United States
Department of
Agriculture

Forest
Service

Pacific
Southwest Region

R5-MB-166
December 2008

Draft Environmental Impact Statement

Plumas National Forest Public Motorized Travel Management

Plumas National Forest
Plumas County, California

Public Motorized Travel Management EIS

Draft Environmental Impact Statement

Lead Agency: USDA Forest Service
Cooperating Agency: California Parks and Recreation
Responsible Official: Alice B. Carlton, Forest Supervisor
Plumas National Forest
P.O. Box 11500
159 Lawrence Street
Quincy, CA 95971

For further information, contact:

Peter Hochrein
Plumas National Forest
P.O. Box 11500
159 Lawrence Street
Quincy, CA 95971
Phone: (530) 283-7718

Abstract: This Draft Environmental Impact Statement (EIS) describes the environmental effects of a proposal by the Plumas National Forest (PNF) to: 1. Prohibit cross-country motor vehicle travel off designated National Forest Transportation System (NTFS) roads, trails and areas by the public except as allowed by permit or other authorization (excluding snowmobile use). 2. Add 364 miles of existing unauthorized routes to the current system of NFTS trails currently open to the public for motor vehicle use. 3. Addition of 1 area, totaling 36 acres, where use of motor vehicles by the public would be allowed anywhere within that specifically delineated area. These actions are needed in order to implement the 2005 Travel Management Rule (36 CFR Part 212, Subpart B) while providing for a diversity of motor vehicle recreation opportunities and providing motorized access to dispersed recreation opportunities on the PNF. The Draft EIS discloses environmental impacts associated with the proposed action, a No-action Alternative and three additional action alternatives developed to meet the purpose and need and respond to issues raised by the public. Of the alternatives under consideration at this stage, Alternative 5 is preferred by the responsible official.

Reviewers should provide the Forest Service with their comments during the review period of the Draft EIS. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the Final EIS, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final EIS. City of Angoon v. Hodel (9th Circuit, l986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft EIS should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

Send Comments to: Alice B. Carlton, Forest Supervisor, c/o Plumas NF Travel Management Team, PO Box 11500, 159 Lawrence Street, Quincy, CA 95971. Comments may be hand delivered Monday through Friday, 8:00 am to 4:30 pm, excluding holidays. Comments may also be faxed to (530) 283-7746 or emailed to plumas_ohv_mail_in_database@fs.fed.us. The acceptable format(s) for electronic comments is: Microsoft Word or Rich Text Format. The Opportunity to Comment ends 45 days following publication of the notice of availability (NOA) in the Federal Register.

Summary of the Draft Environmental Impact Statement

Proposed Action

The Plumas National Forest (PNF) proposes the following actions: (1) The prohibition of motor vehicle travel off the designated National Forest Transportation System (NFTS) roads, motorized trails and areas by the public except as allowed by permit or other authorization (excluding snowmobiles). (2) The addition of 478 existing unauthorized routes (approximately 364 miles) to the current NFTS trails for public motor vehicle use. (3) The addition of 1 area, totaling 36 acres, where use of motor vehicles by the public would be allowed anywhere within that specifically delineated area.

Significant Issues

Internal and external scoping identified the following significant issues and these issues were used to develop the action alternatives (Table S-1).

Table S-1. List of significant issues.

Issue Topic	Cause and Effect
1. Access and Recreation Opportunity	The proposed action unreasonably restricts motorized recreation use. The prohibition on cross-country travel will severely limit recreation opportunities and access, and the addition of only 364 miles of motorized trails to the National Forest Transportation System (NFTS) provides insufficient public access to PNF lands and unfairly limits motorized recreation.
2. Proposed Citizen Inventoried Roadless Areas.	The proposed addition of motorized trails to proposed citizen inventoried roadless areas (CIRAs) will adversely affect the roadless characteristics of these areas including opportunities for solitude, undisturbed landscapes and primitive, non-motorized recreation.
3. Resource Impacts.	Many of the unauthorized routes proposed for addition to the NFTS as trails are poorly located and will cause adverse impacts to plants, wildlife, water quality, soils and other natural resources.

Alternatives Considered In Detail

The PNF developed five alternatives: the No-action, the Proposed Action, and three other action alternatives developed to meet the purpose and need and respond to the significant issues listed above. The five alternatives considered in detail for this analysis are listed in Table S-2. Complete details of the alternatives, including project design criteria, are found in Chapter 2 of this document.

Table S-2. List of alternatives considered in detail.

Alternative	Description
Alternative 1: No-action Alternative	The No-action Alternative provides a baseline for comparing the other alternatives. This alternative maintains the status quo. Under the No-action Alternative, current management plans would continue to guide management of the project area. No changes would be made to the current NFTS and no cross-country travel prohibition would be put into place. The Step 2 order would expire. The Travel Management Rule would not be implemented, and no Motor Vehicle Use Map (MVUM) would be produced. Motor vehicle travel by the public would not be limited to designated routes. The agency would take no affirmative action on any unauthorized routes. • Does Not Prohibit Cross-country Motorized Travel • Adds No New NFTS Facilities
Alternative 2: Proposed Action	The Proposed Action is the proposed changes to the NFTS and the prohibition of cross-country travel as described in the NOI published January 3, 2008 (Volume 73, Number 2): 1. The prohibition of cross-country motor vehicle travel off designated NFTS roads, motorized trails and areas by the public except as allowed by permit or other authorization (excluding snowmobile use). 2. The addition of approximately 364 miles of existing unauthorized routes to the current NFTS trails for public motor vehicle use, and 3. The addition of one 36-acre area, where use of motor vehicles by the public would be allowed anywhere within that specifically delineated area. • Prohibits Cross-country Motorized Travel • Adds: 364 Miles of NFTS Motorized Trails • Adds One Specifically Delineated 36-Acre Area Open to Motor Vehicles
Alternative 3:	Alternative 3 meets the objective of prohibiting cross-country travel, but proposes no new additions to the existing system of roads and trails. It responds to the issues of proposed citizen inventoried roadless areas (CIRAs) and natural resource impacts by prohibiting cross-country travel without adding any additional facilities to the NFTS. This alternative also provides a baseline for comparing the impacts of other alternatives that propose changes to the NFTS. • Prohibits Cross-country Motorized Travel • Adds No New NFTS Facilities
Alternative 4:	Alternative 4 emphasizes natural resource protection and avoidance of CIRAs. This alternative prohibits cross-country travel, adds no motorized routes to CIRAs, California red legged frog critical aquatic areas and does not add routes where resource concerns require extensive trail mitigation. • Prohibits Cross-country Motorized Travel • Adds: 141 Miles of NFTS Motorized Trails • Changes Vehicle Class on 11.3 Miles of NFTS Roads
Alternative 5:	Alternative 5 emphasizes access and motorized recreation opportunity. This alternative prohibits cross-country travel and incorporates suggestions for additional and alternative routes received during scoping. This includes trails identified during scoping as necessary to access dispersed campsites and recreational use. Mitigation on trails with resource concerns would occur thereby allowing trails with resource concerns to be included. Trails with extensive or critical trail mitigations would be added to the NFTS, but not placed on the MVUM as open to the public until the mitigation has been completed. • Prohibits Cross-country Motorized Travel • Adds: 251 Miles of NFTS Motorized Trails • Adds One Specifically Delineated 36-Acre Area Open to OHV Use • Changes Vehicle Class on 11.3 Miles of NFTS Roads

Summary of Environmental Consequences

Table S-3 summarizes the environmental consequences by providing an average ranking of each alternative by resource area. Detailed information can be found in Chapter 3.

Table S-3. Summary of environmental consequences by alternatives

Resource Area:	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Aquatic Biota	1.0	2.0	5.0	4.0	3.0
Botanical Resources	1.0	2.0	5.0	4.0	3.0
Cultural Resources	1.0	2.0	5.0	4.0	3.0
Noxious Weeds	1.0	2.0	5.0	4.0	3.0
Recreation Resources	3.4	4.2	3.4	3.7	4.1
Visual Resources	1.0	3.7	5.0	4.4	4.2
Transportation Facilities	1.0	3.6	5.0	4.2	4.0
Water and Soil Resource	1.0	2.0	5.0	4.3	3.6
Terrestrial Biota	1.0	2.0	5.0	4.0	3.0

[1]A score of 5 indicates the alternative has the least impact for the specified resource; a score of 1 indicates the alternative has the most impact for specified resource. See Chapter 3 for more details.

Table of Contents

List of Tables

List of Figures

Chapter 1 Purpose and Need for Action

1.1 Document Structure

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

- Chapter 1. Purpose and Need for Action: This chapter briefly describes the proposed action, the need for that action, and other purposes to be achieved by the proposal. This section also details how the Forest Service informed the public of the proposed action and how the public responded.
- Chapter 2. Alternatives, including the Proposed Action: This chapter provides a detailed description of the agency's proposed action as well as alternative actions that were developed in response to comments raised by the public during scoping. The end of the chapter includes a summary table ranking the proposed action and alternatives with respect to their environmental impacts.
- Chapter 3. Affected Environment and Environmental Consequences: This chapter describes the environmental impacts of the proposed action and alternatives.
- Chapter 4. Consultation and Coordination: This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.
- Index: The index provides page numbers by document topic.
- Appendices: The appendices provide more detailed information to support the analyses presented in this Environmental Impact Statement.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at Plumas National Forest Supervisor's Office, Quincy CA.

1.2 Background

Over the past few decades, the availability and capability of motor vehicles, particularly off-highway vehicles (OHVs) and sport utility vehicles has increased tremendously. Nationally, the number of OHV recreationists has climbed sevenfold in the past 30 years, from approximately 5 million in 1972 to 36 million in 2000. California is experiencing the highest level of OHV use of any state in the nation. There were 786,914 All Terrain Vehicles (ATVs) and OHV motorcycles registered in 2004, up 330 percent since 1980. Annual sales of ATVs and OHV motorcycles in California were the highest in the U.S. for the last 5 years. Four-wheel drive vehicle sales in California also increased by 1,500 percent to 3,046,866 from 1989 to 2002.

Unmanaged motor vehicle use, particularly OHV use, has resulted in unplanned roads and trails, erosion, watershed and habitat degradation, and impacts to cultural resource sites. Compaction and erosion are the primary effects of motor vehicle use on soils. Riparian areas and aquatic dependent species are particularly vulnerable to damage from motor vehicle use. Unmanaged recreation, including impacts from OHVs, is one of “Four Key Threats Facing the Nation’s Forests and Grasslands.” (USDA Forest Service, June 2004).

On August 11, 2003, the Pacific Southwest Region of the Forest Service entered into a Memorandum of Intent (MOI) with the California Off-Highway Motor Vehicle Recreation Commission and the Off-Highway Motor Vehicle Recreation Division of the California Department of Parks and Recreation. That MOI set in motion a Region-wide effort to “Inventory and designate OHV roads, trails, and any specifically defined open areas for motor vehicles on maps of the 18 National Forests in California by 2007.”

On November 9, 2005, the Forest Service published final travel management regulations in the Federal Register (FR Vol. 70, No. 216-Nov. 9, 2005, pp 68264-68291),, 36 CFR 212, Subpart B of the final Travel Management Rule requires designation of those roads, trails, and areas that are open to motor vehicle use on National Forests. Only roads and trails that are part of a National Forest Transportation System (NFTS) may be designated for motorized use. Designations are made by class of vehicle and, if appropriate, by time of year. Part 261 – Prohibitions, Subpart A (36 CFR 261.13) of the final rule prohibits the use of motor vehicles off designated roads, trails and areas, as well as use of motor vehicles on roads and trails that are not consistent with the designations.

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

The Plumas National Forest has 999,521 acres currently open to cross-country travel by motor vehicles. In 2005, the Plumas National Forest completed an extensive inventory of unauthorized routes on NFS lands open to cross-country travel as described in the MOI. Approximately 1,109 miles of unauthorized routes were identified. The Forest then used an interdisciplinary process to review the existing NFTS and the inventory of unauthorized routes to identify proposals for limited changes to the NFTS. This process included review of the Forest Plan, internal and external discussions, including extensive public collaboration workshops and input, and internal and external validation of the locations of unauthorized routes using the inventory maps. The travel management regulations provide for the incorporation of previous decisions regarding travel management. Roads, trails and areas that are currently part of the Plumas National Forest transportation system and open to motor vehicle travel will remain designated for such use. This proposal makes needed changes (additional motorized trails and areas, seasonal restrictions, etc.) to the Plumas National Forest NFTS trails and areas on NFS lands in accordance with the Travel Management Rule (36 CFR Part 212, Subpart B).

In accordance with Subpart B of the Travel Management Rule (36 CFR 212.56), following a decision on this proposal, the Forest will publish a Motor Vehicle Use Map (MVUM) identifying all Plumas National Forest NFTS roads, trails and areas that are designated for motor vehicle use. The MVUM shall specify the classes of vehicles and, if appropriate, the time of year for which use is designated. Upon publication of the MVUM, it is prohibited to possess or operate a motor vehicle on NFS lands other than in accordance with those designations. These maps shall be made available to the public on the internet and at the headquarters of corresponding administrative units and Ranger Districts of the National Forest System. The unauthorized routes not included in this proposal are not precluded from future consideration for either removal from the landscape and restoration to the natural condition or addition to the NFTS and inclusion on a MVUM. Future decisions associated with changes to the NFTS and MVUM are dependent on available staff and resources and may trigger the need for additional environmental analysis, public involvement, and documentation.

1.2.1 Travel Management on the Plumas National Forest

Management of the transportation system on the Plumas National Forest is a dynamic process. This proposal is just one project, among many, in the Forest’s long-term goal of managing the transportation system. Previous decisions have substantially reduced the number of miles of NFTS roads and trails available for motorized use and in some cases restricted the season of use. These previous decisions have resulted in decommissioning 56 miles of system roads and 91 miles of unclassified roads. The net result is that the existing NFTS roads open year round have been reduced by 1.4 percent. This has been accomplished through Forest Planning, vegetation management projects, watershed restoration projects, fuel treatment projects; trail management decisions, landscape analysis, watershed analysis and the Roads Analysis Process (RAP). All of these efforts have helped to identify and manage the current transportation system.

In addition to this proposal, ongoing efforts to manage motor vehicle travel on the Forest include (1) An interim Forest Order (MOI – Step 2) prohibiting cross-country motorized travel for resource protection pending a decision on this proposal, (2) reducing adverse environmental impacts associated with unauthorized motorized trails through various project-level planning efforts, and (3) addressing impacts associated with the current NFTS through the Forest’s road and trail maintenance program.

Implementation of this proposal and subsequent designation of motorized routes through publication of the MVUM is only one step in the overall management of the Plumas National Forest NFTS.

1.2.2 Project Location

The proposal includes the entire Plumas National Forest. The Forest is located in northeast California (Figure 1).

Figure 1. Plumas National Forest Vicinity Map

1.3 Purpose and Need

The following needs have been identified for this proposal:

1. There is a need for regulation of unmanaged motor vehicle travel by the public. The proliferation of unplanned, unauthorized, non-sustainable roads, trails and areas created by cross-country travel adversely impacts the environment. The 2005 Travel Management Rule, 36 CFR Section 212, Subpart B, provides for a system of NFTS roads, NFTS trails and areas on National Forest System lands that are designated for motor vehicle use. After roads, trails , and areas are designated, motor vehicle use off designated roads and trails and outside designated areas is prohibited by 36 CFR 261.13. Subpart B is intended to prevent resource damage caused by unmanaged motor vehicle use by the public. In accordance with national

direction, implementation of Subpart B of the travel management rule for the Plumas National Forest is scheduled for completion in 2009.

2. There is a need for limited changes to the Plumas NFTS to:
    - Provide motor vehicle access to dispersed recreation opportunities (camping, hunting, fishing, hiking, horseback riding, etc.). A substantial portion of known dispersed recreation activities are not typically located directly adjacent to existing NFTS roads or NFTS motorized trails. Some dispersed recreation activities depend on foot or horseback access, and some depend on motor vehicle access. Those activities accessed by motor vehicles are typically accessed by short spurs that have been created primarily by the passage of motor vehicles. Many such unauthorized "user-created" routes are not currently part of the NFTS. Without adding them to the NFTS and designating them on a MVUM, the regulatory changes noted above would make continued use of such routes illegal and would preclude public access to many dispersed recreation activities.
    - Provide a diversity of motorized recreation opportunities (4X4 vehicles, motorcycles, ATVs, SUVs, passenger vehicles, etc.). It is Forest Service policy to provide a diversity of road and trail opportunities for experiencing a variety of environments and modes of travel consistent with the National Forest recreation role and land capability (FSM 2353.03(2)). Implementation of Subpart B of the Travel Management Rule would severely reduce acres and miles of motorized recreation opportunities relative to current levels. As a result, there is a need to consider limited changes to the NFTS.

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

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

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

- Speed, volume, composition and distribution of traffic on roads.
- Compatibility of vehicle class with road geometry and road surfacing

- Maintaining valid existing rights of use and access (rights-of-way).

1.4 Proposed Action

10. **Prohibition of cross-country motor vehicle travel off designated NFTS roads, motorized trails and areas by the public except as allowed by permit or other authorization (excluding snowmobile use).**
11. **Additions to the National Forest Transportation System (NFTS)**—The PNF currently manages and maintains approximately 4,137 miles of NFTS roads and 123 miles of NFTS motorized trails. Based on the stated purpose and need for action, the PNF proposes to add approximately 364 miles of existing unauthorized routes. These additions would bring the total NFTS motorized trails to 496 miles.
12. **Motorized Open Area Addition**—The PNF currently has 1 area (approximately 4 acres) designated open to motor vehicle use. The PNF proposes to designate 1 additional open area (36 acres).

A detailed description of the proposed action can be found in Chapter 2 of this EIS. Maps depicting the proposed action are posted on the Plumas National Forest website.

1.5 Principle Laws and Regulations that Influence the Scope of this EIS

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

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

1.6 Decision Framework

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

1.6.1 Responsible Official

The Forest Supervisor for the Plumas National Forest will be the deciding official. The Forest Supervisor will sign the Record of Decision (ROD).

1.7 Public Involvement

The Interdisciplinary Team relied on public involvement to ensure that a full range of alternatives, representing a broad array of perspectives, would be analyzed. Public involvement occurred during three key periods: first during the public collaboration process that began in 2004, second during the 60-day public scoping period for the Notice of Intent (NOI), and third during meetings with public groups to explore issues they raised during scoping.

Tribal consultation occurred concurrently with other public involvement activities. The project was discussed at multiple meetings with Concow Maidu Tribe of Mooretown Rancheria, Estom Yumeka Tribe of Enterprise Rancheria, Greenville Rancheria, Mechoopda Indian Tribe of Chico Rancheria, Susanville Indian Rancheria, Tyme Maidu Tribe of Berry Creek Rancheria, and Washoe Tribe of California and Nevada. Letters were sent to the tribes throughout the planning process, as well.

In the spring of 2007, a series of three public meetings and three workshops were conducted to identify which of the routes and areas should become part of the proposed action, the type of use that each would have, and locations to be considered for dispersed recreation use per the new Travel Management Rule. The concept of “mixed use” was also introduced during these meetings. At the first session of the two-part series, public meetings were held in Quincy (April 17) Portola (April 18), and Oroville (April 19). At the second set of workshops, individuals worked with Forest Service specialists to identify important routes. These meetings were held in Blairsden (May 2), Quincy (May 3) and Oroville (May 10). Groups shared their ideas and their various concerns. Roughly 300 people participated in these workshops. In early 2007, an e-mail update was issued sharing information on the meetings and the outcome. The Forest Service Interdisciplinary Team took this information and developed the proposed action for the NOI.

1.7.1 60-Day Public Scoping Period for the Notice of Intent

In January 2008, the Forest Service completed the Proposed Action and Notice of Intent to Prepare an Environmental Impact Statement based on comments from the meetings held in the spring of 2007. The comment period on the proposed action began on January 3, 2008, and ended March 3, 2008. Presentations to a variety of groups, phone calls, news releases, website postings and emails were used to alert the public of the opportunity to comment on the proposed action. Public meetings were held in Blairsden (January 15), in Quincy (January 22) and in Oroville (January 29) to explain the Proposed Action. Over 3,300 comments were received. Many were identical emails.

1.8 Issues

Comments from the public, other agencies, and the Washoe Tribe were used to formulate issues concerning the proposed action. An issue is a matter of public concern regarding the proposed action and its environmental impacts. The Forest Service separated the issues into two groups: significant and non-significant. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: (1) outside the scope of the proposed action; (2) already decided by law, regulation, the Forest Plan, or other higher level decision; (3) irrelevant to the decision to be made; or (4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

1.8.1 Significant Issues

Issue 1: The proposed action unreasonably restricts motorized recreation use by prohibiting cross-country travel and restricting use to designated routes. The addition of only 364 miles of NFS motorized trails to the NFTS provides insufficient public access to PNF NFS lands and unfairly limits motorized recreation.

Discussion: Concerns were raised that restricting cross-country travel across the entire Forest by restricting use to designated routes severely impacts motorized recreation opportunities and unfairly restricts access for hunting, fishing, camping and a host of other outdoor activities. The route inventory identified 1,109 miles of unauthorized routes being used and the proposed action only retains 364 miles of these. This is insufficient to maintain a quality motorized recreation experience on the PNF.

Issue 2: The proposed addition of motorized trails to proposed citizen inventoried roadless areas (CIRAs) will adversely affect the roadless characteristics of these areas including opportunities for solitude, undisturbed landscapes and primitive, non-motorized recreation.

Discussion: Concerns were raised that adding motorized trails CIRAs on the Plumas National Forest would reduce opportunities for solitude, and primitive non-motorized experiences would be ruined by the noise and disturbance of vehicles. Motorized trails would change the character of these areas.

Issue 3: Many of the motorized trails proposed for addition to the NFTS are poorly located and will cause adverse impacts to plants, wildlife, water quality, soils and other natural resources.

Discussion: Many commenters expressed concerns about impacts to a variety of natural resources, citing stream crossings, habitat fragmentation, wildlife disturbance, sedimentation, cultural resources, invasive weeds and other resources that would be impacted by motorized use of roads and trails added to the NFTS.

1.8.2 Non-significant Issues

1. **Snowmobile Use**: Concerns were expressed regarding the impacts of snowmobile use on the Plumas National Forest.

   Reasons why not addressed in the proposed action: Designation of areas open to snowmobile use is covered under 36 CFR 212, Subpart C, and is outside of the scope of this decision, which is focused on implementing 36 CFR 212, Subpart B of the Travel Management Rule.

2. **Other types of wheeled vehicle use (mountain bikes) or other forms of travel (hiking, horseback riding)**: Concerns were expressed regarding the need to provide opportunities for non-motorized forms of travel.

   Reasons why not addressed in the proposed action: This issue is outside of the scope of the purpose and need for the project. This proposal is focused only on motor vehicle use in accordance with 36 CFR 212, Subpart B of the Travel Management Rule.

Addressing maintenance and decommissioning needs on the National Forest Transportation System (NFTS): Concerns were expressed that the Forest should reconsider previous decisions to establish system roads and trails in the NFTS. Some existing system roads and trails are in need of repair and maintenance and should be either repaired or closed as part of the proposal.

Reasons why not addressed in the proposed action: The proposed action implements 36 CFR 212, Subpart B of the Travel Management Rule, which states: *"The responsible official may incorporate previous administrative decisions regarding travel management made under other authorities, including designations and prohibitions of motor vehicle use, in designating National Forest System roads, National Forest System trails, and areas on National Forest System lands for motor vehicle use under this subpart"* (36 CFR: **§** 212.50 (b)). The responsible official has determined that existing NFTS roads and trails will not to be considered for repair, reconstruction, or decommissioning as part of this proposal. Repair and maintenance of the existing NFTS are routine, ongoing activities on National Forests and are typically categorically excluded from documentation in an environmental assessment or environmental impact statement in accordance with agency policy in Forest Service Handbook 1909.15, Chapter 30, Section 31.12 (4) "Repair and maintenance of roads trails and landline boundaries." Further, re-evaluation of previous decisions that established the current NFTS is not necessary for implementing 36 CFR 212, Subpart B of the Travel Management Rule. However, past, present, and future environmental impacts of the current NFTS are incorporated into cumulative effects analyses for the proposed action and alternatives. Decommissioning occurs on an ongoing basis when roads and trails are no longer needed or are relocated for resource protection. Typically this occurs as part of vegetation management projects, watershed restoration projects, fuel treatment projects, and trail construction projects.

Chapter 2 Alternatives, Including the Proposed Action

2.1 Introduction

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

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

This chapter is divided into four parts:

- Part 1 describes how the alternatives were developed.
- Part 2 presents the alternatives considered in detail.
- Part 3 presents the alternatives that were considered, but eliminated from detailed analysis. It includes the rationale for eliminating these alternatives.
- Part 4 compares the alternatives based on their environmental, social and economic consequences, and includes a comparative display of the projected effects of the alternatives.

2.2 How the Alternatives Were Developed

The four action alternatives represent a wide range of perspectives designed to address the issues as described in the Purpose and Need (Chapter 1).

2.2.1 Refining Alternatives Submitted by the Public During Scoping

During the 60-day public scoping process alternatives were submitted for consideration by two groups. After the scoping period concluded, the Forest Service met with each of these groups to review and give due consideration to their proposals. The resulting alternatives incorporate these and other suggestions offered by the public.

Also important in this process were the ideas and advice gathered by the Forest Service in their consultation and discussions with tribal representatives, local counties, and Forest Service employees. State and Federal agencies advised the process through numerous informal contacts.

2.3 Alternatives Considered in Detail

Four action alternatives (Alternatives 2, 3, 4, and 5) and a No-action Alternative (Alternative 1) are analyzed in detail in this EIS. The No-action Alternative represents the continuation of cross-country travel including continued use of all unauthorized routes by motor vehicles. This alternative serves as a baseline for comparison among the alternatives, and is required by the implementing regulations of the NEPA.

Currently, the PNF has an interim Forest Order in place that prohibits motorized cross-country travel and confines motor vehicles to the National Forest Transportation System and existing unauthorized routes. This prohibition will remain in effect until December 31, 2009. It is assumed that unless one of the action alternatives implementing the Travel Management Rule is selected, the temporary forest order prohibiting motorized cross-country travel would expire and motorized cross-country travel would resume under the No-action alternative.

The planning area for the alternatives includes National Forest System (NFS) lands on the PNF. It does not include any private, state, or other federal lands.

Each alternative assumes that other adjacent federal lands, such as those administered by the Bureau of Land Management would be managed according to existing management plans and applicable federal laws. Each alternative also assumes that private lands would meet applicable state and federal land use regulations.

2.3.1 Monitoring

All action alternatives will adhere to the Travel Management Monitoring Plan. Monitoring is critical for evaluating the effectiveness of management decisions and the accuracy of analysis assumptions and conclusions. Monitoring of road and trail conditions is required, and must meet Regional and/or National standards. If monitoring determines additional resource damage is occurring, steps to prevent further damage must be taken. If the mitigations are not effective or are not possible, additional road or trail closures may be required (will require additional NEPA analysis). It is also important to develop a monitoring strategy that: (1) Develops a baseline prior to project implementation and mitigations. (2) Is helpful in making effective management decisions in the future, and (3) Is feasible to implement. Once implementation begins, more effective monitoring elements may be identified and implemented.

Road and trail condition monitoring: Trails may be monitored using the deferred maintenance condition survey protocol. A sampling of the routes should be completed each year; trails would be monitored on a 5-year cycle. Both PNF employees and the public would use this monitoring process to document trail conditions, based on field observations and measurements. Information derived from this monitoring is used to update the maintenance schedule and assist in prioritizing maintenance needs. Initially, the monitoring would focus on the unauthorized routes that have been added to the NFTS.

Heritage monitoring: The Motorized Recreation Programmatic Agreement with the State Historic Preservation Office (SHPO) outlines future work in support of the selected alternative that would include the development of a monitoring plan for at-risk historic sites in order to measure effects. This plan would also include monitoring in areas within the NFTS with high concentrated use and high site density or high value sites.

Sensitive plant and noxious weed monitoring: Monitoring would occur along routes added to the NFTS that have been identified as a high risk to sensitive plants or as highly vulnerable to noxious weed spread (see Biological Evaluation and Noxious Weed Risk Assessment in the Project Record). These areas have the greatest potential for adverse effects from the continued use of public motor vehicles. Sites monitored may vary from year to year. If negative impacts are documented, appropriate mitigation measures (i.e. signs or weed treatments) would be developed and implemented.

Soil and water monitoring: A portion of the set of trails monitored annually for road and trail condition (described above) would also be monitored for soil and water impacts. Evaluations E08 and E09 of the USFS Pacific Southwest Region's "Best Management Practices (BMPs) Evaluation Program" (May 2002) would be used to evaluate whether the monitored trails are impacting soil or water resources. These evaluations were developed to monitor the condition and drainage features of road surfaces and road/stream crossings. While OHV trails are typically narrower and often steeper than forest roads, the drainage practices that are necessary to protect soil and water quality are the same for both types of facilities. Monitoring would occur along routes that have been identified as a higher risk to soil or water resources (see Appendix A and the Soil and Water Resources section of Chapter 3).

2.3.2 Implementation Strategy

The Forest Service developed the following management strategies to be used as part of all of the action alternatives to improve implementation of the designated route system:

- Based on the selected alternative, produce a primary Motor Vehicle Use Map (MVUM) following National Forest Service standards that indicates which routes are designated open to the public by type of vehicle per route and season open for use. The MVUM would be used for law enforcement. This map would be made available to the public free of charge. Designations, use restrictions, and operating conditions would be revised in future decisions as needed to meet changing conditions or management strategies.
- Produce a subsequent local travel map following production of the primary MVUM that indicates which routes are designated open to the public by type of vehicle per route and season open for use, and identifies other important features on the Forest that would help the public navigate the system.
- Provide a Forest brochure in conjunction with the public MVUM with clear and simple explanation of the rules and restrictions, and examples of signs on the ground.
- Provide clear, consistent, and adequate signs that identify trails designated open by type of vehicle per route and season open for use corresponding to the public MVUM and local travel map. Signing of dead-end routes leading to/stopping at rivers, streams, meadows, and other sensitive resources would be a priority to help protect resources from public motor vehicle damage.
- Begin working with a collaborative group of public stakeholders within six months of the final decision. This group would work together with the Forest Service to implement the designated system, including:
  - Development of a public education strategy to educate Forest visitors about the designated route system, to assist the public with reading the public MVUM and local travel map, to educate Forest visitors about the potentially negative effects of motorized travel activities, and to discuss how the public can help with implementation of the

designated system by volunteering for maintenance activities, enforcement of the rules, and education of other Forest visitors.

- Development of a public volunteer strategy to identify opportunities for the public to help implement, enforce, maintain, and fund the designated route system.

