roads: Under this alternative, 3 NFTS roads (0.23 miles) currently closed year round that are within 300 feet of CRLF potential suitable breeding habitat are proposed for a new seasonal closure date, but would not be open for vehicle travel until at least April 20th of each year. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within potential suitable breeding habitat are: Stabilize road to eliminate sediment entering creek, install additional ditch relief pipes and possibility for reconstructing as outsloped road.

Alternative 5

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, three proposed routes and two use areas within potential suitable breeding CRLF habitat in the project (analysis) area. Direct and indirect effects would be similar to those described in Alternative 2.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 3 route (0.19 miles), one seasonal stream crossing (outside of potential suitable breeding habitat) and two use areas (1.0 acres) proposed for addition to the NFTS within CRLF potential suitable breeding habitat (Table 220). This alternative would have beneficial effects by excluding use of approximately 7.01 miles (97.3 percent of total miles) of inventoried routes within CRLF habitat and provide for natural recovery over the long term. Use area access would be limited to two use areas as well as those which are currently managed.

There are three proposed routes (AE-23, BP111 and BP133) and two use areas (BLUCYN4, BLUCYN6) analyzed for Route Designation Project Design Criteria consistency outlined in the USFWS Programmatic Agreement (2006). BP111 is discussed in Alternative 4.

1. AE-23 (0.16 miles) is located within 300 feet of potential suitable breeding habitat along Summit Creek. There are no seasonal stream crossings along the route. Field data collected notes: trail rutting, erosion present. Bringing this route up to forest standard would meet the USFWS Programmatic Agreement (2006) for routes with potential to capture surface run-off, however this route does not avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCA) except where necessary to cross streams. Additional consultation with USFWS will be needed to add this route to the NFTS
2. BP133 (0.03 miles) is located within 300 feet of potential suitable breeding habitat along Willow Creek. Only a very small portion enters potential suitable breeding habitat. No effects from this route are expected.

3. Use areas BLUCYN4, BLUCYN6 are located along opposite side of the streambanks of Summit Creek and are within 300 feet of potential suitable breeding habitat. Both areas are located inside of RR and RCAs, within CRLF potential suitable breeding habitat. Therefore, they are not consistent with the USFWS PA. Additional consultation with USFWS would be needed to add these use areas to the NFTS.

Since there is a slight increase in the number of routes and use areas added to the system within potential suitable breeding habitat compared to Alternatives 2 and 4, there would be an incremental increase in the direct and indirect effects to CRLF within the project area over the short and long term. Proposed routes would be located within potential suitable breeding habitat, but not known occupied habitat. CRLF may be affected; however, potential direct effects of adding these routes and use areas would affect less than 1 percent of potential suitable breeding habitat analyzed (Table 220).

Changes in Season of Use on Current NFTS Roads: Under this alternative, 3 NFTS roads (0.23 miles) currently closed year round that are within 300 feet of CRLF potential suitable breeding habitat are proposed for a new seasonal closure date (Table 220), but would not be open for vehicle travel until at least April 20th of each year. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable CRLF habitat are outlined in Alternative 4 and also include installing drain dips with equipment. For site specific aquatic/riparian species mitigation measures on routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) in the project record and a summary in Appendix A of this document.

Table 220. Direct and Indirect Effect Indicators for Alternative 1 through 5 for the California Red-legged Frog

California Red-legged Frog - Direct and Indirect Effects Indicators	Alt. 1[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of routes within 300 feet of potential suitable breeding habitat	89	1	0	1	3
Miles of routes proposed for motor vehicle use within 300 feet of potential suitable breeding habitat	7.2	0.33	0	0.03	0.19
Number of routes that have the potential to capture surface run-off and then deliver sediment into a stream associated with potential suitable breeding habitat	Up to 89	1	0	1	2
Number of stream crossings on proposed routes within 300 feet of potential suitable breeding habitat.	51	3	0	1	1
Number of perennial stream crossings on proposed routes that crosses potential suitable breeding habitat.	0	0	0	0	0
Number of routes that do not avoid Riparian Reserve (RR) and Riparian Conservation Areas (RCAs) except where necessary to cross streams.	Up to 87	2	0	1	1
Number of use areas open for motor vehicle use within 300 feet of potential suitable breeding habitat	107	0	0	0	2

California Red-legged Frog - Direct and Indirect Effects Indicators	Alt. 1[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Acres of use areas open for motor vehicle use within 300 feet of potential suitable breeding habitat	8.6	0	0	0	1.0
Percentage of habitat directly impacted by routes/use areas added to the NFTS.	0.19 %	0.004 %	0 %	0.004 %	0.01 %
Number of NFTS roads with a year round closure proposed for a season of use change within 300 feet of potential suitable breeding habitat	0	1	0	3	3
Miles of NFTS roads with a year round closure proposed for a season of use change within 300 feet of potential suitable breeding habitat	0	0.02	0	0.23	0.23

[1] Alternative 1 is calculated as an estimate of the total number and miles of routes / acres of use areas that have been inventoried (2005) in cross-country travel areas in order to display a comparison between alternatives.

Cumulative Effects Unique to this Species

Cumulative impacts have likely contributed to the decline in CRLF numbers and distribution. See discussion under the Effects Common to all Aquatic Wildlife section.

In addition to the direct and indirect effects evaluated for CRLF and Effects Common to all Aquatic Wildlife discussion, there are 3 HUC8 subdrainages that were evaluated as having a high risk of Cumulative Watershed Effects (CWE) (Gallegos 2009). Within these subdrainages, there are no routes or use areas inventoried intersecting the 179.9 acres of CRLF potential suitable breeding habitat. This represents 0 percent of potential suitable breeding habitat for CRLF subject to indirect affects related to unstable stream channels within these subdrainages.

Summary of Effects Analysis Across All Alternatives

Historically, the California Red-legged frog (CRLF) was common in coastal habitats from the vicinity of Point Reyes National Seashore, Marin County, California and inland from the vicinity of Redding, Shasta County, California, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985). The CRLF is not known to occur within the project area or on the SNF; however, protocol-level surveys have not been completed in potential suitable breeding habitat. Direct, indirect and cumulative effects from **Alternative 3** *will not affect* the CRLF or its habitat (*No Effect*). **Alternatives 2, 4 and 5** *may affect but is not likely to adversely affect* the CRLF. Based on the indicators evaluated, **Alternative 1** (current condition) has the highest probability of negative effects to CRLF. **Alternative 1** *may affect but is not likely to adversely affect* the CRLF.

Additional consultation with USFWS would be needed for Alternative 1, identified routes proposed under Alternatives 2 and 4 and identified routes and use areas proposed in Alternative 5. For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record.

Foothill Yellow-legged Frog – Affected Environment

Species and Habitat Account

Historically, Foothill yellow-legged frogs (FYLF) occurred between sea level and 6,000 feet in most Pacific drainages west of the Sierra-Cascade crest from the Santiam River, Marion County

Oregon, to the San Gabriel Drainage, Los Angeles County, California (Hayes and Jennings 1988). Jennings (1996) indicates that FYLF no long occur within 45 percent of historic habitat in California and has disappeared from 66 percent of its historic habitat within the Sierra Nevada mountain range.

Currently there is only one known population of FYLF on the SNF (Jose Basin – San Joaquin drainage). The Museum of Vertebrate Zoology (Berkeley, California) indicates RABO specimens collected from Big Creek (Mariposa country) in 1953, which could represent *Rana muscosa* due to elevation (5100 feet) and revisions in taxonomy in 1955 (both species were classified as FYLF prior to Zwiefel's revision). No other verified specimen from the forest has been collected since 1970. One time visual encounter surveys have been performed since the 1990s (primarily during the hydro-relicensing projects) on several streams within the species elevation range without detections.

The Pacific Southwest Region of the Forest Service designated the FYLF as a sensitive species in 1998.

Foothill yellow-legged frogs are a highly aquatic species and prefer partial shade, shallow riffles and cobble sized or greater substrate (Hayes and Jennings 1986). Occasionally, this species is also found in other riparian habitats, including moderately vegetated backwaters, isolated pools (Hayes and Jennings 1986) and slow moving rivers with mud substrates. During the winter, FYLF have been observed in abandoned rodent burrows and under logs as far as 100 meters (328 feet) from a stream (Zeiner et al. 1988). The CWHR highly suitable habitats (CDFG 2005) for this species that occur within the SNF are riverine and valley foothill riparian with mostly submerged and flooded gravels, cobble, boulders and bedrock with trees greater than six inches in diameter and canopy closures greater than 10 percent.

For the purposes of this analysis, potential suitable habitat for the FYLF was evaluated as perennial (stream order 4 and greater) and intermittent (stream order 3) streams below 5,000 feet in elevation with a 165 foot dispersal area (CDFG 2005) on each side of the streams. Since aquatic species or habitat surveys were not conducted on all potential suitable habitats determined by GIS within the project area, a conservative approach was taken for suitable habitat available and suitable habitat was assumed occupied. General field data was collected on routes and use areas proposed in action alternatives to confirm suitable habitat.

Foothill yellow-legged frog – Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

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

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities (presently unauthorized roads, trails and/or areas) to the NFTS,
- Changing the season of use on NFTS routes,
- Implementing project mitigation measures.

These actions may have direct and indirect effects on FYLF through: human-caused mortality, changes in behavior and habitat modification (see Effects Common to all Aquatic Wildlife). These frogs may be less susceptible to motorized travel management because they are a highly aquatic species (Hayes and Jennings 1986), therefore, routes within a RCA of suitable stream habitat would have less affect on these frogs than other more terrestrial aquatic/riparian species.

The FYLF may however, be more vulnerable to affects of motorized travel management at stream crossings where suitable habitat is identified. The primary indirect effect from routes is a reduction in the quantity and quality of habitat due to sediment. Potential sediment movement from routes into suitable stream habitat as an indirect affects may have the most affects to the species and habitat.

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect affects to the FYLF and habitat. Biological thresholds for these indicators have not been established. However, these indicators provide general measures by which the effects of the project alternatives may be compared. Suitable stream habitats considered were perennial (stream order 4 and above) and intermittent (stream order 3) streams.

Occupied habitat:

- Number of stream crossings (perennial and intermittent) on proposed routes added to the NFTS within known occupied stream habitat.
- Number of routes added to the NFTS within 165 feet of known occupied stream habitat.
- Miles of routes added to the NFTS within 165 feet of known occupied stream habitat.
- Number of use areas proposed to be added to the NFTS within 165 feet of known occupied stream habitat.
- Acres of use areas proposed to be added to the NFTS within 165 feet of known occupied stream habitat

Suitable habitat:

- Number of routes added to the NFTS within 165 feet of suitable stream habitat.
- Miles of routes added to the NFTS within 165 feet of suitable stream habitat.
- Number of stream crossings (perennial and intermittent) on proposed routes added to the NFTS within 165 feet of suitable stream habitat.
- Number of use areas proposed to be added to the NFTS within 165 feet of suitable stream habitat.
- Acres of use areas proposed to be added to the NFTS within 165 feet of suitable stream habitat.
- Percentage of occupied/suitable habitat directly impacted by routes/use areas added to the NFTS.
- Number of NFTS roads with a year round closure proposed for a season of use change within 165 feet suitable or occupied habitat.
- Miles of NFTS roads with a year round closure proposed for a season of use change within 165 feet of suitable or occupied habitat.

Alternative 1(No Action)

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1). About 45,985 acres of suitable FYLF habitat are located within the project area. Less than 1 percent of potential FYLF habitat is located within areas prohibited to cross-country travel shown in Figure 1. For the purpose of this

analysis, route miles and use area acres (including in prohibited cross-country travel areas) inventoried in 2005 were calculated to get an approximate base number of miles/areas that have been created as a result of cross-country travel (Table 221). Within 165 feet of suitable FYLF habitat, approximately 528 routes (25.9 miles), 124 stream crossings (0 cross known occupied habitat) and 279 use areas (20.3 acres) were inventoried. Only one route has been inventoried within a known occupied stream. Eleven inventoried routes and nine use areas are located in areas prohibiting cross-country travel shown in Figure 1. Approximately 45,982 acres of potential suitable FYLF habitat occurs within the project area.