2.3.3 Mitigations for Soil and Water Resource Impacts

Typical site-specific mitigations for existing, unauthorized routes that are proposed for addition to the NFTS may include:

1. **Out-sloping of motorized trail template**: Out-sloped trail templates are desirable because runoff is dispersed and flows across the trail surface and is not confined to the trail surface or directed to an inside ditch. If the surrounding topography is conducive, segments of routes that are currently entrenched or in-sloped may be out-sloped with a backhoe or a dozer to more closely match the hillside drainage pattern that would naturally occur if the trail template was not there.
2. **Installation of surface drainage structure**: Many of the existing, unauthorized routes have long stretches in which runoff is confined to the route surface and causes excessive rilling. Surface drainage structures would be installed to shunt this water off the trail at frequent intervals so that the runoff does not gain enough momentum to cause rilling and erosion. Rolling dips are the preferred surface drainage structure because those dips are more conducive to motorized travel than waterbars. Rolling dips are constructed with a dozer, excavator or by hand by pushing a broad, shallow trough in the trail that slopes toward the fill slope. The material excavated from the trough is feathered into the down-trail side of the trough to create a gradual hump across the trail surface that would keep runoff in the trough. To provide effective surface drainage, rolling dips are typically installed so that trail lengths in which surface drainage is not shunted off of the trail do not exceed 500 feet. Rolling dips would be installed more frequently on steeper trails or trails with erodible surface soils.
3. **Installation or improvement of trail/stream crossing structure**: Many of the existing, unauthorized routes were user-created or created for temporary use during the dry summer season. Such trails may cross ephemeral or intermittent stream drainages but may not have had stream crossing structures installed. At these crossings, erosion of the surface or fill slope can readily occur during higher flows or the trail template may even capture the stream flow, diverting the stream down the trail for several hundred feet. A typical crossing mitigation would be to install a rocked ford (or “low water crossing”) structure. These fords would drop the route surface down to match the natural streambed elevation that exists upstream and downstream of the route. The ford surface is typically armored with 4-12” angular diameter rock that is compacted in place to result in a decent running surface. For steeper stream channels (greater than 5 to 10%), the fill slope would be armored with larger riprap to prevent erosion of the fill slope from the downstream edge of the ford down to the downstream channel.

4. **Armored dip to relieve diversion potential**: Culverts currently exist at stream crossings for many of the existing unauthorized routes. All culverts are prone to blockage during high flows, usually initiated by bedload or woody debris accumulating at the inlet. If a culvert is blocked or does not hold the capacity for the flood flow, water may back up and flow onto the trail. Some trail/stream crossings are configured such that this water will then flow down the trail surface rather than flowing directly across the trail and back into the stream channel. This diverted stream flow can cause excessive erosion of the trail surface and fill slope. An effective mitigation to prevent stream diversion is to install a small rocked dip similar to the ford described in #3 above. This dip would rarely flow water (typical stream flows would run under the trail through the culvert) but, in the event that the culvert is blocked, the backed up water will flow through the dip, directly over the trail and back into the stream channel, preventing diversion of the stream down the trail surface.
5. **Relocation of short segments**: Short segments of existing, unauthorized routes could be relocated to reduce adverse impacts to soil and water resources. The previous location of the route would be obliterated, including plowing (subsoiling) of the surface and restoration of natural hillside topography and vegetation. Segments to be relocated would typically be those located close to sensitive stream channels, entrenched segments, or those segments located in steep or highly erodible soils. Since trail relocation would involve ground disturbance off of the existing route template, additional NEPA analysis would likely be required.

2.3.4 Descriptions of the Alternatives

This section describes each of the five alternatives considered in detail. The alternatives are described as follows:

1. **Cross-country travel**. Generally, all of the action alternatives prohibit cross-country travel except in smaller "open" areas that are specifically designated for such use. Open areas are described below under "Roads, trails and areas to be added to the National Forest System".
2. **Changes to the existing National Forest Transportation System (NFTS):** The alternatives vary in changes to the existing NFTS in terms of vehicle class and/or season of use.
3. **Additions to the NFTS**: Each alternative includes lists of trails and open areas that are proposed for addition to the NFTS. Each of these trails is identified by a unique trail number and open areas are identified by name and location. All proposed trail additions have an assigned maintenance level based on specific trail management objectives. All proposed trails would receive the appropriate level of routine maintenance such as brushing, signing, cleaning, clearing debris, etc. Each trail or area is site-specifically addressed in "Appendix A—Route Analysis Database Summary Report" where site-specific reviews by resource specialists are documented. Resource specialists reviewed all proposed trails and open areas to determine site-specific impacts. For some trails and areas, no work beyond routine maintenance is needed. For others, additional work is needed to bring the trail or area up to a safe and environmentally sustainable condition. Where specific actions are identified for a

given trail, such actions must be completed prior to designation of the trail for public motorized use.

2.3.4.1 Alternative 1: No-action

The No-action Alternative provides a baseline for comparing the other alternatives. Under the No-action alternative, current management plans would continue to guide management of the project area. No changes would be made to the current NFTS and no cross-country travel prohibition would be put into place. The Travel Management Rule would not be implemented, and no Motor Vehicle Use Map (MVUM) would be produced. Motor vehicle travel by the public would not be limited to designated routes. Unauthorized routes would continue to have no status or authorization as NFTS facilities.

1. Cross-country travel: Motor vehicle travel off designated NFTS roads, NFTS trails and areas by the public would continue except as prohibited by Forest Order.
2. Roads trails and areas added to existing NFTS: No roads, trails or areas are proposed for addition to the NFTS under this alternative.
3. Over 1,109 miles of unauthorized routes would receive continued use. Of these, approximately 725 miles are suitable for all vehicles, 159 miles are 50” or less in width and 225 miles are suitable for motorcycles only. Routes would continue to proliferate.

2.3.4.2 Alternative 2: Proposed Action

The Proposed Action contains the proposed changes to the NFTS and the prohibition of cross-country travel as described in the NOI published January 3, 2008 (Volume 73, Number 2):

1. Cross-country travel: Motor vehicle travel off designated NFTS roads, NFTS trails and areas by the public except as allowed by permit or other authorization would be prohibited.
2. Roads trails and areas added to the existing NFTS: The following table displays those trails and areas to be added into the NFTS (Table 1) and their season of use. Trails with an asterisk (*) after the trail number would need mitigation completed prior to being added to the MVUM and used by the public (see Appendix A for more information).
3. Sly Creek (36 acres) would be added as a motorized area open for yearlong use for vehicles 50” or less in width.

Table 1. Alternatives—Trails added to the National Forest Transportation System under Alternatives 2 through 5

Trail #	Vehicle Type	District	Season	Alt 2	Alt 4	Alt 5
4M01*	Motorcycle Only	Feather River		1.55		1.55
4M02	Motorcycle Only	Feather River		0.76		
5M01	Motorcycle Only	Feather River	6/1-12/1	2.16		2.16
5M02	Motorcycle Only	Feather River	5/1-12/1	2.74		2.54
5M04	Motorcycle Only	Feather River	5/1-12/1	1.92		1.92
5M05	Motorcycle Only	Feather River	5/1-12/1	0.88		0.88
5M06	50" or less in width	Feather River	5/1-12/1	0.47		
5M07*	Motorcycle Only	Feather River		0.29		0.29
5M08*	Motorcycle Only	Feather River	5/1-12/1	0.45		0.45
5M08A	50" or less in width	Feather River	5/1-12/1	0.12		
5M09	50" or less in width	Feather River	5/1-12/1	0.65		0.65
5M10	Motorcycle Only	Feather River		0.28		0.28
5M11	Motorcycle Only	Feather River	5/1-12/1	0.65		0.65
5M12	Motorcycle Only	Feather River	5/1-12/1	1.69	1.69	1.69
5M13	Motorcycle Only	Feather River	5/1-12/1	1.11		1.11
5M14	50" or less in width	Feather River		0.55		
5M15	Motorcycle Only	Feather River		1.05		
5M16	50" or less in width	Feather River	5/1-12/1	0.84	0.84	0.84
5M17	Motorcycle Only	Feather River	5/1-12/1	0.90		0.90
5M18	Motorcycle Only	Feather River		1.00		
5M19*	Motorcycle Only	Feather River	5/1-12/1	0.60		0.60
5M20*	Motorcycle Only	Feather River	5/1-12/1	0.85		0.85
5M21	Motorcycle Only	Feather River		1.32		
5M22	Motorcycle Only	Feather River		1.60		
5M23	Motorcycle Only	Feather River		1.69		
5M24*	Motorcycle Only	Feather River	5/1-12/1	1.17		1.17
5M25*	Motorcycle Only	Feather River	5/1-12/1	0.76		0.76
5M25A	Motorcycle Only	Feather River		0.34		
5M26	All	Feather River	5/1-12/1	0.49	0.49	0.49
5M27	Motorcycle Only	Feather River		1.22		
5M28	Motorcycle Only	Feather River	5/1-12/1	1.19	0.43	0.43
5M29	All	Feather River	5/1-12/1	2.34	2.34	2.34
5M30	Motorcycle Only	Feather River		1.42		
6M02*	Motorcycle Only	Feather River	5/1-12/1	0.87		0.87
6M03*	Motorcycle Only	Feather River	5/1-12/1	1.15		1.15
6M03A	Motorcycle Only	Feather River		0.08		
6M04	Motorcycle Only	Feather River		1.39		
6M05	Motorcycle Only	Feather River	5/1-12/1	0.41		0.41
6M06	All	Feather River		0.88		
6M08*	Motorcycle Only	Feather River	5/1-12/1	0.56		0.56
6M09	Motorcycle Only	Feather River	5/1-12/1	0.37		0.37
6M10	Motorcycle Only	Feather River	5/1-12/1	3.60		1.70
6M11*	Motorcycle Only	Feather River	5/1-12/1	0.98		0.98
6M12	Motorcycle Only	Feather River		0.43		

Trail #	Vehicle Type	District	Season	Alt 2	Alt 4	Alt 5
6M13	Motorcycle Only	Feather River		1.41		
6M14*	Motorcycle Only	Feather River	5/1-12/1	2.62		2.62
6M14A	Motorcycle Only	Feather River		0.17		
6M15	Motorcycle Only	Feather River	5/1-12/1	0.40		0.40
6M16*	Motorcycle Only	Feather River	5/1-12/1	2.26		2.26
6M16A*	Motorcycle Only	Feather River	5/1-12/1	0.29		0.29
6M16B*	Motorcycle Only	Feather River	5/1-12/1	0.11		0.11
6M19	Motorcycle Only	Feather River		3.02	3.02	3.02
6M20	Motorcycle Only	Feather River		1.77	1.27	1.27
6M21	Motorcycle Only	Feather River		0.77		
6M22*	Motorcycle Only	Feather River		2.83	0.93	2.83
6M22A	Motorcycle Only	Feather River		0.65	0.65	0.65
6M23*	Motorcycle Only	Feather River		1.29		0.99
6M24	50" or less in width	Feather River		0.23		0.23
6M25	All	Feather River		0.20		
6M26	Motorcycle Only	Feather River		1.36		
6M27	Motorcycle Only	Feather River		0.83		
6M28	Motorcycle Only	Feather River		0.09	0.09	0.09
6M29*	50" or less in width	Feather River		3.91		3.91
6M29A*	Motorcycle Only	Feather River		0.20		0.20
6M29B*	Motorcycle Only	Feather River		0.47		0.47
6M29C*	Motorcycle Only	Feather River		0.76		0.76
6M29D*	Motorcycle Only	Feather River				0.52
6M30*	Motorcycle Only	Feather River		0.50	0.33	0.50
6M30A	Motorcycle Only	Feather River		0.30	0.30	0.30
6M31*	Motorcycle Only	Feather River		0.67	0.20	0.35
6M32	Motorcycle Only	Feather River		0.36		
6M33*	50" or less in width	Feather River		0.65		0.65
6M34	All	Feather River		0.52	0.52	0.52
6M34A*	Motorcycle Only	Feather River		0.37		0.37
6M35	Motorcycle Only	Feather River		0.47		
6M36*	Motorcycle Only	Feather River		0.86		0.86
6M37	All	Mount Hough		1.42	1.42	1.42
6M38	All	Mount Hough		0.38		
6M39*	All	Mount Hough		0.66		0.66
6M47	Motorcycle Only	Feather River		0.74		0.94
6M48*	Motorcycle Only	Feather River				0.28
6M51	Motorcycle Only	Feather River			0.77	0.77
7M01	All	Feather River		0.59		
7M02	Motorcycle Only	Feather River		1.12		
7M03	All	Feather River		0.36	0.36	0.36
7M04*	Motorcycle Only	Feather River		0.85		0.85
7M07*	Motorcycle Only	Feather River		0.39		0.39
7M08	50" or less in width	Feather River		0.86		
7M09	All	Feather River		0.26		
7M10	Motorcycle Only	Feather River		0.54		
7M11	50" or less in width	Feather River		0.48		0.48

Trail #	Vehicle Type	District	Season	Alt 2	Alt 4	Alt 5
7M12	50" or less in width	Feather River		0.94		
7M13	All	Mount Hough		0.70		
7M14	All	Mount Hough		0.25	0.25	0.25
7M15	All	Mount Hough		1.20	1.20	1.20
7M16	All	Mount Hough		0.94	0.94	0.94
7M17	All	Mount Hough		1.73	1.73	1.73
7M18	All	Mount Hough		0.66	0.66	0.66
7M22	50" or less in width	Mount Hough		0.72	0.72	0.72
7M28	All	Feather River			0.39	0.39
8M01	Motorcycle Only	Feather River		0.50		
8M02	All	Mount Hough		0.78	0.78	0.78
8M03	All	Mount Hough		1.57	1.57	1.57
8M04	50" or less in width	Mount Hough		0.69		
8M10*	50" or less in width	Mount Hough		0.67		0.67
8M11	All	Mount Hough		1.73	1.73	1.73
8M11A	All	Mount Hough		0.12	0.12	0.12
8M13	50" or less in width	Mount Hough		0.96		
8M14	50" or less in width	Mount Hough		0.27		
8M15*	50" or less in width	Mount Hough		0.32		0.32
8M16*	50" or less in width	Mount Hough		0.77		0.77
8M17	50" or less in width	Mount Hough		1.28		
8M18	50" or less in width	Mount Hough		0.41		
8M19	50" or less in width	Mount Hough		1.27		
8M20	All	Mount Hough		0.19		
8M21	All	Mount Hough		0.72		
8M22	All	Mount Hough		0.48		
8M23*	All	Mount Hough		0.49		0.49
8M24	50" or less in width	Mount Hough	8/15-3/1	2.71	2.71	2.71
8M25	All	Mount Hough		1.03	1.03	1.03
8M26	All	Mount Hough		1.01	1.01	1.01
8M27	All	Mount Hough		2.26	2.26	2.26
8M27A*	All	Mount Hough		0.33		0.33
8M28	50" or less in width	Mount Hough		1.08	1.08	1.08
8M28A	50" or less in width	Mount Hough		0.10		
8M29	50" or less in width	Mount Hough		0.66	0.66	0.66
8M30	50" or less in width	Mount Hough		0.49	0.49	0.49
8M31	50" or less in width	Mount Hough		1.11	1.11	1.11
8M32	All	Mount Hough		0.64	0.64	0.64
8M33	All	Mount Hough		0.96	0.96	0.96
8M34	All	Mount Hough		0.06		
8M35	All	Mount Hough		1.57	1.57	1.57
8M36	All	Mount Hough		0.96	0.96	0.96
8M37	All	Mount Hough		0.82	0.82	0.82
8M37A	All	Mount Hough		0.08		
8M37B	All	Mount Hough		0.15	0.15	0.15
8M38*	All	Mount Hough		0.54		0.54
8M39	All	Mount Hough		0.71	0.71	0.71

Trail #	Vehicle Type	District	Season	Alt 2	Alt 4	Alt 5
8M39A	All	Mount Hough		0.32	0.32	0.32
8M40	All	Mount Hough		0.34	0.34	0.34
8M41*	All	Mount Hough		0.33		0.33
8M42*	50" or less in width	Mount Hough		0.98		0.98
8M43	All	Mount Hough		0.36	0.36	0.36
8M44	All	Mount Hough		0.30	0.30	0.30
8M45	All	Mount Hough		0.46	0.46	0.46
8M46	All	Mount Hough		0.61	0.61	0.61
8M47	All	Mount Hough		1.46	1.46	1.46
8M47A	All	Mount Hough		0.35		
8M48*	All	Mount Hough	8/15-3/1	0.49	0.49	0.49
8M49	All	Mount Hough		0.32	0.32	0.32
8M50	All	Mount Hough		0.83	0.83	0.83
8M51	All	Mount Hough		0.84	0.84	0.84
8M52	All	Mount Hough		1.39	1.39	1.39
8M53	All	Mount Hough		0.66	0.66	0.66
8M54	All	Mount Hough		0.82	0.82	0.82
9M01	50" or less in width	Feather River		0.91	0.91	0.91
9M02	Motorcycle Only	Feather River		0.39	0.39	0.39
9M03	50" or less in width	Feather River		0.56		
9M04*	Motorcycle Only	Feather River		0.18		
9M05	50" or less in width	Feather River		1.66	1.57	1.57
9M06	50" or less in width	Feather River		0.14		
9M07	Motorcycle Only	Feather River		0.08		
9M08	50" or less in width	Feather River		2.11	2.11	2.11
9M08A	50" or less in width	Feather River		0.13	0.13	0.13
9M09	50" or less in width	Feather River		0.84	0.84	0.84
9M10	50" or less in width	Feather River		1.65	1.65	1.65
9M11	Motorcycle Only	Feather River		0.65	0.65	0.65
9M12*	Motorcycle Only	Feather River		0.38		0.38
9M13*	All	Feather River		0.48		0.48
9M14*	All	Feather River		1.50		0.94
9M14A*	All	Feather River		0.58		
9M15	Motorcycle Only	Feather River		0.81	0.81	0.81
9M16	50" or less in width	Feather River		1.22	1.22	1.22
9M16A	50" or less in width	Feather River		0.57		
9M17	All	Feather River		1.38		
9M18	All	Feather River		0.05		
9M19	All	Feather River		0.67		
9M20	All	Feather River		1.39		
9M21	All	Feather River		1.63	1.63	1.63
9M22	All	Feather River		0.75	0.37	0.37
9M23	All	Feather River		0.69	0.69	0.69
9M24	All	Feather River		0.85		
9M25	50" or less in width	Feather River		1.72		
9M25A	50" or less in width	Feather River		0.14		
9M26	50" or less in width	Feather River		0.90		

Trail #	Vehicle Type	District	Season	Alt 2	Alt 4	Alt 5
9M27	50" or less in width	Feather River		0.24		
9M32	All	Mount Hough		0.96	0.53	0.53
9M33	Motorcycle Only	Mount Hough		2.66		
9M34	Motorcycle Only	Mount Hough		0.55	0.55	0.55
9M35*	Motorcycle Only	Mount Hough	8/15-3/1	0.69		0.69
9M36	All	Mount Hough		1.33		
9M37*	All	Mount Hough		1.68		1.68
9M37A	All	Mount Hough		0.43		
9M37B	All	Mount Hough		0.25		
9M38	50" or less in width	Mount Hough		1.61	1.61	1.61
9M39	All	Mount Hough		1.13	1.13	1.13
9M39A	All	Mount Hough		0.69	0.69	0.69
9M40	50" or less in width	Mount Hough		1.01		
9M41	Motorcycle Only	Mount Hough		0.67		
9M41A	Motorcycle Only	Mount Hough		0.19		
9M42	All	Mount Hough		0.81	0.49	0.49
9M42A*	All	Mount Hough		0.17		0.17
9M42B*	All	Mount Hough		0.52		0.52
9M43	All	Mount Hough		0.26	0.26	0.26
9M44	All	Mount Hough		0.49	0.49	0.49
9M45*	Motorcycle Only	Mount Hough	8/15-3/1	0.61		0.61
9M46*	All	Mount Hough		0.95		0.95
9M46A*	All	Mount Hough		0.49		0.49
9M47A	All	Mount Hough		0.47	0.47	0.47
9M48	All	Mount Hough		0.96	0.96	0.96
9M49	All	Mount Hough		1.76	1.76	1.76
9M50	All	Mount Hough		0.47	0.33	0.33
9M50	All	Mount Hough		0.14		
9M51	All	Mount Hough		1.27	1.27	1.27
9M52	All	Mount Hough		0.63	0.63	0.63
9M53	All	Mount Hough		0.59		
9M53A	All	Mount Hough		0.46		
9M54	All	Mount Hough		1.00	1.00	1.00
9M55	All	Mount Hough		0.53	0.53	0.53
9M56*	All	Mount Hough		0.73		0.73
9M56A*	All	Mount Hough		0.38		0.38
9M57	All	Mount Hough		0.82	0.82	0.82
9M57A	All	Mount Hough		0.17	0.17	0.17
9M58	All	Mount Hough		1.11	1.11	1.11
9M58A	All	Mount Hough		0.63	0.63	0.63
9M58B	All	Mount Hough		0.55	0.55	0.55
9M59A	All	Mount Hough		0.47		
9M59C	All	Mount Hough		0.18		
9M59D	All	Mount Hough		0.18		
9M59E	All	Mount Hough		0.43		
9M60	All	Mount Hough		0.42	0.42	0.42
9M62	All	Feather River		0.48	0.48	0.48

Trail #	Vehicle Type	District	Season	Alt 2	Alt 4	Alt 5
9M65	All	Mount Hough		0.63	0.63	0.63
10M01	Motorcycle Only	Feather River		0.45		
10M02*	50" or less in width	Feather River		1.25		1.25
10M07	50" or less in width	Feather River		2.64		
10M09	All	Feather River		0.84		
10M11	All	Feather River		1.36		1.36
10M12	All	Beckwourth		0.95	0.95	0.95
10M13	All	Beckwourth		0.20	0.20	0.20
10M14	All	Mount Hough		0.12	0.12	0.12
10M15	All	Beckwourth		0.54		0.54
10M16	All	Mount Hough	8/15-3/1	1.09		
10M19	All	Mount Hough		1.26	1.26	1.26
10M20	All	Mount Hough		1.31	1.31	1.31
10M20A	All	Mount Hough		0.48	0.48	0.48
10M20B	All	Mount Hough		0.13		
10M21*	All	Mount Hough		1.24		1.24
10M21A	All	Mount Hough		0.27	0.11	0.11
10M21B	All	Mount Hough		0.91	0.91	0.91
10M21C	All	Mount Hough		0.13		
10M22	All	Mount Hough		0.50		
10M23*	All	Mount Hough		2.07		2.59
10M24*	All	Mount Hough		1.28		1.28
10M25	All	Mount Hough		1.14	1.14	1.14
10M27*	All	Mount Hough		0.96		0.96
10M28	All	Mount Hough		1.38		1.38
10M28A	All	Mount Hough		1.01		1.01
10M29*	All	Mount Hough		1.56		1.56
10M30	All	Mount Hough		0.83	0.83	0.83
10M30A	All	Mount Hough		0.24	0.24	0.24
10M30B	All	Mount Hough		0.27		
10M30C	All	Mount Hough		0.09		
10M30D	All	Mount Hough		0.18		
10M31	All	Mount Hough		0.24	0.24	0.24
10M32*	50" or less in width	Mount Hough		1.26		1.26
10M33	All	Mount Hough		0.70		
10M34	All	Mount Hough		1.83	1.83	1.83
10M35	All	Mount Hough		0.51		
10M36*	All	Mount Hough		1.01		1.01
10M36A	All	Mount Hough		0.17		
10M38	50" or less in width	Mount Hough		2.47		
10M39	All	Mount Hough		0.17		
10M40*	50" or less in width	Mount Hough		1.35		1.35
10M42	All	Mount Hough		1.44		
10M43	All	Mount Hough		1.15		
10M44	All	Mount Hough		0.45	0.45	0.45
10M45	All	Mount Hough		0.67	0.67	0.67
10M46	All	Mount Hough		0.71	0.71	0.71

Trail #	Vehicle Type	District	Season	Alt 2	Alt 4	Alt 5
10M47	All	Mount Hough		1.50	1.50	1.50
10M54	All	Mount Hough		0.83	0.83	0.83
10M55*	All	Mount Hough				0.25
11M02*	All	Beckwourth		1.72		1.72
11M03*	All	Beckwourth		0.52		0.52
11M04	All	Beckwourth		0.76	0.76	0.76
11M05	All	Beckwourth		0.96	0.96	0.96
11M06	All	Beckwourth		0.42	0.42	0.42
11M07	All	Beckwourth		0.16	0.16	0.16
11M08	All	Mount Hough		1.16		
11M08A*	All	Mount Hough		0.27		
11M08B*	All	Mount Hough		0.09		
11M09*	All	Beckwourth		1.07		
11M10	50" or less in width	Beckwourth		1.97		
11M11	50" or less in width	Beckwourth		1.03		
11M13	50" or less in width	Mount Hough		1.03		1.03
11M13A	All	Mount Hough		0.35		0.35
11M13B	50" or less in width	Mount Hough		0.53		
11M13C	50" or less in width	Mount Hough		0.06		
11M13D	50" or less in width	Mount Hough		0.08		
11M14	50" or less in width	Mount Hough		0.42		
11M15	All	Mount Hough		0.38		0.38
11M15A	All	Mount Hough		0.25		
11M16*	50" or less in width	Mount Hough		0.65		
11M17	All	Mount Hough		0.96		0.96
11M18	All	Mount Hough		0.23		0.23
11M18A	All	Mount Hough		0.54		0.54
11M19	All	Mount Hough		0.66		
11M20	All	Mount Hough		3.33	3.33	3.33
11M22	50" or less in width	Mount Hough		0.40		0.40
11M23*	50" or less in width	Mount Hough		0.67		0.67
11M24*	All	Mount Hough		0.47		0.47
11M25*	All	Mount Hough		0.43	0.43	0.43
11M30	All	Mount Hough		0.58	0.58	0.58
11M34	All	Mount Hough		0.73	0.73	0.73
11M35*	All	Mount Hough		0.71		0.71
11M36*	All	Mount Hough		1.36		1.36
11M37	All	Mount Hough		2.15	2.15	2.15
11M38	All	Mount Hough		0.53	0.53	0.53
11M39	All	Mount Hough		0.55	0.55	0.55
11M40	All	Mount Hough		0.64		
11M41	All	Mount Hough		1.29	1.29	1.29
11M41A	All	Mount Hough		0.35	0.35	0.35
11M42	All	Mount Hough		0.16		
12M02	All	Beckwourth		1.23	1.23	1.23
12M03	All	Beckwourth		0.76	0.76	0.76
12M04	All	Beckwourth		0.41	0.41	0.41

Trail #	Vehicle Type	District	Season	Alt 2	Alt 4	Alt 5
12M06	All	Beckwourth		0.85		
12M07	All	Beckwourth		0.44	0.44	0.44
12M08	All	Beckwourth		0.72		0.72
12M09*	All	Mount Hough		3.08		3.08
12M09A*	All	Mount Hough		0.84		0.84
12M10*	All	Beckwourth		2.96		2.96
12M10A*	All	Beckwourth		0.58		0.58
12M12*	All	Beckwourth		0.67		0.67
12M13	All	Beckwourth		0.40	0.40	0.40
12M14	All	Beckwourth		0.58		
12M15*	All	Mount Hough		0.23		0.23
12M16	All	Mount Hough		1.21		
12M17	All	Mount Hough		0.16	0.16	0.16
12M18	All	Mount Hough		0.14		
12M19	All	Mount Hough		0.68	0.68	0.68
12M20	All	Mount Hough		0.11	0.11	0.11
12M21*	All	Mount Hough		0.23		0.23
12M21A*	All	Mount Hough		0.05		0.05
12M22*	All	Mount Hough		0.15		0.15
12M23	All	Mount Hough		0.91	0.91	0.91
12M24	All	Mount Hough		0.28		
12M25	50" or less in width	Mount Hough		1.44		
12M26	50" or less in width	Mount Hough		1.55		
12M27	50" or less in width	Mount Hough		0.91	0.91	0.91
12M30	All	Mount Hough		0.04		
12M31*	All	Mount Hough				0.99
12M32	All	Mount Hough			0.16	0.16
12M34	All	Mount Hough			0.25	0.25
12M35	All	Beckwourth			0.11	0.11
12M37	All	Beckwourth			0.17	0.17
12M38	All	Mount Hough			0.26	0.26
13M01	All	Beckwourth		1.07	1.07	1.07
13M03	All	Beckwourth		0.45		
13M04	All	Beckwourth		0.49	0.49	0.49
13M04A	All	Beckwourth		0.16		
13M04B	All	Beckwourth		0.11	0.11	0.11
13M05	All	Beckwourth		0.58		
13M06*	All	Beckwourth		1.63		1.63
13M07	All	Beckwourth		1.24		
13M08	All	Beckwourth		1.39		
13M09	All	Beckwourth		0.46	0.46	0.46
13M09A	All	Beckwourth		0.06		
13M10	All	Beckwourth		12.04		
13M10A	All	Beckwourth		0.04		
13M10B	All	Beckwourth		0.13		
13M10C	All	Beckwourth		0.04		
13M11	50" or less in width	Beckwourth		1.97		

Trail #	Vehicle Type	District	Season	Alt 2	Alt 4	Alt 5
13M12	All	Beckwourth		1.50	1.50	1.50
13M12A	All	Beckwourth		0.25	0.25	0.25
13M13*	All	Beckwourth		1.07		0.67
13M14	All	Beckwourth		1.33	1.33	1.33
13M15	All	Beckwourth		0.81	0.81	0.81
13M16	All	Beckwourth		0.54	0.54	0.54
13M17	All	Beckwourth		1.02	1.02	1.02
13M18	All	Beckwourth		0.65	1.50	1.50
13M19	All	Beckwourth		1.19		
13M20	All	Beckwourth		0.22		
13M21	All	Beckwourth		1.31	0.60	0.60
13M21A	All	Beckwourth		0.22		
13M22	All	Beckwourth		1.12		
13M23	All	Beckwourth		0.60		
13M24	All	Beckwourth		0.64		
13M25*	All	Beckwourth		0.70		0.70
13M26	All	Beckwourth		0.59	0.59	0.59
13M27	All	Beckwourth		0.93		
13M28	All	Beckwourth		0.45	0.45	0.45
13M29	All	Beckwourth		2.24	2.24	2.24
13M30*	Motorcycle Only	Beckwourth		0.43		0.43
13M31	All	Beckwourth		2.33		2.33
13M31A	50" or less in width	Beckwourth		1.56		1.56
13M32*	All	Beckwourth				0.21
13M34	All	Beckwourth			0.54	0.54
13M36	All	Beckwourth			0.13	0.13
13M37	All	Beckwourth			0.57	0.57
13M38	All	Beckwourth			0.47	0.47
13M40	All	Beckwourth			1.02	1.02
13M41*	All	Beckwourth				0.82
13M42*	All	Beckwourth				0.08
14M01	All	Beckwourth		1.76	1.76	1.76
14M01A	All	Beckwourth		0.22		
14M01B	All	Beckwourth		0.17		
14M01C	All	Beckwourth		0.24		
14M02	All	Beckwourth		1.26	0.45	0.45
14M04	All	Beckwourth		0.70		0.70
14M05*	All	Beckwourth		0.72		0.72
14M06*	All	Beckwourth		0.37		0.37
14M07	All	Beckwourth		0.49		
14M08	All	Beckwourth		0.48		
14M09	All	Beckwourth		1.41		
14M10	All	Beckwourth		0.57	0.57	0.57
14M11	All	Beckwourth		2.27	2.07	2.07
14M12	All	Beckwourth		1.52	1.52	1.52
14M16	All	Beckwourth			0.29	0.29
15M01	50" or less in width	Beckwourth		1.46		

Trail #	Vehicle Type	District	Season	Alt 2	Alt 4	Alt 5
15M01A	50" or less in width	Beckwourth		0.16		
15M02	All	Beckwourth		1.46		
15M02A	All	Beckwourth		0.09		
15M02B	All	Beckwourth		1.08	0.86	0.86
15M03	All	Beckwourth		0.29		
15M04	All	Beckwourth		0.32		0.32
15M05	All	Beckwourth		2.83		2.83
15M07	All	Beckwourth			0.76	0.76
15M08	All	Beckwourth			0.40	0.40
15M10	All	Beckwourth			0.34	0.34
16M01	All	Beckwourth		1.78		
16M03	All	Beckwourth		0.77	0.77	0.77
16M03A	All	Beckwourth		0.12		
16M03B	All	Beckwourth		0.27		
16M04*	All	Beckwourth		2.08		2.08
16M04A*	All	Beckwourth		0.54		0.54
17M01	50" or less in width	Beckwourth		0.28	0.28	0.28
17M02	All	Beckwourth		0.66		
17M03	All	Beckwourth		0.51	0.51	0.51
17M04	All	Beckwourth		1.22		1.22
17M05	All	Beckwourth		3.87		
17M06	All	Beckwourth		0.72		
17M06A	All	Beckwourth		0.69		
Play Area	50" or less in width	Feather River		36 Ac		36 Ac
	All			222.53	109.91	164.73
	50" or less in width			64.75	18.84	35.01
	Motorcycle Only			77.12	12.06	50.86
				364.40	**140.81**	**250.61**

* Trail would require mitigation prior to being added to the MVUM and used by the public.

2.3.4.3 Alternative 3: Cross-Country Travel Prohibition Only—Make No Additions to the Current National Forest Transportation System

Alternative 3 responds to non-motorized recreation interest in "Citizen Inventoried Roadless Areas (CIRAs)" proposed by the Wilderness Society and natural resource impacts by prohibiting cross-country travel without adding any additional facilities to the NFTS. This alternative also provides a baseline for comparing the impacts of other alternatives that propose changes to the NFTS. None of the current unauthorized routes would be added to the NFTS.

1. **Cross-country Travel**: Motor vehicle travel off the designated NFTS roads, NFTS trails and areas by the public except as allowed by permit or other authorization would be prohibited.
2. **Roads trails and areas added existing National Forest System**: No roads, trails or areas would be added to the NFTS.

2.3.4.4 Alternative 4: Minimize Impacts to Natural Resources and "Citizen Inventoried Roadless Areas

Alternative 4 responds to non-motorized recreation interest in "Citizen Inventoried Roadless Areas (CIRAs)" proposed by the Wilderness Society and natural resource impacts. This alternative adds no motorized routes to CIRAs. This alternative does not designate routes as trails where resource concerns require extensive trail mitigation.

1. **Cross-country Travel**: Motor vehicle travel off the designated NFTS roads, NFTS trails and areas by the public except as allowed by permit or other authorization would be prohibited.
2. **Class of Vehicles**: The table below (**Error! Reference source not found.**) lists passenger car roads that were evaluated for potential mixed use (combining highway legal and non-highway legal vehicles on the same road) and where high clearance conditions are not needed because there are low safety risks.
3. **Trails Added to NFTS**: Table 1 displays those trails to be added to the NFTS.

Table 2. Alternative 4 and 5—Proposed vehicle class changes

Road Number	Road Name	Current Vehicle Class	Proposed Vehicle Class	Length (miles)
23N28	French Creek	Highway Legal Vehicles Only	All Vehicles	3.21
24N28	Slate Creek	Highway Legal Vehicles Only	All Vehicles	4.15
28N01	Janesville-Frenchman	Highway Legal Vehicles Only	All Vehicles	3.95
			Grand Total	11.31

2.3.4.5 Alternative 5: Improved Access and Motorized Recreation Opportunities

Alternative 5 responds to the issue of access and motorized recreation opportunity. During scoping the Plumas National Forest received suggestions for additional routes and alternative routes that would better provide access and motorized recreation opportunity.

1. **Cross-country Travel**: Motor vehicle travel off the designated NFTS roads, NFTS trails and areas by the public except as allowed by permit or other authorization would be prohibited.
2. **Class of Vehicles**: Table 2 lists passenger car roads that were evaluated for potential mixed use (combining highway legal and non-highway legal vehicles on the same road) and where high clearance conditions are not needed because there are low safety risks.
3. **Trails and Areas Added Existing NFTS**: Table 1 displays those trails and areas to be added into the NFTS. Trails with an asterisk (*) after the trail number would need mitigation completed prior to being added to the MVUM and used by the public (see Appendix A for more information).

2.4 Alternatives Considered, but Eliminated from Detailed Analysis

The following describes those alternatives that were considered but eliminated from detailed study and the rationale for their elimination.

2.4.1 Designate All Inventoried Routes as Motorized Trails

A total of 1,109 miles of routes were inventoried and considered for inclusion into the NFTS. This alternative was eliminated from detailed study for the following reasons. It included several short routes that would not benefit the trail system. It included some routes that had multiple resource issues. It also included some routes that the public was not interested in designating.

2.4.2 Designate Areas for Dispersed Camping

Designating existing dispersed campsites was considered during proposal development. This was eliminated from detailed study because it did not closely relate to travel management. Dispersed campsites are flat areas where people camp and park vehicles incidental to camping, generally adjacent to roads. They are not travel routes. In addition, the Interdisciplinary Team found that ongoing management of individual dispersed campsites provides resource protection, and there was no immediate need to limit or regulate dispersed camping.

2.5 Comparison of Alternatives

Chapter 3 describes the environmental consequences of the alternatives in detail. This section of Chapter 2 compares the alternatives by summarizing key differences between the alternatives, including their effects (Table 3 and Table 4). It is organized in three sections: Outputs, Environmental Effects, and Addressing the Issues.

Table 3. Summary Comparison of Alternatives

Item		**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**
Cross-country Travel		Continues	Prohibited	Prohibited	Prohibited	Prohibited
Changes to Vehicle Class from Highway Legal Only to Mixed Use (Both Highway-Legal and Non-Highway Legal Allowed)		0 miles	0 miles	0 miles	11 miles	11 miles
Motorized Trails & Areas Added To National Forest System	**Trails Added Open to All Vehicles**	0 miles	222 miles	0 miles	110 miles	165 miles
	Trails Added Open to OHV Use Vehicles 50” or Less	0 miles	68 miles	0 miles	19 miles	35 miles
	Trails Added Open to Motorcycles	0 miles	77 miles	0 miles	12 miles	51 miles
	Total	0 miles	364 miles	0 miles	141 miles	251 miles
	Areas Added Open to OHV Use Vehicles 50” or Less	None	Sly Creek	None	Sly Creek	Sly Creek

Table 4. Summary comparison of alternatives by environmental effects.

Resource Area	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Aquatic Biota	1.0	2.0	5.0	4.0	3.0
Botanical Resources	1.0	2.0	5.0	4.0	3.0
Cultural Resources	1.0	2.0	5.0	4.0	3.0
Noxious Weeds	1.0	2.0	5.0	4.0	3.0
Recreation Resources	3.4	4.2	3.4	3.7	4.1
Visual Resources	1.0	3.7	5.0	4.4	4.2
Transportation Facilities	1.0	3.6	5.0	4.2	4.0
Water and Soil Resource	1.0	2.0	5.0	4.3	3.6
Terrestrial Biota	1.0	2.0	5.0	4.0	3.0

[1]A score of 5 indicates the alternative is the best for the specified resource; a score of 1 indicates the alternative is the worst for specified resource. See Chapter 3 for more details.

Chapter 3 Affected Environment and Environmental Consequences

3.1 Introduction

This chapter summarizes the physical, biological, social and economic environments affected by the proposed action and alternatives and the effects on the environment that would result from implementation of any of the alternatives. This chapter also presents the scientific and analytical basis for comparison of the alternatives presented in “Chapter 2: Alternatives”.

The “Affected Environment” section under each resource topic describes the existing, or baseline, condition against which environmental effects were evaluated and from which progress toward the desired condition can be measured. Environmental consequences form the scientific and analytical basis for comparison of alternatives, including the proposed action, through compliance with standards set forth in the 1988 Forest Plan, as amended, and a summary of monitoring required by the National Environmental Policy Act of 1969 (NEPA) and National Forest Management Act of 1976 (see Appendix B of this EIS for the findings). The environmental consequences discussion centers on direct, indirect, and cumulative effects, along with applicable mitigation measures. Effects can be neutral, beneficial, or adverse. The “Irreversible and Irretrievable Commitments of Resources” section is located at the end of this chapter. These terms are defined as follows:

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

3.1.1 Analysis Process

The environmental consequences presented in this chapter address the impacts of the actions proposed under each alternative for the Plumas National Forest. This effects analysis was done at the Forest scale (the scale of the proposed action as discussed in Chapter 1). However, the effects findings in this chapter are based on site-specific analyses of each road, trail and area proposed for addition to the National Forest Transportation System (NFTS). Each affected road, trail and area proposed in the alternatives has been reviewed by resource specialists and their findings documented (Appendix A). Readers seeking information concerning the environmental effects associated with a specific road, trail or area are directed to Appendix A, where details concerning any mitigation measures or any other findings are documented.

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

1. Prohibition of cross-country motorized vehicle travel. The direct and indirect effects of this action are described generally in each alternative, considering both current conditions and projected trends. Both short (1 year) and long-term (approximately 20 years) effects are presented.
2. Addition of new facilities (roads, trails, and/or areas) to the NFTS. As described above, the impacts of new facilities are addressed in sum total in this chapter while impacts of individual routes or areas are addressed in Appendix A. For most resources, one or more resource indicators are used to measure the direct and indirect effects of each alternative. Both short (1 year) and long-term (approximately 20 years) impacts are presented.
3. Changes to vehicle class and season of use on the existing NFTS. Impacts caused by changes to vehicle class and season of use on the existing NFTS are described generally by alternative. For some impacts (for example public safety), impacts are also addressed by route. Where impacts associated with individual routes are warranted, the reader is directed to appendices or project files where this data is located.

3.1.2 Cumulative Effects

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

The cumulative effects analysis area is described under each resource, but in most cases includes the entire Plumas National Forest including private and other public lands that lie within the Forest boundary. Past activities are considered part of the existing condition and are discussed in the “Affected Environment (Existing Conditions)” and “Environmental Consequences” section under each resource.

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

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

Additionally, focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the CEQ issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.” For these reasons, the analysis of past actions in this section is based on current environmental conditions.

Appendix C lists present and reasonably foreseeable future actions potentially contributing to cumulative effects.

3.1.3 Affected Environment Overview

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

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

In December 2007, a temporary Forest Order was implemented that prohibited travel off of existing routes shown on the Forest Order exhibit map. The order was established for a period not to exceed two years to protect resources and help prevent additional user-created routes from being established while the PNF undertook implementation of the Travel Management Rule and the production of their Motor Vehicle Use Map (MVUM).

3.1.4 Assumptions and Limitations

The following assumptions and limitations were applied in the effects analysis in each section:

1. No NEPA decision is necessary to continue use of the NFTS (e.g. OHV and transportation) as currently managed under the No-action alternative. These decisions were made previously.
2. User-created roads, trails and areas are not NFTS facilities. They are unauthorized. Proposals to add these to the NFTS require a NEPA decision.
3. Temporary roads, trails and areas built to support emergency operations or temporarily authorized in association with contracts, permits or leases are not intended for public use. They are not NFTS facilities (i.e. they are unauthorized for public use). Any proposal to add these temporary roads to the NFTS will require a NEPA decision.

4. Any unauthorized routes not included in the proposed action are not precluded from consideration for addition to the NFTS in future travel management actions.
5. The Agency will continue to make changes to the NFTS on an “as needed” basis. It will also continue to make decisions about temporary roads or trails on an “as needed” basis associated with contract, permit, lease or other written authorization.
6. Any activity associated with contract, permit, lease or other written authorization is exempt from designation under the Travel Management Rule (36 CFR 212.51 (a) (8) and should not be part of the proposal (e.g. fuelwood permits, motorized Special Use Permit (SUP), mining activity, etc.). Such actions are subject to separate NEPA analysis.
7. “Designation” is an administrative act, which does not trigger NEPA. Designation technically occurs with printing of the MVUM. NEPA is not required for printing a map.
8. For travel management, the federal action triggering NEPA, is any change to current restrictions or prohibitions regarding motorized travel by the public (for example: prohibiting cross-country travel, changing management—changing vehicle class or season of use, and any additions or deletions of facilities (roads, trails or areas) to the NFTS.
9. Previous decisions on the NFTS do not need to be revisited to implement the Travel Management Rule or the MVUM. That is, the NFTS contains existing facilities (roads and trails) that either underwent NEPA or predate NEPA. Allowing continued motorized use of the facilities in the NFTS in accordance with existing laws and regulations, does not require NEPA.
10. Dispersed recreation activities (i.e. activities which occur after the motor vehicle stops such as: camping, hunting, fishing, hiking, etc.) are not part of the scope of the proposed action. The action and the analysis focus on motor vehicle use.
11. Travel analysis is a pre-NEPA planning exercise for transportation planning, which informs travel management. Until new directives are published, the agency continues to follow existing policy related to transportation planning and analysis. For example, some Roads Analysis Process requirements in FSM 7700 and 7710 are still applicable.
12. Setting road maintenance levels and changing maintenance levels are administrative and not subject to NEPA. However, changes in allowed vehicle class, season of use, access, and proposals to reconstruct facilities are subject to NEPA.
13. The system would be maintained to standard, and all additions or changes to the NFTS would meet standards prior to availability for public use.
14. Trails with a season of use shown in the descriptions of the alternatives in Chapter 2 may be used only during those dates. Trails without dates listed are not subject to seasonal restrictions.

3.1.5 Resource Reports

Each section in this chapter provides a summary of the project-specific reports, assessments, and input prepared by Forest Service specialists, which are incorporated by reference in this EIS. The following reports and memoranda are incorporated by reference: Botanical Biological Evaluation, Botany Report, and Noxious Weed Risk Assessment; Biological Assessment/Biological Evaluation (BA/BE) for Fish and Wildlife; Hydrology Report; Soils Report; Recreation, Visuals, Lands, and Minerals Report; and the Heritage Resources Report. These reports or memoranda are part of the project record on file at the Forest Supervisor's Office in Quincy, California. Copies of these reports are available upon request by contacting Peter Hochrein, Project Leader, at (530) 283-7718.

3.1.6 Route Data

During the planning stages of the travel management project for the Plumas National Forest (PNF), members of the public recommended changes to the existing NFTS with a focus on unauthorized routes. Comments regarding specific routes were also received during the public scoping period for the NOI. The disposition of these routes fell into two categories: routes brought forward for detailed study in alternative(s), and routes eliminated from detailed study. These decisions were made by the responsible official based upon the purpose and need, the scope of the EIS, and issues raised by the public and the Interdisciplinary Team. Route assessments were done for all routes considered in alternative(s). These route assessments are summarized in Appendix A. The project file contains a Route Assessment Spreadsheet, which contains additional information, including concerns and risks for resources, recreation benefits and access needs related to individual routes.

A number of the recommended routes are proposed to be added to the NFTS under one or more of the action alternatives. For these routes, the route assessment in Appendix A identifies the number of miles, effects determinations by resource and any mitigation measures (including the season when the route would be open and any mitigation measures that would be implemented on the route prior to publication on a MVUM and allowing public use). Regular operation and maintenance activities (e.g. brushing, signing, cleaning and maintaining existing drainage structures patrolling routes, etc.) are a part of regular maintenance and management strategies for the NFTS and covered under separate NEPA.

3.1.7 Law Enforcement

Enforcement Assumptions:

- Enforcement of the laws and regulations related to Travel Management would be enforced equally in authority and weight as with all other Federal laws and regulations.
- As with any change in a regulation on NFS lands, there is usually a transitional period for the public to understand the changes. It is anticipated there would be a higher number of violations to the Travel Management Rule the first few years and the number of violations would decline as the users understand and comply with the rules. It is assumed :
- Users in communities adjacent to the Forest would comply within 1 to years.
- Frequent users but further in distant from the Forest would comply within 2 to 3 years.
- Infrequent users regardless of distance may take up to 5 years to comply.
- Law enforcement officer (LEO) and agency personnel's presence and enforcement actions would positively affect OHV users' behaviors and attitudes.

- The Travel Management Rule and associated MVUM clearly define the designated routes; therefore, making violations to the rule unequivocal.
- Once the MVUM is published, the implementation of the established dedicated network of roads, trails, and areas with signs, and user education programs, would reduce the number of violations.
- Fire Prevention Officers spend a large percentage of their time on Travel Management issues, and depending on the Forest the estimate range from 30 to 50 percent. Law Enforcement Officers spend approximately 10 to 20 percent of their time on enforcement of OHV issues.
- The proposal to provide additional facilities to the NFTS through some action alternatives is anticipated to assist enforcing the shift from an "open to cross-country motor vehicle travel' management situation to one where such use is prohibited. These actions provide opportunities and access where such use was occurring in key popular dispersed locations based upon recreation analysis and public input. Providing opportunities in popular, key areas would help relieve pressure to travel off of designated routes.

3.1.8 Information on Other Resource Areas

The proposed action and alternatives do not propose actions affecting these resources. However, a brief summary on why they are not included in this chapter is provided based upon input received during scoping:

Wilderness—Actions proposed are in compliance with Wilderness Designations and the Wilderness Act of 1964. These resources are not affected by the proposed action or the alternatives, and motorized activity continues to be prohibited in wilderness under all the alternatives per the Wilderness Act of 1964.

Air Quality—Actions proposed are in compliance with state air quality regulations and the Forest Plan. Air emissions are generally managed and analyzed spatially by air basins (http://www.arb.ca.gov/knowzone/basin/basin.swf) where topographic features delineate common air quality characteristics. Air quality conditions are highly controlled by short and long-term meteorological and climate conditions.

Generally, the number of vehicle miles traveled annually by Forest users is not expected to change in any alternatives through the prohibition of cross-country travel and the redirection of motorized use onto a designated system of roads, trails and areas. As a result, no adverse effects are anticipated to air quality. It is possible, where seasonal restrictions are put into place, that there may be a slight benefit to air quality as a result of the actions. Where action alternatives propose adding routes to the NFTS, any air quality related issues are offset by the reduction of cross-country travel. These routes were pulled from the inventory of unauthorized routes open to public use as part of cross-country travel prior to this proposal. The following analysis led to a determination that no adverse effects to air quality would result from any of the action alternatives: none of the alternatives proposed designated trails, areas or terminal facilities would result in a significant increase or change in concentration of use. Tailpipe emissions have been accounted for by CARB in the green/red sticker program suggesting that CARB has a program to regulate these emissions to achieve state implementation plan targets. No adverse change in attainment status is expected to occur as a result of these projects. The San Bernardino National Forest Travel Route Designation Project Air Quality Report as prepared by Beth Plymale on Feb. 28th, 2008 indicates no significant impacts to air quality and is generally representative of the Region's travel management proposals.

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

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

3.1.9.1 National Forest Management Act

The Forest Service is complying with the provisions of this law by designing the project to meet Forest Plan Standards and Guidelines. Appendix B contains a list of the Forest Plan Standards and Guidelines that apply to this project.

3.1.9.2 2005 Travel Management Rule 36 CFR 212

This project is designed to comply with the provisions of this law by developing a travel management plan that ends cross-country travel and associated route proliferation.

3.2 Recreation Resources

3.2.1 Introduction

This section of the Motorized Travel Management environmental analysis examines the extent to which alternatives respond to recreation management direction established in the Plumas National Forest Land and Resource Management Plan ("Forest Plan") and the Travel Management Rule. The Forest Plan recreation direction was established under the implementing regulations of the National Forest Management Act (NFMA). The NFMA requires the provision of a broad spectrum of forest and rangeland-related outdoor recreation opportunities that respond to current and anticipated user demands. The Forest Plan satisfies this requirement through its use of the Recreation Opportunity Spectrum (ROS) classification system of "zoning" recreation opportunities in the Forest Plan. In addition, specifically for "off-road vehicle" use, the NFMA requires that these motor vehicle opportunities be planned and implemented to protect land and other resources, promote public safety, and minimize conflicts with other uses of the National Forest System (NFS) lands. The Travel Management Rule requires that we examine the compatibility of motor vehicle use with existing conditions in populated areas; the conflict between motor vehicle use and existing or proposed recreational uses of NFS lands or neighboring federal lands; and the provision of recreational opportunities and access needs.

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

Direction relevant to the alternatives as they affect recreation resources includes:

National Forest Management Act (NFMA) of 1976. Specifically for Off-Highway Vehicle management, NFMA requires that this use be planned and implemented to protect land and other resources, promote public safety, and minimize conflicts with other uses of the NFS lands. NFMA also requires that a broad spectrum of forest and rangeland-related outdoor recreation opportunities be provided that respond to current and anticipated user demands.

Sierra Nevada Forest Plan Amendment (SNFPA). The SNFPA established the direction to prohibit motorized vehicle travel off of designated routes, trails, and limited off-highway vehicle (OHV) use areas. Unless otherwise restricted by current Forest Plans or other specific area Standards and Guidelines, cross-country travel by over-snow vehicles would continue.

Travel Management Rule. The Travel Management Rule requires that in designating NFS roads, trails, and areas, responsible officials consider the provision of recreational opportunities; public access needs; conflicts among uses of NFS lands, including other recreational uses; and the compatibility of motor vehicle use with existing conditions in populated areas.

Plumas National Forest Land Management Plan. The Forest Plan provides goals for the recreation resource and requires a broad range of developed and dispersed recreation opportunities in balance with existing and future demand. The Recreation Opportunity Spectrum (ROS) is the basic inventory that was used to create recreation-opportunity "zoning" in these plans. The intent is to provide for these recreation opportunities within these zones to meet NFMA requirements for a broad spectrum of forest and rangeland-related outdoor recreation opportunities that respond to current and anticipated user demands. As noted above, NFMA requires that the term “off-road vehicle” opportunities be planned and implemented to protect land and other resources, promote public safety, and minimize conflicts with other uses of NFS lands. For the purposes of travel management actions, “off-road vehicles” is applied to public motor vehicle use (highway legal and non-highway legal). The ROS inventory provides for a spectrum of classes from “Urban” to “Primitive.” There is a distinction between motorized and non-motorized spectrum classes (or “zones”). Motorized use falls in the motorized ROS classes (Urban, Rural, Roaded-Modified, Roaded-Natural). Non-motorized classes include Semi-Primitive Non-Motorized (SPNM) and Primitive Non-Motorized (PNM).

3.2.3 Effects Analysis Methodology

3.2.3.1 Assumptions Specific to Recreation Resources Analysis

1. Unless otherwise proposed as an Forest Plan amendment, the prohibition of motorized cross-country travel is not a change to ROS. It is simply a prohibition within that ROS “zone” to travel off of designated routes. The ability to add or remove routes in the future is still guided by NFMA largely through local Forest Plan ROS and is not affected by the action of prohibiting motorized cross-country travel and limiting travel to designated routes throughout the Forest.
2. Proposed additions to the NFTS would have a beneficial effect on the motor-vehicle experience by providing a variety of riding experiences (variety of easy-to-difficult riding experiences) and contributing to the continuity of the motor-touring experience, including access to dispersed recreation activities (both motorized and non-motorized).
3. The Plumas National Forest’s National Visitor Use Monitoring (NVUM) report accurately expresses the most popular non-motorized recreation activities for analysis.
4. The Stewardship and Fireshed Assessment (SFA) accurately expresses the Forest’s Wildland/Urban Interface (WUI) zone.
5. Overall changes in the NFTS may result in corresponding changes in the net SPNM ROS class acres available on the Forest.
6. The number of NFTS miles in WUI and net SPNM acres per alternative is adequate to express cumulative effects.

3.2.3.2 Data Sources

1. Plumas National Forest Plan for distribution of ROS classes.
2. Forest’s SFA for WUI zones.
3. Forest’s NVUM report for most popular non-motorized recreation activities.

3.2.3.3 Recreation Resources Indicators

- The extent of non-motorized recreation activities displaced by proposed motor vehicle use.
- The number of proposed NFTS miles within proximity to populated areas or neighboring federal lands.
- The number of miles devoted to each vehicle class.

- The number of miles devoted to each vehicle class for access to dispersed activities.
- Net SPNM and PNM Acres Available.

3.2.3.4 Recreation Resources Methodology by Action

1. **Direct/indirect effects of the prohibition of cross-country motorized vehicle travel.**

Considerations: The prohibition of motor vehicle use off designated NFS transportation systems and areas would have a beneficial effect on non-motorized recreation activities throughout the Forest, in populated areas and neighboring federal lands in the short and long terms; it would curtail ongoing [noise, dust and physical presence] effects.

2. **Direct/Indirect effects of adding facilities (presently inventoried routes, and areas) to the NFTS, including identifying seasons of use and vehicle class.**

Considerations: Adding facilities can have a beneficial effect on the motorized vehicle experience if the additions contribute to the variety of riding experience (easy-to-difficult riding experience), or if the additions contribute to the continuity of the motor-touring experience including access to dispersed recreation activities (both motorized and non-motorized).

3. **Changes to the existing NFTS.**

Considerations: Changes to the NFTS could have a beneficial effect if the changes contribute to an increased variety of riding experiences (easy-to-difficult riding experiences) or if changes contribute to the continuity of the motor-touring experience including access to dispersed recreation activities (both motorized and non-motorized). Changes due to season of use could have a negative effect if the season of use is shorter in duration. Changes to the existing NFTS would have no cumulative effect on the recreation resource.

Short-term timeframe: 1 year.

Long-term timeframe: 20 year.

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

Indicator(s): (1) The extent of non-motorized recreation activities displaced by proposed motor vehicle use; (2) The number of proposed NFTS miles within proximity to populated areas or neighboring federal lands; (3) The number of miles devoted to each vehicles class; (4) The number of miles devoted to each vehicle class for access to dispersed activities; (5) Net SPNM and PNM acres available.

Methodology: GIS analysis of added routes in relation to ROS classes, WUI zones, most popular non-motorized recreation activities, and vehicle classes.

Rationale: The indicators address how alternatives respond to the Forest Plan and the Travel Management Rule: whether the motorized recreation opportunity conflicts with other recreation opportunities, specifically non-motorized opportunities; the proximity of motor vehicle use to populated areas or neighboring federal lands; the quality of the motorized recreation experience; and the quality of motorized access to dispersed areas.

4. **Cumulative Effects**

Considerations: cumulative effects should be discussed in reference to the 2 'benchmark' alternatives (Alternatives 1 and 3).

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

Long-term timeframe: 20 years.

Spatial boundary: The Forest boundary is the unit of spatial analysis for determining cumulative effects.

Indicator(s): (1) Net SPNM and PNM Acres Available; (2) The number of NFTS miles within proximity to populated areas or neighboring federal lands (within WUI zone).

Methodology: GIS analysis of the SPNM ROS class acres and total NFTS miles within WUI zones.

Rationale: The alternative containing the largest NFTS would have the smallest amount of residual SPNM acres, thus reducing the opportunity for non-motorized recreation activities. Conversely, the alternative with the most compact NFTS could have more opportunity for non-motorized recreation activities. The number of NFTS miles in the WUI zone would illustrate the cumulative effects of the proximity of the proposed NFTS per alternative to populated areas.

3.2.4 Affected Environment

The Plumas National Forest currently hosts a wide range of motorized and non-motorized recreation experiences that occur year round. Motorized recreation involves the use of highway-licensed cars, sedans, sport utility vehicles (SUVs), dual-sport motorcycles, off-highway vehicles (OHVs), motorcycles, all terrain vehicles (ATVs), snowmobiles, and four-wheel drives (4WDs), including highly customized and specialized machines able to travel extreme terrain. Non-motorized recreational activities, include hiking, camping, mountain bike riding, horseback riding, wildlife viewing, picnicking, rock climbing, hunting, fishing, recreational shooting, recreational gold panning and dredging, cross-country skiing, snowshoeing, snow camping and snow play. These opportunities are roughly depicted in the Recreation Opportunity Spectrum (ROS) mapping completed at the time the Forest Plan was developed.

3.2.4.1 Recreation Visitor Use

Visitor use estimates for the Forest were generated based on the National Visitor Use Monitoring (NVUM) survey that was conducted from October 2004 through September 2005. The survey was designed to assess existing recreation demand on the Forest by asking visitors what they did during their visit, and visitors could check multiple activities. This resulted in two categories of visitor use, activities participated in and main activity, and it highlighted the fact that the two may or may not be related. For example, over 75 % of Forest visitors reported participating in the viewing of natural features but less than 7% reported that as their main activity. On the other hand, 34% reported participating in fishing and 28% reported that as their main activity. (Table 5).

While access to all types of recreation is recognized as the most common motor vehicle use, it was reported that an estimated 26.9% of visits involved driving for pleasure, while 1.6 % of visits involved OHV use. OHV use as the primary activity was estimated for only 0.3% of visits.

Conversely, as estimated 45.7% of visits involved hiking/walking in the Forest with 14.1% of visits reporting hiking/walking as the primary activity.

Table 5. Plumas National Forest visits by participation and primary activity

Activity	% Participating	% as Main Activity
Relaxing	77.2	11.3
Viewing Natural Features	75.1	7.3
Viewing Wildlife	60.6	1.1
Hiking/Walking	45.7	14.1
Fishing	34.1	27.5
Motorized Water Activities	32.9	11.1
Driving for Pleasure	26.9	3.2
Other Non-motorized	15.3	3.4
Developed Camping	11.4	1.5
Snowmobiling	9.8	9.0
Visiting Historic Sites	9.8	0.3
Some Other Activity	8.7	5.2
Picnicing	8.7	1.5
Nature Study	7.2	0.1
Gathering Forest Products	5.7	2.9
Non-motorized Water	4.1	1.1
Primitive Camping	2.7	0.1
Skiing	2.4	1.7
OHV Use	1.6	0.3
Backpacking	1.3	0.7
Bicycling	1.3	0.4
Resort Use	1.0	0.1
Hunting	0.9	0.5
Horseback Riding	0.3	0.1

Based on the reported 667,600 public visits to the Plumas National Forest (PNF) during fiscal year 2005, this would mean that 179,600 visits involved driving for pleasure, 10,700 visits involved the use of OHVs and the primary activity for 2,000 visits to the PNF was OHV use. Additionally, 305,100 visits involved hiking or walking and the primary activity for 94,100 visits to the PNF. When primary motorized uses are combined, including OHV use, and driving for pleasure, the approximated number of visits is 23,350 or 3.5%, compared to 308,450 visits, or 46% for primary non-motorized uses combined, including backpacking, fishing, hiking/walking, horseback riding, bicycling, and other non-motorized activities.