It is assumed that wheeled vehicles would continue to use all existing motorized routes and use areas inventoried, as well potentially continue to create new routes and use areas within the 45,982 acres of suitable habitat in the project (analysis) area. This would result in increasing direct and indirect effects to FYLF individuals and habitat.

The use of inventoried routes and the continued proliferation of new routes would increase both direct and indirect effects to FYLF individuals and habitat. No road maintenance or improvement plans for any routes or use areas created would also add to increasing direct and indirect effects to the FYLF and its habitat over the short and long term. The short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long-term.

Currently, potential impacts from these routes and use areas directly effect less than 1 percent of suitable or occupied habitat.

Adding Routes or Use Areas to the NFTS: There are no routes or use areas identified to add to the NFTS in Alternative 1.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are no changes to the current season of use NFTS road plan.

Project Mitigation Measures: There are no project mitigation measures implemented for this alternative because no changes are proposed to the current NFTS.

Alternative 2 – Proposed Action

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 10 proposed routes and 0 unmanaged use areas within suitable FYLF habitat in the project area. There are no routes or use areas within occupied habitat proposed. This alternative would eliminate the potential use of approximately 45,980 acres from Alternative 1 of suitable/occupied FYLF habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the FYLF individuals and habitat. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to FYLF from motorized travel over the short and long term.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 10 routes (2.15 miles), 8 stream crossings and no use areas proposed for addition to the NFTS within suitable FYLF habitat (Table 221). No routes or use areas are located within known occupied FYLF habitat are proposed. This alternative would have beneficial impacts to the FYLF by excluding the use of approximately 23.75 miles (91.6 percent of total miles) of inventoried routes within FYLF suitable habitat and allow for natural recovery over the long term. Use area access would be limited to only those which are currently managed. Short term effects of adding proposed routes to the NFTS could have a beneficial impact on FYLF habitat since these routes would be brought up to Forest road standards and maintained. This should reduce sediment, stabilize stream crossings and improve habitat condition. There would be continued direct and indirect

effects to FYLF individuals and suitable habitat along proposed routes and use areas over the long term. The addition of routes would likely result in direct effects to all life stages of FYLF and result in indirect effects to both aquatic and terrestrial habitat over the short and long term.

Since there is a decrease in the number of routes and use areas available to the public within suitable FYLF habitat compared to Alternatives 1 and 5, there would be an incremental decrease in the direct and indirect effects to individuals within the project area. Proposed routes would be located within suitable, but not known occupied habitat. This alternative would directly effect less than 1 percent of occupied/suitable habitat which may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long-term or result in a Federal listing or loss of viability.

Changes in Season of Use on Current NFTS Roads: Under this alternative, 11 NFTS roads (4.4 miles) currently closed year round that are within 165 feet of suitable FYLF habitat are proposed for a new seasonal closure date (Table 221), but would not be open for vehicle travel until at least April 20th of each year. A wet weather closure should reduce the potential of native surface road sediment run-off into associated FYLF habitat, reduce streambank disturbance at stream crossings and minimize direct and indirect effects to aquatic and terrestrial habitat. Closure of routes during the wet weather season would likely reduce disturbance to all life stages of the FYLF and habitat.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable FYLF habitat include: stabilize stream crossing (i.e. hardening), drainage improvements to protect ephemeral streams from sedimentation and installation of ditch relief pipes. Implementation of these project mitigation measures may result in short-term disturbance to some individuals, but would limit route widening, reduce soil perturbation and reduce sedimentation, providing beneficial effects over the long-term. For site specific aquatic/riparian species mitigation measures on routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record and a summary in Appendix A of this document.

Alternative 3

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only current NFTS roads. This would eliminate the potential use of approximately 45,980 acres of suitable FYLF habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the FYLF. Direct and indirect effects would be similar to those described in Alternative 2.

This alternative would have beneficial impacts on the FYLF and its habitat by excluding approximately 25.9 miles of inventoried routes from use in suitable/occupied habitat and allow for their natural recovery over the long term. Use areas would be limited to only those that are currently managed.

Adding Routes or Use Areas to the NFTS: There would be no routes or use areas proposed to be added to the NFTS.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are no changes to the current season of use NFTS road plan.

Project Mitigation Measures: No routes or use areas are proposed under this alternative; therefore, there would be no project mitigation measures to be implemented.

Alternative 4

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 9 proposed routes and no use areas within suitable FYLF habitat in the project area. Direct and indirect effects are similar to those described in Alternative 2.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 9 routes (0.69 miles), 8 stream crossings and no use areas proposed for addition to the NFTS within suitable FYLF habitat (Table 221). There are no routes or use areas proposed within occupied habitat. This alternative would have beneficial effects by excluding use of approximately 25.21 miles (97.3 percent of total miles) of inventoried routes within FYLF habitat and provide for natural recovery over the long term. Use area access would be limited to only those which are currently managed. Direct and indirect effects would be similar to those described in Alternative 2.

Since there is a slight decrease in the number of routes added to the system within FYLF habitat from Alternatives 2 and 5, there would be an incremental decrease in the potential direct and indirect effects to individuals within the project area. This alternative would directly effect less than 1 percent of occupied/suitable habitat which may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long-term or result in a Federal listing or loss of viability.

Changes in Season of Use on Current NFTS Roads: In this alternative, 18 NFTS roads (6.5 miles) currently closed year round that are within 165 feet of suitable FYLF habitat are proposed for a new seasonal closure date (Table 221), but would not be open for vehicle travel until at least May 1st of each year. Effects would be the same as described in Alternative 2.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable FYLF habitat would be as described in Alternative 2.

Alternative 5

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 24 proposed routes and 2 use areas within suitable/occupied FYLF habitat in the project area. Effects would be similar to those described in Alternative 2.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 23 routes (2.76 miles), 23 stream crossings and 2 use areas (1 acre) within suitable FYLF habitat proposed for addition to the NFTS (Table 221). No routes or use areas are proposed within occupied habitat. This alternative would have beneficial impacts by excluding use of approximately 23.14 miles (89.3 percent of total miles) of inventoried routes within FYLF habitat and provide for natural recovery over the long-term. Use area access would be limited to these two areas as well as only those which are currently managed. There would be continued direct and indirect effects to suitable FYLF habitat along proposed routes and use areas. However, short-term effects of adding the routes to the NFTS could have a beneficial affect on FYLF habitat since these routes would be brought up to Forest road standards reducing sediment and stabilizing stream crossings.

There is a slight increase in the number of routes added to the system within suitable FYLF habitat compared to Alternatives 2 and 4. There would be an incremental increase in the direct and indirect effects to individuals within the project area. This alternative would directly effect less than 1 percent of occupied/suitable habitat which may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long-term or result in a Federal listing or loss of viability.

Changes in Season of Use on Current NFTS Roads: In this alternative, 19 NFTS roads (6.72 miles) currently closed year round that are within 165 feet of suitable FYLF habitat are proposed for a new seasonal closure date (Table 221), but would not be open for vehicle travel until at least May 1st of each year. Direct and indirect effects would be similar to those described in Alternative 2.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable FYLF habitat are described in Alternative 2.

Table 221. Direct and Indirect Effects Indicators for Alternative 1 through 5 for the Foothill Yellow-legged Frog

Foothill yellow-legged Frog - Direct and Indirect Effects Indicators	Alt. 1[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of stream crossings (perennial and intermittent) on proposed routes to be added to the NFTS within known occupied stream habitat	1	0	0	0	0
Number of routes added to the NFTS within 165 feet of known occupied stream habitat	1	0	0	0	0
Miles of routes added to the NFTS within 165 feet of known occupied stream habitat	0.46	0	0	0	0
Number of use areas proposed to be added to the NFTS within 165 feet of known occupied stream habitat	0	0	0	0	0
Acres of use areas proposed to be added to the NFTS within 165 feet of known occupied stream habitat	0	0	0	0	0
Number of routes added to the NFTS within 165 feet of suitable stream habitat	528	10	0	9	23
Miles of routes added to the NFTS within 165 feet of suitable stream habitat	25.9	2.15	0	0.69	2.76
Number of stream crossings (perennial and intermittent) on proposed routes added to the NFTS within 165 feet of suitable stream habitat.	124	8	0	8	23
Number of use areas proposed to be added to the NFTS within 165 feet of suitable stream habitat	279	0	0	0	2
Acres of use areas proposed to be added to the NFTS within 165 feet of suitable stream habitat	20.3	0	0	0	1.0
Percentage of occupied/suitable habitat directly impacted by routes/use areas added to the NFTS.	0.10 %	0.005 %	0 %	0.001 %	0.01 %
Number of NFTS roads with a year round closure proposed for a season of use change within 165 feet of potential (suitable or occupied) stream habitat.	0	11	0	18	19
Miles of NFTS roads with a year round closure proposed for a season of use change within 165 feet of potential (suitable or occupied) stream habitat.	0	17.9	0	6.5	6.72

[1] Alternative 1 is calculated as an estimate of the total number and miles of routes / acres of use areas that have been inventoried (2005) in cross-country travel areas in order to display a comparison between alternatives

Cumulative Effects Unique to this Species

Cumulative impacts have likely contributed to the decline in FYLF numbers and distribution. See discussion under the Effects Common to all Aquatic Wildlife section.

In addition to the Direct and Indirect effects evaluated for FYLF and Effects Common to all Aquatic Wildlife discussion, there are 4 HUC8 subdrainages that were evaluated as having a high risk of Cumulative Watershed Effects (CWE) (Gallegos 2009). Within these subdrainages, 83 routes (8.96 miles) have been inventoried intersecting 1076.4 acres within 165 feet potential suitable FYLF habitat. This represents 1 percent of suitable habitat for FYLF subject to indirect affects related to unstable stream channels.

Addition of routes in these subdrainges along with cumulative effects discussed would increase the potential of direct, indirect and cumulative effects to the FYLF and it habitat.

Summary of Effects Analysis Across All Alternatives

Historically, Foothill yellow-legged frogs (FYLF) occurred between sea level and 6,000 feet in most Pacific drainages west of the Sierra-Cascade crest from the Santiam River, Marion County Oregon, to the San Gabriel Drainage, Los Angeles County, California (Hayes and Jennings 1988). On the SNF, only one population has been documented. Direct, indirect and cumulative effects from **Alternatives 3** *will not affect* the FYLF or its habitat. (*No Effect*). **Alternatives 2, 4 and 5** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the FYLF.* Based on the indicators evaluated, **Alternative 1** (current condition) has the highest probability of negative effects to FYLF. **Alternative 1** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the FYLF.* For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record.

Relictual slender salamander – Affected Environment

Species and Habitat Account

The Relictual slender salamander (RSS) is a Forest Service sensitive species whose distribution **was** considered to extend from the central California coast to nearly the length of the Sierra Nevada mountain range at elevations from 560 to 7,600 feet (Hansen 2006). However, this species was added to the sensitive species list in 1998 prior to research (Jockush et al. 1998; Jockush and Wake 2002) being conducted, which subsequently delineated the RSS into four separate species. Three of the revised species have distributions outside the SNF boundary. The 4th species, the Kings River slender salamander, occurs within the Forest. Distribution of the RSS is now restricted to the west slopes of the southern Sierra Nevada mountain range, from the lower Kern River Canyon to the highlands drained by the Tule and Kern rivers (Hansen 2006), thus the RSS does not occur on the SNF. The sensitive species list has not been updated to reflect changes to species and distribution within the slender salamander complex.

Hansen (1998) indicated that the RSS previously noted as occurring on the Forest, would presently be considered Kings River slender salamander, which are believed to be restricted within the Kings and Kaweah River drainages. The Kings River slender salamander is known to occur on the Forest at several sites in the Kings River drainage below 3,000 feet elevation. The CNDDB (CDFG 2005) lists the Kings River slender salamander as G1S1 (globally and sub-National critically imperiled), similar to NatureServe, while the World Conservation Union lists

the species as V(D2) (vulnerable, populations with very restricted area of occupancy). The species: gregarious slender salamander (*GSS*) as described by Hanson (2006), closely follows the original range (though at slightly lower elevations (<6,000 feet)) of the RSS extending from Yosemite National Park to the Kern River. *GSS* has no ranking from the CNDDB; G3 (global, vulnerable) from NatureServe; and LC (least concern; widespread and abundant) from the World Conservation Union. Neither Kings River slender salamander nor GSS are on the current sensitive species list, but are being considered as part of the revision to the list. There are more than 200 specimens of GSS collected across the Forest within the Museum of Vertebrate Zoology and the California Academy of Science.