3.2.5 Environmental Consequences

3.2.5.1 Direct and Indirect Effects for all Alternatives

Indicator Measure 1: The extent of non-motorized recreation activities displaced by proposed motor vehicle use. Visitors should expect that the potential non-motorized recreation experience may differ greatly among the alternatives, with those alternatives with fewer motorized trails having a lower impact to non-motorized recreation. Table 6 displays the number of proposed designated trail miles within Roaded Natural Area (ROS Roaded Natural) for each alternative. Alternative 3 poses the least impact to non-motorized recreation activities followed by Alternatives 4, 5, and 2 in that order. The greatest impact to non-motorized recreation activities is Alternative 1 because the forest would remain open to cross country travel and 158 miles of inventoried routes would remain in Roaded Natural Areas. Alternative 2 has a 78% improvement from Alternative 1 while Alternatives 3, 4 and 5 have a 100%, 88% and 83% improvement respectively within Roaded Natural Areas.

Table 6. Proposed OHV trail mileage within Roaded Natural Areas for each action alternative.

Class of Vehicle	Alt. 2		Alt. 3		Alt. 4		Alt. 5	
	Mileage	%	Mileage	%	Mileage	%	Mileage	%
OHV 4WD	22.2	64	0	0	13.2	69	16.9	62
OHV ATV	5.1	15	0	0	4.3	23	6.5	24
Motorcycle	7.2	21	0	0	1.6	8	3.9	14
Total Miles	34.5		0		19.2		27.3	
Reduction from Existing	123.7	78	158.2	100	139.0	88	130.9	83

[1]Under Alternative 1 (No-action) approximately 999,521 acres remain open to cross-country motor vehicle travel. This includes approximately 1,109 miles of inventoried routes used by OHVs. OHV 4WD – 103.3 miles (65%), OHV ATV – 22.7 miles (15%), Motorcycle 32.2 miles (20%), Total 158.2 miles within Roaded Natural Areas.

Indicator Measure 2: The extent of proposed motor vehicle use impacting urban areas. Visitors should expect that the potential impacts to urban areas may differ greatly among the alternatives, with those alternatives with fewer roads having a lower impact of noise, dust and physical presence in urban areas. Table 7 displays the number of proposed designated trail miles within the Wildland Urban Interface (Urban Core and WUI) for each alternative. Alternative 3 poses the least impact to urban areas followed by Alternatives 4, 5 and 2 in that order. The greatest impact to urban areas is Alternative 1 because the Forest would remain open to cross country travel and 207 miles of inventoried routes would remain in wildland urban interface and urban core areas. Alternative 2 has a 73% improvement from Alternative 1 while Alternatives 3, 4 and 5 have a 100%, 83% and 80% improvement respectively for OHV trail mileage within wildland urban interface and urban core areas.

Table 7. Proposed OHV trail mileage within wildland urban interface and urban core.

Class of Vehicle	Alt. 2		Alt. 3		Alt. 4		Alt. 5	
	Mileage	%	Mileage	%	Mileage	%	Mileage	%
OHV 4WD	36.0	64	0	0	25.7	74	30.3	71
OHV ATV	18.8	34	0	0	8.5	25	11.4	27
Motorcycle	1.1	2	0	0	0.5	1	0.7	2
Total Miles	55.8		0		34.7		42.4	
Improvement from Existing	151.3	73	207.1	100	172.4	83	164.7	80

[1]Under Alternative 1 (No-action) approximately 999,521 acres remain open to cross-country motor vehicle travel. This includes approximately 1,109 miles of inventoried routes used by OHVs. OHV 4WD – 138.8 miles (67%), OHV ATV – 64.2 miles (31%), Motorcycle 4.1 miles (2%), Total 207.1 miles within Wildland Urban Interface and Urban Core.

Indicator Measure 3: The miles of roads and motorized trails available by alternative and the total miles available by vehicle type by alternative. Visitors should expect that the potential recreation experience may differ greatly among the alternatives, which contain routes ranging from high standard surfaced roads already designated for public highway-licensed motor vehicle use to roughly graded native surface roads and trails. Table 8 displays the mileage by vehicle type for each alternative. As the table illustrates, all the action alternative have a general decrease in mileage for all motorized uses from that included in Alternative 1. Management of the systems proposed in all action alternatives would represent a change from the current condition. This would result in adverse impacts to motorized recreationists as cross-country travel and use on previously open routes is prohibited in all action alternatives. Alternative 1 provides the highest mileage of roads and motorized trails because the Forest would remain open to cross country travel and the 1109 miles of inventoried routes would remain open to motor vehicle use. Alternatives 2, 5 and 4 provide the next highest mileage of roads and motorized trails in that order. The alternative with the lowest mileage of roads and motorized trails is Alternative 3. Alternative 2 has a 67% reduction in OHV proposed trail mileage compared to inventoried routes in Alternative 1 while Alternatives 3, 4 and 5 have a 100%, 87% and 77% reduction respectively.

Table 8. Mileage by vehicle type for each action alternative.

Class of Vehicle	Alt. 2		Alt. 3		Alt. 4		Alt. 5	
	Mileage	%	Mileage	%	Mileage	%	Mileage	%
Passenger Car Only	638	14	638	15	627	14	627	14
Mixed Use	3,480	75	3,480	82	3,491	80	3,491	78
4WD Trails	331	7	109	3	219	5	274	6
ATV Trails	72	2	7	0	26	0.5	42	1
Motorcycle Trails	91	2	14	0	26	0.5	65	1
Total Miles	4,612		4,248		4,389		4,499	
Reduction from Existing Inventoried Routes (1109 mi)	745	67	1,109	100	968	87	858	77

[1]Under Alternative 1 (No-action) approximately 999,521 acres remain open to cross-country motor vehicle travel. This includes approximately 1,109 miles of inventoried routes used by OHVs (4WD – 725 miles, ATV – 159 miles, Motorcycle – 225 miles).

Table 9 displays the total mileage available for each vehicle type by alternative. Unlicensed vehicles (ATVs and some motorcycles) cannot use passenger car roads unless the roads are designated for mixed use. Alternatives 4 and 5 include 11.3 miles of mixed use on three important ATV connector routes. All-Terrain Vehicles are also not allowed on motorcycle trails and vehicle greater than 50” in width are not allowed on ATV and motorcycle trails. Alternative 1 provides the highest mileage of roads and motorized trails and routes because the Forest would remain open to cross country travel and the 1,109 miles of inventoried routes would remain open to motor vehicle use for a total of 5,357 miles. This includes 4,118 miles for passenger cars, 4,930 miles for 4WD, 4,453 miles for ATV and 4,684 miles for motorcycle.

Table 9. Total mileage available for each vehicle type for each action alternative.

Class of Vehicle	Alt. 2		Alt. 3		Alt. 4		Alt. 5	
	Mileage	%	Mileage	%	Mileage	%	Mileage	%
Total Miles	4,615		4,248		4,389		4,499	
Passenger Car	4,118	89	4,118	97	4,118	94	4,118	92
4WD	4,450	96	4,228	99	4,337	99	4,392	98
ATV	3,883	84	3,597	85	3,736	85	3,807	85
Motorcycle	3,977	86	3,610	85	3,762	86	3,872	86

Indicator Measure 4: Visitors selecting dispersed recreation areas, rather than developed areas, report they viewed highly developed areas as overcrowded, noisy, expensive, and too developed. These visitors preferred the characteristics of roaded, dispersed areas, including the lack of development, fees, regimentation, control, and greater privacy and the freedom to engage in activities that may conflict with others in developed locations, such as OHV use, bringing along a noisy dog, and occupying the site in a manner that meets their needs. In addition, dispersed recreation areas provide large groups better opportunity to camp in close proximity to each other, and away from others, than do most developed group campgrounds.

The action alternatives have the potential to reduce motorized access to dispersed recreation across the Forest, resulting in reduced access to dispersed recreation by motor vehicles (Table 10). Decreased direct motor vehicle access to dispersed use areas would directly impact recreationists with campers and trailers, limiting their choices in parking locations to the designated system.

Motor vehicle access to dispersed recreation opportunity is reduced in all action alternatives (Table 10). The action alternatives result in a relative decrease in the number of dispersed recreation opportunities within 300 feet of proposed OHV trails by between 66 to 80%, compared to Alternative 1. Alternatives 2 and 5 pose the least impact to dispersed camping access followed by Alternative 4. The greatest impact to dispersed camping access is Alternative 3.

Table 10. Inventoried dispersed sites and inventoried dispersed sites within 300’ of water

Alternative	Within 300’ of a proposed motorized trail	Percentage of inventoried dispersed recreation sites accessible by motorized vehicle.	Within 300’ of a proposed motorized trail and 300’ of water	Percentage of inventoried dispersed recreation site accessible by motorized vehicle and 300’ of water.
1	0[1]	100%	0[2]	100%
2	31	34%	13	37%
3	0	0%	0	0%
4	18	20%	4	11%
5	28	34%	10	29%

[1]Approximately 91 inventoried dispersed recreation sites can be accessed via motorized cross-country travel. [2]Of the 91 dispersed recreation sites accessed via motorized cross county travel, approximately 35 are located within 300’ of water.

In all action alternatives, access to dispersed sites located within 300 feet of water has decreased by 63 to 89%. This distance, while highly desirable to recreationists, corresponds with the extent of riparian habitat conservation areas (RHCAs) for perennial streams, lakes, and ponds, which are provided with protections in the Forest Plan and the Sierra Nevada Forest Plan Amendment. These protections and management direction are discussed in the Soils and Water Resources and Aquatic Biota sections.

Indicator Measure 5: Net SPNM and PNM Acres Available. There are no reductions in semi primitive and primitive non-motorized acres in any of the alternatives from the current condition.

3.2.5.2 Alternative 1

Motorized Recreation: Alternative 1 includes the most motorized travel opportunity of all alternatives with 999,521 acres open to motorized use including approximately 1,109 miles of inventoried OHV routes. With no change to the managed use of existing NFS roads and trails, this alternative results in the least impact to motorized recreation.

Since Alternative 1 represents the existing condition, few adverse impacts are incurred by motorized recreationists. The inventoried routes, however, vary greatly in condition and the quality of recreational experience. In some areas, visitors may have difficulty making sense of, and navigating, the dense web of inventoried routes. This alternative does not represent a cohesive, designed, or well-managed recreation system.

Recreation Settings: The No-action Alternative does not have any significant effects on the recreation settings as described in the Affected Environment of this Recreation section. Non motorized users would continue to be impacted by cross-country motorized use.

Dispersed Recreation: Alternative 1 provides the greatest amount of access to dispersed use areas, including 91 inventoried sites. Approximately 38% of the inventoried dispersed sites are within 300 feet of a stream or lake. This alternative represents the least adverse impact to dispersed recreationists seeking motorized access.

3.2.5.3 Alternative 2

Motorized Recreation: Alternative 2 includes the highest motorized trail mileage of all the action alternatives (494 miles). This alternative has the highest mileage of motorcycle-only trail (91 miles) of all the action alternatives. The Forest would be closed to cross-country travel.

Recreation Settings: Alternative 2 includes the French Creek, Flea and Granite Basin motorcycle single track and ATV areas. These three areas provide exceptional riding experiences for all levels of motorcycle riders. They are sponsored by very active groups who are committed to maintaining and improving the riding conditions of these trails. In the rest of the Forest, proposed designated trails would provide access to many outstanding points of interest with groups committed to maintaining these trails.

Dispersed Recreation: Alternative 2 provides the greatest amount of access to dispersed use areas of the action alternatives, including 31 inventoried sites that are within 300 feet of a proposed trail. Approximately 31% of the inventoried dispersed sites are within 300 feet of a stream or lake. Alternatives 2 has the least adverse impact to dispersed recreationists of the action alternatives.

3.2.5.4 Alternative 3

Motorized Recreation: Alternative 3 has no new motorized trail miles. This alternative results in the greatest impact to motorized recreation. The Forest would be closed to cross-country travel.

Recreation Settings: Alternative 3 does not provide any additional motorized trails.

Dispersed Recreation: Alternative 3 provides the least amount of access to dispersed use areas because no motorized trails are added to the system.

3.2.5.5 Alternative 4

Motorized Recreation: Alternative 4 includes the least motorized trail mileage (271 miles) of all the alternatives that add trails to the National Forest Transportation System (NFTS). This alternative has the least mileage of motorcycle-only trail (26 miles) of the alternatives that add motorized trails. The Forest would be closed to cross-country travel.

Recreation Settings: Alternative 4 includes the Granite Basin motorcycle single track and ATV areas, but excludes the French Creek area due to California red legged frog concerns and most of the Flea area due to watershed concerns. In the rest of the Forest, proposed trails would provide access to many outstanding points of interest with groups committed to maintaining these trails. Trails in Citizen Inventoried Roadless Areas (CIRAs) have been dropped from this alternative to reduce impacts to these areas.

Dispersed Recreation: Alternative 4 provides the least amount of access to dispersed use areas of the alternatives that add trails, including 18 inventoried sites that are within 300 feet of a proposed trail. Four (22%) of these inventoried dispersed sites are within 300 feet of a stream or lake. This alternative represents the greatest adverse impact to dispersed recreationists of the alternatives that add trails to the NFTS.

3.2.5.6 Alternative 5

Motorized Recreation: Alternative 5 includes the second highest motorized trail mileage (381 miles) of the alternatives that add trails to the NFTS. This alternative has the second highest mileage of motorcycle-only trail (65 miles) of the alternatives that add motorized trails. The Forest would be closed to cross-country travel.

Recreation Settings: Alternative 5 includes the French Creek and Granite Basin motorcycle single track and ATV areas. These two areas provide exceptional riding experiences for all levels of motorcycle riders. They are sponsored by very active groups that are committed to maintaining and improving the riding conditions of these trails. In the rest of the Forest, proposed designated trails will provide access to many outstanding points of interest with groups committed to maintaining these trails.

Dispersed Recreation: Alternative 5 provides the greatest amount of access to dispersed use areas of the alternatives that add trails to the NFTS, including 28 inventoried sites that are within 300 feet of a proposed designated trail. Ten (36 %) of these inventoried dispersed sites are within 300 feet of a stream or lake. Alternatives 5 has the second least adverse impact to dispersed recreationists of the alternatives that add motorized trails.

3.2.5.6.1 Cumulative Effects for all Alternatives

The cumulative effects analysis for recreation considers impact of the alternatives when combined with the following past, present, and foreseeable future actions and events: National Forest System trails and inventoried routes, on the ground management decisions, road and trail maintenance, road and trail construction, and population growth. These actions were selected because they have caused or have the potential to cause changes in recreation opportunities, public access or the creation of routes on the ground. The geographic scope (Forest-wide) of the cumulative effects analysis was selected because impacts to the recreation system in one area of the Forest can affect the continuity of the system and public access opportunities in other areas. The temporal scope was selected because impacts to recreation and public access can continue over time. By identifying existing inventoried routes during the route inventory, we captured the network of routes attributed to past recreation use Forest-wide.

Indicator Measure 1: There are no proposed designated trails in semi primitive non motorized and primitive non motorized areas.

Indicator Measure 2: The extent of proposed motor vehicle use impacting urban areas. Visitors should expect that the potential impacts to urban areas may differ greatly among the alternatives, with those alternatives with fewer roads having a lower impact of noise, dust and physical presence in urban areas. Alternative 3 poses the least impact to urban areas followed by Alternatives 4, 5 and 2 in that order. The greatest impact to urban areas is Alternative 1 due to continued cross-county motor vehicle travel.

Management decisions are directly responsible for maintaining the current route system, opening new routes, or closing existing routes. Active management that involves education, maintenance, and volunteers are effective measures for controlling the creation of inventoried routes and protecting Forest resources. When routes become rutted, culverts become blocked, or erosion is evident, engaging volunteers to mitigate the possible adverse effects on resources and maintaining the quality of the recreation infrastructure is the option preferred by the Agency and the public as opposed to closing the route to public use.

Road and trail maintenance and construction are essential for creating and managing a cohesive motorized recreation system. There were 786,914 ATVs and OHV motorcycles registered in California in 2004, up 330% since 1980. At the same time, the road and trail maintenance budget has been steadily declining. The cumulative effect of increasing road and trail use and decreasing maintenance could be erosion and deterioration of roads and an increase risk of failure. A lack of maintenance, in the long term, could result in the closing of trails in order to prevent resource damage. An actively engaged volunteer program with focus on recruitment, training, and support along with grants and Forest Service support, could provide maintenance for our entire system of motorized trails, while meeting Forest Service standards and resource concerns. Mixed use would be allowed in Alternative 4 and 5 on three roads (11.3 miles) currently managed for passenger vehicles. This would allow for additional loop opportunities for unlicensed vehicles users.

3.2.6 Summary of Effects Analysis Across all Alternatives

The following table summarizes the environmental effects for recreation across all alternatives (

Table 11). The rankings are based on a sliding scale from 0 thru 5, with 5 being the best condition for that indicator and 0 being the worst condition.

Table 11. Summary comparison of alternatives by environmental effects for recreation.

Indicators – Recreation Resources	Rankings of Alternatives for Each Indicator[1]				
	Alt. 1	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**
Proximity: Non-Motorized Recreation Compatibility (The extent of non-motorized recreation activities displaced by proposed motor vehicle use).	1.0	4.1	5.0	4.5	4.3
Proximity: Proximity of motor vehicle use to populated areas, neighboring federal lands (The number of NFTS miles within proximity to populated areas or neighboring federal lands (within WUI zone).	1.0	3.9	5.0	4.3	4.2
Opportunity: Quality and diversity of motorized recreation experience (The number of miles devoted to each vehicle class).	5.0	4.0	1.0	2.2	3.1
Opportunity: Quality of motorized access to dispersed recreation opportunities (The number of miles devoted to each vehicle class for access to dispersed activities).	5.0	4.0	1.0	2.7	3.7
Net SPNM and PNM Acres Available.	5.0	5.0	5.0	5.0	5.0
Average for Recreation Resources	**3.4**	**4.2**	**3.4**	**3.7**	**4.1**

[1] A score of 5 indicates the alternative with the least adverse impact on the recreation resources related to the indicator; A score of 1 indicates the alternative with the most adverse impact for recreation resources related to the indicator

3.2.7 Compliance with the Forest Plan and Other Direction

Alternative 1 does not comply with the 2004 Sierra Nevada Forest Plan Amendment Record of Decision because it would allow wheeled vehicle travel off of designated routes, trails and limited off-highway vehicle use areas.

3.3 Transportation Facilities

This section of the environmental analysis examines the extent to which alternatives respond to transportation facilities direction established in the Plumas National Forest Land and Resource Management Plan. The Forest Plan transportation facilities direction was established under the implementing regulations of the National Forest Management Act (NFMA) and the National Forest Roads and Trails Act (FRTA). The National Forest Transportation System (NFTS) consists of roads, trails, and airfields. The NFTS provides for protection, development, management, and utilization of resources on the National Forests. There are other roads and trails existing on the Forest that are not currently part of the NFTS. Transportation facilities considered in this analysis include roads and trails that are suitable for motor vehicle use. This analysis considers changes needed to the NFTS to meet the purpose and need of this analysis. Decisions regarding changes in the transportation facilities must consider: 1) providing for adequate public safety, and 2) providing adequate maintenance of the roads and trails that will be designated for public use. The analysis in this section focuses primarily on these two aspects of the NFTS.

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

Direction relevant and specific to the proposed action as it affects transportation facilities includes:

Title 36, Code of Federal Regulations, Part 212 (36 CFR 212) is the implementing regulation for the FRTA and includes portions of the Travel Management Rule published in the Federal Register on November 9, 2005. Part 212 provides criteria for designation of roads and trails. Providing safe transportation facilities and considering the affordability of maintaining the transportation facilities are two of the criteria.

Forest Service Manual Sections 2350 and 7700 contain agency policy for management of the National Forest Transportation System. The policy requires the development of trail management objectives (TMOs) and road management objectives (RMOs). The TMOs and RMOs document the purpose of each trail or road. The purpose for the trail or road sets the parameters for maintenance standards needed to meet user needs, resource protection and public safety. Forest Service Handbook 7709.58 describes the maintenance management system the Forest Service uses and the maintenance standards needed to meet road management objectives (RMOs) for the road system and include considerations for public safety.

Regional Forester's letters, file code 7700/2350, dated 08/26/06 and 06/20/07 contain procedures National Forests in Pacific Southwest Region will use to evaluate safety aspects of public travel on roads when proposed changes to the NFTS will allow both highway legal and non-highway legal traffic on a road (motorized mixed use).

The California Vehicle Code (CVC) regulates the use of motor vehicles in California, including motor vehicles used on the National Forests. The CVC sets safety standards for motor vehicles and vehicle operators. It defines the safety equipment needed for highway legal and non-highway legal vehicles. It also defines the roads and trails where non-highway legal motor vehicles may be operated.

3.3.2 Effects Analysis Methodology

3.3.2.1 Transportation Specific Assumptions

1. Any motor vehicle use authorized by state law is occurring on the NFTS unless there are Forest specific prohibitions.
2. Motor vehicle use by special use permit or other permitted activities are outside the scope of this proposal (fuel wood gathering, motorized Special Use Permit event, Recreation Residences, mining activities).
3. Motorized trails eligible classes are high clearance vehicles (4WD etc.), ATV and motorcycles. Low clearance highway legal vehicles are not prohibited on trails but will not be found using trails.
4. There is some cost for maintenance that will have to be born by the Forest Service for any route open to motor vehicle use by the public.
5. State law regulating motor vehicle drivers sets the standard of care for the safety of themselves and other users for the NFTS.

Public Safety – 36 CFR 212.55 requires public safety be considered when designating roads, trails and areas for motor vehicle use. The proposed additions and changes to the NFTS have been evaluated for the affects on public safety.

Affordability – 36 CFR 212.55 requires consideration of the need for maintenance and administration of the designated NFTS. Costs for the NFTS system include costs for needed maintenance work that has not been completed for various reasons (deferred maintenance) and costs of maintenance that should be performed routinely to maintain the facility to its current standard (annual maintenance). In addition, there may be additional costs associated with proposed changes to the NFTS (implementation costs). These costs may be for improving unauthorized routes that will be added to the NFTS, costs for proposed safety and resource improvements, costs for changing maintenance levels, and costs for closing routes to use by motor vehicles.

3.3.3 Affected Environment/Environmental Consequences

3.3.3.1 Affected Environment

The road system has evolved over time. The first roads built through the National Forest were routes providing access to Chester, Greenville, Quincy and Portola along the Feather River. These early roads followed existing trails used by miners and trappers. As transportation needs changed over time, the routes were reconstructed to higher standards.

In 1910, work was completed on the Western Pacific Railroad in the North Fork of the Feather River. Completion of Highway 70 in 1937 opened the Feather River drainage to automobile traffic, encouraging tourism associated with the abundance of wildlife and natural beauty. The Forest undertook a transportation planning effort in the 1920s with a focus on access for fire protection, but little road construction actually occurred. The Civilian Conservation Corps built some roads in the 1930s. In 1935 another Forest transportation study was conducted, again with the goal of enhancing fire protection, but little road construction occurred until America entered World War II, when emphasis was directed towards developing access to strategic mineral deposits. Even with this emphasis, most of the Forest remained inaccessible by vehicle.

In the late 1940s, America demanded timber to support its building boom. Congress appropriated large road budgets to develop an infrastructure for removing timber from previously remote areas. Main roads were designed and constructed by the Bureau of Public Roads, now the Federal Highway Administration; these roads were normally constructed to highway standards. The Forest Service was responsible for providing a long-term, sustainable flow of timber. Development of a system of lower-volume project roads, such as the roads within timber sale areas, fell to the agency. Often the road location, design, and construction standards were left to the timber purchaser's discretion. In the urgency to provide timber access, many miles of primary timber access roads were hastily surveyed and constructed with insufficient attention paid to possible watershed impacts and long-term stability issues. Many roads were constructed during this period, accessing large areas of old growth and late seral stage timber throughout the Forest.

In the early 1950s, the Forest Service began requiring the use of geometric standards for road design that set limits on grades and curves. The excavations required to establish alignment and grade often resulted in large cuts and fills. Most of the high-volume roads were designed and constructed as in-slope, ditch roads with a cross-drain configuration that tends to concentrate surface runoff and often contributes to offsite resource damage.

The majority of the roads on the Forest were constructed from 1960 through 1990 in support of a robust timber program, which averaged 203 million board feet of timber from 1974 to 1990. Road construction programs were large. To ensure that the Forest Service was receiving the quality of road paid for, an emphasis was placed on contract administration. A national training and certification program was developed to ensure that contract administrators were qualified and experienced. Timber companies that used the roads for hauling provided maintenance of the growing road system. Large reconstruction budgets in the 1970s and 1980s allowed managers to reconstruct many problem road segments associated with early road construction practices.

During this period road standards were modified several times. The geometric design standards introduced in the 1950s were used until 1976, when nongeometric design methods were implemented. These standards permitted the road alignment to follow the existing contour of the ground as closely as possible, resulting in significantly less excavation, embankment, and ground disturbance. Also, roads were typically designed with an out-sloped configuration, thereby reducing the concentration of road surface runoff. In the early 1980s, the agency began a shift in emphasis away from commodity outputs to a more holistic view of resource management. This new focus allowed the Forest Service to sacrifice serviceability of the road in order to reduce potential environmental impacts. Lower design standards and nongeometric design methods coupled with well trained administrators significantly reduced many of the environmental impacts associated with early road construction and use.

By the mid-1980s, the amount of new road construction began to taper off. The timber program was fluctuating, and the majority of the arterial and collector road system was in place. New road construction was primarily limited to short spur roads needed to access individual timber stands. As timber harvest decreased, maintenance of the transportation system became an issue.

The Plumas National Forest Land and Resource Management Plan (Forest Plan), issued in 1988, established land allocations for the Forest. Some of these, such as Late-Successional Reserves and Riparian Reserves, are not considered available for timber harvest. Currently, approximately 77% of the land base is available for programmed timber harvest. The annual harvest levels of 200 million board feet common in the 1970s and 1980s have been reduced to an estimated annual sale quantity of 15 million board feet. A significant portion of the road system initially developed to facilitate timber harvest now accesses lands where timber harvest is either not permitted or is not the primary management emphasis. This means that the road system will receive a very limited amount of maintenance funding from timber harvest in the future.

The current road inventory for the Plumas National Forest is 4,137 miles, which includes approximately 458 miles of cost share roads. These are classified roads that are jointly financed and maintained by the Forest and Sierra Pacific Industries, Soper Wheeler or Collins Pine. The Forest Service manages these roads as part of the transportation system, but cannot make unilateral decisions to decommission, reconstruct, or change service levels on these roads. Road decisions must be by agreement with each landowner, as described in the Road Right-of-Way Construction and Use Agreement.

Forest-wide average costs per mile to maintain each operational maintenance level (ML) were developed and applied to the road system to calculate the estimated total cost. The average annual maintenance costs are shown in the following table. The average costs per mile were derived from condition survey estimates. This includes costs for maintaining route markers and signs needed for public safety.

Table 12. Existing System Roads Average Annual Maintenance Needs

Operational Maintenance Level	Miles	Cost per Mile	Annual Maintenance Cost
1	262	$56	$20,363
2	3,240	$136	$439,830
3	404	$2,718	$1,097,870
4	106	$3,527	$373,836
5	124	$3,527	$437,317
Total	4,137	$573	$2,369,215

The Plumas National Forest expects to receive $700,000 in Forest Service appropriated funds and $500,000 in other appropriated funds per year. Cooperators and timber purchasers invest approximately $700,000 in road maintenance work per year on the Forest. The remaining short fall means that some roads are not maintained on a yearly basis and maintenance is completed on roads with the most use.

The expected average annual motorized trail maintenance cost by alternative is shown in the following table. The following cost per mile for trail maintenance is estimated to be the following; all vehicles-$225 per mile, 50”and less-$112/mile and motorcycle - $56/mile. Costs include safety and resource improvements on system trails. The Plumas National Forest expects to receive $25,000 in Forest Service appropriated funds for motorized trail maintenance. Trail maintenance money has been declining each year and the Plumas National Forest is dependent on volunteer labor and grants for any additional trail maintenance.

Table 13. Existing Motorized Trail Average Annual Maintenance Cost by Alternative

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
All Vehicles Miles	109	109	109	109	109
50" Less Miles	7	7	7	7	7
Motorcycle Miles	14	14	14	14	14
Total Miles	130	130	130	130	130
Total Maintenance	$26,100	$26,100	$26,100	$26,100	$26,100

3.3.3.2 Environmental Consequences

3.3.3.2.1 Measurement Indicator 1: Public Safety

1A. Adding unauthorized routes to the trail system: Most of the trails added to the system would not have safety concerns. Routes with safety concerns would be identified and corrections made during trail maintenance work. Some of the more demanding motorcycle singletrack trails could be a safety concern for the inexperienced rider. Local riding maps with difficulty ratings would be helpful to direct riders to trails of their ability.

Serpentine soils can produce asbestos dust that may cause health concerns. The following table depicts the number of miles of trails proposed to be added to the NFTS that traverse serpentine soils and the total miles of serpentine soils traversed by those trails. Five trails (5M11, 5M13, 8M11, 8M23 and 8M32) are entirely in serpentine soils. The presence of asbestos in serpentine soils and health risks to trail users has not been determined. The Pacific Southwest Region is developing guidelines for determining the presence of asbestos and the health risks to the public. The Plumas NF will follow the guidelines when they are available and implement mitigation measures required by the Region if health risks are found to be present. Potential mitigation measures are anticipated to include public notice of asbestos hazards, closure of portions of trails to the public, and seasonal closure of portions of trails to the public.

Table 14. The Number of Miles of Motorized Trails in Serpentine Ecosystems by Alternative

Measure	Alternative				
	1 (No Action)	2	3	4	5
Proposed Routes		11		8	14
Unauthorized Routes	37				
Total miles	40	14	3	4.1	6.5

1B. Motorized Mixed Use: The California Vehicle Code (CVC) requires motor vehicles operated on roads to be highway legal and be operated by licensed drivers. The CVC has exceptions to those requirements for off-highway vehicles. The CVC allows the operation of non-highway legal vehicles operated by unlicensed drivers on roughly graded roads. The Plumas National Forest considers roads maintained for high clearance vehicles as roughly graded and considers operation of OHVs on these roads to be consistent with state law. Roads maintained for passenger cars are not considered roughly graded and operation of OHVs on those roads is not consistent with state law.

1B1. Motorized mixed use (MMU) on high clearance roads: All the high clearance roads currently open to the public on the Plumas National Forest were determined to have minimal safety concerns and will be designated as open to all vehicles.

1B2. Motorized mixed use (MMU) on passenger car roads: Three passenger car roads (11.3 miles) have been proposed for mixed use. These roads have no accident history and have very few safety concerns. They are near the end of the passenger car segment and tend to be narrower and have more curves then the previous passenger car segment. They are out sloped and tend to require slower speeds. They will be posted for mixed use to warn drivers to anticipate ATV's and motorcycles.

The following table displays the number of miles of proposed and existing motorized trails. Alternative 1 is displayed to show the miles of unauthorized routes as if they were added to the trail system. These miles would remain open and therefore would continue to have potential safety and exposure concerns to the public. The table also shows the miles of proposed motorized mixed use roads consistent with California vehicle code requirements.

Table 15. Public Safety Measurement Indicator – Propose and Existing Motorized Trails

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
4WD Trail Miles	834	332	109	219	274
ATV Trail Miles	166	75	7	26	42
Motorcycle Miles	239	91	14	26	65
Total OHV Trail Miles	1,239	497	130	271	381
Motorized Mixed Use on Low Clearance Roads	0	0	0	11.3	11.3

3.3.3.2.2 Measurement Indicator 2: Transportation System Affordability

Table 16 below displays the proposed and existing motorized trails and estimated costs for each alternative. The total cost shown at the bottom of the table includes the estimated annual maintenance costs as well as implementation costs for motorized trails. Costs include safety and resource improvements on the motorized trails, work needed to bring unauthorized routes to acceptable standards for use by motor vehicles and the cost of producing the motor vehicle use map. The following cost per mile for trail maintenance is estimated to be the following: all vehicles-$225 per mile, 50" and less-$112/mile and motorcycle-$56/ mile. The following cost per mile to bring the proposed trail to minimum trail standards is estimated to be the following: all vehicles-$1,000 per mile, 50" and less-$500/mile and motorcycle-$250/ mile. These costs are averaged over all miles and will be accomplished with grant money and volunteer labor.

Table 16. Trail System Affordability

	Alt 1 (Unauthorized routes)	Alt 2	Alt 3	Alt 4	Alt 5
Miles All Vehicles	811	331	109	219	274
Miles 50" Less	161	75	7	26	42
Miles Motorcycle	232	91	14	26	65
Total Miles	1,239	497	130	271	381
Annual Maintenance:	$26,000	$88,000	$26,000	$54,000	$70,000
Cost of adding trails	$0	$276,000	$0	$122,000	$195,000
Cost of implementing MVUM	$0	$30,000	$30,000	$30,000	$30,000
Total Estimated cost for Alternative	$26,000	$394,000	$56,000	$206,000	$295,000

3.3.3.3 Alternative 1 – No action

3.3.3.3.1 Direct and Indirect Effects

Public Safety

Alternative 1 includes the most motorized route mileage of the all alternatives (1,239 miles) and cross-country travel on 999,521 acres is not prohibited. Since no change is proposed to the managed use of existing NFS roads and trail, this alternative would result in the greatest impact to motorized safety.

This alternative has the highest mileage of 4X4 motorized routes (811 miles), ATV routes (161 miles) and motorcycle only routes (232 miles) of all alternatives, but none of these would become system trails. These routes would continue to cause resource damage and would need a certain amount of maintenance in order to continue to be usable. The routes, however, vary greatly in condition and the quality of recreational experience provided. In some areas, visitors may have difficulty making sense of, and navigating, the dense web of routes. This alternative does not represent a cohesive, designed, or well-managed recreation system.

Maintenance, signing and trail improvements would not occur and therefore safety concerns would not be addressed. Maps to help direct riders to the appropriate trails for their skill level would not be available to the public.

Transportation System Affordability:

Alternative 1 has the greatest cost due to resource damage caused by continued route proliferation and unauthorized trail use.

3.3.3.4 Alternative 2 – Proposed Action

3.3.3.4.1 Direct and Indirect Effects

Public Safety

Alternative 2 includes the highest proposed motorized trail mileage of all the action alternatives (364 miles). This alternative proposes the highest mileage of motorcycle only trails (91 miles) of all the action alternatives. The Forest would be closed to cross-country travel. Maintenance, signing and trail improvements would occur and therefore safety concerns would be addressed. Maps to help direct riders to the appropriate trails for their skill level would be available to the public.

Transportation System Affordability

Alternative 2 requires the highest amount of investment and maintenance because 364 mile of motorized trails would be added to the system. Trails added to the system would be maintained thereby reducing the amount of damage inflicted on other resources.

3.3.3.5 Alternative 3

3.3.3.5.1 Direct and Indirect Effects

Public Safety

Alternative 3 has no proposed additional NFTS motorized trail miles. This alternative results in the least impact to public safety. The Forest would be closed to cross-country travel.

Transportation System Affordability

Alternative 3 requires the least amount of investment and maintenance because no trails would be added to the system. Unauthorized trails would continue to cause damage to other resources because they would not be maintained or rehabilitated as with the other action alternatives.

3.3.3.6 Alternative 4

3.3.3.6.1 Direct and Indirect Effects

Public Safety

Alternative 4 includes the least proposed motorized trail mileage of alternatives with proposed additional motorized trails (141 miles). This alternative includes the least mileage of proposed motorcycle-only trails (12 miles) for all the action alternatives. The Forest would be closed to cross-country travel. Maintenance, signing and trail improvements would occur and therefore safety concerns would be addressed. Maps to help direct riders to the appropriate trails for their skill level would be available to the public.

Transportation System Affordability

Alternative 4 requires the lowest amount of investment and maintenance of alternatives with proposed additional motorized trails because only 141 mile of motorized trails would be added to the system. Trails added to the system would be maintained thereby reducing the amount of damage inflicted on other resources.

3.3.3.7 Alternative 5

3.3.3.7.1 Direct and Indirect Effects

Public Safety

Alternative 5 includes the second highest proposed motorized trail mileage of all the action alternatives (251 miles). This alternative included the second highest mileage of proposed motorcycle only trails (51 miles) of all the action alternatives. The Forest would be closed to cross-country travel. Maintenance, signing and trail improvements would occur and therefore safety concerns would be addressed. Maps to help direct riders to the appropriate trails for their skill level would be available to the public.

Transportation System Affordability

Alternative 5 requires the second highest amount of investment and maintenance of the action alternatives because 251 mile of motorized trails would be added to the system. Trails added to the system would be maintained thereby reducing the amount of damage inflicted on other resources.

3.3.4 Summary Of Effects Analysis Across All Alternatives

Table 17. Summary Comparison of Alternatives by Environmental Effects for Facilities

Indicators – Facilities Resources	Rankings of Alternatives for Each Indicator1				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Public Safety	1.0	3.7	5.0	4.5	4.1
Transportation System Affordability	1.0	3.5	5.0	4.2	3.9
Average for Facilities Resources	1.0	3.6	5.0	4.4	4.0

[1] A score of 5 indicates the alternative is the best for facilities resources related to the indicator; A score of 1 indicates the alternative is the worst for facilitiesl resources related to the indicator

3.3.5 Compliance with the Forest Plan and Other Direction

All alternatives comply with the Plumas National Forest Land and Resource Management Plan and other regulatory directions.

3.4 Visual Resources

3.4.1 Introduction

This section examines the extent to which alternatives respond to visual resources management direction established in the Plumas National Forest Land and Resource Management Plan (Forest Plan) and the Travel Management (TM) Rule. The Forest Plan visual resources direction was established under the implementing regulations of the National Forest Management Act (NFMA).

In the development of the Plumas Forest Plan, the Forest's visual resources were inventoried to determine the landscape's scenic attractiveness (Variety Class inventory) and the public's visual expectations (Sensitivity Level inventory). Based upon these inventories, Visual Quality Objectives (VQOs) were established for all Forest land areas. The VQOs establish minimum acceptable thresholds for landscape alterations from an otherwise natural-appearing forest landscape. For example, areas with a Retention VQO are expected to retain a natural appearance; areas with a Partial Retention VQO may have some alterations, but they remain subordinate to the characteristic landscape; areas with a Modification VQO can have alterations that do not look natural appearing.

Roads and trails create linear alterations in landscapes that can be mitigated through sound design. Unmitigated, they present uncharacteristic line qualities in forest landscapes. Landscapes with a dense canopy cover have the capability of masking these linear alterations; sparsely covered landscapes have less capability. The proliferation of unauthorized routes, particularly in sparsely covered landscapes, can adversely affect the Forest's visual resources.

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

Direction relevant to the proposed action as it affects visual resources includes:

National Forest Management Act (NFMA). The National Forest Management Act (NFMA), and its implementing regulations, required the inventory and evaluation of the Forest's visual resource, addressing the landscape's visual attractiveness and the public's visual expectations. Management prescriptions for definitive lands areas of the Forest are to include Visual Quality Objectives.

Travel Management Rule. The TM Rule does not cite aesthetics specifically, but in the designation trails or areas, the responsible official shall consider effects on Forest resources, with the objective of minimizing effects of motor vehicle use.

Sierra Nevada Forest Plan Amendment (SNFPA). No specific direction related to visual resources is in the Final Supplemental ROD.

Plumas National Forest Land and Resource Management Plan (Forest Plan). The Forest Plan contains Forest-wide management direction in the form of Visual Quality Objectives and specific management area direction for visual resources.

3.4.3 Effects Analysis Methodology

3.4.3.1 Assumptions specific to visual resources analysis:

1. Based upon the review of the Forest Plan, the basic Measurement Indicator for the visual resources is compliance with the Retention and Partial Retention VQOs.
2. NFTS additions that contribute to the continuity of motor touring will have a beneficial effect on visual resources, since it is assumed that dead-end route situations will be reduced.

3.4.3.2 Data Sources:

Forest Plan for distribution of VQOs.

3.4.3.3 Visual Resources Indicators:

The extent to which the proposed NFTS falls within the Retention and Partial Retention VQOs (number of miles traversing landscapes that are to remain natural to near-natural appearing in character).

3.4.3.4 Visual Resources Methodology by Action:

1. Direct/indirect effects of the prohibition of cross-country motorized vehicle travel. The prohibition of cross-country motorized vehicles will have a positive effect on the Forest's visual resources. Improvement of the visual resource is long-term; unauthorized routes and impact areas will gradually heal over time.
2. Direct/Indirect Effects of adding trails and areas to the NFTS, including identifying vehicle class. Table 18 and Table 19 document the miles of trails in retention and partial retention visual quality objective areas. Non-characteristic line quality created by trail segments is the greatest impact to the visual resources – the location and design of these segments can significantly reduce their visual impact.

Table 18. Proposed OHV Mileage within Retention Visual Quality Objective Area

Class of Vehicle	1		2		3		4		5	
	Mileage	%	Mileage	%	Mileage	%	Mileage	%	Mileage	%
OHV 4WD	95.2	94	19.8	62	0	0	15.0	79	16.6	78
OHV ATV	5.3	5	10.5	33	0	0	3.9	21	4.7	22
Motorcycle	1.4	1	1.4	5	0	0	0.0	0	0.0	0
Total Miles	101.0		31.7		0		18.9		21.3	

Table 19. Proposed OHV Mileage within Partial Retention Visual Quality Objective Area

Class of Vehicle	1		2		3		4		5	
	Mileage	%	Mileage	%	Mileage	%	Mileage	%	Mileage	%
OHV 4WD	308.2	92	71.3	63	0	0	38.0	85	52.8	74
OHV ATV	15.7	5	21.5	19	0	0	4.6	10	8.0	11
Motorcycle	25.0	3	20.0	18	0	0	2.4	5	10.6	15
Total Miles	348.9		112.8		0		45.0		71.3	

Short-term timeframe: 1 year

Long-term timeframe: 20 years.

Spatial boundary: The "viewshed" is the unit of spatial analysis when considering effects associated with changes in the NFTS.

Indicator(s): The extent to which the proposed NFTS falls within the Retention and Partial Retention VQOs (number of miles traversing landscapes that are to remain natural to near-natural appearing in character).

Methodology: GIS analysis of added trails in relation to Retention and Partial Retention VQOs.

Rationale: Compliance with the Retention and Partial Retention Visual Quality Objectives (VQOs).

Changes to the existing NFTS

No change in effect for visual resources.

Cumulative Effects

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

Long-term timeframe: 20 years.

Spatial boundary: The "viewshed" is the unit of spatial analysis for determining cumulative effects.

Indicator(s): Number of key viewsheds that are or have the potential to be affected by motor vehicle travel.

Methodology: Identify key Forest viewsheds (scenic byway corridors, etc). These viewsheds are sometimes identified in the Forest Plan. Identify whether any of these key viewsheds are or have the potential to be affected by motor vehicle travel.

Rationale: Compliance with the Retention and Partial Retention Visual Quality Objectives (VQOs).

3.4.4 Affected Environment/Environmental Consequences

3.4.4.1 Affected Environment

In the development of the Plumas Forest Plan, the Forest's visual resources were inventoried to determine the landscape's scenic attractiveness (Variety Class inventory) and the public's visual expectations (Sensitivity Level inventory). Based upon these inventories, Visual Quality Objectives (VQOs) were established for all Forest land areas. The VQOs establish minimum acceptable thresholds for landscape alterations from an otherwise natural-appearing forest landscape. For example, areas with a Retention VQO are expected to retain a natural appearance; areas with a Partial Retention VQO may have some alterations, but they remain subordinate to the characteristic landscape; areas with a Modification VQO can have alterations that do not look natural appearing.

Visual quality objectives describe different degrees of acceptable alteration on of the natural landscape. The Objectives are considered the measurable standards for the management of the "seen" aspects of the land. Two short-term management efforts may be required. The first is to upgrade landscapes containing visual elements that do not meet the established VQOs. The second is to improve landscapes having a potential for greater natural-appearing variety. Once this is attained, one of the following five Quality Objectives is then applied.

Preservation: Only ecological change is allowed.

Retention: People's activities are not to be evident to the casual Forest visitor.

Partial Retention: People's activities may be evident but must remain subordinate to the characteristic landscape.

Modification: Activities may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. Activities should appear as a natural occurrence when viewed in the foreground or middle ground.

Maximum Modification: Activities may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

Roads and trails create linear alterations in landscapes that are hard to mitigate, making Retention and Partial Retention VQO achievement difficult. Landscapes with a dense canopy cover have the capability of masking these linear alterations; sparsely covered landscapes have less capability. The proliferation of unauthorized routes, particularly in sparsely covered landscapes, can adversely affect the Forest's visual resources.

3.4.4.2 Environmental Consequences

3.4.4.2.1 Alternative 1 – No action

Direct/Indirect Effects

Approximately 500 miles of unauthorized trails out of 1,109 miles of inventoried (45%) routes are in retention and partial retention VQOs. Additional routes would develop with no cross-country ban of off-highway vehicle use. Users would continue to create additional motorcycle single track and quad trails.

Cumulative Effects

Alternative 1 has the greatest potential for having a negative cumulative effect for visual resources. The continued proliferation and concentration of user-created route segments may create uncharacteristic line quality in forest landscapes.

3.4.4.2.2 Alternative 2 – Proposed Action

Direct/Indirect Effects: Direct/Indirect Effects

Approximately 144 miles of proposed trails out of 1,109 miles of inventoried (13%) routes are in retention and partial retention VQOs. No additional routes would develop with a ban on cross-country vehicle use.

Cumulative Effects

Alternative 2 has the second highest potential for having a negative cumulative effect for visual resources. With a ban on cross-country travel, over time an improvement of the visual resource would occur with unauthorized routes and impact areas gradually disappearing.

3.4.4.2.3 Alternative 3

Direct/Indirect Effects

This alternative does not add any trails. Therefore, there is no effect (0% proposed trails) in retention and partial retention VQOs. No additional trails would develop with a ban on cross-country vehicle use.

Cumulative Effects

Alternative 3 has the lowest cumulative effect for visual resources because no unauthorized routes are proposed to be added to the trail system. With a ban to cross-country travel, over time an improvement of the visual resource would occur with unauthorized routes and impact areas gradually disappearing.

3.4.4.2.4 Alternative 4

Direct/Indirect Effects

Approximately 64 miles of proposed trails out of 1,109 miles of inventoried (6%) routes are in retention and partial retention VQOs. No additional trails would develop with a ban on cross-country vehicle use.

Cumulative Effects

Alternative 4 has second lowest potential cumulative effect for visual resources with the second lowest miles of trails added to the trail system. With a ban to cross-country travel, over time an improvement of the visual resource would occur with unauthorized routes and impact areas gradually disappearing.

3.4.4.2.5 Alternative 5

Direct/Indirect Effects

Approximately 63 miles of proposed trails out of 1,109 miles of inventoried (8%) routes are in retention and partial retention VQOs. No additional trails would develop with a ban on cross-country vehicle use.

Cumulative Effects

Alternative 5 has third lowest potential cumulative effect for visual resources with the third lowest miles of trails added to the trail system. With a ban to cross-country travel, over time an improvement of the visual resource would occur with unauthorized routes and impact areas gradually disappearing.

3.4.5 Summary Of Effects Analysis Across All Alternatives

Table 20. Visual Resources Indicator Assessment

Indicators – Visual Resources	Rankings of Alternatives for Each Indicator1				
	Alt. 1	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**
Disturbance/Integrity: Compliance with the Retention and Partial Retention VQOs.	1.0	3.7	5.0	4.4	4.2
Average for Visual Resources	1.0	3.7	5.0	4.4	4.2

[1] A score of 5 indicates the alternative is the best for visual quality related to the indicator; A score of 1 indicates the alternative is the worst for visual quality related to the indicator.

3.4.6 Compliance with the Forest Plan and Other Direction.

All alternatives comply with the Plumas Forest Plan and other regulatory directions.

3.5 Soil and Water Resources

3.5.1 Introduction

The Plumas National Forest has managed the landscape as open to cross-country motor vehicle travel (motorized travel off of designated National Forest System (NFS) roads, trails or areas). Repeated use has resulted in unplanned, unauthorized routes. These routes generally developed without environmental analysis or public involvement, and do not have the same status as NFS roads and NFS trails included in the National Forest Transportation System (NFTS). This has resulted in unplanned roads and trails created without meeting Forest Plan Standards and Guidelines and Best Management Practices (BMPs). As a result, effects to soil and water resources have occurred in some locations.

The purpose of the "Soil and Water Resource Report" is to analyze the direct, indirect, and cumulative effects of the alternatives on soil and water resources, specifically long-term soil productivity and hydrologic function. The land management activities proposed under this project have the potential to affect soil and water resources in a beneficial, indifferent, or adverse manner. This report identifies mitigation measures needed to have a functioning trail system with minimal effects to these resources.

The soil resource provides many essential functions for NFS lands. It sustains plant growth that provides forage, fiber, wildlife habitat and watershed protection. It absorbs precipitation, stores water for plant growth, and gradually releases surplus water, which attenuates runoff rates. It sustains microorganisms which recycle nutrients for continued plant growth. The National Forest Management Act of 1976 and other acts recognized the fundamental need to protect, and where appropriate, improve the quality of soil. The alternatives could potentially affect soil productivity and its other ecosystem functions and is therefore addressed in this section.

Protection of water quantity and quality is an important part of the mission of the Forest Service (Forest Service Strategic Plan for 2007 to 2012, July 2007). Management activities on NFS lands must be planned and implemented to protect the hydrologic function of watersheds, including the volume, timing, and quality of streamflow. The use of roads, trails, and other areas on National Forests for public operation of motor vehicles has potential to affect these hydrologic functions through interception of runoff, compaction of soils, and detachment of sediment (e.g., Foltz, 2006). Management decisions to eliminate cross-country motorized travel and add new trails and areas to the NFTS, could potentially affect watershed functions and are therefore addressed in this section.

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

Direction relevant to the project as it affects soil resources includes:

National Forest Management Act of 1976. Renewable Resource Program. "recognize the fundamental need to protect and where appropriate, improve the quality of soil, water, and air resources."

National Soil Management Handbook. The Soil Management Handbook (USDA 1991) is a national soils handbook that defines soil productivity and components of soil productivity, establishes guidance for measuring soil productivity, and establishes thresholds to assist in Forest Planning.

Region 5 Soil Management Handbook Supplement. The Forest Service Region 5 Soil Management Handbook Supplement (R5 FSH Supplement 2509.18-95-1) establishes Regional Soil Quality Analysis Standards and provides threshold values that indicate when changes in soil properties and soil conditions would potentially result in a significant change in soil productivity (including soil loss, porosity; and organic matter), soil hydrologic function, or soil buffering capacity. The analysis standards are to be used for areas dedicated to growing vegetation. They are not applied to lands with other dedicated uses, such as developed campgrounds, administrative facilities or in this case, the actual land surface authorized for travel by the public using various kinds of vehicles.

Regional Forester's Letter (dated Feb 5, 2007). This letter provided clarification to Forest Supervisors on the appropriate use of the R5 Soil Management Handbook Supplement (R5 FSH Supplement 2509.18-95-1). It states in part:

> *Analysis or evaluation of soil condition is the intended use of the thresholds and indicators in R5 FSH Supplement 2509.18-95-1. They are not a set of mandatory standards or requirements. They should not be referred to as binding or mandatory requirements in NEPA documents. Standards and guidelines in Forest Land and Resource Management Plans provide the relevant substantive standards to comply with NFMA.*

The thresholds and indicators represent desired conditions for the soil resource. Utilization of the thresholds and indicators provides a consistent method to analyze, describe and report on soil condition throughout the Region.

Plumas National Forest Land and Resource Management Plan. The 1988 Forest Plan establishes Standards and Guidelines to prevent significant or permanent impairment of soil productivity on page 4-44 (USDA 1988). The analysis standards are to be used for areas dedicated to growing vegetation. They are not applied to lands with other dedicated uses, such as developed campgrounds, administrative facilities or in this case, the actual land surface authorized for travel by the public using various kinds of vehicles.

Direction relevant to the project as it affects water resources includes:

Clean Water Act of 1948 (as amended in 1972 and 1987) establishes as federal policy the control of point and non-point pollution and assigns the States the primary responsibility for control of water pollution. Compliance with the Clean Water Act by National Forests in California is achieved under state law (see below).

Section 303(d) of the Clean Water Act. This section requires the identification of water bodies that do not meet, or are not expected to meet, water quality standards or are considered impaired. The list of affected water bodies, and associated pollutants or stressors, is provided by the State Water Resources Control Board and approved by the US EPA. The most current list available is the 2006 303(d) list (SWRCB, 2006). The Plumas National Forest has three streams listed as impaired: Dolly Creek and Little Grizzly Creek (both due to Walker Tailings) and the North Fork Feather River (mercury and temperature). The addition of trails to the NFTS would not cause additional mine tailings or mercury to enter the stream course. The temperature concerns on the North Fork Feather River are due to the hydropower facilities and dams.

Non-point source pollution on National Forests is managed through the Regional Water Quality Management Plan (USDA Forest Service, Pacific Southwest Region, 2000). The Plan relies on implementation of prescribed best management practices. The Water Quality Management Plan includes one BMP for OHV use (4-7) and 28 BMPs related to road construction and maintenance (2-1 to 2-28) (See Appendix D for a complete list of BMPs that apply). All NFS roads and trails open to OHV use are required to comply with these BMPs.

Of particular relevance for motorized travel management, BMP 4-7 requires each Forest to: (1) identify areas or routes where OHV use could cause degradation of water quality; (2) identify appropriate mitigation and controls, and (3) restrict OHV use to designated routes. This BMP further requires Forests to take immediate corrective actions if considerable adverse effects are occurring or are likely to occur (See below Sections "Effects Analysis Methodology and "Affected Environment/Environmental Consequences").

Regional Water Quality Control Board—Central Valley Region—Beneficial Uses and State Water Quality Objectives. Beneficial uses are defined under California State law in order to protect against degradation of water resources and to meet state water quality objectives. The Forest Service is required to protect and enhance existing and potential beneficial uses during water quality planning (California Regional Water Quality Control Board [CRWQCB] 1998). The Cumulative Off-site Watershed Effects analysis of the Motorized Travel Management is designed to include all effects on beneficial uses of water that occur away from locations of actual land use and are transmitted through the fluvial system (USDA Forest Service 1990). Beneficial uses of surface water bodies that may be affected by activities on the Forest are listed in Chapter 2 of the Central Valley Region's Water Quality Control Plan (hereinafter referred to as the "Basin Plan") for the Sacramento and San Joaquin River basins (CRWQCB 1998). Existing and potential beneficial uses are defined for Lake Almanor, North Fork Feather River, Middle Fork Feather River, source to Little Last Chance Creek, Frenchman Reservoir, Little Last Chance Creek to Lake Oroville, Lake Davis, Lakes Basin Lake, and Lake Oroville for the Feather River from the fish barrier dam in Oroville to the Sacramento River, for the watershed areas that are sources to Englebright Reservoir on the Yuba River, and for the Yuba River downstream of Englebright Reservoir. The defined existing beneficial uses are listed in the Riparian Conservation Objectives (RCO) Analysis (Soil and Water Resource Report, Appendix A in the project record).

The California Water Code. consists of a comprehensive body of law that incorporates all state laws related to water, including water rights, water developments, and water quality. The laws related to water quality (sections 13000 to 13485) apply to waters on the National Forests and are directed at protecting the beneficial uses of water. Of particular relevance for the proposed action is section 13369, which deals with nonpoint-source pollution and best management practices.

The Porter-Cologne Water-Quality Act, as amended in 2006 (included in the California Water Code). This Act provides for the protection of water quality by the State Water Resources

Control Board and the Regional Water Quality Control Boards, which are authorized by the U.S. Environmental Protection Agency to enforce the Clean Water Act in California.

The Sierra Nevada Forest Plan Amendment (SNFPA). The Record of Decision (ROD) for the 2004 SNFPA includes a strategy for aquatic management which includes broad goals, Riparian Conservation Objectives (RCOs) and specific standards and guidelines for achieving the goals and objectives. The broad goals were created as endpoints toward which land management practices move ecosystem conditions towards restoring and maintaining the physical, chemical and biological integrity of the Region's waters. The goal areas are Water Quality, Species Viability, Plant and Animal Community Diversity, Special Habitats, Watershed Connectivity, Floodplains and Water Tables, Watershed Condition, Streamflow Patterns and Sediment Regimes, and Stream Banks and Shorelines. These goals provide a comprehensive framework for establishing desired conditions at larger scales, including river basin, watershed, and landscape scales.

The 2004 ROD required the establishment of riparian conservation areas (RCAs) and critical aquatic refuges that delineate aquatic, riparian, and meadow habitats, which are to be managed consistent with the RCOs and associated standards and guidelines. A RCO report was generated for this DEIS and is included in Appendix A of the Soil and Water Resource Report, in the project record.

RCAs widths are defined as (1) *Perennial Streams*: 300 feet on each side of the stream, measured from the bank full edge of the stream; (2) *Seasonally Flowing Streams (includes intermittent and ephemeral streams)*: 150 feet on each side of the stream, measured from the bank full edge of the stream; (3) *Streams in Inner Gorge (stream adjacent slopes greater than 70 percent gradient)*: top of inner gorge; (4) *Special Aquatic Features(includes lakes, wet meadows, bogs, fens, wetlands, vernal pools, and springs) or Perennial Streams with Riparian Conditions extending more than 150 feet from edge of streambank or Seasonally Flowing streams with riparian conditions extending more than 50 feet from edge of streambank:* 300 feet from edge of feature or riparian vegetation, whichever width is greater; and (5) *Other hydrological or topographic depressions without a defined channel*: RCA width and protection measures determined through project level analysis.

Specific Standards and Guidelines for water resources that apply to the Motorized Travel Management EIS are included in the Soil and Water Resource Report, Appendix B—Streamside Management Zone Plan in the project record.

Plumas National Forest Land Management Resource Plan ("Forest Plan"). The 1988 Forest Plan was amended by the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision. The Forest Plan states "maintain or, where necessary, improve water quality using Best Management Practices (BMPs)." Subsequent Forest Plan Standards and Guidelines state: "implement BMPs to meet water quality objectives and improve the quality of surface water on the Forest." Best Management Practices are procedures, techniques, and mitigation measures that are incorporated in all Plumas National Forest actions to protect water resources and prevent or diminish adverse effects to water quality (see the Soil and Water Resource Report, Appendix B in the project record for a complete list of BMPs that apply to Travel Management).

3.5.3 Effects Analysis Methodology

This section describes the methodology used for the effects analysis of the proposed project for soils and water resources. This section establishes indicators chosen to measure potential effects, the analysis area, timeframe, methods used (including field survey methods), and assumptions made for the effects analysis to soil and water resources of all action alternatives.

The overall methodology used for effects analysis of soil and water resources is separated into two topics to be analyzed. The first topic is a site-specific analysis of each individual, existing unauthorized route that is proposed for addition to the current system of Plumas National Forest System (NFS) trails. The second topic is an analysis of each project alternative as a whole.

3.5.3.1 Site Specific Analysis Indicators for Existing Unauthorized Routes:

- Indicator #1: BMP Evaluation E08 Rating (Pass, Fail or At-Risk) for each segment of each route.
- Indicator #2: Stream Diversion Potential at route/stream crossings.

Geographic Scope of the Soil and Water Resource Analysis. Plumas National Forest watershed staff have performed initial or abbreviated field surveys of the full length of every existing, unauthorized route that is proposed for addition to the current NFTS under Alternative 2 and 5. Subsequent field visits to potentially problematic routes identified by the initial field surveys were performed in summer 2008 to assess water quality effects and to formulate mitigations. The focus of these surveys was to determine whether the unauthorized route was causing adverse soil and water resource effects, or had the potential to cause future adverse effects and, if so, whether these adverse effects could be mitigated. The goal of these surveys, and subsequent field visits and discussions, is to make one of four ratings of soil and water effects for each proposed trail:

1. Low: The route was considered, a field visit was made and the soil and water resource effects would not be adverse (assuming routine maintenance of the trail).
2. Moderate: The route was considered, a field visit was made and soil and water effects are currently less than adverse. Site-specific mitigation is prescribed to prevent future potential adverse effects to soil and water resources. Site-specific mitigations may include addition or modification of route drainage features (out-sloping, rolling dips, waterbars, or ditch relief culverts); addition or modification of existing route stream crossing structures; and designation of acceptable seasons of use and vehicle class.
3. High: The route was considered, a field visit was made and soil and water effects are currently adverse. Site-specific mitigations for these routes are comprised of the same list of mitigations presented above for the “Moderate” rating. However, mitigations for routes rated “High” are necessary to reduce current soil and water resource effects to less than adverse. The watershed staff recommends that these routes may be added to the NFTS with this EIS but not be legal for traffic until these critical mitigations are in place and proper installation is verified by Forest staff.
4. Extreme : The route was considered, a field visit was made and a determination was made that the soil and water resource effects are currently adverse. The route is not recommended

by the watershed staff for addition to the NFTS. The reason for this recommendation is that mitigations to reduce soil and water resource effects to less than adverse would not be economically feasible, meet safety standards, or would not be effective due to physical constraints (such as the route's close proximity to streams, frequent stream crossings, steep slopes, or highly erosive soils).