Members of the genus Batrachoseps (slender salamanders) rely on passages made by other animals or produced by root decay or soil shrinkage (Yanev 1978). They are usually found under boards, rotting logs, rocks, bark and surface litter and tree debris (Jennings and Hayes 1994). Hansen (2006) notes the species as occurring in damp places (or on the surface during wet periods) near meadow edges and seeps. The CWHR highly suitable habitats (CDFG 2005) for this species that occur within the project area are blue oak woodland, blue oak – foothill pine, montane hardwood, montane hardwood – conifer, montane riparian, sierra mixed conifer, valley foothill riparian, valley oak woodland and white fir. In riparian areas any size tree and greater than 10 percent canopy closure is highly suitable. In oak woodland areas trees greater than 11 inches in diameter and canopy closures greater than 40 percent is highly suitable. In montane and white fir areas trees greater than 24 inches and canopy closures greater than 40 percent is highly suitable. Use by the RSS is in relatively small, mesic areas (e.g., swales, drainages, etc.) with an overstory of trees or shrubs and abundant rocks, litter or woody debris (CDFG 2005).

Lacking updates to the sensitive species list to re-define descriptions, ranges or listing status, the RSS is analyzed in this document under the original, broader description. The range of the RSS from the 1998 sensitive species list is from Fresno County, south to the Greenhorn Mountains and Kern River Canyon in Kern County.

For the purposes of this analysis, suitable habitat is being defined conservatively as within 300 feet of any known sight records of a slender salamander species and within 300 feet of any known seeps, springs, bogs, meadows or perennial streams. There is potentially suitable habitat within any riparian conservation areas (RCAs) occurring 7,600 feet and below in elevation. Using RCAs can estimate the total acreages available for this species; though through more detailed analysis a lesser amount of acreage may actually be suitable. Since defining suitable habitat for this species across the Forest is problematic, an estimate using the RCAs was generated. Surveys have not been conducted in suitable habitat within the project area; therefore, this analysis assumes that suitable habitat is occupied.

Relictual slender salamander – Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

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

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities (presently unauthorized roads, trails and/or areas) to the NFTS,
- Changing the season of use on NFTS routes,
- Implementing project mitigation measures.

These actions may have direct and indirect effects on the RSS through: human-caused mortality, changes in behavior and habitat modification (see Effects Common to all Aquatic Wildlife). Although the RSS has been re-categorized and is not considered present on the SNF, slender salamanders in general move only short distances (about 5 feet) and are most vulnerable in areas where routes cross springs or areas of perennial stream / meadows. Slender salamanders may be most vulnerable to habitat fragmentation and degradation of perennial habitat such as springs and meadows (Hayes and Jennings 1994).

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the RSS. 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 proposed routes to be added to the NFTS within 300 feet of suitable habitat.
- Miles of routes added to the NFTS within 300 feet of suitable habitat.
- Number of stream crossings (perennial) on routes added to the NFTS within 300 feet of suitable habitat.
- Acres of proposed use areas added to the NFTS within 300 feet of suitable habitat.
- Percentage of suitable habitat directly impacted by routes/use areas added to the NFTS.
- Number of NFTS roads with a year round closure proposed for a season of use change within 300 feet of suitable habitat.
- Miles of NFTS roads with a year round closure proposed for a season of use change within 300 feet of suitable habitat.

Alternative 1 – No Action

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1). About 102,301 acres of suitable habitat are located within the project area. Approximately 10 percent of potential slender salamander habitat is located within areas prohibited to cross-country travel shown in Figure 1.

For the purpose of this analysis, route miles and use area acres inventoried (2005) (including those inventoried in prohibited cross-country travel areas) were calculated to get an approximate base number of miles/area that have been created as a result of cross-country travel (Table 222). Within suitable slender salamander habitat, approximately 943 routes (96.5 miles), 100 perennial stream crossings and 1110 use areas (88.6 acres) have been inventoried. One hundred of those routes were locate within areas prohibited to cross-country travel.

It is assumed that wheeled vehicles would continue to use all existing motorized routes and use areas inventoried, as well potentially continue to create new routes and use areas within the 102,301 acres of suitable habitat in the project (analysis) area. The use of inventoried routes and use areas and the continued proliferation of new routes/areas would increase both direct and indirect effects to the slender salamander and habitat. This, as well as having no road maintenance or improvement plans for any routes or use areas created, would increase the amount of direct and indirect effects to the slender salamander or its habitat. Short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long term.

Currently, potential impacts from these routes and use areas directly effect less than 1 percent of suitable habitat.

Adding Routes or Use areas to the NFTS: No routes or use areas identified to add to the NFTS in Alternative 1.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are no proposed changes to the current season of use NFTS road plan.

Project Mitigation Measures: There are no project mitigation measures implemented under this alternative because no changes are proposed to the current NFTS.

Alternative 2 – Proposed Action

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 48 proposed routes and 1 use area within suitable slender salamander habitat in the project area. This would eliminate the potential use of approximately 101,000 acres of suitable slender salamander habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the slender salamander. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce the direct and indirect effects to slender salamander habitat from motorized travel over the short and long term.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 48 routes (7.25 miles), 10 perennial stream crossings and 1 use area (3.14 acres) proposed for addition to the NFTS within suitable slender salamander habitat (Table 222). This alternative would have beneficial impacts by excluding the use of approximately 89.25 miles (92.5 percent of total miles) of inventoried routes within slender salamander habitat and provide for natural recovery over the long-term. There would be continued direct and indirect effects to suitable slender salamander habitat along proposed routes and use area over the long term. The short term effects of adding the routes to the NFTS could have a beneficial impact on slender salamander habitat since these routes would be brought up to NFTS road standards reducing sediment, stabilizing stream crossings and improve habitat condition. Use areas would be limited to those that are currently managed.

Since there is a slight decrease in the number of routes available to the public within suitable slender salamander habitat compared to Alternatives 1 and 5, there would be an incremental decrease in the direct and indirect effects to individuals within the project area. Project routes or use areas would be located within suitable, but not known occupied habitat. There would be less than 1 percent of suitable habitat directly effected by routes/use areas inventoried which may impact individuals, but is not expected to impact populations or result in a Federal listing or loss of viability.

Changes in Season of Use on Current NFTS Roads: In this alternative, 37 NFTS roads (10.8 miles) currently closed year round that are within 300 feet of suitable slender salamander habitat are proposed for a new seasonal closure date (Table 222), but would not be open for vehicle travel until at least April 1st of each year (depending on elevation). A wet weather closure should reduce the potential of native surface road sediment run-off into associated slender salamander habitat, reduce streambank disturbance at stream crossings and minimize direct and indirect effects on riparian habitat. Closure of routes during the wet weather season would likely reduce disturbance to the slender salamander and habitat.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable slender salamander habitat include: drain dips, stream crossing improvements (i.e. hardening) gully repair, additional waterbar installation, culvert replacement or installation or

barricades. Implementation of these project mitigation measures may result in short-term disturbance to some individual slender salamanders, but would limit route widening, reduce soil perturbation and reduce sedimentation, providing beneficial effects over the long-term. For site specific aquatic/riparian species mitigation measures on routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record and a summary in Appendix A of this document.

Alternative 3

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only current NFTS roads. This would eliminate the potential use of 102,301 acres of suitable slender salamander habitat available to motor vehicles traveling cross-country, which would have beneficial direct and indirect effects to the slender salamander and habitat. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to slender salamanders from motorized travel over the short and long term.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are no changes to the current season of use NFTS road plan.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are no changes to the current season of use NFTS road plan.

Project Mitigation Measures: No additional routes or use areas are proposed under this alternative; therefore, there would be no project mitigation measures to be implemented.

Alternative 4

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 45 proposed routes and 2 use areas within suitable slender salamander habitat in the project area. Effects are similar to those described in Alternative 2.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 45 routes (5.25 miles) and 2 use areas (3.17 acres) proposed for addition to the NFTS within suitable slender salamander habitat (Table 222). This alternative would have a beneficial effect by excluding the use of approximately 91.25 miles (94.6 percent of total miles) of inventoried routes within slender salamander habitat and provide for natural recovery over the long-term. Effects would be similar to those described in Alternative 2.

Since there is a decrease in the number of routes added to the system within suitable slender salamander habitat from Alternatives 1, 2 and 5, there would be an incremental decrease in the potential direct and indirect effects to individuals within the project area. There would be less than 1 percent of suitable habitat directly effected by routes/use areas inventoried which may impact individuals, but is not expected to impact populations or result in a Federal listing or loss of viability long-term.

Changes in Season of Use on Current NFTS Roads: In this alternative, 40 NFTS roads (13.07 miles) currently closed year round that are within 300 feet of suitable slender salamander habitat are proposed for a new seasonal closure date (Table 225), but would not be open for vehicle travel until at least April 1st of each year (depending on elevation). This wet weather closure should give adequate protection to native surface roads and minimize direct and indirect effects to slender salamanders and habitat.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable slender salamander habitat are outlined in Alternative 2.

Alternative 5

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 86 proposed routes and 7 use areas within suitable slender salamander habitat in the project area. Effects would be similar to those described in Alternative 2.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 86 routes (10.8 miles) and 7 use areas (9.53 acres) proposed for addition to the NFTS within suitable slender salamander habitat (Table 222). This alternative would have a beneficial effect by excluding the use of approximately 85.7 miles (88.8 percent of total miles) of inventoried routes within slender salamander habitat and provide for natural recovery over the long-term. Effects would be similar to those described in Alternative 2.

Since there is an increase in the number of routes added to the system within suitable slender salamander habitat from Alternatives 2 and 4, there would be an increase in the direct and indirect effects to individuals within the project area. This alternative would directly effect less than 1 percent of suitable habitat which may impact some individuals, but would not likely result in impacts to populations within the project area over the short or long-term or result in a Federal listing or loss of viability.

Changes in Season of Use on Current NFTS Roads: In this alternative, 48 NFTS roads (14.05 miles) currently closed year round that are within 300 feet of suitable slender salamander habitat would have a new seasonal closure date (Table 222), but would not be open for vehicle travel until at least April 1st of each year (depending on elevation). This wet weather closure should give protection to native surface roads and minimize direct and indirect effects to slender salamanders and habitat.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable slender salamander habitat are outlined in Alternative 2.

Table 222. Direct and Indirect Effect Indicators for Alternative 1 through 5 for the Relictual Slender Salamander

Relictual Slender Salamander - Direct and Indirect Effects Indicators	Alt. 1[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of proposed routes to be added to the NFTS within 300 feet of suitable habitat	943	48	0	45	86
Miles of routes added to the NFTS within 300 feet of suitable habitat.	96.5	7.25	0	5.25	10.8
Number of stream crossings (perennial) on routes added to the NFTS within 300 feet of suitable habitat.	100	11	0	5	12
Number of proposed use areas added to the NFTS within 300 feet of suitable habitat.	1110	1	0	2	7
Acres of proposed use areas added to the NFTS within 300 feet of suitable habitat.	88.6	3.14	0	3.17	9.53
Percentage of suitable habitat directly impacted by routes/use areas added to the NFTS.	0.18 %	0.01 %	0 %	0.01 %	0.02 %
Number of NFTS roads with a year round closure proposed for a season of use change within 300 feet of suitable habitat	0	37	0	40	48
Miles of NFTS roads with a year round closure proposed for a season of use change within 300 feet of suitable habitat	0	10.8	0	13.07	14.05

[1] Alternative 1 is calculated as an estimate of the total number and miles of routes / acres of use areas that have been inventoried (2005) in cross-country travel areas in order to display a comparison between alternatives.

Cumulative Effects Unique to this species

Cumulative impacts have likely contributed to the decline in slender salamander numbers and distribution. See discussion under the Effects Common to all Aquatic Wildlife section.