Field surveys performed in fall 2007 and summer 2008 were completed for all of the roughly 370 miles proposed for addition to the NFTS throughout all action alternatives. Further, subsequent field visits to potentially problematic routes identified by the initial field surveys to discuss potential mitigations were performed in summer 2008. The proposed Sly Creek play area was surveyed in summer 2008. Twenty miles or routes were not surveyed per the initial survey methodology because these routes are located within the perimeter of the 2008 Butte Lightning Complex wildfires and were generally unsafe to access in summer and fall 2008. However, abbreviated surveys of these routes were performed. The abbreviated surveys covered the entire lengths of the proposed trails but the full set of initial field survey data was not gathered due to time and safety constraints. However, a determination of the soil and water resource impact level was made based upon key elements of the initial survey protocol. Mitigations were also formulated for these routes. See Appendix F of the Soil and Water Resources Report for more information.

The entire set of existing, unauthorized routes described in the No-action alternative (totaling approximately 1,109 miles) was not surveyed for existing condition because actions are not proposed for all of these routes.

Timeframe for the Analysis: The site-specific analysis establishes the existing condition of the routes. The analysis also indicates mitigations needed to reduce soil and water resource effects to less than adverse or to prevent future adverse effects.

Passive vegetative recovery of existing, unauthorized routes that are not proposed for addition to the NFTS is expected to occur within 20 to 30 years. Recovery depends upon soil type, precipitation amounts and level of disturbance to soil productivity and hydrologic function.

Field survey methodology. The methodology used to assess the existing condition of unauthorized routes stems from general direction for soil and water resources in the Forest Plan and from the Standards and Guidelines listed in the 2004 SNFPA ROD (see above Section "Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction" for specific information).

The Pacific Southwest Region has developed a "Best Management Practices Evaluation Program (BMPEP)" (1992, last updated in May 2002) to assess both the implementation of BMPs and BMP effectiveness. The Program consists of 25 evaluation protocols. Two protocols were used on this project, Evaluation E08 and E09. Evaluation E08 is performed in order to assess "Road Surface Drainage and Protection,". Evaluation E09 is performed in order to assess "Stream Crossings". Standardized forms are utilized to assess the BMP 2-2, 2-4, 2-5, 2-10 and 2-23 in the case of Evaluation E08; and BMP 2-1 in the case of E09.

While the surveyed routes are proposed not as NFS roads but as NFS trails, the chief difference between these two types of NFS facilities is simply the width of the traveled way (OHV trails, particularly motorcycle trails are narrower than roads). The surface drainage and protection BMPs that are evaluated by E08 are the same practices that are necessary to protect water quality effects from OHV trails. While OHV trails may also be steeper than the NFS roads, the E08 evaluation allows flexibility in assessing whether the route drainage features adequately protect water quality. Mitigations prescribed in the field also take into account the steeper grades encountered on OHV trails. For example, prescribed waterbar or rolling dip spacing is shorter on the steeper OHV trails.

The E08 effectiveness evaluation criteria and rating scheme were used for the analysis of the field survey data collected on unauthorized routes proposed for addition to the NFTS as trails. These unauthorized routes were old temporary roads used in past timber sales, old firelines, or user-created routes so evaluation of whether or not BMPs were implemented at the time of route creation is not appropriate. However, the E08 effectiveness evaluation criteria indicate whether the drainage features, and the surface and slope characteristics of the route template—as these route features currently exist on the ground—are effective in preventing adverse effects to soil resources and water quality. The E08 effectiveness evaluation consists of objective measures of road surface rilling (rutting); erosion and/or failure of route fill slopes, cutslopes, and inside ditches; whether or not erosion from these features is delivered to stream channels; and scour and/or plugging of route cross drain structures (rolling dips, waterbars, or ditch relief culverts).

The full length of each proposed trail was field surveyed and evaluated by dividing each route into a number of separate segments. Beginning and end points of segments were defined at the points where surface drainage left the route (at either a cross drain feature, a stream crossing, or a sag in route profile). The E08 effectiveness criteria were applied to each separate segment. The Pacific Southwest Region BMPEP scoring system was applied to each set of segment data, resulting in an objective rating of “Pass,” “Fail” or “At-Risk.” This scoring system emphasizes whether or not route-generated sediment is delivered to a stream channel; any one E08 criterion which indicated sediment delivery to a channel automatically results in a “Fail” rating for that segment.

Ratings of “Fail” or “At-Risk” for one or more segments of a proposed trail indicated that further investigation of that route was necessary before rating the route as “Low” for soil and water effects. Further investigation consisted of a subsequent field visit to investigate potential water quality effects and possible mitigation measures or a closer look at other data collected during the initial survey, such as route slope, soil texture, frequency of cross drain structures, route location (near ridgetop or mid-slope), proximity to nearest stream channel, and route/stream crossing characteristics (including diversion potential).

Additional data collected during initial field surveys included route width, slope, and proximity to nearest stream channel. Effectiveness criteria for evaluation E09, “Stream Crossings” (evaluation used to assess Practice 2-1) were evaluated for every stream crossing on the proposed trails. “Pass”, “Fail” or “At-Risk” ratings were not determined for the E09 data because most of the E09 criteria (such as route and fill slope rilling, fill slope failure, and drainage ditch stability) are included in the E08 evaluation. However, four criteria are specific to stream crossings and are unique to the E09 evaluation (crossing scour at outlet, plugging and piping of crossing structures, and the crossing’s potential to divert the stream down the proposed trail). Effectiveness deficiencies observed for these four crossing criteria were considered in rating each route for soil and water effects. The diversion potential criterion is presented as an indicator for the direct and indirect effects analysis for each alternative. A minimum of two soil texture samples were collected on each route to indicate erosion potential of the route and to verify soil survey map units. Additional soil texture samples were collected where ground conditions and ocular observations indicated that the soil texture had changed significantly.

Copies of the Watershed Field Survey form and the BMPEP rating scheme are presented in the Soil and Water Resource Report, Appendix C in the project record. A summary of E08 ratings for all proposed trails surveyed to date are presented for each District in Appendix F, G and H of the the Soil and Water Resource Report in the project record.

3.5.3.2 The Field Survey Protocol: Potential Impacts, Assumptions and Limitations

3.5.3.2.1 Soil Resource

The principal concern or effect to be assessed for the soil resource is the potential for soil erosion and subsequent effects on soil productivity or the ability of the soil to produce vegetation. The 1988 Forest Plan establishes Standards and Guidelines to prevent significant or permanent impairment of soil productivity, and the Region 5 Soil Management Handbook establishes soil quality analysis standards (see above Section “Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction”). However, both documents only apply to areas dedicated to growing vegetation. Erosion of trail system surfaces, fill slopes and cut slopes are not a concern in regards to soil productivity because all of the routes proposed for addition to the NFTS currently exist on the landscape are no longer dedicated to growing vegetation. The proposed trail areas would be dedicated to motor vehicle use. Therefore, the soil quality analysis standards were not applied to the route areas proposed for addition to the NFTS. Erosion and sediment generated by system trail surfaces is a concern to water quality if there is potential for its delivery to a drainage feature and was included in the analysis for water resource concerns.

Secondary effects from erosion are the loss of soil depth, infiltration capacity and permeability or reduction in the soil hydrologic function. Erosion of Forest landscapes due to cross-country travel on previously untracked areas is a concern to the soil resource because that erosion can disturb the A-horizon (organic-rich topsoil) portion of soil profiles to the point where vegetative productivity in those disturbed areas is significantly reduced.

3.5.3.2.2 Water Resources

All road and trail templates that currently exist on the landscape, whether these templates are unauthorized routes or part of the NFTS, modify surface-water runoff timing and magnitude owing to interception of surface and subsurface runoff during rainfall and snowmelt events. Road and trail cutslopes can intercept subsurface spring flows, causing groundwater flows that would have percolated slowly through the hillside to become surface flows that run much more quickly over land (Figure 2). All road and trail surfaces intercept and concentrate precipitation and snowmelt to some degree. Runoff that would have been well dispersed and would have flowed slowly over well-vegetated hillsides is instead concentrated in roadside ditches or surface drains (rolling dips or waterbars), flowing much more quickly. The result is a modification of the natural watershed drainage regime that is created by nearly every road and trail on the landscape. This modification is frequently manifested as a network of unnatural, small drainage (i.e. stream) channels created by a road or trail.

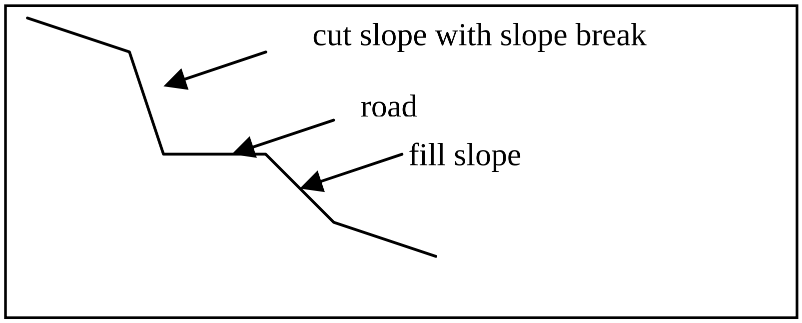


Figure 2. Typical cross section of a road template.

Cross-country travel on previously untracked areas can cause similar modification of surface water runoff timing and magnitude due to the vehicle track ruts that can occur. Such rutting occurs much more readily when ground conditions are wet in late fall and early spring.

The magnitude of effects to surface water runoff timing and volume caused by roads and trails may be insignificant for individual roads, particularly those located near ridge tops or in low-precipitation areas. However, even these individually insignificant effects can add up to cumulative effects that can accelerate stream erosion processes, resulting in the alteration of physical processes in streams and potential loss or degradation of beneficial uses of water in those streams. Watersheds with high road densities can result in significant and long lasting degradation of water quality and aquatic habitat.

A second potential impact to water resources of NFS roads, trails, and cross-country travel is the generation of erosion that can be delivered as fine sediments to stream channels. Runoff on nearly all road and trail surfaces will result in mobilization of at least some amount of fine material that will eventually leave the surface. The mean amount of road-generated sediment for gravel-surfaced roads can be as much as 16 times less than for native surface roads. (Coe 2006) Sedimentation effects are also substantially less for roads and trails that have been designed, constructed and maintained with quality drainage systems that disperse runoff effectively. However, roads and trails that are constructed with few or no surface drainage features (rolling dips or waterbars) or are entrenched, may result in runoff flowing down the surface for hundreds or thousands of feet. Other route templates that are sloped inward to the hillside will concentrate runoff in a roadside ditch that, if infrequently drained, may also run for hundreds or thousands of feet. Runoff that remains confined to a surface or ditch for long runs may gain enough flow magnitude to mobilize substantial amounts of fine material, resulting in surface ruts or eroding ditches (Figure 3).

This concentrated runoff from poorly drained roads and trails – and the sediment carried with it - will eventually flow off of the surface at the next downgradient cross drain feature, stream crossing, or natural sag in the road profile. The outlets of surface drains (rolling dips, waterbars, or ditch relief culverts) that are spaced too far apart are typically observed to be significant and continual sources of sediment (Figure 4). Oftentimes on uncontrolled or poorly drained roads or trails, the runoff will leave the road or trail at an inopportune location, such as down a steep slope that is not well vegetated, resulting in additional erosion from the road or trail fill slope (Figure 5). If the runoff is concentrated on a surface or in a ditch for a great distance, even well vegetated slopes can be badly eroded where the runoff leaves the road or trail, creating a perpetual source of erosion that can even cut through much of the road or trail template width, resulting in tons of sediment mobilized and delivered downslope. Further, runoff that is concentrated in ditches for long runs can also lead to under-cutting of the road or trail cutslope, adding more sediment to the ditch flow. For steep, unvegetated cut slopes, such undercutting may result in slopes so steep that the slopes will not be stable again for decades, until the slope ravels to the ridgetop.

Figure 3. In 2002, Road 22N25 on Feather River Ranger District exhibits severe rutting as a result of a poorly drained surface that concentrates runoff. This road was reconstructed in 2003.

Road/stream crossings are significant sources of sedimentation on NFS lands. Even well-drained roads and trails will deliver some amount of surface-generated sediment to stream channels at crossings. For the approximately 50-200 feet of a well designed road or trail surface (length depending upon the slope of the terrain) that approaches the stream channel on both sides of the crossing, there is really no other place for surface-generated sediment to go but into the stream channel.

Apart from this inevitability, a second sediment impact frequently observed at stream crossings is diversion of the stream by the road or trail. Poorly designed, constructed, or maintained road or trail surfaces (e.g. rutted, entrenched roads or roads with berms created by poor grading practices) may capture the stream flow at crossings, sending the entire stream flow, including flood flows, down the road or trail surface. Eventually, this flow may leave the surface at inopportune locations, resulting in the drastic erosion sites described in the paragraph above (Figure 5).

Figure 4. Due to infrequent cross drain spacing, the outlet of this rolling dip on 22N25 was badly eroding and delivered sediment off of the road to the neighboring riparian area. This road was reconstructed in 2003. (Clipboard is shown for scale).

Culverts at road/stream crossings, even those that are properly sized and maintained, are susceptible to plugging during extreme flood events. Such plugging, usually initiated by woody debris caught across the span of the culvert inlet, may result in the flood flow over-topping the road or trail and returning to the channel over the steep, and oftentimes unarmored, crossing fill slope. In large floods, over-topping can cut through the entire width of the road or trail template at the crossing, resulting in tens to hundreds of tons of fine sediment delivered to the stream channel. Plugged stream crossings can also be captured and diverted down the road or trail, resulting in the drastic erosion events described above.

Active restoration or obliteration of one or more unauthorized routes or areas is not part of any of this project’s action alternatives. Without active restoration or obliteration of road and trail templates (including out-slope and re-contour of road and trail areas to closely match the natural topography and removal of culverts and other stream crossing structures), some amount of the potential water resource effects described above will persist for periods of years to decades following prohibition of public motorized vehicle use on the Plumas National Forest. Impacts to water resources will be reduced, however, over this period due to the vegetative recovery that will occur on routes in which traffic is prohibited.

Figure 5. This bank erosion occurred on 22N25 during a normal precipitation year when concentrated surface drainage left the road at an inopportune location. The slump material was delivered to the RCA of Pinchard Creek, which is located less than 150 feet from the road. This road was reconstructed in 2003. (clipboard is shown for scale).

Sediment production from motor vehicle use of native-surfaced NFTS routes is typically increased by higher levels of traffic and is reduced by proper design, installation, and maintenance of road drainage features (including out-sloped surface, rolling dips, waterbars, ditches, and ditch relief culverts).

3.5.4 Analysis Methodology for Each Project Alternative as a Whole:

As defined in the regulations for implementing NEPA, Code of Federal Regulations, Chapter 40, Sections 1500-1508, direct effects are those effects which are caused by the project actions and which occur at the same time and place as the action. Indirect effects are those caused by the action, which are later in time or farther removed in distance from the location of the action.

Direct and indirect effects of each project alternative will be analyzed together for three separate action components:

1. The prohibition of cross-country motorized vehicle travel
2. The addition of facilities (trails and/or areas) to the Plumas National Forest Transportation System (NFTS)
3. Changes to the existing NFTS, including deletions of existing facilities or changing the vehicle class and season of use for existing facilities

3.5.4.1.1 Direct and Indirect Effects of the Prohibition of Cross-Country Motorized Vehicle Travel.

Indicator # 1: Total mileage of proposed trails and roads open to motorized traffic on Plumas National Forest System lands

Short-term timeframe: 1 year

Long-term timeframe: 25 to 30 years

Spatial boundary: Area of land managed by the Plumas National Forest.

Methodology: A GIS (Geographic Information System) data layer was created for the alternatives. The route locations are based on information from the public (digitized from maps) and GPS (Global Positioning System) data from contractors and Forest Service Employees. This GIS data layer, the corporate NFTS roads GIS layer (created from PNF INFRA database), and the corporate GIS ownership layer were used to calculate the total miles of routes and roads open to motorized traffic by alternative. Limitations to this calculation include unauthorized routes not found during data call and errors in the INFRA database such as missing roads or included roads that had been removed from the NFTS.

Indicator # 2: Total mileage of proposed trails and roads open to motorized traffic on Plumas National Forest System lands that are situated in hydrologically sensitive areas

Short-term timeframe: 1 year

Long-term timeframe: 25 to 30 years

Spatial boundary: Hydrologically sensitive areas are Riparian Conservation Areas (RCAs) as defined by the 2004 SNFPA ROD (see Section "Analysis Framework: Statute, Regulation, Forest Plan, and Other Direction")

Methodology: A GIS data layer was created for the alternatives. The route locations are based on information from the public (digitized from maps) and GPS data from contractors and Forest Service Employees. A GIS layer for hydrologically sensitive areas was created using known information from corporate GIS layers. The corporate GIS layers include information on streams, lakes, and meadows. The project GIS data layer, the corporate NFTS roads GIS layer, the hydrologically sensitive layer, and the corporate GIS ownership layer were used to calculate the total miles of routes, trails and roads open to motorized traffic within hydrologically sensitive areas by alternative. Limitations to this calculation include unauthorized routes not found during data call and errors in the INFRA database such as missing roads or included roads that had been removed from the NFTS, and errors in the stream and meadow layers. The corporate stream layer is based on a crenulations model and some portions of the Forest are either over mapped or under mapped depending on the topography. The corporate stream type designation (perennial, intermittent, or ephemeral) was based on an office exercise, so the designations of these are not always accurate. The meadow and lake corporate layers only include the larger features identified on topographic maps.

Indicator # 3: Total mileage of proposed trails and roads open to motorized traffic on Plumas National Forest System lands by Maximum Potential Erosion Hazard Rating (EHR)

Short-term timeframe: 1 year

Long-term timeframe: 25 years on the westside and 30 years on the eastside

Spatial boundary: Area of land managed by the Plumas National Forest and maximum potential of EHR as defined by the Plumas National Forest Soil Resource Inventory, which is an Order 3 soil survey (USDA Forest Service 1989).

Methodology: EHR is a risk assessment of specific soil factors that induce accelerated erosion (USDA Forest Service 1990). The purpose of the EHR is to: (1) evaluate the likelihood of accelerated sheet and rill erosion from a specific soil disturbing activity, (2) evaluate the risk for adverse consequences, and (3) identify approximate soil cover amounts needed to achieve an acceptable risk. A corporate GIS soil layer was created based on the PNF Soil Resource Inventory, including the calculated maximum EHR for each soil map unit. The Plumas National Forest Soil Resource Inventory (USDA Forest Service 1989) was a broad survey and identifies general soil map units; it does not delineate the exact location of each soil type. Map unit soil textures for proposed trails for addition to the NFTS were confirmed using the soil texture samples described in the Site Specific Analysis section above.

A GIS data layer was created for the alternatives. The route locations are based on information from the public (digitized from maps) and GPS data from contractors and Forest Service Employees. The project GIS data layer, the corporate NFTS roads GIS layer, the soil layer, and corporate GIS ownership layer were used to calculate the total miles of proposed NFTS trails by EHR for each alternative. Limitations to this calculation include unauthorized routes not found during data call and errors in the INFRA database such as missing roads or include roads that we were removed from the NFTS, and the fact that the soil layer only includes broad general information about soil map units.

3.5.4.1.2 Direct and Indirect Effects of adding trails and areas to the NFTS, including identifying seasons of use and vehicle class.

Short-term timeframe: 1 year

Long-term timeframe: 25 or 30 years

Spatial boundary: Area of land managed by the Plumas National Forest

Indicator(s): (1) BMP Evaluation E08 Rating (Pass, Fail or At-Risk) for each segment of each trail proposed for addition to the NFTS; (2) Stream Diversion Potential at stream crossings for each trail proposed for addition to the NFTS

Methodology: In general, direct and indirect effects to soil and water resources of motorized travel on these previously unauthorized routes have already occurred. Water resource effects that have already occurred include modification of surface-water runoff timing and magnitude owing to interception of surface and subsurface runoff during rainfall and snowmelt events. Water resource direct effects that have already occurred also include the generation of erosion that can be delivered as fine sediments to stream channels. Indirect effects that have already occurred include potentially significant and long lasting degradation of water quality and aquatic habitat. Direct effects to soil resources that have already occurred include a loss of vegetative productivity for the routes and areas subjected to motorized vehicle traffic, due to loss of soil cover, soil compaction, and loss of soil hydrologic function.

3.5.4.1.3 Direct and Indirect Effects of Changes to the existing NFTS.

The only changes to the existing NFTS facilities would be the mixed use proposed for approximately 11 miles of National Forest System roads in Alternatives 4 and 5. These alternatives would allow non-highway legal vehicles to use French Creek, Slate Creek and Janesville-Frenchman Roads as shown in Chapter 2 under the descriptions of the alternatives. Direct and indirect effects to soil and water resources due to changes in the vehicle class allowed on existing NFTS facilities are expected to be negligible. Allowing narrower, non-street legal vehicles to travel existing NFS roads would not lead to a change in the width of those roads.

3.5.4.1.4 Cumulative Effects of the Three Alternative Components as a Whole

As defined in the Code of Federal Regulations, Chapter 40, Sections 1500-1508, cumulative effects are those effects "on the environment which result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time."

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

Long-term timeframe: 25 to 30 years

Spatial boundary: Road density calculations are based on watersheds created for the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery EIS and ROD. These watersheds are generally on a HUC -7 scale.

Indicator(s): Density based on miles per square mile (mi/mi^2) of proposed trails and roads open to motorized traffic on public and private lands within Plumas National Forest watersheds.

Methodology: A GIS data layer was created for the alternatives. The route and proposed trail locations are based on information from the public (digitized from maps) and GPS data from contractors and Forest Service Employees. HFQLG watershed GIS layer, the project GIS data layer, and the corporate NFTS roads GIS layer were used to calculate the total miles of routes, proposed trails, and roads open to motorized traffic on both public and private lands by alternative. Limitations to this calculation include unauthorized routes not found during data call and errors in the INFRA database such as missing roads or included roads that we were removed from the NFTS, and there isn't a HFQLG watershed identified in the Paradise area (see the Soil and Water Resource Report, Appendix D—Watershed Maps in the project record).

As stated above, the combination of the three action components analyzed for direct and indirect effects was then added to past, present and reasonably foreseeable actions to analyze the cumulative effects of implementing each alternative as a whole.

Past actions are represented by the existing condition of Plumas National Forest watersheds. The existing condition of Plumas National Forest watersheds and the sensitivity to disturbance of these watersheds were analyzed in Appendix N of the 1999 Final EIS for the Herger-Feinstein Quincy Library Group Forest Recovery Act (HFQLG FRA) (see the Soil and Water Resource Report, Appendix E in the project record). This analysis was performed for all watersheds containing Plumas

National Forest System lands. The watersheds were analyzed at a scale that ranged between Hydrologic Unit Code 7 (HUC-7) and HUC-6. The watersheds range in size from 1,192 to 23,516 acres, with a mean of 8,536 acres. Watershed sensitivity ratings for each watershed were developed based upon Erosion Hazard Rating, the percent of the watershed in slopes greater than 60%, the percent alluvial stream channels, rain-on-snow or thunderstorm potential, and vegetative recovery potential. Watershed condition ratings for each watershed were developed based upon road density, road/stream crossing density, condition of alluvial stream channels, and percentage of land disturbed. The sensitivity rating and condition rating for each watershed were multiplied to derive a sensitivity condition rating, which determined a risk of cumulative watershed effects of low, moderate, high or very high.

The condition and sensitivity of these Plumas National Forest watersheds, i.e. the existing condition of these watersheds, has changed little since that 1999 HFQLG FEIS analysis. More than 15 miles of alluvial channels have been restored since 1999, particularly eastside meadow channels that had been subjected to headcuts and gully erosion, but the length of these reaches total a relatively small amount of the total alluvial stream channels that exist on the Forest. Data presented in the 2007 HFQLGFRA Pilot Project Monitoring Report to Congress for “Question 17: What is the effect of activities on indicators of watershed condition?” indicate that little change in watershed condition has occurred since 1999 (Table 21). Road density decreased approximately 2.0%, primarily due to obliteration of more than 80 miles of road implemented by Plumas National Forest staff. The number of road/stream crossings decreased by nearly the same percentage (a total decrease of 54 crossings), again due primarily to the obliteration of roads mentioned above. Near-stream road density decreased by 5.5%, a larger percent decrease than the total road density decrease because the road obliteration projects were focused on roads that contributed significant volumes of sediment to stream channels.

Table 21. Summary of HFQLG Question 17 Monitoring Plan Results (2007).

Watershed Condition Indicator	Total acreage of sub-watersheds reporting	Unit of Measure	Pre-Project Condition	Post-Project Condition	Percent Change
Road Density	719,000 acres	miles per square mile	2.96	2.90	- 2.0%
Near-Stream Road Density	592,000 acres	miles per square mile	3.61	3.41	- 5.5%
Equivalent Roaded Acres (ERA)	1,154,000 acres	equivalent roaded acres	60,200 (5.2%)	78,100 (6.8%)	+ 22%
Near-Stream ERA	17,700 acres	equivalent roaded acres	472	489	+3.5%
Number of Road/Stream Crossings	564,000 acres	number	3,039	2,985	- 1.8%

The percentage of land disturbed in Plumas National Forest watersheds has increased since the 1999 HFQLG EIS as reflected in the reported increase in Equivalent Roaded Acres (ERA). The ERA measure is derived from site disturbance coefficients used to track general changes in hydrologic function of watersheds. The coefficients have been developed by comparing the effect of a land use activity to that of a road in terms of altering surface runoff patterns and timing. For example, the Plumas National Forest has typically modeled one acre of single-tree selection harvest with tractor yarding as being equivalent to 0.15 to 0.2 acres of roaded landscape. The ERA increase of 17,900 acres across the entire HFQLG FRA pilot project area, as reported in the 2007 Monitoring Report, when expressed as a percentage of watershed area, results in a 1.6% average increase (from 5.2% to 6.8%). However, this average increase results when the ERA increase is applied to only the HUC-8 subwatershed areas in which work occurred (a total of 1.154 million acres). Much of the HFQLG watershed areas were devoid of work between 1999 and 2007. When the ERA increase of 17,900 is applied over the entire area of HFQLG watersheds in which work occurred (2.248 million acres), the resulting average increase is 0.8%.

The ERA increase for each HFQLG watershed that includes Plumas NFS lands is presented in the Soil and Water Resource Report, Appendix E in the project record. Between 1999 and 2007, work has occurred in 66 HFQLG watersheds. The data indicate that the change in ERA for these watersheds, expressed as a percentage of the HFQLG watershed area, ranges from -0.85% to 7.92% with an average increase of 0.94%. The median increase is 0.39%. The reported ERA increases are predominantly due to vegetation management actions (group selection and fuel reduction thinning treatments) that have occurred under the HFQLG FRA Pilot Project. Cumulative Watershed Effects (CWE) from these vegetation projects are closely controlled by assuring that the resulting ERA model outputs for the project watersheds, when expressed as a percentage of total watershed area, do not exceed the prescribed Threshold of Concern (TOC). Predominately, the TOC for Plumas NF watersheds is prescribed to be 12% of the watershed area. Since 1999, none of the PNF vegetation management projects have resulted in an exceedance of the TOC for any of the project watersheds. In most cases, the ERA increase (0.8% on average, as stated above) is minor and leaves the analysis watershed well below threshold. For the remaining watersheds, including the one that experienced the 7.9% increase in ERA and several others that were close to the TOC under the pre-project condition, vegetation management activities are minimized or controlled so that the TOC is not exceeded.

The addition of unauthorized routes to the NFTS as trails would not increase the percentage of land disturbed because these routes already exist on the landscape. The prohibition of cross-country travel would reduce future land disturbance on the Forest and would allow passive recovery of unauthorized route that have already disturbed the landscape.

For each alternative, the density of roads and routes that would be open to motorized vehicle traffic within each analysis watershed is compared with a threshold road/route value. The threshold value does not represent an exact level at which a detrimental CWE would occur. Rather, it serves as a “yellow flag” indicator of increased risk of significant adverse cumulative effects occurring within a watershed. Analysis watersheds that exceed this threshold require additional, focused analysis. The exact level of road/route density that would result in a detrimental CWE is dependent upon a variety of factors that are specific to each analysis watershed. These factors include soil type, hillslope gradient and road location. Based upon past experience and observations on the Plumas NF, for the purpose of this project analysis, Forest watershed staff have determined a road/route density threshold of 4.0 miles per square mile. Watersheds with motorized road and route densities that exceed this threshold are at risk of detrimental CWE.

The 1999 HFQLG FRA EIS watershed sensitivity condition ratings and risk of cumulative watershed effects for each of the project watersheds are presented in the Soil and Water Resource Report, Appendix E in the project record along with the calculated increase in percentage of land disturbed, represented by the ERA data from the 2007 HFQLG FRA Pilot Project Monitoring Report. These risk ratings and data will be used in conjunction with the calculated total road density for each project alternative to predict whether a cumulative watershed effect will occur for each of the HFQLG Plumas National Forest watersheds, particularly those that exceed a density of 4.0 miles per square mile.

A short-term timeframe is not applicable to the cumulative effects analysis. For existing unauthorized routes that are not proposed for addition to the NFTS, it will be assumed that passive recovery of soil cover and the vegetative productivity of soils, with concurrent reductions in erosion and sedimentation from road surfaces, will occur over a 25 year period on the westside and 30 year period on the eastside. As stated above, effects to soil and water resources due to changes in the vehicle class allowed on existing NFTS facilities are expected to be negligible. As stated above, the vast majority of soil and water resource effects of the unauthorized routes and areas that are proposed for addition to the NFTS have already occurred since these routes currently exist on the landscape. It is assumed that all of the reasonably foreseeable actions presented in Appendix C will proceed in the future regardless of which project alternative is selected.

3.5.5 Affected Environment

3.5.5.1 Climate

Weather in the planning area follows a Mediterranean pattern of wet winters and dry summers. East of the Sierra crest, marine influence lessens and there is a greater range in daily and seasonal temperatures, lower precipitation and humidity, and rain from summer thunderstorms is normal. Most precipitation on both sides of the crest falls as winter frontal disturbances are lifted and cooled over the mountains.

Over 95% of the precipitation in the planning area occurs during winter months. Precipitation ranges from 15 inches on the eastside of the Sierra crest, to 90 inches on the westside. Winter temperatures below 0°F and summer temperatures above 100°F have been recorded. Snowpack is common from December through May at elevations above 4,000 feet, although individual winter storms may bring rain to the highest elevations. Thunderstorms generally occur during the summer months and most frequently on the eastside of the range.

3.5.5.2 Watershed Condition

Streamflow in the planning area corresponds to seasonal precipitation, with low flows during summer and fall, and higher flows during winter and spring (Linsley 1955). Floods can occur throughout winter and spring, with large peak flows causing major flooding (Dong and Tobin 1971). Storm events that cause these peak floods occur approximately every 1 to 10 years (Department of Water

Resources: California Climate Facts, circa 1960). Warm mid-winter rainstorms on snowpack generate most large floods (Schultz and Roby 1996).