In addition to the Direct and Indirect effects evaluated for slender salamander and Effects Common to all Aquatic Wildlife discussion, there are 5 HUC8 subdrainages that were evaluated as having a high risk of Cumulative Watershed Effects (CWE) (Gallegos 2009). Within these subdrainages, 62 routes (9.83 miles) have been inventoried intersecting 1782.5 acres within 300 feet potential suitable slender salamander habitat. In addition to NFTS roads within suitable habitat, this represents less than 1 percent of suitable habitat for slender salamander subject to indirect affects related to unstable stream channels across the SNF.

For slender salamanders, the cumulative effect of all the activities may lead to the isolated unknown populations being harmed. It is extremely difficult to determine the locations of this species and thus areas that have been identified as potential suitable habitat may not provide adequate protection.

Addition of routes in these subdrainges along with cumulative effects discussed would increase the potential of direct, indirect and cumulative effects to the slender salamander and its habitat.

Summary of Effects Analysis Across All Alternatives

The Relictual slender salamander (RSS) is a Forest Service sensitive species whose distribution was considered to extend from the central California coast to nearly the length of the Sierra Nevada mountain range at elevations from 560 to 7,600 feet (Hansen 2006). Direct, indirect and cumulative effects from **Alternatives 3** *will not affect* the slender salamander or its habitat (*No Effect*). **Alternatives 2, 4 and 5** *may affect individual slender salamanders, but is not likely to cause a trend toward Federal listing or a loss of viability* for either the Kings River or gregarious slender salamanders. **Alternative 1** (current condition) has the highest probability of negative effects to slender salamanders. Based on the indicators evaluated, **Alternative 1** *may affect individual slender salamanders, but is not likely to cause a trend toward Federal listing or a loss of viability* for either the Kings River or gregarious slender salamanders. For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record.

Mountain yellow-legged Frog – Affected Environment

Species and Habitat Account

This species is a high elevation species that only occurs in the Sierra Nevada Mountains of California from elevations of 4,500 feet to 12,000 feet (CDFG 2005). The range of this species extends from Plumas County to Tulare County. DNA sequencing by Vrebenburg (2007) suggests two species within the historic range of MYLF. *R. muscosa* (southern mountain yellow-legged frog) would apply to populations south of the divide between the Middle and South Forks of the Kings River. Populations to the north (including the SNF) would be considered *R. Sierra* (Sierra Nevada mountain yellow-legged frog).

Vrebenburg et al. (2007) report that MYLF no longer occurs at more than 92 percent of its historic sites, in the Sierra Nevada, with even greater declines in the Transverse Range and southern California. The USDI-USFWS found that listing was warranted as threatened or endangered for this species however, the listing was precluded at the time based on other higher priority issues (68 **FR** 2283). The MYLF is currently designated as a candidate species and is currently managed as sensitive by the Pacific Southwest Region of the Forest Service (1998).

On the SNF there are 38 known locations currently occupied by MYLF. The majority of occupied sites are at high elevations within wilderness areas; however there have been recent confirmed detections on the SNF in meadow streams around 5100 feet elevation.

MYLF typically live along the edge of watercourses and rely heavily on an aquatic environment for foraging, shelter, breeding and protection from predators. Primary habitat is perennial streams, lakes and ponds (CDFG 2005). The CWHR highly suitable habitats (CDFG 2005) for this species are lacustrine, montane riparian, riverine and wet meadows with mostly submerged and flooded gravels, cobbles and boulders with trees greater than one inch in diameter, short or tall herbaceous cover and vegetation and canopy closures greater than 10 percent.

For the purposes of this analysis, potential suitable habitat for this species was evaluated as perennial streams (stream order 4 and greater, although juveniles have been noted as using intermittent streams to disperse (Bradford 1991)) and lakes and ponds above 5,000 feet in elevation with a 165 feet dispersal area on either side of streams and around lakes and ponds (CDFG 2005). Since aquatic species or habitat surveys were not conducted on all potential suitable habitats determined by GIS within the project area, a conservative approach was taken for suitable habitat available. General field data was collected on routes and use areas proposed in action alternatives to confirm suitable habitat.

Mountain yellow-legged Frog – Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

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

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities (presently unauthorized roads, trails and/or areas) to the NFTS,
- Changing the season of use on NFTS routes,
- Implementing project mitigation measures.

These actions may have direct and indirect effects on MYLFs through: human-caused mortality, changes in behavior and habitat modification (see Effects Common to all Aquatic Wildlife). These frogs may be less susceptible to motorized travel management because they are a highly aquatic species (Hayes and Jennings 1986), therefore, routes within a RCA of suitable stream habitat would have less affect on these frogs than other more terrestrial aquatic/riparian species. The MYLF may however, be more vulnerable to affects of motorized travel management at stream crossings where suitable habitat is identified. Potential sediment movement from routes into suitable stream habitat as an indirect affects may have the most affects to the species and habitat.

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the MYLF. 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. Suitable habitat is defined as perennial streams (stream order 4 and above) and lakes and ponds above 5000 feet elevation:

- Number of proposed routes added to the NFTS within 165 feet of suitable habitat (including perennial streams and lakes/ponds).
- Miles of proposed routes added to the NFTS within 165 feet of suitable habitat (including perennial streams and lakes/ponds).
- Number of stream crossings (perennial) on routes added to the NFTS within 165 feet of suitable habitat.
- Number of proposed use areas added to the NFTS within 165 feet of suitable habitat (including perennial streams and lakes/ponds).
- Acres of proposed use areas within 165 feet of suitable habitat (including perennial streams and lakes/ponds).
- Percentage of suitable habitat directly impacted by routes/use areas added to the NFTS.
- Number of NFTS roads with a year round closure proposed for a season of use change within165 feet of suitable habitat (including perennial streams and lakes/ponds).
- Miles of NFTS roads with a year round closure proposed for a season of use change within 165 feet of suitable habitat (including perennial streams and lakes/ponds).

Alternative 1 – No Action

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1). About 32,747 acres of suitable habitat are located within the project area. Approximately 75 percent of potential MYLF habitat is located within areas prohibited to cross-country travel shown in Figure 1. For the purpose of this analysis, route miles and use area acres inventoried (2005) (including those inventoried in prohibited cross-country travel areas) were calculated to get an approximate base number of miles/area that have been created as a result of cross-country travel (Table 223). Within suitable MYLF habitat, approximately 292 routes (17.4 miles), 136 perennial stream crossings and 498 use areas (36.7 acres) have been inventoried. Eighty-five inventoried routes and approximately half of the use areas were located within areas prohibited to cross-country travel.

It is assumed that wheeled vehicles would continue to use all existing motorized routes and use areas inventoried, as well potentially continue to create new routes / use areas within the 32,747 acres of suitable habitat in the project area. The use of inventoried routes and use areas and the continued proliferation of new routes / use areas would increase both direct and indirect effects to MYLF individuals and habitat. No road maintenance or improvement plans for any routes or use areas created would also add to increasing direct and indirect effects to the MYLF and its habitat over the short and long term. The short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long term.

Currently, potential impacts from these routes and use areas directly effect less than 1 percent of suitable habitat.

Adding Routes or Use Areas to the NFTS: No routes or use areas identified to add to the NFTS in Alternative 1.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are changes to the current season of use NFTS road plan.

Project Mitigation Measures: There are no project mitigation measures implemented for this alternative because no changes are proposed to the current NFTS.

Alternative 2 – Proposed Action

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 18 proposed routes and 0 unmanaged use areas within suitable MYLF habitat in the project area. This alternative would eliminate the potential use of approximately 32,700 acres of suitable MYLF habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the MYLF individuals and habitat. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to MYLF from motorized travel over the short and long term.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 18 routes (1.37 miles), 1 perennial stream crossing and no use areas proposed for addition to the NFTS within suitable MYLF habitat (Table 223). This alternative would have beneficial impacts by excluding the use of approximately 16.03 miles (92.1 percent of total miles) of inventoried routes within potential MYLF habitat and provide for natural recovery over the long-term. There would be continued direct and indirect effects to suitable MYLF habitat along proposed routes and use area over the long term. The short term effects of adding the routes to the NFTS could have a beneficial impact on MYLF habitat since these routes would be brought up to Forest road standards reducing sediment, stabilizing stream crossings and improve habitat condition. Use areas would be limited to those that are currently managed.

Since there is a slight decrease in the number of routes available to the public within MYLF habitat compared to Alternatives 1 and 5, there would be an incremental decrease in the direct and indirect effects to individuals within the project area. There would be less than 1 percent of suitable habitat directly effected by routes/use areas inventoried which may impact individuals, but is not expected to impact populations or result in a Federal listing or loss of viability.

Changes in Season of Use on Current NFTS Roads: Under this alternative,15 NFTS roads (2.27 miles) currently closed year round that are within 165 feet of suitable MYLF habitat are proposed for a new seasonal closure date (Table 223), but would not be open for vehicle travel until at least May 20th of each year. A wet weather closure should reduce the potential of native surface road sediment run-off into associated MYLF habitat, reduce streambank disturbance at stream crossings and minimize direct and indirect effects to aquatic and terrestrial habitat. Closure of routes during the wet weather season would likely reduce disturbance to all life stages of the MYLF and habitat.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable MYLF habitat include: stabilize stream crossing (i.e. hardening), waterbars, barriers to prevent vehicles from accessing unauthorized routes, drainage improvements to protect ephemeral streams and marking end of a route with barriers or signs. Implementation of these project mitigation measures may result in short-term disturbance to some individuals, but would limit route widening, reduce soil perturbation and reduce sedimentation, providing beneficial effects over the long-term. For site specific aquatic/riparian species mitigation measures on routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record and a summary in Appendix A of this document.

Alternative 3

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only current NFTS roads. This would eliminate the potential use of approximately 32,747 acres of suitable MYLF habitat available to motor vehicles traveling cross-country in Alternative 1 and result in a reduction of direct and indirect effects. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to MYLF from motorized travel over the short and long term.

This alternative would have beneficial impacts on the MYLF and its habitat by excluding approximately 17.4 miles of inventoried routes from authorized use in suitable habitat and allow for their natural recovery over the long term. Access to use areas would be only those that are currently managed.

Adding Routes or Use areas to the NFTS: There are no routes or use areas proposed to be added to the NFTS.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are no changes to the current season of use NFTS road plan.

Project Mitigation Measures: No routes or use areas are proposed under this alternative; therefore, there would be no project mitigation measures to be implemented.

Alternative 4

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 10 proposed routes and no use areas within suitable MYLF habitat in the project area. Direct and indirect effects are similar to those described in Alternative 2.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 10 routes (0.63 miles), 1 perennial stream crossing and no use areas proposed for addition to the NFTS within suitable MYLF habitat (Table 223). This alternative would have some beneficial effects by excluding use of approximately 16.77 miles (96.4 percent of total miles) of inventoried routes within MYLF habitat and provide for natural recovery over the long term. Use area access would be limited to only those which are currently managed. Direct and indirect effects would be similar to those described in Alternative 2.

Since there is a slight decrease in the number of routes added to the system within suitable MYLF habitat from Alternatives 2 and 5, there would be an incremental decrease in the potential direct and indirect effects to individuals within the project area. Potential impacts from these actions directly effect less than 1 percent of suitable habitat analyzed which would likely impact individuals, but would not likely result in impacts to populations within the project area or lead to Federal listing or loss of viability over the short or long term.

Changes in Season of Use on Current NFTS Roads: In this alternative, 14 NFTS roads (2.7 miles) currently closed year round that are within 165 feet of suitable MYLF habitat are proposed for a new seasonal closure date (Table 223), but would not be open for vehicle travel until at least May 20th of each year. Effects would be the same as described in Alternative 2.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable MYLF habitat would be as described in Alternative 2.

Alternative 5

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 30 proposed routes and 2 use areas within suitable MYLF habitat in the project area. Effects would be similar to those described in Alternative 2.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 30 routes (2.02 miles), 2 perennial stream crossings and 2 use areas (2.8 acres) within suitable MYLF habitat proposed for addition to the NFTS (Table 223). This alternative would have the least amount of beneficial impacts from all action alternatives by excluding use of approximately 15.53 miles (88.4 percent of total miles) of inventoried routes within MYLF habitat and provide for natural recovery over the long-term. Use area access would be limited to 2 areas as well as only those which are currently managed. There would be continued direct and indirect effects to suitable MYLF habitat along proposed routes and use areas. However, short term effects of adding the routes to the NFTS could have some beneficial affect on MYLF habitat since these routes would be brought up to Forest road standards reducing sediment and stabilizing stream crossings.

There is a slight increase in the number of routes added to the system within suitable MYLF habitat compared to Alternatives 2 and 4. There would be an incremental increase in the direct and indirect effects to individuals within the project area. Potential impacts from these actions directly effect less than 1 percent of suitable habitat analyzed which would likely impact individuals, but would not likely result in impacts to populations within the project area or lead to Federal listing or loss of viability over the short or long-term.

Changes in Season of Use on Current NFTS Roads: In this alternative, 15 NFTS roads (2.8 miles) currently closed year round that are within 165 feet of suitable MYLF habitat are proposed for a new seasonal closure date (Table 223), but would not be open for vehicle travel until at least May 20th of each year. Effects would be the same as described in Alternative 2.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable FYLF habitat are described in Alternative 2.

Table 223. Direct and Indirect Effect Indicators for Alternative 1 through 5 for the Mountain Yellow-legged Frog

Mountain yellow-legged Frog - Direct and Indirect Effects Indicators	Alt. 1[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of proposed routes added to the NFTS within 165 feet of suitable habitat (including perennial streams and lakes/ponds).	292	18	0	10	30
Miles of routes added to the NFTS within 165 feet of known suitable habitat (including perennial streams and lakes/ponds).	17.4	1.37	0	0.63	2.02
Number of stream crossings (perennial) on routes added to the NFTS within 165 feet of suitable habitat.	136	1	0	4	2
Number of proposed use areas added to the NFTS within 165 feet of suitable habitat (including perennial streams and lakes/ponds).	498	0	0	0	2
Acres of proposed use areas within 165 feet of suitable habitat (including perennial streams and lakes/ponds)	36.7	0	0	0	2.8
Percentage of suitable habitat directly impacted by routes/use areas added to the NFTS.	0.16 %	0.02 %	0 %	0.01 %	0.04 %
Number of NFTS roads with a year round closure proposed for a season of use change within 165 feet of suitable habitat (including perennial streams and lakes/ponds).	0	15	0	14	15
Miles of NFTS roads with a year round closure proposed for a season of use change within 165 feet of suitable habitat (including perennial streams and lakes/ponds).	0	2.27	0	2.7	2.8

[1] Alternative 1 is calculated as an estimate of the total number and miles of routes / acres of use areas that have been inventoried (2005) in cross-country travel areas in order to display a comparison between alternatives

Cumulative Effects Unique to this Species

Cumulative impacts have likely contributed to the decline in MYLF numbers and distribution. See discussion under the Effects Common to all Aquatic Wildlife section.

In addition to the Direct and Indirect effects evaluated for MYLF and Effects Common to all Aquatic Wildlife discussion, there is 1 HUC8 subdrainage that was evaluated as having a high risk of Cumulative Watershed Effects (CWE) (Gallegos 2009). Within this subdrainage, 10 routes (1.25 miles) have been inventoried intersecting 97.7 acres within 165 feet potential suitable MYLF habitat. In addition to roads within this HUC8, less than 1 percent of suitable habitat for MYLF is subject to indirect affects related to unstable stream channels.

Addition of routes in this subdrainges along with cumulative effects discussed could increase the potential of direct, indirect and cumulative effects to the MYLF and its habitat.

Summary of Effects Analysis Across All Alternatives

The Mountain yellow-legged frog is a high elevation species that only occurs in the Sierra Nevada Mountains of California from elevations of 4,500 feet to 12,000 feet (CDFG 2002).

Direct, indirect and cumulative effects from **Alternatives 3** *will not affect* the MYLF or its habitat (*No Effect*). **Alternatives 2, 4 and 5** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the MYLF* . Based on the indicators evaluated, **Alternative 1** (current condition) has the highest probability of negative effects to MYLF. **Alternative 1** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the MYLF.* For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes, Strand 2009) located in the project record.

Western pond turtle – Affected Environment

Species and Habitat Account

The central Sierra Nevada Mountains are an area of overlap between two pond turtle subspecies, *Clemmys marmorata marmorata* (northwestern pond turtle) and *Clemmys marmorata pallida* (southwestern pond turtle). These pond turtles, collectively known as western pond turtles (WPT), are found from sea level to 4,690 feet in elevation (Jennings and Hayes 1994). There are records of WPT detected at elevation exceeding 6,000, but turtles were known to be introduced at these sites (Jennings and Hayes 1994). Historically, WPT occurred along the west slope of Cascade/Sierra Nevada mountain ranges from the Columbia River (Slater 1962) to northern Baja California (Stebbins 1985).

On the SNF, surveys for WPT have been conducted between 1993 and 2008. Numerous detections have been identified across the SNF.

In 1992 the USFWS was petitioned to consider the species for listing under the Endangered Species Act (USDSI-USFWS 1992). Following review, the USFWS declined to list the species. The Pacific Southwest Region of the Forest Service designated the western pond turtle as a sensitive species in 1993.

WPT occur in a variety of both permanent and intermittent aquatic habitats and is often restricted to areas near the banks or in quiet backwaters where the current is relatively slow and basking sites and refugia are available (CDFG 2005). Movements of WPT of over 1 mile have been reported when local aquatic habitat conditions change (e.g. drought), however most stay within 325 feet of the stream channel mainly moving during breeding and egg-laying (CDFG 2005). Aerial basking on logs and rocks occurs when air temperature exceeds water temperature (Holland 1991). The CWHR highly suitable habitats (CDFG 2005) for this species that occur are blue oak woodland, blue oak – foothill pine, fresh emergent wetland, lacustrine, riverine, valley foothill riparian and valley oak woodland. Highly suitable areas include those with short or tall herbaceous plants and vegetation closures greater than 40 percent with trees larger than six inches in diameter and canopy closure greater than 10 percent is highly suitable. In stream, lakes and pond habitats are highly suitable areas are those that range from mostly exposed to flooded cobbles, boulders and bedrock.

For the purposes of this analysis, potential habitat within the SNF was evaluated as perennial (stream order 4 and greater) and intermittent (stream order 3) streams and lakes and ponds below 5000 feet elevation. Terrestrial habitat used for breeding or a movement corridor of 325 feet to either side of the channels and around lakes and ponds would define potential habitat (CDFG 2005). Aquatic species or habitat surveys have not been completed across all potential suitable habitats. Potential habitat has been determined by GIS within the project area and assumed occupied. General field data was collected on routes and use areas proposed in action alternatives to confirm suitable habitat. WPT may have movements beyond 325 feet from aquatic habitat for overwintering purposes, which makes them more susceptible to upland affects than other aquatic/riparian species.

Western pond turtle – Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

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

- Prohibiting cross-country travel off of the NFTS,
- Adding facilities (presently unauthorized roads, trails and/or areas) to the NFTS,
- Changing the season of use on NFTS routes,
- Implementing project mitigation measures.

These actions may have direct and indirect effects on WPT through: human-caused mortality, changes in behavior and habitat modification (see Effects Common to all Aquatic Wildlife). Furthermore, WPT may be susceptible to negative effects from motorized travel management because essentially all individuals utilize terrestrial habitats extensively throughout the year and they are vulnerable to mortality at stream crossings. During nesting excursions, females are very sensitive to disturbance and will abandon the nesting effort (Reese 1996, Rathbun et al. 2002) thus WPT may be disturbed by motor vehicle use during this period. 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.

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the WPT. 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. Suitable habitat was considered to be perennial (stream order 4 and above) and intermittent (stream order 3 only) streams, along with ponds/lakes below 5000 feet elevation.

- Number of proposed use areas within 325 feet of suitable stream and pond/lake habitat.
- Miles of proposed routes added to the NFTS within 325 feet of suitable stream and pond/lake habitat.
- Number of stream crossings (perennial and intermittent) on routes added to the NFTS within 325 feet of suitable stream and pond/lake habitat.
- Acres of use areas within 325 feet of suitable habitat stream and pond/lake habitat.
- Percentage of suitable habitat directly impacted by routes/use areas added to the NFTS.
- Number of NFTS roads with a year round closure proposed for a season of use change within 325 feet of suitable stream and pond/lake habitat.
- Miles of NFTS roads with a year round closure proposed for a season of use change within 325 feet of suitable stream and pond/lake habitat.

Alternative 1 – No Action

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1). About 91,227 acres of suitable habitat are located within the project area. Less than 5 percent of potential WPT habitat is located within areas prohibited to cross-country travel shown in Figure 1. For the purpose of this analysis,

route miles and use area acres inventoried from 2005 (including those inventoried in areas prohibited to cross-country travel) were calculated to get an approximate base number of miles/area that have been created as a result of cross-country travel (Table 224). Within 325 feet of suitable WPT habitat, approximately 481 routes (55.2 miles), 132 stream crossings and 373 use areas (29.6 acres) have been inventoried (Table 224). Seventeen of those routes and 15 use areas are located within areas prohibited to cross-country travel.

It is assumed that wheeled vehicles would continue to use all existing motorized routes and use areas inventoried, as well potentially continue to create new routes / use areas within the 91,227 acres of suitable habitat in the project area. The use of inventoried routes and the continued proliferation of new routes would increase both direct and indirect effects to the WPT individuals and habitat. Additional cross-country travel within WPT terrestrial habitat could also result in direct and indirect effects to females moving to upland habitat to find suitable nesting locations and hatchlings being crushed or disturbed as they leave to find aquatic habitat. No road maintenance or improvement plans for any routes or use areas created would also add to increasing direct and indirect effects to the WPT and its habitat over the short and long term. The short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long term.

Currently, potential impacts from these routes and use areas directly effect less than 1 percent of suitable habitat.

Adding Routes or Use areas to the NFTS: There are no routes or use areas identified to add to the NFTS in Alternative 1.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are changes to the current season of use NFTS road plan.

Project Mitigation Measures: There are no project mitigation measures implemented for this alternative because no changes are proposed to the current NFTS.

Alternative 2 – Proposed Action

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 18 proposed routes and no unmanaged use areas within suitable WPT habitat in the project area. This would eliminate the potential use of approximately 91,100 acres of suitable WPT habitat available to motor vehicles traveling cross-country within the project area and result in beneficial direct and indirect effects to the WPT individuals and habitat. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to WPT from motorized travel over the short and long term.

Adding Routes or use areas to the NFTS: Under this alternative, there are 18 routes (5.05 miles), 8 stream crossings and no use areas proposed for addition to the NFTS within suitable WPT habitat (Table 224). This alternative would have a beneficial impact to WPT by excluding the use of approximately 50.15 miles (90.9 percent of total miles) of inventoried routes within its habitat and provide for natural recovery over the long-term. Use area access would be limited to only those which are currently managed. There would be continued direct and indirect effects to WPT individuals and suitable habitat along proposed routes, however, short term effects of adding the routes to the NFTS could have a beneficial impact on WPT habitat since these routes would be brought up to Forest road standards and maintained. This should reduce sediment, stabilize stream crossings and improve habitat condition.

Since there is a slight decrease in the number of routes added to the system within suitable WPT habitat compared to Alternatives 1 and 5, there would be an incremental decrease in the direct

and indirect effects to individuals within the project area. Potential impacts from these actions directly effect less than 1 percent of suitable habitat analyzed which would likely impact individuals, but would not likely result in impacts to populations within the project area or lead to Federal listing or loss of viability over the short or long-term.