The watersheds of the planning area are composed of a variety of soil types that influence the timing of water movement to streams. Some soils contribute to rapid runoff and abrupt increases in streamflow during storm events. Other soils moderate runoff and streamflow. Shallow soils usually generate quicker winter and spring runoff than deeper soils do. Deep soils not only absorb and store more water than shallow soils, they also release more to summer flows. The deep soils of large alluvial areas, such as meadows, not only store and release water, but moderate high flows and increase late season flows (USDA Forest Service 1999).

A combination of road construction, soil compaction, ground cover reduction, and degradation of stream channels and riparian conditions has generated "accelerated over natural conditions" runoff and sediment yields from many watersheds (USDA Forest Service 1999).

Streams in the planning area range from high gradient (usually headwater channels that are sources and transporters of sediment, water, nutrients, and large wood), to low gradient channels (usually in riparian ecosystems), which can be very sensitive to changes in the amount of water and sediment delivered to them. Degradation of Sierra Nevada streams, and their aquatic and riparian ecosystems, has been linked to dams, reservoirs, water diversions, livestock grazing, invasive species, mining, water pollution, roads, logging, direct changes to stream channels and stream flows, and recreational and residential developments (USDA Forest Service 1999).

The low gradient channels of the east and central areas generally flow through large, wide meadows. On the westside, channels more often flow through narrow valley bottoms. Most meadow streams were once a braided network of shallow channels that overflowed their banks each year and covered the meadows with water. The meadows remained wet most of the year, slowly releasing water to downstream reaches well into the dry season. Today, most of these meadow channels have been deeply gullied. Rather than holding water close to the surface of the meadow, gullied streams are deep and wide enough to contain most flood flows and subsequently drain much of the water from meadows early in the dry season. Through this process, wetland areas have evolved into dry lands that foster dry land conditions and species (USDA Forest Service 1999).

3.5.6 Environmental Consequences

3.5.6.1 Alternative 1

As described in Chapter 2 of this EIS, under the No-action alternative, current management plans would continue to guide management of the project area. No changes would be made to the current NFTS and no cross-country travel prohibition would be put into place. The Travel Management Rule would not be implemented and no MVUM would be produced.

1. **Cross Country Travel:** For Alternative 1, no prohibition would be established for motorized vehicle travel off designated NFS roads, NFS trails and areas by the public. Motor vehicle travel would not be limited to designated routes.

2. **Routes and Areas Added to the Existing National Forest System:** No new NFTS facilities would be added. The agency would take no affirmative action on any unauthorized routes and they would continue to have no status or authorization as NFTS facilities.
3. **Class of Vehicles:** For Alternative 1, no changes to the existing NFTS are proposed, including deletions of existing facilities or changing the vehicle class and season of use for existing facilities.

3.5.6.1.1 Direct and Indirect Effects:

Alternative 1, Action Component 1: Prohibition of Cross-Country Vehicle Travel

Under Alternative 1, cross-country motorized travel would be permitted on Plumas National Forest areas beyond the authorized NFTS. Approximately 5,027 miles of existing routes and roads on Plumas NFS lands would be available to motorized traffic (Table 23), including 2,174 miles situated in the hydrologically sensitive areas described above. Motorized traffic would be prohibited on none of the miles of existing, unauthorized routes (totaling 1,109 miles) that are currently open to motorized traffic, including 455 miles of existing routes situated in hydrologically sensitive areas. As described above, direct and indirect effects to water resources due to motorized travel on these routes include increased peak flows and sediment loads.

Past cross-country motorized travel on these unauthorized routes has resulted in soil compaction and erosion of the A-horizon portion of soil profiles to the point where vegetative productivity in those disturbed areas is significantly reduced. Certain soil types are more susceptible to erosion. For Alternative 1, Table 23 on page 105 displays the number of miles of NFTS routes on Plumas NFS lands available to motorized traffic within the different Erosion Hazard Rating categories. Direct and indirect effects to soil resources due to the continuation of cross-country traffic include a continuation of these soil compaction and erosion effects.

In the short term (considered to be a 1-year timeframe for the purpose of this analysis), the unauthorized routes disturbed by motor-vehicle use would not change because these routes would still be open to motorized traffic. The short-term reductions in sediment delivery to stream systems in the vicinity of these routes predicted for Alternatives 2 through 5 would not occur.

Restoration of soil vegetative productivity would potentially not occur on the 1,109 miles of unauthorized routes as a result of Alternative 1 because motorized traffic would not be prohibited on these areas. Vegetative recovery would presumably occur on some of these routes if public members are not interested in traveling upon them over the long term. However, without a defined prohibition, it is difficult to predict how many routes would experience vegetative recovery. Without vegetative recovery, these unauthorized routes would not regain their hydrologic and geomorphic functions over the long term (considered to be a 25 to 30 year timeframe for the purpose of this analysis).

With continued motorized traffic, the increased peak flow effect that has occurred to date as a result of these unauthorized routes will remain over the long term because the road templates will continue to intercept subsurface runoff and concentrate surface runoff. Additionally, without vegetative recovery, unauthorized routes with continued motorized traffic would not experience the decreased amounts of erosion sediment delivery to area stream channels that would be experienced under Alternatives 2 through 5.

Cross-country traffic on areas that are currently untracked would not be prohibited under Alternative 1. The potential would exist for proliferation of new unauthorized routes with the same type of effects to soil and water resources that are observed on existing, unauthorized routes. Erosion and disturbance of the A-horizon (organic-rich topsoil) portion of soil profiles in areas that are currently untracked could occur, impacting soil vegetative productivity. Modification of surface water runoff timing and magnitude due to vehicle track ruts on currently untracked areas could occur, impacting water resources downslope of those areas.

Action Component 2: Addition of Facilities (Routes and Areas) to the NFTS

Direct and indirect effects for this component are not applicable to Alternative 1 because no facilities are proposed to be added to the NFTS.

Action Component 3: Changes to the existing NFTS

Direct and indirect effects for this component are not applicable to Alternative 1 because no changes to the existing NFTS are proposed.

3.5.6.1.2 Cumulative Effects

When compared with Alternatives 2 through 5, no apparent long-term (25-30 year) benefit to soil and water resources would occur under Alternative 1 because motorized traffic would be allowed on all 1,109 miles of inventoried existing, unauthorized routes that are currently open to motorized traffic. Additionally, potential risks to long-term watershed condition are apparent under Alternative 1 as a result of the potential for further proliferation of cross-country traffic on areas that are currently untracked. Erosion and disturbance of the A-horizon portion of soil profiles in areas that are currently untracked would likely occur, potentially impacting soil vegetative productivity. Modification of surface water runoff timing and magnitude due to vehicle track ruts on currently untracked areas would likely occur, potentially impacting water resources downslope of those areas.

The net effect of past, present and reasonably foreseeable actions on each subwatershed is indicated by the total mileage and density of routes and roads open to traffic on public and private roads within the watershed (Table 23). Road and route density could continue to proliferate under Alternative 1 but would decrease significantly under Alternatives 2 through 5. It is possible that some existing unauthorized routes could revegetate due to lack of motorized traffic on routes that no longer hold interest to the public. This would decrease cumulative impacts to Forest soil and water resources. However, there is a greater possibility that the number of unauthorized routes would increase without a prohibition on cross-country motorized travel, resulting in an increased cumulative impact to Forest soil and water resources.

3.5.6.2 Alternative 2

As described in Chapter 2 of this EIS, the Proposed Action is the proposed changes to the NFTS and the prohibition of cross-country travel:

1. **Cross Country Travel:** Motorized vehicle travel off designated NFS roads, NFS trails and areas by the public except as allowed by permit or other authorization will be prohibited.
2. **Routes and Areas Added to the Existing National Forest System**: For Alternative 2, a total of 364 miles of existing, unauthorized routes are proposed to be added to the NFTS as trails open to motorcycles, ATVs, a combination of these two vehicle types, or all vehicles. Also, the 36-acre Sly Creek area would be open year-round to motorized vehicles with widths that do not exceed 50”.
3. **Class of Vehicles:** For Alternative 2, no changes to the existing NFTS are proposed, including deletions of existing facilities or changing the vehicle class and season of use for existing facilities.

3.5.6.2.1 Direct/Indirect Effects

Alternative 2, Action Component 1: Prohibition of Cross-Country Vehicle Travel

The effect of the prohibition on cross-country motorized travel would be to end traffic on Plumas National Forest areas beyond the authorized NFTS. For Alternative 2, 4,289 miles of routes and roads on Plumas NFS lands would be available to motorized traffic (Table 23), including 1,854 miles situated in the hydrologically sensitive areas described above. Motorized traffic would be prohibited on at least 738 miles of existing, unauthorized routes that are currently open to motorized traffic, including 320 miles of existing routes situated in hydrologically sensitive areas. Direct and indirect effects to water resources due to prohibition of motorized travel on these routes include reduced peak flows and sediment loads.

Past cross-country motorized travel on these routes has resulted in soil compaction and erosion of the A-horizon portion of soil profiles to the point where vegetative productivity in those disturbed areas is significantly reduced. Certain soil types are more susceptible to erosion. For Alternative 2, Table 23 displays the number of miles of NFTS routes on Plumas NFS lands available to motorized traffic within the different Erosion Hazard Rating categories. Direct and indirect effects to soil resources due to prohibition of cross-country traffic include cessation of these soil compaction and erosion effects.

In the short-term (considered to be a 1-year timeframe for the purpose of this analysis), the unauthorized routes and areas disturbed by motor-vehicle use would not change much because removal of vegetation, compaction of soils, and alteration of drainage patterns require time to heal without active restoration. Thus, short-term reductions in peak flows would be small and unquantifiable since the routes would continue to intercept and concentrate surface flows. However, short-term reductions in sediment delivery to stream systems in the vicinity of these routes would be realized. Erosion of native-surfaced roads and routes is typically higher for routes with active motorized traffic.

Due to the highly compacted condition and the loss of A-horizon for soils in many of these areas, this analysis assumes that full restoration of the original soil productivity would not occur as a result of traffic prohibition alone. However, analysis indicates that, by prohibiting traffic, all of these routes hold the potential to substantially revegetate and regain much of their hydrologic and geomorphic functions over the long term (considered to be a 25 to 30-year timeframe for the purpose of this analysis). Vegetation growth on lands throughout the Forest is typically vigorous, due to favorable climate and precipitation. Additionally, needle scatter and litter fall from nearby trees is usually sufficient to provide seed source and the soil cover and organic input necessary to facilitate re-growth of vegetation. Recent experience in closing and obliterating roads on all three Ranger Districts indicate that for the vast majority of the obliterated road areas the addition of straw mulch is not necessary to provide the cover necessary to protect and keep soils in place or to restore sufficient organic concentrations in the soils. Needle scatter and placement of slash is typically sufficient to provide soil cover.

With regard to soil compaction, the recent Long-term Soil Productivity (LTSP) study indicates that severe compaction of forest soils does not preclude the re-establishment of vegetation (Powers et. al. 2005). The National ten-year results indicate that soil compaction effects on total biomass productivity (all vegetation within a site, not just tree growth) differs depending upon the soil particle size or soil texture, along with other factors such as initial bulk density, rock content, and climate. On soils characterized as “sandy”, compacted plots had greater biomass productivity than uncompacted plots; on soils characterized as “loamy”, compaction resulted in little change in biomass productivity; and on soils characterized as “clayey”, compaction resulted in up to a 50% reduction in biomass productivity at particular sites in the Southern Coastal plains, primarily in areas with poor soil drainage or high water table. This ten-year publication incorporated results from 6 of the 12 California sites. Recently in June 2007, during the National LTSP Conference, additional results were presented by David Young (R5 North Zone Soil Scientist) incorporating 9 of the 12 California sites to reach ten years; these sites include all study sites within the Sierra Nevada (including Challenge Experimental Forest located on the Feather River Ranger District of the Plumas National Forest). The latest results have concluded that severe soil compaction, even at degrees that far exceed what is considered detrimental by Regional analysis standards (a vibrating drum roller, typically used in highway construction, was used), has little effect on soil productivity at most sites, at least at ten years of growth (based on personal communications with David Young June through July 2007). These results will be revisited and published after ten year data is available for all 12 California LTSP sites. It is clear from this study and observations of roads closed in the past on the Forest, that compacted road surfaces are typically still capable of absorbing and holding the water necessary to support vegetative recovery in the Mediterranean climate of the Plumas National Forest.

Active restoration or obliteration of unauthorized routes (including out-sloping and re-contouring routes to closely match the natural topography and removal of culverts and other stream crossing structures) is not a part of any of the project alternatives. Much of the increased peak flow effect that has occurred to date as a result of these unauthorized routes will remain over the long term; without active restoration, the route templates, including any cut slopes, ruts, ditches, or culverts that currently exist, will continue to intercept subsurface runoff and concentrate surface runoff. However, the long-term establishment of vegetative growth on these routes will somewhat reduce area peak flows. More significantly, this vegetation will substantially decrease the amount of erosion from these areas and the amount of sediment delivered to area stream channels. The vegetative canopy will intercept precipitation and significantly reduce detachment of soil particles from the former route surface due to rainsplash erosion. Stems that grow on the route surface will intercept surface runoff, slowing and lengthening the runoff flow path to reduce the occurrence of concentrated runoff that generates erosion. Roots of vegetation that re-grows on these routes will act to hold vast areas of soil in place. Re-established vegetation will transpire a significant portion of precipitation that formerly ran down and off the road surface.

In addition to soil and water improvements realized by the prohibition of motorized traffic on these 738 miles of existing unauthorized routes, prohibition of cross-country traffic on areas that are currently untracked would prevent the same type of effects to soil and water resources that are observed on existing, unauthorized routes. Erosion and disturbance of the A-horizon (organic-rich topsoil) portion of soil profiles in areas that are currently untracked would be prevented, protecting soil vegetative productivity. Modification of surface water runoff timing and magnitude due to vehicle track ruts on currently untracked areas would be prevented, protecting water resources downslope of those areas.

Unauthorized use of these routes by nonmotorized traffic following prohibition could delay or prevent recovery.

Alternative 2, Action Component 2: Addition of Facilities (Routes and Areas) to the NFTS

Alternative 2 proposes to add 364 miles of existing, unauthorized routes to the NFTS. Additionally, Alternative 2 would allow year-round motorized vehicle traffic within the 36-acre Sly Creek area. In general, any direct and indirect effects to soil and water resources caused by motorized travel on these previously unauthorized routes have already occurred. Water resource effects that have already occurred include modification of surface-water runoff timing and magnitude owing to interception of surface and subsurface runoff during rainfall and snowmelt events. Water resource direct effects that have already occurred also include the generation of erosion that can be delivered as fine sediments to stream channels. Indirect effects that have already occurred include potentially significant and long lasting degradation of water quality and aquatic habitat. Direct effects to soil resources that have already occurred include a loss of vegetative productivity for the routes and areas subjected to motorized vehicle traffic, due to loss of soil cover, soil compaction, and loss of soil hydrologic function.

For Alternative 2, E08 evaluation data indicates that 188 miles (51% of the 364 miles proposed for addition to the NFTS) contain at least one segment that rates as “Fail” for effectiveness in protecting water quality. Typically, these segments “fail” because of delivery of route-generated sediment to stream channels or because the route has captured a stream channel. Over half of these effects can be mitigated. For Alternative 2, 126 route/stream crossings were observed to either be currently diverting stream flow down the route surface or having the potential to divert stream flow if the route/stream crossing plugged. “Moderate”, “High” or “Extreme” ratings for soil and water resource effects were rated for 331 proposed miles of trails, meaning that soil and water effects are currently adverse or have the potential to be adverse in the future. Of these 331 miles, 52 miles are rated as “High”, meaning that soil and water effects are currently adverse but can be mitigated.

Eighty-five miles of routes proposed under Alternative 2 are rated "Extreme" for soil and water effects, meaning that effects are currently adverse and mitigation of these effects is not economically feasible, would not meet safety standards, or would not be effective due to physical constraints. For example, many of the "Extreme" routes are located along stream channels on steep, erosive soils and are entrenched, a combination that results in no viable alternative for adequately draining the route to prevent sediment from entering the channel. Other "Extreme" routes are located within active stream channels and would require a new location, a mitigation that is beyond the scope of this EIS. Site specific survey, effects and mitigation information for each route is included in Appendix A of the DEIS and Appendices F, G, and H of the Soil and Water Resource Report, in the project record.

Alternative 2 proposes to add a 36-acre area near Sly Creek to the NFTS. This area would be open year-round to motorized vehicles with widths that do not exceed 50". This area is rated as "High" for soil and water resource effects. The current access approach to the area is too steep, causing excessive rutting and erosion that will, in the near future, preclude this location's use as an access approach to the play area. Additionally, an ephemeral channel is currently used as access to the play area from Sly Creek Campground. Traffic in this channel is causing discharge of traffic-related sediment to and beyond the downstream paved road drainage system. Mitigations are prescribed for this area. Watershed staff recommends that this area not be open to motorized traffic until these mitigations are in place.

By prohibiting traffic on other unauthorized routes on the Forest, facilities added to the NFTS under Alternative 2 may experience increased traffic levels resulting in a slight increase in road and trail generated erosion. However, increased maintenance attention, along with mitigations installed to prevent adverse effects to water quality, for these added facilities would reduce erosion to a greater degree.

Alternative 2, Action Component 3: Changes to the existing NFTS

Direct and indirect effects for this component are not applicable to Alternative 2 because no changes to the existing NFTS are proposed.

3.5.6.2.2 Cumulative Effects

As stated above, the combination of the three action components analyzed for direct and indirect effects are added to past, present and reasonably foreseeable actions to analyze the cumulative effects of implementing each alternative as a whole.

As described, past actions are represented by the existing condition of PNF watersheds. The existing condition of PNF watersheds is represented by the watershed condition sensitivity rating and risk of cumulative watershed effects from the 1999 Final EIS for the Herger-Feinstein Quincy Library Group Forest Recovery Act, with further indication of the condition provided by results from the 2007 HFQLG FRA Pilot Project Monitoring Report to Congress (see the Soil and Water Resource Report, Appendix E in the project record). The 2007 Monitoring Report to Congress indicates that watershed condition has changed little since the 1999 HFQLG FEIS analysis. The most significant potential change to watershed condition observed in the report is reflected in increases in ERA values due to HFQLG FRA projects implemented since 1999. Those ERA changes are presented for each analysis subwatershed in the Soil and Water Resource Report, Appendix E in the project record.

Alternative 2 proposes to add 364 miles of existing, unauthorized routes to the NFTS. Additionally, Alternative 2 would allow year-round motorized vehicle traffic within the 36-acre Sly Creek area. This addition of unauthorized routes to the NFTS as trails would not increase the percentage of land disturbed and would not increase adverse effects to soil and water resources because these routes already exist on the landscape. Alternative 2 would result in prohibition of travel on 738 miles of unauthorized routes that are open to motorized traffic under the No-action alternative. The prohibition of cross-country travel would reduce future land disturbance on the Forest and, over the long-term timeframe for this analysis (25-30 years), would allow passive recovery of unauthorized routes that have already disturbed the landscape. Reasonably foreseeable actions are presented in Appendix C. It is assumed that each of these actions would potentially occur regardless of which alternative for this project is selected.

The long-term, net effect of these past, present and reasonably foreseeable actions on each HFQLG watershed is indicated by the total mileage and density of proposed NFS trails and roads open to traffic on public and private roads within the HFQLG watersheds (see the Soil and Water Resource Report, Appendix E in the project record). As described above in the methods section, the road/route density is compared with a threshold value of 4.0 miles per square mile. This threshold value does not represent an exact level at which a detrimental CWE will occur but serves as a “yellow flag” indicator of increased risk of significant adverse cumulative effects occurring within a watershed.

Under the existing condition (represented by Alternative 1), 19 of the 178 analysis watersheds (11%) have road/route densities that exceed the threshold of 4.0 mi/mi^2 (Table 22). For these 19 watersheds, the mean density is 4.73 mi/mi^2 and the median is 4.56 mi/mi^2. Two of these watersheds were determined to be at “High” risk of CWE in the 1999 HFQLG EIS and the remaining 17 watersheds rated as “Moderate” risk. Since 1999, watershed condition has changed little in these 19 watersheds, as demonstrated by the 2007 HFQLG FRA monitoring report. The percent change in ERA for those watersheds averages 0.7% with a median change of 0%. No change in ERA from 1999-2007 was reported for 11 of the 19 watersheds.

The density of roads and routes open to motorized traffic would decrease for all of these watersheds under Alternative 2. A net total of 128 miles of unauthorized routes within these 19 watersheds would be made unavailable to motorized traffic under Alternative 2, with watershed 110192 experiencing the largest decrease (over 22 miles). The average decrease in road/route density for these 19 watersheds would be 0.77 mi/mi^2 with a median decrease of 0.61 mi/mi^2. As a result, the density for 9 of the 19 watersheds would be less than the analysis threshold under Alternative 2. For the remaining 10 watersheds, the effects of Alternative 2 on watershed resources would also be beneficial, including improved surface water runoff timing and magnitude and reduced sediment delivery as a result of decreased road/route density.

For the two watersheds with the greatest increase in past ground disturbance from 1999 – 2007, watersheds 110041 and 110192 (respectively situated on the Feather River Ranger District in the

Lower North Fork Yuba River HUC-5 drainage and on the Beckwourth Ranger District in the Last Chance Creek HUC-5 drainage), Alternative 2 would produce significant reductions in road/route density, resulting in densities of 3.83 and 1.81 mi/mi^2, respectively. While Alternative 2 would add to the NFTS 3.9 miles and 0.7 mile of trails to the watersheds (respectively), these routes already exist in these watersheds and this alternative would also prohibit motorized traffic and allow for the passive restoration of 7.1 and 23.1 miles of routes (respectively) that currently exist in these watersheds. None of the reasonably foreseeable actions presented in Appendix C are proposed within these two watersheds.

For the two watersheds that were determined to have a high risk of CWE in the 1999 HFQLG EIS, watersheds 110114 and 110159 (both situated on the Mount Hough Ranger District in the Spanish Creek and Seneca HUC-5 drainages, respectively), Alternative 2 would produce significant reductions in road/route density, resulting in densities of 4.49 and 3.40 mi/mi^2, respectively. While Alternative 2 would add to the NFTS 3.1 and 5.0 miles of trails to the watersheds (respectively), these routes already exist in these watersheds and this alternative would also prohibit motorized traffic and allow for the passive restoration of 11.2 and 11.1 miles of routes (respectively) that currently exist in these watersheds. None of the reasonably foreseeable actions presented in Appendix C are proposed within these two watersheds.

The cumulative effect for each watershed as a result of Alternative 2 is generally beneficial (173 of 178 or 97% of the analysis watersheds), as observed by a decrease in density of roads and routes open to motorized traffic (see the Soil and Water Resource Report, Appendix E in the project record). For these watersheds, prohibition of motorized traffic on the portion of the 738 miles of unauthorized routes would result in a decrease in road/route density. The density decrease in each watershed ranges from 0.01 to 2.27 mi/mi^2 with a mean of 0.33 and a median of 0.25 mi/mi^2. Additionally, long-term watershed condition would improve and risk of cumulative watershed effects would decrease under Alternative 2 as a result of prohibition of cross-country traffic on areas that are currently untracked. Erosion and disturbance of the A-horizon portion of soil profiles in areas that are currently untracked would be prevented, protecting soil vegetative productivity. Modification of surface water runoff timing and magnitude due to vehicle track ruts on currently untracked areas would be prevented, protecting water resources downslope of those areas.

The road/route density for the remaining 5 subwatersheds (3% of analysis watersheds) indicates no change in the risk of cumulative soil and water resource effects. These subwatersheds are not affected by the prohibition of motorized traffic on the 738 miles of unauthorized routes. However, the benefits of prohibition of cross-country traffic on areas that are currently untracked would also be realized within these subwatersheds, resulting in a long-term improvement of watershed condition and a long-term decrease in the risk of cumulative watershed effects.

Reasonably foreseeable actions that would affect soil and water resources at a cumulative, watershed scale are chiefly the HFQLG FRA vegetation management activities that are described above in the Methods section. As stated above, these actions predominately result in minor increases in ERA values such that watersheds remain below the Threshold of Concern. For example, Table 22 identifies that the Watdog vegetation management project is a planned project for watershed 110038 (situated on the Feather River Ranger District in the Lower Middle Fork Feather River HUC-5 watershed). The watershed effects analysis for the Watdog project divided 110038 into 9 subwatersheds (see Hydrology Report, Watdog Project, USDA 2007). The total ERA increase for watershed 110038 due to the Watdog Project is 87 acres, or 0.8% of the 11,140 acre watershed. This is a minor increase when applied to watershed 110038. The resulting ERA percent for the 9 subwatersheds averaged 4.1% of the subwatershed area, well below the TOC of 12 percent. While Alternative 2 would add 0.3 miles of trail to the NFTS within 110038, these routes already exist in the watershed and this alternative would also prohibit motorized traffic and allow for the passive restoration of 2.9 miles of routes that currently exist in the watershed. This improvement in road/route density (a decrease of 0.15 mi/mi^2) is typically larger for all of the 178 watersheds under Alternative 2 (average decrease of 0.33 mi/mi^2). The improvement in road/route density under Alternative 2, considered along with the minor increases in ERA indicated for the reasonably foreseeable actions, would result in no increase in risk of detrimental cumulative watershed effects and would, by and large, decrease this risk.

While the cumulative effect of Alternative 2 is predicted to be beneficial at the watershed scale for all 179 watersheds (as indicated by decreases in road/route density and/or prohibition of cross-country travel on untracked areas), adverse effects are indicated at a smaller scale per the Action Component 2 analysis above. Alternative 2 proposes to add to the NFTS 137 miles of routes that are rated as “High” or “Extreme” for soil and water effects, meaning that all of these routes are currently having adverse effects on soil and water resources. Of these 137 miles, 85 miles are rated “Extreme” , meaning that these adverse effects cannot be feasibly mitigated and would persist in the future. Mitigations are prescribed for the 52 miles of proposed trail that are rated as “High”.

3.5.6.3 Alternative 3

Alternative 3 responds to the issues of cost and and natural resource effects by prohibiting cross-country travel without adding any additional facilities to the NFTS. None of the currently unauthorized routes or areas would be added to the National Forest System (NFS).

1. **Cross-country Travel:** Motorized vehicle travel off designated NFS roads, NFS trails and areas by the public except as allowed by permit or other authorization will be prohibited.
2. Routes and Areas Added to the Existing National Forest System: No roads, trails, or areas would be added to the NFTS.
3. **Class of Vehicles:** For Alternative 3, no changes to the existing NFTS are proposed, including deletions of existing facilities or changing the vehicle class and season of use for existing facilities.

3.5.6.3.1 Direct and Indirect Effects

Action Component 1: Prohibition of Cross-Country Vehicle Travel

The direct and indirect effects to soil and water resources of the prohibition on cross-country motorized travel would be similar to Alternative 2. For Alternative 3, 3,922 miles of roads and routes on Plumas NFS lands would be available to motorized traffic (Table 23), including 1,719 miles situated in the hydrologically sensitive areas described in the Methods section. Motorized traffic would be prohibited on all 1,109 miles of inventoried existing, unauthorized routes that are currently open to motorized traffic, including 455 miles of existing routes situated in hydrologically sensitive areas. Direct and indirect effects to water resources due to prohibition of motorized travel on these routes include reduced peak flows and sediment loads.

When compared with Alternative 2, greater long-term (25-30 year) benefit to soil and water resources would occur under Alternative 3 because an additional 364 miles of unauthorized routes would be prohibited from motorized traffic. This would allow the passive re-vegetation of an additional 364 miles of unauthorized routes, resulting in these areas attaining much of their original hydrologic and geomorphic functions. The long-term establishment of vegetative growth on these routes will substantially decrease the amount of erosion and the amount of sediment delivered to area stream channels from 1,109 miles of unauthorized routes and would somewhat reduce area peak flows.

Benefits to soil and water resources due to prohibition of cross-country traffic on areas that are currently untracked would be the same as Alternative 2. These benefits associated with prohibition of cross-country traffic on areas that are currently untracked would be identical for all action alternatives (Alternatives 2 through 5). Unauthorized use of these routes by non-motorized traffic following prohibition could delay or prevent recovery.

Action Component 2: Addition of Facilities (Routes and Areas) to the NFTS

Direct and indirect effects for this component are not applicable to Alternative 3 because no facilities are proposed to be added to the NFTS.

Action Component 3: Changes to the existing NFS

Direct and indirect effects for this component are not applicable to Alternative 3 because no changes to the existing NFTS are proposed.

Table 22. Summary of Cumulative Soil and Water Resource Effects Analysis for Watershed Exceeding Density Threshold

Watershed ID Number	Watershed Area, (sq mi)	1999 Watershed Sensitivity Condition Rating (a)	1999 Risk of Cumulative Effects (a)	Percent Change in ERA, 1999-2007 (b)	Density of Roads and Routes open to motorized traffic (mi/mi^2), Alt. 1	Density of Roads and Routes open to motorized traffic (mi/mi^2), Alt. 2	Density of Roads and Routes open to motorized traffic (mi/mi^2), Alt. 3	Density of Roads and Routes open to motorized traffic (mi/mi^2), Alt. 4	Density of Roads and Routes open to motorized traffic (mi/mi^2), Alt. 5	Reasonably Foreseeable Actions to occur in this Watershed - c
110067	14.16	72.0	M	N/A	6.53	5.24	3.81	4.15	5.08	Basin Project
110114	6.00	77.0	H	N/A	5.84	4.49	3.96	3.96	4.06	Meadow Valley Project (d)
110054	8.05	54.0	M	N/A	5.49	4.63	3.58	3.58	4.38	None
110034	11.04	60.0	M	0	5.44	4.88	4.58	4.58	4.80	None
110051	16.55	72.0	M	0.5	4.99	4.68	4.60	4.51	4.62	Basin Project, Hardquartz Mine Hazard Abaterment
110042	13.12	72.0	M	0.9	4.84	4.24	2.92	3.49	3.68	Sugarberry, Winkeye Mining Claim
110124	6.29	60.0	M	N/A	4.77	3.33	2.68	3.00	3.31	Empire Veg Mgmt Project
110021	8.10	60.0	M	1.8	4.61	4.30	4.30	4.30	4.30	Sugarberry Project
110041	4.29	66.0	M	4.7	4.57	3.83	2.93	3.75	3.75	Sugarberry Project
110069	1.86	50.0	M	N/A	4.56	3.14	3.14	3.14	3.14	None
110030	14.83	50.0	M	0.1	4.43	4.39	4.39	4.39	4.39	None
110038	17.41	60.5	M	N/A	4.40	4.25	4.23	4.23	4.23	Watdog Project
110053	12.42	60.0	M	N/A	4.30	3.77	3.31	3.31	3.66	None
110159	6.93	77.0	H	0.7	4.29	3.40	2.68	3.16	3.35	None
110113	8.99	45.0	M	N/A	4.28	3.55	2.85	3.05	3.12	Meadow Valley Project (d)
110055	7.19	55.0	M	N/A	4.22	4.01	3.59	3.83	3.99	None
110023	17.49	60.0	M	1.1	4.13	3.75	3.70	3.75	3.75	Sugarberry Project
110192	9.88	71.5	M	3.5	4.08	1.81	1.75	1.90	1.90	Camp 14 Salvage
110033	10.29	55.0	M	0	4.03	3.56	3.10	3.10	3.33	None

a - from Appendix N, "Herger Feinstein Quincy Library Group Forest Recovery Act FEIS" (August 1999)

b - from "Monitoring Report Fiscal Year 2007, Herger Feinstein Quincy Library Group Forest Recovery Act Pilot Project"

c - from Appendix C of this DEIS

d- Meadow Valley project effects are included in “Percent ERA Change” column

N/A - Not applicable. No HFQLGFRA work reported in this watershed for 1999-2007

3.5.6.3.2 Cumulative Effects

General cumulative effects to soil and water resources under Alternative 3, and indeed for all action Alternatives (2 through 5) would be the same as cumulative effects for Alternative 2. Detailed differences from the Alternative 2 cumulative watershed effects analysis are presented below.