Changes in Season of Use on Current NFTS Roads: In this alternative, 13 roads (7.7 miles) currently closed year round that are within 325 feet of suitable WPT habitat are proposed for a new seasonal closure date (Table 224), but would not be open for vehicle travel until at least April 20th of each year. A wet weather closure should reduce the potential of native surface road sediment run-off into associated WPT habitat and minimize direct and indirect effects to WPT habitat. Limiting the season of use would likely reduce potential disturbance to some WPT individuals. Some roads are located within 325 feet of existing populations and may not protect against direct effects of breeding or overwintering movements over terrestrial habitats of WPT.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable WPT habitat include: drain dips, repairing rills, spot rocking dips, waterbars and improvements to stream crossings. Implementation of these project mitigation measures may result in short-term disturbance to some individual WPT, but would limit route widening, reduce soil perturbation and reduce sedimentation, providing beneficial effects over the long-term. For site specific aquatic/riparian species mitigation measures on routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record and a summary in Appendix A of this report.

Alternative 3

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only current NFTS roads. This would eliminate the potential use of approximately 91,227 acres of suitable WPT habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the WPT. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to WPT from motorized travel over the short and long term. This alternative would have a beneficial effect on the WPT and its habitat by excluding approximately 55.2 miles of inventoried routes from motorized use in suitable WPT habitat and allow for their natural recovery over the long term. Access to use areas would be only those that are currently managed.

Adding Routes or Use areas to the NFTS: There are no routes or use areas proposed to be added to the NFTS in Alternative 3.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are no changes to the current season of use NFTS road plan.

Project Mitigation Measures: No routes or use areas are proposed under this alternative; therefore, there are no project mitigation measures to be implemented.

Alternative 4

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 11 proposed routes and no use areas within suitable WPT habitat in the project area. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Adding Routes or use areas to the NFTS: Under this alternative, there are 11 routes (1.28 miles), 8 stream crossings and no use areas proposed for addition to the NFTS within suitable WPT habitat (Table 224). This alternative would have a beneficial effect by excluding use of

approximately 53.92 miles (97.7 percent of total miles) of inventoried routes within WPT habitat and provide for natural recovery over the long-term. Use area access would be limited to only those which are currently managed. There would be continued direct and indirect effects to WPT individuals and suitable habitat along proposed routes and use areas, however, short term effects of adding the routes to the NFTS could have a beneficial effect on WPT habitat since these routes would be brought up to road standard and maintained. This should reduce sediment and stabilize stream crossings.

Since there is a slight decrease in the number of routes added to the system within suitable WPT habitat compared to Alternatives 1, 2 and 5, there would be an incremental decrease in the direct and indirect effects to individuals within the project area. Potential impacts from these actions directly effect less than 1 percent of suitable habitat analyzed which would likely impact individuals, but would not likely result in impacts to populations within the project area or lead to Federal listing or loss of viability over the short or long-term.

Changes in Season of Use on Current NFTS Roads: In this alternative, 21 NFTS roads (12.2 miles) currently closed year round that are within 325 feet of suitable WPT habitat are proposed for a new seasonal closure date (Table 224), but would not be open for vehicle travel until at least May 1st of each year. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable WPT habitat are described in Alternative 2.

Alternative 5

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 30 proposed routes and 3 use areas within suitable WPT habitat in the project area. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Adding Routes or Use Areas to the NFTS: Under this alternative, 30 routes (5.21 miles), 23 stream crossings and 3 use areas (1.5 acres) are proposed for addition to the NFTS within suitable WPT habitat (Table 224). This alternative would have a beneficial effect by excluding use of approximately 49.99 miles (90.6 percent of total miles) of inventoried routes within WPT habitat and provide for natural recovery over the long-term. Use area access would be limited to 3 areas as well as those which are currently managed. One proposed use area is located in the Jose Creek CAR and is within 325 of an occupied WPT stream. The other two proposed use areas are also within 325 feet of WPT occupied streams. There would be continued direct and indirect effects to suitable WPT habitat along proposed routes and use areas, however, short term effects of adding the routes to the NFTS could have a beneficial affect on WPT habitat since these routes would be brought up to standard reducing sediment, stabilize stream crossings.

Since there is an increase in the number of routes added to the system within suitable WPT habitat compared to Alternatives 2 and 4, there would be an incremental increase in the direct and indirect effects to individuals within the project area. Potential impacts from these actions directly effect less than 1 percent of suitable habitat analyzed which would likely impact individuals, but would not likely result in impacts to populations within the project area or lead to Federal listing or loss of viability over the short or long-term.

Changes in Season of Use on Current NFTS Roads: In this alternative, 22 NFTS roads (12.8 miles) currently closed year round that are within 325 feet of suitable WPT habitat would have a new seasonal closure date (Table 224), but would not be open for vehicle travel until at the earliest May 1st of each year (depending on other closure factors). Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable WPT habitat are described in Alternative 2.

Table 224. Direct and Indirect Effects Indicators for Alternative 1 through 5 for the Western Pond Turtle

Western pond turtle - Direct and Indirect Effects Indicators	Alt. 1[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of proposed routes added to the NFTS within 325 feet of suitable habitat.	481	18	0	11	30
Miles of proposed routes added to the NFTS within 325 feet of suitable habitat.	55.2	5.05	0	1.28	5.21
Number of stream crossings (perennial and intermittent) on routes added to the NFTS within 325 feet of suitable aquatic habitat.	132	8	0	8	23
Number of proposed use areas within 325 feet of suitable habitat.	373	0	0	0	3
Acres of use areas within 325 feet of suitable habitat.	29.6	0	0	0	1.5
Percentage of suitable habitat directly impacted by routes/use areas added to the NFTS.	0.09 %	0.006 %	0 %	0.001 %	0.007 %
Number of NFTS roads with a year round closure proposed for a season of use change within 325 feet of suitable stream and pond/lake habitat.	0	13	0	21	22
Miles of NFTS roads with a year round closure proposed for a season of use change within 325 feet of suitable stream and pond/lake habitat.	0	7.7	0	12.2	12.8

[1] Alternative 1 is calculated as an estimate of the total number and miles of routes / acres of use areas that have been inventoried (2005) in cross-country travel areas in order to display a comparison between alternatives.

Cumulative Effects Unique to this species

Cumulative impacts have likely contributed to the decline in WPT numbers and distribution. See discussion under the Effects Common to all Aquatic Wildlife section.

In addition to the Direct and Indirect effects evaluated for WPT and Effects Common to all Aquatic Wildlife discussion, there are 4 HUC8 subdrainages that were evaluated as having a high risk of Cumulative Watershed Effects (CWE) (Gallegos 2009). Within these subdrainages, 69 routes (8.67 miles) have been inventoried intersecting the 2079.7 acres within 325 feet potential suitable WPT habitat. These routes, as well as roads within the HUC8s represent less than 1 percent of suitable habitat for WPT subject to indirect affects related to unstable stream channels across the Forest.

Addition of routes in these subdrainges along with cumulative effects discussed would increase the potential of direct, indirect and cumulative effects to the WPT and its habitat.

Summary of Effects Analysis Across All Alternatives

The Western pond turtle (WPT) is a Forest Service sensitive species whose distribution is from sea level to 4,690 feet in elevation (Jennings and Hayes 1994). Direct, indirect and cumulative effects from **Alternatives 3** *will not affect* the WFP (*No Effect*) and could have beneficial impacts. **Alternatives 2, 4 and 5** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the WPT.* Based on the indicators evaluated, **Alternative 1** (current condition) has the highest probability of negative effects to WPT. **Alternative 1** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the WPT.* For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record.

Yosemite toad – Affected Environment

Species and Habitat Account

The original range of the Yosemite toad (YT) extends from Ebbetts Pass in Alpine County to south of Kaiser Pass and Evolution Lake in Fresno County (Karlstrom 1962, 1973; CDFG 2005) above 6000 feet elevation. However, forestwide protocol level inventories conducted between 2002 and 2004 found populations as far south as Spanish Mountain, located in the Monarch Wilderness along the southern most portion of the SNF

This species was inventoried for occurrence between 2002 and 2004 across the SNF. Before 2002, visual encounter surveys and incidental sightings were documented in several locations throughout the forest. Currently on the SNF there are over 300 locations known to be occupied by YT.

The Yosemite toad is a Federal candidate species and a Forest Service sensitive species. The USFWS found that listing was warranted as threatened or endangered for this species however the listing was precluded at the time based on other higher priority issues (67 FR 75834). The species is managed as sensitive by the Pacific Southwest Region of the US Forest Service (1998).

YT breed in shallow pools and small, slow moving, shallow streams usually in meadows (Martin 1992). Movement to and from breeding sites could be up to 0.56 miles including moving over extensive snowfields from over-winter hibernation sites in forested areas (CDFG 2005). Seasonal variation in home range size is considerable. Mullally (1953) estimated breeding sights of some toads to be about 20 feet, but suggested that individuals may travel long distances away from water (CDFG 2005). The CWHR highly suitable habitats (CDFG 2005) for this species are wet meadows that have short (< 12 inches) herbaceous plants with vegetation closures greater than 10 percent.

For the purposes of this analysis, YT meadow habitat was divided into 2 categories: occupied and suitable meadows. Occupied habitat were considered meadows inventoried from the 2002-2004 Forestwide survey, as well as confirmed sightings from visual encounter surveys and buffered with a 0.6 mile dispersal area (CDFG 2005). Suitable meadow habitat was considered all meadows above 6000 feet elevation that were not currently occupied and were buffered with a 300 foot analysis area. These two analysis areas were merged for a total potential habitat area.

Yosemite toad – Environmental Consequences

Direct and Indirect Effects

General - All Alternatives

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

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

These actions may have direct and indirect effects on YTs through: human-caused mortality, changes in behavior and habitat modification (see Effects Common to all Aquatic Wildlife). In addition, YTs may be less susceptible to motorized travel management during early spring because breeding movements typically occur when roads or areas near breeding sites are primarily impassable due to snow. However, the dispersal and overwintering movements of adults and some juveniles are large (approximately 0.60 miles) making it possible that toads may have to cross roads when they are open to vehicle travel to reach preferred foraging or overwintering sites.

Indicators

Based upon the available literature, the following indicators were chosen to provide a relative measure of the direct and indirect effects to the YT. 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.

Occupied habitat:

- Number of proposed routes within 0.6 miles of known occupied habitat.
- Miles of routes within 0.6 miles in known occupied habitat.
- Number of meadow crossings of proposed routes in known occupied meadows.
- Miles of proposed route crossings on known occupied meadows.
- Number of proposed use areas within 0.6 miles of known occupied habitat.
- Acres of use areas within 0.6 miles of known occupied habitat.

Suitable habitat:

- Number of proposed routes within 300 feet of suitable habitat.
- Miles of routes within 300 feet of suitable habitat.
- Number of meadow crossings on proposed routes in suitable habitat.
- Miles of proposed route crossings on suitable habitat.
- Number of proposed use areas within 300 feet of suitable habitat
- Acres of use areas within 300 feet of suitable habitat.
- Percentage of occupied/suitable habitat directly impacted by routes/use areas added to the NFTS.

- Number of NFTS roads with proposed changes to season of use within potential (suitable or occupied) habitat.
- Miles of NFTS roads with proposed changes to season of use within potential (suitable or occupied) habitat

Alternative 1 – No Action

Cross-Country Travel: Cross-country travel would not be prohibited under this alternative except within areas described in the 1977 ORV Plan (Figure 1). About 75,701 acres of suitable and occupied habitat are located within the project area. Approximately 80 percent of the total suitable YT habitat is located within areas prohibited to cross-country travel shown in Figure 1. For the purpose of this analysis, route miles and use area acres inventoried from 2005 (including those inventoried in areas prohibited to cross-country travel) were calculated to get an approximate base number of miles/area that have been created as a result of cross-country travel (Table 225). Within suitable YT habitat, approximately 541 routes (61 miles) with 50 routes crossing meadows and 665 use areas (52.7 acres) have been inventoried. There are 227 routes and numerous use areas (Table 225) inventoried in areas prohibited to cross-country travel.

It is assumed that wheeled vehicles would continue to use all existing motorized routes and use areas inventoried, as well potentially continue to create new routes / use areas within the 75,701 acres of suitable habitat in the project area. Approximately 36,435 of the total acres are located in the Tamarack Dinkey Analysis Unit. The use of inventoried routes and use areas and the continued proliferation of new routes / use areas would increase both direct and indirect effects to the YT individuals and habitat. Additional cross-country travel within YT dispersal habitat could also result in direct and indirect effects to adult and juveniles moving out to terrestrial habitat to find suitable over-wintering sights by being crushed or disturbed as they leave meadow habitat. No road maintenance or improvement plans for any routes or use areas created would also add to increasing direct and indirect effects to the YT and its habitat over the short and long term. The short-term effects would be similar to current conditions, while continued proliferation of routes would be exacerbated over the long-term.

Currently, potential impacts from these routes and use areas directly effect less than 1 percent of occupied / suitable habitat.

Adding Routes or Use areas to the NFTS: There are no routes or use areas identified to add to the NFTS in Alternative 1.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are no changes to the current season of use NFTS road plan.

Project Mitigation Measures: There are no project mitigation measures implemented for this alternative because no changes are proposed to the current NFTS.

Alternative 2 – Proposed Action

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 23 routes and 1 use area within suitable or occupied YT habitat in the project area. Although 42 percent of inventoried routes within occupied (169 routes) or suitable (58 routes) habitat were located within areas prohibited to cross-country travel (Figure 1), Alternative 2 would eliminate the potential use of approximately 75,500 acres of occupied or suitable YT habitat across the Forest available to motor vehicles traveling cross-country and result in beneficial direct and indirect effects to the YT individuals and habitat. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would

reduce direct and indirect effects to all life stages of YT from motorized travel over the short and long term.

Adding Routes or use areas to the NFTS: Under this alternative, there are 10 routes (1.4 miles), no meadow crossing and no use areas proposed for addition to the NFTS within 0.6 miles of occupied YT habitat (Table 225). In addition, there are 13 routes (1.25 miles), no meadow crossings and 1 use area (3.1 acres) proposed for addition to the NFTS within 300 feet of suitable YT habitat (Table 225). This alternative would have a beneficial impact to YT by excluding the use of approximately 58.35 miles (95.7 percent of total miles) of inventoried routes within YT habitat and provide for natural recovery over the long-term. Use area access would be limited to the one proposed use area and those which are currently managed.

Short term effects of adding these routes to the NFTS could have some beneficial effects to YT habitat since these routes would be brought up to NFTS road standards and maintained. This would reduce sediment entering habitat and inventoried routes crossing meadow habitat would not be added to the NFTS. There would continue to be direct and indirect effects to some juveniles and adults and indirect effects to all life history stages of the YT and occupied or suitable habitat along proposed routes.

Since there is a decrease in the number of routes and use areas added to the system within suitable YT habitat compared to Alternative 1, there would be an incremental decrease in the direct and indirect effects to individuals within the project area. Potential impacts of adding proposed routes and use areas directly effect less than 1 percent of suitable habitat analyzed which would likely impact individuals, but would not likely result in impacts to populations within the project area or lead to Federal listing or loss of viability over the short or long-term.

Changes in Season of Use on Current NFTS Roads: In this alternative, 24 NFTS roads (9.5 miles) currently closed year round that are within occupied or suitable YT habitat are proposed for a new seasonal closure date (Table 225). Roads would not be open until May 20th (suitable habitat) or August 15th (occupied habitat).

A wet weather closure on these routes should minimize direct and indirect effects to all life stages of YT and habitat by reducing the potential of native surface road sediment run-off and provide additional protection to YT emerging in the spring for breeding. Opening roads within occupied habitat would likely increase potential disturbance to some YT adults and juveniles as they move into terrestrial habitats to enter torpor in the fall.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within occupied or suitable YT habitat include: Blocking route at both ends, waterbars, slash placement, brushing, drainage improvements at proper spacing to limit erosion, rock/slash placement at waterbar outlets to prevent continuation of gullies, gully repair, improved drainage management and stream crossing improvements.

Implementation of these project mitigation measures may result in short-term disturbance to some individual YT, but would limit route widening, reduce soil perturbation into meadows and streams and reduce sedimentation, providing some beneficial effects over the long-term. For site specific aquatic/riparian species mitigation measures on routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record and a summary in Appendix A of this document.

Alternative 3

Cross-Country Travel: Cross-country travel would be permanently prohibited under this alternative. Prohibition of cross-country travel would limit motor vehicle travel to only current NFTS roads. This would eliminate from approved use approximately 75,701 acres of suitable YT

habitat available to motor vehicles traveling cross-country and result in a reduction of direct and indirect effects to the YT. Implementation of this rule would also make the proliferation of additional routes an unauthorized action, which would reduce direct and indirect effects to YT from motorized travel over the short and long term.

This alternative would have a beneficial effect on the YT and its habitat by excluding approximately 61 miles of inventoried routes from authorized use in suitable or occupied YT habitat and allow for their natural recovery over the long term. Access to use areas would be only those that are currently managed.

Adding Routes or Use areas to the NFTS: There are no routes or use areas proposed to be added to the NFTS in Alternative 3.

Changes in Season of Use on Current NFTS Roads: Under this alternative, there are no changes to the current season of use NFTS road plan.

Project Mitigation Measures: No routes or use areas are proposed under this alternative; therefore, there are no project mitigation measures to be implemented.

Alternative 4

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 24 proposed routes and 3 use areas within occupied or suitable YT habitat in the project area. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 10 routes (2.5 miles), no meadow crossings and 1 use area (1.5 acres) proposed for addition to the NFTS within occupied YT habitat (Table 225). In addition, there are 14 routes (1.71 miles), no meadow crossings and 2 use areas (3.14 acres) proposed for addition to the NFTS within suitable YT habitat. This alternative would have a beneficial effect by excluding use of approximately 56.79 miles (93.1 percent of total miles) of inventoried routes within occupied or suitable YT habitat and provide for natural recovery over the long-term. Direct and indirect effects would be similar to those described in Alternative 2.

Since there is a decrease in the number of routes added to the system within occupied or suitable YT habitat compared to Alternatives 1 and 5, there would be an incremental decrease in the direct and indirect effects to habitat and individuals within the project area. Potential impacts of adding proposed routes and use areas directly effect less than 1 percent of suitable habitat analyzed which would likely impact individuals, but would not likely result in impacts to populations within the project area or lead to Federal listing or loss of viability over the short or long term.

Changes in Season of Use on Current NFTS Roads: In this alternative, 24 NFTS roads (10.5 miles) currently closed year round that are within occupied or suitable YT habitat are proposed for a new seasonal closure date (Table 225). Roads would not be open until May 20th (suitable habitat) or August 15th (occupied habitat). Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within occupied or suitable YT habitat include: waterbars, protection of meadow from sediment, deposition by slash placement, slash / groundcover to encourage deposition and prevent gullies, crossing improvements to minimize bank erosion, drain dips with equipment and ending a route at campsite, obliterating last ~250 ft down steep, sandy slope and rehab slope, including old route that is now a gully. Implementation of these project mitigation measures may result in short-term disturbance to some individual YT, but would limit route widening, reduce soil perturbation into meadows and streams and reduce sedimentation, providing some beneficial effects over the long-

term. For site specific aquatic/riparian species mitigation measures on routes proposed, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record and a summary in Appendix A in this document.

Alternative 5

Cross-Country Travel: Cross-country travel would be permanently prohibited in this alternative. Prohibition of cross-country travel would limit motor vehicle travel to current NFTS roads, 28 proposed routes and 3 use areas within occupied or suitable YT habitat in the project area. Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Adding Routes or Use Areas to the NFTS: Under this alternative, there are 14 routes (3.4 miles), 0 meadow crossings and 1 use area (1.5 acres) proposed for addition to the NFTS within occupied YT habitat (Table 225). In addition, there are 18 routes (2.18 miles), 0 meadow crossings and 2 use areas (3.16 acres) proposed for addition to the NFTS within suitable YT habitat. This alternative would have a beneficial effect by excluding use of approximately 55.42 miles (90.9 percent of total miles) of inventoried routes within YT habitat and provide for natural recovery over the long-term. Use areas would be limited to 3 in addition to currently managed ones. Direct and indirect effects would be similar to those described in Alternative 2.

Since there is a slight increase in the number of routes added to the system within suitable YT habitat compared to Alternatives 2 and 4, there would be an incremental increase in the direct and indirect effects to individuals within the project area. Potential impacts of adding proposed routes and use areas directly effect less than 1 percent of suitable habitat analyzed which would likely impact individuals, but would not likely result in impacts to populations within the project area or lead to Federal listing or loss of viability over the short or long term.

Changes in Season of Use on Current NFTS Roads: In this alternative, 32 NFTS roads (11.3 miles) currently closed year round that are within occupied or suitable YT habitat are proposed for a new seasonal closure date (Table 225). Roads would not be open until May 20th (suitable habitat) or August 15th (occupied habitat). Direct and indirect effects from this alternative would be similar to those described in Alternative 2.

Project Mitigation Measures: Under this alternative, project mitigation measures on routes within suitable YT habitat are described in Alternative 2 and 4.

Table 225. Direct and Indirect Effects Indicators for Alternative 1 through 5 for the Yosemite Toad

Yosemite toad - Direct and Indirect Effects Indicators	Alt. 1[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of proposed routes within 0.6 miles of known occupied habitat.	286	10	0	10	14
Miles of routes within 0.6 miles in known occupied habitat.	34.2	1.4	0	2.5	3.4
Number of meadow crossings of proposed routes in known occupied meadows.	1	0	0	0	0
Miles of proposed route crossings on known occupied meadows.	0.16	0	0	0	0
Number of proposed use areas within 0.6 miles of known occupied habitat.	378	0	0	1	1
Acres of use areas within 0.6 miles of known occupied habitat.	29.6	0	0	1.5	1.5

Yosemite toad - Direct and Indirect Effects Indicators	Alt. 1[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Number of proposed routes within 300 feet of suitable habitat.	255	13	0	14	18
Miles of routes within 300 feet of suitable habitat.	26.8	1.25	0	1.71	2.18
Number of meadow crossings on proposed routes in suitable habitat.	49	0	0	0	0
Miles of proposed route crossings on suitable habitat.	8.74	0	0	0	0
Number of proposed use areas within 300 feet of suitable habitat.	287	1	0	2	2
Acres of use areas within 300 feet of suitable habitat.	23.1	3.1	0	3.14	3.16
Percentage of occupied/suitable habitat directly impacted by routes/use areas added to the NFTS.	0.15 %	0.01 %	0 %	0.01 %	0.01 %
Number of NFTS roads with proposed changes to season of use within potential (suitable or occupied) habitat.	728	24	0	24	32
Miles of NFTS roads with proposed changes to season of use within potential (suitable or occupied) habitat.	347.8	9.5	0	10.5	11.3

[1] Alternative 1 is calculated as an estimate of the total number and miles of routes / acres of use areas that have been inventoried (2005) in cross-country travel areas in order to display a comparison between alternatives

Cumulative Effects Unique to this Species

There are no cumulative effects unique to this species. See Effects Common to all Aquatic Wildlife section.

Summary of Effects Analysis Across All Alternatives

The Yosemite toad (YT) is an endemic species to the State of California and is found at high elevations in the Sierra Nevada Mountains. Currently the YT only occupies approximately 50 percent of their historic range (Lannoo 2005). Direct, indirect and cumulative effects from **Alternatives 3** *will not affect* the YT (*No Effect*) and could have beneficial impacts. **Alternatives 2, 4** and **5** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the YT.* Based on the indicators evaluated, **Alternative 1** (current condition) has the highest probability of negative effects to YT. **Alternative 1** *may affect individuals, but is not likely to result in a trend toward Federal listing or a loss of viability for the YT*. For further discussion of the effects analysis and determinations, refer to the Aquatic Biological Assessment / Biological Evaluation (Barnes and Strand 2009) located in the project record.

Aquatic Habitat for Management Indicator Species

This section will summarize effects of the five alternatives on habitat for benthic macroinvertebrates, identified as the Management Indicator Species for aquatic habitat (USDA-FS 2007). The complete MIS report for the DEIS is part of the project record.

Aquatic Habitat

The analysis area drains approximately 1,243,000 acres. The analysis area (summarized in Table 226) consists of perennial streams (1,605 miles) and third order (intermittent) streams (1,673 miles) for a total of approximately 3,277 miles. The analysis area includes an estimated 17,220 acres of lakes. Riparian Conservation Areas (RCAs) (USDA-FS 2001, 2004) extend for 300 feet on either side of a perennial stream and lake, while intermittent streams have 150 feet from both channel banks. There are a total of 377,400 acres of RCA in the analysis area. The Cumulative Watershed Effects Analysis (Gallegos 2009 identified 5 HUC8 subdrainages at-risk of a cumulative watershed effect. Aquatic habitat elements evaluated for effects are flow, sediment and water surface shade.

Table 226. Aquatic Habitat within the HUC6 Subdrainage Forming the Analysis Area

HU6 (ac)	Streams (mi)		Lakes (ac)
	Perennial (mi) (order4+)	Intermittent (mi) (order 3)	
1,243,205	1,605	1,673	17,217

Flow is affected by climate, geology, elevation, aspect and topography. Trails and roads collect and transmit water during and following storm-events, thus represent an extension of the stream drainage system and possibly affect magnitude of peak flows. The density of routes within Riparian Conservation Areas (RCAs) is the measure of analysis for Flow.

Sediment consists of both fine-sized substrate and coarse sand (< 2 mm) and is an element of stream balance. Altering of flow magnitude can disrupt the water/sediment transport equilibrium of a stream system. Water and associated sediment enters the stream network at crossings, thus crossings are of particular concern due to connectivity. The number of crossings within RCAs is the measure of analysis for sediment.

Loss of vegetation is associated with the development of roads and trails. Roads and trails within RCAs could influence water temperature is the amount sunlight reaching the water surface increases. The miles of route within RCAs serve as the indictor for possible effects to Water Surface Shade.

Lacustarine/ Riverine Habitat Affects Summary

The indicators for each alternative is shown below in Table 227.

Table 227. Indicators for Aquatic Habitat

Aquatic Element	Indicators	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Flow	Inventoried / Proposed route density within RCA (mi/mi²)	0.32	0.02	0	0.02	0.04
	Potential to change habitat quality	Low/Moderate	Low	Low	Low	Low
Sediment	Number of stream crossings with RCA for routes	1586	147	0	96	201
	Potential to change habitat quality	Low/Moderate	Low	Low	Low	Low
Water Surface Shade	Inventoried / Proposed miles of route within RCA	179.7	13.87	0	11.16	21.7
	Potential to change habitat quality	Low	Low	Low	Low	Low

There are about 3,100 miles of road and about 550 miles of inventoried routes (Alternative 1) for a combined total of about 3,650 miles. Of this total, 1,009 miles of road and 180 miles of routes are located within RCAs with a combined density within RCAs of 2.0 mi/mi^2 (1.7 for roads and 0.3 for routes). There are 14,611 road stream crossings and 2,494 route stream crossings, with 10,335 (8,749 road crossings and 1,586 route crossings) located within RCAs. Alternative 1 (current conditions) represents the highest potential for effects to habitat and primarily related to continued cross-country travel within RCAs (377,400 acres), use areas in RCAs (158 acres), miles of route within RCA (180) and the number of stream crossings within RCAs (1,586). The current condition has the highest probability of affecting habitat quantity and quality primarily though sediment, which is reflected in five HUC8 subdrainages indicated to be at high risk of a cumulative watershed effect (Gallegos 2009). This could affect habitat quality for 29 stream miles and 1 acre of lake, which represents less than 0.9 percent of the potential aquatic/riparian species habitat evaluated within the HUC6 watersheds comprising the analysis area.

Under the action alternatives (2-5), it would be expected that any changes in flow and water surface shade would be too small to be measured, although local changes in water surface shade could occur within Miami Creek basin related to channel instability and undermining of bank trees. Aquatic habitat under these Alternatives would benefit from wet weather closures and prohibition of cross-country travel. Alternative 3 would represent the least effects to aquatic habitat with no routes or crossings being added to the NFTS. Under the action alternatives, use areas proposed within RCAs would be 3 acres for Alternative 2, 0 acres for Alternative 3, 3 acres for Alternative 4 and 7 acres for Alternative 5. The action alternatives (2-5) represent lower potential for reduction in habitat quality through elimination of cross-country travel, fewer acres of use areas within RCAs, along with fewer miles of route and stream crossings with RCAs. None of the Action Alternatives would alter the existing trend in the habitat or aquatic macroinvertebrates across the Sierra Nevada bioregion.

Wet Meadow Habitat for Management Indicator Species

This section will summarize effects of the five alternatives on habitat for Pacific tree frog, identified as the Management Indicator Species for wet meadow habitat (USDA-FS 2007). The complete MIS report for the DEIS is part of the project record.

Wet Meadow Habitat

There are approximately 10,295 acres of wet meadow habitat within the project analysis area (evaluated using GIS for HUC6 watersheds containing the ten analysis units).

For this analysis the acres of wet meadow habitat altered by the proposed alternatives for the project are evaluated. Routes and roads can affect meadows and wetlands directly by encroachment and indirectly by altering surface and subsurface flow paths. Hydrologic alteration can result in changes to channel morphology, resulting in channel downcutting, over-widening and lowering of the water table. Effects to meadows were evaluated as the miles of proposed route within the meadow and multiplying by 8 feet (routes analyzed have variable widths and 8 feet represents a maximum width scenario). Roads were evaluated using an 18-foot width template to estimate effects acres.

Wet Meadow Habitat Affects Summary

Table 228 summarizes the analysis effects on habitat for Pacific tree frog from each alternative.

Table 228. Indicator for Wet Meadow Habitat

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Miles of Route within Wet Meadow	3.51	0.07	0	0.03	0.10
Acres of Wet Meadow Affected by Routes	3.40	0.07	0	0.03	0.10
Miles of Road within Wet Meadow	12.7	12.7	12.7	12.7	12.7
Acres of Wet Meadow Affected by Roads	28	28	28	28	28
Total Acres of Affected Wet Meadow	31.4	28.7	28.0	28.0	28.1
Percent of Analysis Area Pacific tree frog habitat affected (10,300 acres)	0.30	0.28	0.27	0.27	0.27
Percent of bioregional Pacific tree frog habitat affected (66,000) acres	0.048%	0.043%	0.042%	0.042%	0.043%

Alternative 1 (current condition) represents the most disturbance to wet meadow habitat, a combined 35 acres of routes (3 ac.), use areas (4 ac) and road (28 ac). If a cumulative watershed effect were to occur within the five at-risk HUC8 subdrainages, there would be 45 acres of wet meadows potentially affected. If 80 acres of wet meadow habitat were to be negatively affected, it would represent effects to approximately 0.12% of bioregional habitat for Pacific tree frog (66,000 ac). The action alternatives (2-5) do not propose routes across meadows within the 5 HUC8 subdrainages at-risk of a CWE and proposed routes total less than 1 acre within wet meadow habitat. The primary cumulative impacts related to the Action Alternatives are the 28 acres of road within wet meadows, which represents combined effects to 0.04 percent of bioregional habitat for Pacific tree frog. Wet meadow habitat under the Action Alternatives would benefit from wet weather closures and prohibition of cross-country travel. None of the action alternative (2-5) would alter the existing trend in wet meadow habitat across the bioregion.

Compliance with the Forest Plan (LRMP) and Other Direction

To assist with the Travel Management Planning process, FS Pacific Southwest Region entered into programmatic consultation with the United States Fish and Wildlife Service (USFWS) for motor vehicle route designation. On December 27, 2006, the USFWS issued a Letter of Concurrence for 14 National Forests in California, including the SNF. 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 or additional consultation must take place for concurrence.

There are two species with PDC on the SNF that are present or have suitable habitat within the project area: Lahontan cutthroat trout and California red-legged frog.

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 on the SNF for the LCT (USFWS 1995). Project Design Criteria (PDC) for route designation are:

USFWS Project Design Criteria (PDC)

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 1 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of routes and stream crossings within the occupied subdrainages of LCT. This alternative would not comply with the above mentioned PDC. Alternatives 2, 3, 4 and 5 would prohibit cross-country travel and would not add any routes or stream crossings within the occupied subdrainages of LCT. Therefore, these alternatives would comply with the above mentioned PDC.
2. Alternative 1 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 2, 3, 4 and 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 without further consultation with USFWS. Therefore, these alternatives would comply with the above mentioned PDC.
3. Alternative 1 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. Alternative 1 would not comply with the outlined PDC. Alternatives 2, 3, 4 and 5 would prohibit cross-country travel and do 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 1 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of areas within RCAs in watersheds that provide habitat for LCT. Therefore, this alternative would not comply with the above mentioned PDC. Alternatives 2, 3, 4 and 5 would prohibit cross-country travel and do not add any areas within RCAs in watersheds that provide habitat for LCT. Therefore, these alternatives would comply with the above mentioned PDC.
5. Alternative 1 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 Alternative 1 would not comply with the above mentioned PDC. Alternatives 2, 3, 4 and 5 would prohibit cross-country travel and do not add any routes within RCAs in watersheds that provide habitat for LCT. Therefore, these alternatives would comply with the above mentioned PDC.

LRMP Direction

Establish a 200-foot zone on each side of all reaches of the tributaries to Portuguese Creek and Cow Creek where Lahontan cutthroat trout currently occur on all Class I, II and III tributaries above those reaches. Apply the following standards for this project within this zone:

- No motor vehicles will be allowed off permanent roads except as authorized by permit or contract;
- Ephemeral channels may only be crossed with equipment after consultation with a fisheries biologist (Standard and Guideline #39)

LRMP COMPLIANCE

Alternative 1 would not prohibit cross-country travel; therefore, this alternative would not prevent vehicles from accessing areas off permanent roads (except as authorized by permit or contract). Therefore, Alternative 1 would not comply with the above mentioned standards and guidelines. Alternatives 2, 3, 4 and 5 would prohibit cross-country travel and would not add any routes or use areas within LCT watersheds. Therefore, these alternatives would comply with the above mentioned standards and guidelines.

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 Sierra National Forest (SNF) (71 **FR** 19244). Project Design Criteria (PDC) for route designation are:

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

The following paragraphs describe how each alternative complies (or not) with the USFWS Project Design Criteria. Each numbered paragraph responds directly to the associated design criteria.

1. Alternative 1 does not prohibit cross-country travel and currently may have several inventoried routes that have the potential to capture surface run-off and then deliver sediment into a stream associated with the California red-legged frog. This alternative also does do not prevent the creation of new routes that may not be consistent with the PDC. Therefore, Alternative 1 would not comply with the above mentioned PDC. Alternatives 2, 4 and 5 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. If these routes are brought up to Forest standards, they should 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 (Table 229).
2. Alternative 1 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. Alternative 1would not comply with the above mentioned PDC. Alternatives 2, 4 and 5 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. These alternatives would not comply with the above mentioned PDC (Table 229) and would need additional consultation with USFWS. 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
3. There are no 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 no 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. Alternative 1 would not prohibit cross-country travel; therefore, this alternative would not prevent the creation of areas located outside of RR and RCAs, meadows and wetlands, within California red-legged frog habitat. Alternative 1 would not comply with the above mentioned PDC. Alternative 5 would prohibit cross-country travel but would add areas that do not avoid RCAs except where necessary to cross streams in suitable California red-legged frog habitat. This alternative would not comply with the above mentioned PDC (Table 229) and would need additional consultation with USFWS. Alternative 2, 3 and 4 would prohibit cross-country travel and would not add any routes to the NFTS in CRLF habitat; therefore, these alternatives would comply with the above mentioned PDC.
6. There are no 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 229. Routes or Use Areas Determined to be Inconsistent with USFWS Project Design Criteria for the California Red-legged Frog

		Route or Use Area is Proposed to be Added to the National Forest Transportation System		
Route Number or Use area	**PDC Consistency**	**Alternative 2**	**Alternative 4**	**Alternative 5**
SR-35z	Inconsistent	Yes	No	No
BP111	Inconsistent	No	Yes	Yes
AE-23	Inconsistent	No	No	Yes
Use area BLUCYN4	Inconsistent	No	No	Yes
Use area BLUCYN6	Inconsistent	No	No	Yes

For additional Forest Plan (LRMP) consistency checks to Standard and Guides outlined in this report refer to the Riparian Conservation Objectives Consistency Analysis (J. Gott, et al 2009).