When compared with Alternative 2, greater long-term benefit to soil and water resources would occur under Alternative 3 because motorized traffic would be prohibited on all 1,109 miles of inventoried existing, unauthorized routes that are currently open to motorized traffic resulting in an additional 364 miles of unauthorized routes to be prohibited from motorized traffic.

Under the existing condition, 19 of the 178 analysis watersheds (11%) have road/route densities that exceed the threshold of 4.0 mi/mi^2 (Table 23). For these 19 watersheds, the mean density is 4.73 mi/mi^2 and the median is 4.56 mi/mi^2. The density of roads and routes open to motorized traffic would decrease for all of these watersheds under Alternative 3. A net total of 216 miles of unauthorized routes within these 19 watersheds would be made unavailable to motorized traffic under Alternative 3, with watershed 110067 experiencing the largest decrease (over 38 miles). The average decrease in road/route density for these 19 watersheds would be 1.2 mi/mi^2 with a median decrease of 1.4 mi/mi^2. As a result, the density for 14 of the 19 watersheds would be less than the analysis threshold under Alternative 3. For the remaining 5 watersheds, the effects of Alternative 3 on watershed resources would also be beneficial, including improved surface water runoff timing and magnitude and reduced sediment delivery as a result of decreased road/route density.

For the two watersheds with the greatest increase in past ground disturbance from 1999–2007, watersheds 110041 and 110192, Alternative 3 would produce significant reductions in road/route density, resulting in densities of 2.93 and 1.75 mi/mi^2, respectively. Alternative 3 would add no new trails to the NFTS and would prohibit motorized traffic and allow for the passive restoration of 7.1 and 23.1 miles of routes (respectively) that currently exist in these watersheds. None of the reasonably foreseeable actions presented in Appendix C are proposed within these two watersheds.

For the two watersheds that were determined to have a high risk of CWE in the 1999 HFQLG EIS, watersheds 110114 and 110159, Alternative 3 would produce significant reductions in road/route density, resulting in densities of 3.96 and 2.68 mi/mi^2, respectively. Alternative 3 would add no new trails to the NFTS and would prohibit motorized traffic and allow for the passive restoration of 11.2 and 11.1 miles of routes (respectively) that currently exist in these watersheds. None of the reasonably foreseeable actions presented in Appendix C are proposed within these two watersheds.

Long-term watershed condition would improve and risk of cumulative watershed effects would decrease under Alternative 3. The net effect of past, present and reasonably foreseeable actions on each subwatershed, as indicated by the total mileage and density of proposed trails and roads open to traffic on public and private roads within the subwatershed (see the Soil and Water Resource Report, Appendix E in the project record), is generally beneficial. Over 99% of the analysis subwatersheds (177 out of 178) indicate a decrease in road/route density. The density decrease for each watershed ranges from 0.01 to 2.72 mi/mi^2 with a mean of 0.48 and a median of 0.34 mi/mi^2. The road/route density for the remaining one subwatershed (less than 1% of the analysis watersheds) indicates no change in the risk of cumulative soil and water resource effects. However, the benefits of prohibition of cross-country traffic on areas that are currently untracked will be realized in all analysis subwatersheds. This long-term improvement of watershed condition and long-term decrease in the risk of cumulative watershed effects due to protection of untracked areas is identical to the effect for Alternative 2. Indeed, the beneficial cumulative effect of prohibiting motorized traffic on areas that are currently untracked is identical for all action alternatives (Alternatives 2 through 5)

Reasonably foreseeable actions that would affect soil and water resources at a cumulative, watershed scale are chiefly the HFQLG FRA vegetation management activities that are described above in the Methods section. The cumulative result of these foreseeable actions and Alternative 3 are generally the same as stated above for Alternative 2. For example, for watershed 110038, the total ERA increase due to the Watdog Project would still be 0.8%, a minor increase in relation to the watershed's Threshold of Concern. Alternative 3 would allow for the passive restoration of 2.9 miles of routes that currently exist in the watershed. This improvement in road/route density (a decrease of 0.15 mi/mi^2) is typically larger for all of the 178 watersheds under Alternative 3 (average decrease of 0.33 mi/mi^2). The improvement in road/route density under Alternative 3, considered along with the minor increases in ERA indicated for the reasonably foreseeable actions, will result in no increase in risk of detrimental cumulative watershed effects and would, by and large, decrease this risk.

3.5.6.4 Alternative 4

Alternative 4 responds to non-motorized recreation interest in "Citizen Inventoried Roadless Areas (CIRAs)" proposed by the Wilderness Society and natural resource impacts. This alternative adds no motorized routes to CIRAs. This alternative does not designate routes as trails where resource concerns require extensive or critical mitigation (those routes rated as "High" for soil and water resource effects). This alternative also does not propose trails that are rated "Extreme" for soil and water resource effects.

1. **Cross Country Travel:** Motorized vehicle travel off designated NFS roads, NFS trails and areas by the public except as allowed by permit or other authorization will be prohibited.
2. **Routes and Areas Added to the Existing National Forest System:** For Alternative 4, a total of 141 miles of existing, unauthorized routes are proposed to be added to the NFTS as trails and open motorcycles, ATVs, a combination of these two vehicle types, or all vehicles. Also, the 36-acre Sly Creek area would be open year-round to motorized vehicles with widths that do not exceed 50".
3. **Class of Vehicles:** Alternative 4 proposes to change the class of vehicles for 11.3 miles of existing NFS roads, allowing all motorized vehicles on these roads that currently allow only highway-legal vehicles.

3.5.6.4.1 Direct and Indirect Effects

Action Component 1: Prohibition of Cross-Country Vehicle Travel

The direct and indirect effects to soil and water resources of the prohibition on cross-country motorized travel would be similar to Alternatives 2 and 3. For Alternative 4, 4,058 miles of roads and routes on Plumas NFS lands would be available to motorized traffic (Table 23), including 1,719 miles situated in the hydrologically sensitive areas described in the Methods section. Motorized traffic would be prohibited on 969 miles of inventoried existing, unauthorized routes that are currently open to motorized traffic, including 414 miles of existing routes situated in hydrologically sensitive areas. Direct and indirect effects to water resources due to prohibition of motorized travel on these routes include reduced peak flows and sediment loads.

When compared with Alternatives 2 and 3, long-term (25-30 year) benefits to soil and water resources under Alternative 4 would be greater than Alternative 2 because an additional 226 miles of unauthorized routes would be prohibited from motorized traffic. Long-term benefits to soil and water resources under Alternative 4 would be less than Alternative 3 because an additional 114 miles of unauthorized routes would be available for motorized traffic. Alternative 4 would allow the passive re-vegetation of 969 miles of unauthorized routes, resulting in these areas attaining much of their original hydrologic and geomorphic functions. The long-term establishment of vegetative growth on these routes would substantially decrease the amount of erosion and the amount of sediment delivered to area stream channels from 969 miles of unauthorized routes and would somewhat reduce area peak flows.

Benefits to soil and water resources due to prohibition of cross-country traffic on areas that are currently untracked would be identical for all action alternatives (Alternatives 2 through 5). Unauthorized use of these routes by non-motorized traffic following prohibition could delay or prevent recovery.

Action Component 2: Addition of Facilities (Routes and Areas) to the NFTS

Alternative 4 proposes to add 141 miles of existing, unauthorized routes to the NFTS. Additionally, Alternative 4 would allow year-round motorized vehicle traffic within the 36-acre Sly Creek area. In general, as with Alternative 2, any direct and indirect effects to soil and water resources of motorized travel on these previously unauthorized routes have already occurred.

For Alternative 4, E08 evaluation data indicates that 27 miles (19% of the 141 miles proposed for addition to the NFTS) contain at least one segment that rated as “Fail” for effectiveness in protecting water quality as a result of initial field survey data, indicating a potential for adverse soil and water effects. However, subsequent site visits indicated that effects are currently less than adverse and mitigations are feasible for all of these segments. For Alternative 4, 47 route/stream crossings were observed to either be currently diverting stream flow down the route surface or having the potential to divert stream flow if the route/stream crossing plugged. All of these crossings can be mitigated. Twenty-six miles are rated as “Low” and 115 miles as “Moderate” for soil and water resource effects, but all routes which rated “High” or “Extreme” have been excluded from Alternative 4, meaning that soil and water effects are not currently adverse for any of the routes proposed for addition to the NFTS. “Moderate” routes have the potential to present adverse soil and water effects in the future but mitigations are included to prevent these potential effects. Site specific survey, effects and mitigation information for each route is included in Appendix A of the DEIS and Appendices F, G, and H in the Soil and Water Resource Report, in the project record

Alternative 4 proposes to add a 36-acre area near Sly Creek to the NFTS. This area would be open year-round to motorized vehicles with widths that do not exceed 50”. This area is rated as “High” for soil and water resource effects. The current approach to the area is too steep, causing excessive rutting and erosion that would, in the near future, preclude this location’s use as an access approach to the play area. Additionally, an ephemeral channel is currently used as access to the play area from Sly Creek Campground. Traffic in this channel is causing discharge of traffic-related sediment to and beyond the downstream paved road drainage system. Mitigations are prescribed for this area. Watershed staff recommends that this area not be open to motorized traffic until these mitigations are in place.

Action Component 3: Changes to the Existing NFTS

Direct and indirect effects to soil and water resources due to allowing all motorized vehicle classes on 11.3 miles of existing NFS roads currently open only to highway-legal vehicles are expected to be negligible. Allowing narrower, non-street legal vehicles to travel existing NFS roads would not lead to a change in the width of those roads.

3.5.6.4.2 Cumulative Effects

General cumulative effects to soil and water resources under Alternative 4, and indeed for all action alternatives (2 through 5), would be the same as cumulative effects for Alternative 2. Detailed differences from the Alternative 2 cumulative watershed effects analysis are presented below.

Long-term (25-30 year) benefits to soil and water resources would occur under Alternative 4 because motorized traffic would be prohibited on 969 miles of inventoried existing, unauthorized routes that are currently open to motorized traffic. Long-term benefits to soil and water resources under Alternative 4 would be greater than Alternative 2 because an additional 226 miles of unauthorized routes would be prohibited from motorized traffic. Long-term benefits to soil and water resources under Alternative 4 would be less than Alternative 3 because an additional 141 miles of unauthorized routes would be available for motorized traffic.

Under the existing condition, 19 of the 178 analysis watersheds (11%) have road/route densities that exceed the threshold of 4.0 mi/mi^2 (Table 23). For these 19 watersheds, the mean density is 4.73 mi/mi^2 and the median is 4.56 mi/mi^2. The density of roads and routes open to motorized traffic would decrease for all of these watersheds under Alternative 4. A net total of 191 miles of unauthorized routes within these 19 watersheds would be made unavailable to motorized traffic under Alternative 4, with watershed 110192 experiencing the largest decrease (over 33 miles). The average decrease in road/route density for these 19 watersheds would be 1.1 mi/mi^2 with a median decrease of 1.0 mi/mi^2. As a result, the density for 13 of the 19 watersheds would be less than the analysis threshold under Alternative 4. For the remaining 6 watersheds, the effects of Alternative 4 on watershed resources would also be beneficial, including improved surface water runoff timing and magnitude and reduced sediment delivery as a result of decreased road/route density.

For the two watersheds with the greatest increase in past ground disturbance from 1999–2007, watersheds 110041 and 110192, Alternative 4 would produce significant reductions in road/route density, resulting in densities of 3.75 and 1.90 mi/mi^2, respectively. While Alternative 4 would add to the NFTS 3.6 miles and 1.5 miles of trails to the watersheds (respectively), these routes already exist in these watersheds and this alternative would also prohibit motorized traffic and allow for the passive restoration of 7.1 and 23.1 miles of routes (respectively) that currently exist in these watersheds. None of the reasonably foreseeable actions presented in Appendix C are proposed within these two watersheds.

For the two watersheds that were determined to have a high risk of CWE in the 1999 HFQLG EIS, watersheds 110114 and 110159, Alternative 4 would produce significant reductions in road/route density, resulting in densities of 3.96 and 3.16 mi/mi^2, respectively. While Alternative 4 would add no routes to the NFTS in 110114 and 3.4 miles of trails to the 1100159 watershed, these routes already exist in these watersheds and this alternative would also prohibit motorized traffic and allow for the passive restoration of 11.2 and 11.1 miles of routes (respectively) that currently exist in these watersheds. None of the reasonably foreseeable actions presented in Appendix C are proposed within these two watersheds.

Long-term watershed condition would improve and risk of cumulative watershed effects would decrease under Alternative 4. The net effect of past, present and reasonably foreseeable actions on each subwatershed, as indicated by the total mileage and density of proposed trails and roads open to traffic on public and private roads within the subwatershed (see the Soil and Water Resource Report, Appendix E in the project record), is generally beneficial. More than 98% of the analysis subwatersheds (175 out of 178) indicate a decrease in road/route density. The density decrease for each watershed ranges from 0.01 to 2.38 mi/mi^2 with a mean of 0.42 and a median of 0.32 mi/mi^2. The road/route density for the remaining three subwatersheds (less than 2% of the analysis subwatersheds) indicates no change in the risk of cumulative soil and water resource effects. However, the benefits of prohibition of cross-country traffic on areas that are currently untracked would be realized in all analysis subwatersheds. This long-term improvement of watershed condition and long-term decrease in the risk of cumulative watershed effects due to protection of untracked areas is identical for all action alternatives (Alternatives 2 through 5).

Reasonably foreseeable actions that would affect soil and water resources at a cumulative, watershed scale are chiefly the HFQLG FRA vegetation management activities that are described above in the Methods section. The cumulative result of these foreseeable actions and Alternative 4 are generally the same as stated above for Alternative 2. For example, for watershed 110038, the total ERA increase due to the Watdog Project would still be 0.8%, a minor increase in relation to the watershed’s Threshold of Concern. Alternative 4 would add no trails to the NFTS within 110038 and would prohibit motorized traffic and allow for the passive restoration of 2.9 miles of routes that currently exist in the watershed. This improvement in road/route density (a decrease of 0.15 mi/mi^2) is typically larger for all of the 178 watersheds under Alternative 2 (average decrease of 0.33 mi/mi^2). The improvement in road/route density under Alternative 4, considered along with the minor increases in ERA indicated for the reasonably foreseeable actions, will result in no increase in risk of detrimental cumulative watershed effects and will, by and large, decrease this risk.

Alternative 4 does not propose to add any routes that are rated as “High” or “Extreme” for soil and water effects (routes that are currently having adverse effects on soil and water resources).

3.5.6.5 Alternative 5

Alternative 5 responds to the issue of access and motorized recreation opportunity. This alternative adds to the proposed action additional routes and alternative routes suggested during public scoping that would improve access and motorized recreation opportunity. This alternative also removes all proposed trails from the proposed action that have an “Extreme” rating for soil and water resource effects.

1. **Cross Country Travel:** Motorized vehicle travel off designated NFS roads, NFS trails and areas by the public except as allowed by permit or other authorization will be prohibited.
2. **Routes and Areas Added to the Existing National Forest System:** For Alternative 5, a total of 251 miles of existing, unauthorized routes are proposed to be added to the NFTS as trails open to motorcycles, ATVs, a combination of these two vehicle types, or all vehicles. Trails that require extensive or critical mitigations to protect water quality (trails rated as “High” for soil and water effects) would be added to the NFTS with this EIS but not placed on the motor vehicle use map until the mitigation has been completed. Also, the 36-acre Sly Creek area would be open year-round to motorized vehicles with widths that do not exceed 50”.
3. **Class of Vehicles:** Alternative 5 proposes to change the class of vehicles for 11.3 miles of existing NFS roads, allowing all motorized vehicles on these roads that currently allow only highway-legal vehicles.

3.5.6.5.1 Direct and Indirect Effects

Action Component 1: Prohibition of Cross-Country Vehicle Travel

The direct and indirect effects to soil and water resources from the prohibition on cross-country motorized travel would be similar to Alternatives 2, 3 and 4. For Alternative 5, 4,172 miles of roads and routes on Plumas NFS lands would be available to motorized traffic (Table 23), including 1,803 miles situated in the hydrologically sensitive areas described in the Methods section. Motorized traffic would be prohibited on 855 miles of inventoried existing, unauthorized routes that are currently open to motorized traffic, including 371 miles of existing routes situated in hydrologically sensitive areas. Direct and indirect effects to water resources due to prohibition of motorized travel on these routes include reduced peak flows and sediment loads.

When compared with Alternatives 2, 3 and 4, long-term (25-30 year) benefits to soil and water resources under Alternative 5 would be greater than Alternative 2 because an additional 116 miles of unauthorized routes would be unavailable for motorized traffic. Long-term benefits to soil and water resources under Alternative 5 would be less than Alternative 3 because an additional 251 miles of unauthorized routes would be available for motorized traffic. Long-term benefits to soil and water resources under Alternative 5 would be less than Alternative 4 because an additional 110 miles of unauthorized routes would be available for motorized traffic. Alternative 5 would allow the passive re-vegetation of 855 miles of unauthorized routes, resulting in these areas attaining much of their original hydrologic and geomorphic functions. The long-term establishment of vegetative growth on these routes would substantially decrease the amount of erosion and the amount of sediment delivered to area stream channels from 855 miles of unauthorized routes and would somewhat reduce somewhat area peak flows.

Benefits to soil and water resources due to prohibition of cross-country traffic on areas that are currently untracked would be identical for all action alternatives (Alternatives 2 through 5). Unauthorized use of these routes by non-motorized traffic following prohibition could delay or prevent recovery.

Action Component 2: Addition of Facilities (Routes and Areas) to the NFTS

Alternative 5 proposes to add 251 miles of existing, unauthorized routes to the NFTS. Additionally, Alternative 5 would allow year-round motorized vehicle traffic within the 36-acre Sly Creek area. In general, as with Alternative 2 and 4, any direct and indirect effects to soil and water resources from motorized travel on these previously unauthorized routes have already occurred.

For Alternative 5, E08 evaluation data indicates that 100 miles (40% of the 251 miles proposed for addition to the NFTS) contain at least one segment that rates as “Fail” for effectiveness in protecting water quality as a result of initial field survey data, indicating a potential for adverse soil and water effects. Typically, these segments “fail” because of delivery of route-generated sediment to stream channels or because the route has captured a stream channel. However, subsequent site visits indicated that potential effects are currently less than adverse and mitigations are feasible for 35 miles that contain these “fail” segments. For Alternative 5, 83 route/stream crossings were observed to either be currently diverting stream flow down the route surface or having the potential to divert stream flow if the route/stream crossing plugged. All of these crossings can be mitigated. Trails that rated as “Extreme” for soil and water resource effects are not proposed for addition to the NFTS under Alternative 5.

“Moderate” or “High” ratings for soil and water resource effects were rated for 216 miles of proposed trails, meaning that soil and water effects are currently adverse or have the potential to be adverse in the future. Of these 216 miles, 65 miles of routes proposed under Alternative 5 are rated as “High” for soil and water effects, meaning that effects are currently adverse and mitigations are necessary to reduce current soil and water resource effects to less than adverse. Alternative 5 proposes to designate these routes as part of the NFTS but these routes would not be placed on the motor vehicle use map until the critical, prescribed mitigations are in place. Motorized traffic would not be legal on these routes until proper installation of the mitigations is completed. If the mitigations are not installed for a number of years, these routes would begin to re-vegetate and regain their hydrologic and geomorphic functions. If the mitigations do not occur within 5-10 years, it is unlikely that the resource analyses provided in this EIS would still be valid and additional analysis would likely be needed to add the routes to the NFTS. Site specific survey, effects and mitigation information for each route is included in Appendix A of the DEIS and Appendices F, G, and H in the Soil and Water Resource Report, in the project record.

Alternative 5 proposes to add a 36-acre area near Sly Creek to the NFTS. This area would be open year-round to motorized vehicles with widths that do not exceed 50”. This area is rated as “High” for soil and water resource effects. The current approach to the area is too steep, causing excessive rutting and erosion that would, in the near future, preclude this location's use as an access approach to the play area. Additionally, an ephemeral channel is currently used as access to the play area from Sly Creek Campground. Traffic in this channel is causing discharge of traffic-related sediment to and beyond the downstream paved road drainage system. Mitigations are prescribed for this area. Watershed staff recommends that this area not be open to motorized traffic until these mitigations are in place.

By prohibiting traffic on other unauthorized routes on the Forest, facilities added to the NFTS under Alternative 5 may experience increased traffic levels resulting in a slight increase in road generated erosion. However, increased maintenance attention, along with mitigations installed to prevent adverse effects to water quality, for these added facilities would reduce erosion to a greater degree.

Action Component 3: Changes to the Existing NFTS

Direct and indirect effects to soil and water resources due to allowing all motorized vehicle classes on 11.3 miles of existing NFS roads currently open only to highway-legal vehicles are expected to be negligible. Allowing narrower, non-street legal vehicles to travel existing NFS roads would not lead to a change in the width of those roads.

3.5.6.5.2 Cumulative Effects

General cumulative effects to soil and water resources under Alternative 5, and indeed for all action Alternatives (2 through 5), would be the same as cumulative effects for Alternative 2. Detailed differences from the Alternative 2 cumulative watershed effects analysis are presented below.

Long-term (25-30 year) benefits to soil and water resources would occur under Alternative 5 because motorized traffic would be prohibited on 855 miles of inventoried existing, unauthorized routes that are currently open to motorized traffic. Long-term benefits to soil and water resources under Alternative 5 would be greater than Alternative 2 because an additional 116 miles of unauthorized routes would be unavailable motorized traffic. Long-term benefits to soil and water resources under Alternative 5 would be less than Alternative 3 because an additional 251 miles of unauthorized routes would be available for motorized traffic. Long-term benefits to soil and water resources under Alternative 5 would be less than Alternative 4 because an additional 110 miles of unauthorized routes would be available for motorized traffic.

Under the existing condition, 19 of the 178 analysis watersheds (11%) have road/route densities that exceed the threshold of 4.0 mi/mi^2 (Table 23). For these 19 watersheds, the mean density is 4.73 mi/mi^2 and the median is 4.56 mi/mi^2. The density of roads and routes open to motorized traffic would decrease for all of these watersheds under Alternative 5. A net total of 152 miles of unauthorized routes within these 19 watersheds would be made unavailable to motorized traffic under Alternative 4, with watershed 110192 experiencing the largest decrease (over 21 miles). The average decrease in road/route density for these 19 watersheds would be 0.9 mi/mi^2 with a median decrease of 0.8 mi/mi^2. As a result, the density for 11 of the 19 watersheds would be less than the analysis threshold under Alternative 5. For the remaining 8 watersheds, the effects of Alternative 5 on watershed resources would also be beneficial, including improved surface water runoff timing and magnitude and reduced sediment delivery as a result of decreased road/route density.

For the two watersheds with the greatest increase in past ground disturbance from 1999–2007, watersheds 110041 and 110192, Alternative 5 would produce significant reductions in road/route density, resulting in densities of 3.75 and 1.90 mi/mi^2, respectively. While Alternative 5 would add to the NFTS 3.6 miles and 1.5 miles of trails to the watersheds (respectively), these routes already exist in these watersheds and this alternative would also prohibit motorized traffic and allow for the passive restoration of 7.1 and 23.1 miles of routes (respectively) that currently exist in these watersheds. None of the reasonably foreseeable actions presented in Appendix C are proposed within these two watersheds.

For the two watersheds that were determined to have a high risk of CWE in the 1999 HFQLG EIS, watersheds 110114 and 110159, Alternative 4 would produce significant reductions in road/route density, resulting in densities of 4.06 and 3.35 mi/mi^2, respectively. While Alternative 5 would add to the NFTS 0.6 and 4.7 miles of trails to the watersheds (respectively), these routes already exist in these watersheds and this alternative would also prohibit motorized traffic and allow for the passive restoration of 11.2 and 11.1 miles of routes (respectively) that currently exist in these watersheds. None of the reasonably foreseeable actions presented in Appendix C are proposed within these two watersheds.

Long-term watershed condition would improve and risk of cumulative watershed effects would decrease under Alternative 5. The net effect of past, present and reasonably foreseeable actions on each subwatershed, as indicated by the total mileage and density of proposed trails and roads open to traffic on public and private roads within the subwatershed (see the Soil and Water Resource Report, Appendix E in the project record), is generally beneficial. More than 97% of the analysis subwatersheds (174 out of 178) indicate a decrease in road/route density. The density decrease for each watershed ranges from 0.01 to 2.18 mi/mi^2 with a mean of 0.37 and a median of 0.27 mi/mi^2. The road/route density for the remaining five subwatersheds (less than 3% of the analysis subwatersheds) indicates no change in the risk of cumulative soil and water resource effects. However, the benefits of prohibition of cross-country traffic on areas that are currently untracked would be realized in all analysis subwatersheds. This long-term improvement of watershed condition and long-term decrease in the risk of cumulative watershed effects due to protection of untracked areas is identical for all action alternatives (Alternatives 2 through 5).

Reasonably foreseeable actions that would affect soil and water resources at a cumulative, watershed scale are chiefly the HFQLG FRA vegetation management activities that are described above in the Methods section. The cumulative result of these foreseeable actions and Alternative 5 are generally the same as stated above for Alternative 2. For example, for watershed 110038, the total ERA increase due to the Watdog Project would still be 0.8%, a minor increase in relation to the watershed's Threshold of Concern. While Alternative 5 would add no trails to the NFTS within 110038 and would prohibit motorized traffic and allow for the passive restoration of 2.9 miles of routes that currently exist in the watershed. This improvement in road/route density (a decrease of 0.15 mi/mi^2) is typically larger for all of the 178 watersheds under Alternative 5 (average decrease of

0.33 mi/mi^2). The improvement in road/route density under Alternative 5, considered along with the minor increases in ERA indicated for the reasonably foreseeable actions, would result in no increase in risk of detrimental cumulative watershed effects and would, by and large, decrease this risk.

The cumulative effect of Alternative 5 is predicted to be beneficial at the watershed scale for all 178 watersheds (as indicated by decreases in road/route density and/or prohibition of cross-country travel on untracked areas). Additionally, adverse effects are not indicated at a smaller site scale per the Action Component 2 analysis above. Alternative 5 does not propose to add any routes that are rated as “Extreme” for soil and water effects (routes that are currently having adverse effects on soil and water resources that cannot be feasibly mitigated). Alternative 5 proposes to add to the NFTS 63 miles of routes that are rated as “High”. Mitigations are prescribed for these routes to reduce the effects to less than adverse and the trails would remain prohibited from motorized traffic until the mitigations are satisfactorily installed.

3.5.7 Summary of Effects Analysis Across all Alternatives

Effects to soil and water resources are summarized by ranking each indicator for each alternative. Table 23 provides the numeric value of the indicator and the ranking among alternatives in parentheses (higher rankings indicate more benefits and/or less adverse effects to soil and water resources for that alternative). The rankings are averaged for each alternative.

Table 23. Summary of Soil and Water Resource Effects

Indicators – Soil and Water Resources	Alt 1	Alt. 2	Alt. 3	Alt.4	Alt. 5
Total miles of proposed trails and roads open to motorized traffic on Plumas National Forest System lands	5,027 (1)	4,289 (2)	3,922 (5)	4,058 (4)	4,172 (3)
Total miles of proposed trails and roads open to motorized traffic on Plumas National Forest System lands that are situated in hydrologically sensitive areas	2,174 (1)	1,854 (2)	1,719 (5)	1,760 (4)	1,803 (3)
Total miles of proposed trails and roads open to motorized traffic on Plumas National Forest System lands by Maximum Potential Erosion Hazard Rating (EHR) **Very High (VH), High (H), Moderate (M), Low (L)**	VH: 277 H: 2,944 M: 1,593 L: 48 (1)	VH: 239 H: 2,502 M: 1,387 L: 46 (2)	VH: 206 H: 2,288 M: 1,283 L: 45 (5)	VH: 210 H: 2,371 M: 1,321 L: 45 (4)	VH: 227 H: 2,443 M: 1,349 L: 45 (3)
Total miles of routes proposed for addition to NFTS that E08 effectiveness evaluation data indicate "fail" segment(s) for protection of water quality	N/A (1)	188 (2)	N/A (5)	27 (4)	100 (3)
Total miles of routes proposed for addition to NFTS that E08 effectiveness evaluation data indicates "fail" segment(s) and adverse effects that can't be mitigated	N/A (1)	85 (2)	N/A (5)	0 (5)	0 (5)
Numbers of locations where routes proposed for addition to NFTS divert or have potential to divert streamflow (before/after mitigation)	N/A (1)	126 (2)	N/A (5)	47/0 (5)	83/0 (5)
Average Density (mi/mi^2) of proposed trails and roads open to motorized traffic on public and private lands within Plumas National Forest watersheds (Mean, maximum and minimum)	2.44 0.13 6.53 (1)	2.14 0.13 5.24 (2)	1.99 0.04 4.60 (5)	2.04 0.04 4.58 (4)	2.09 0.13 5.08 (3)
Average for Water and Soil Resource	**1.0**	**2.0**	**5.0**	**4.3**	**3.6**

N/A – not applicable

3.5.8 Compliance with the Forest Plan and Other Direction

A list of Standards and Guidelines and best management practices that apply to this project are included in the Soil and Water Resource Report, Appendix B in the project record. All Standards and Guidelines and BMPs apply to Alternatives 2, 4, and 5. Mitigation measures were proposed to have compliance with the Forest Plan and Clean Water Act. Alternative 1 would not be in compliance with the Forest Plan and Clean Water Act. Alternative 1 is the No-action alternative and allows for the Forest to open to cross-country travel. If No-action is performed then the existing routes that are currently in the watershed and not a part of the NFTS then these trails would not be mitigated. Alternative 3 is only using roads and trails that are already a part of the NFTS. At the time these routes were constructed they were in compliance with the planning direction at the time. As reconstruction occurs on the NFTS, these routes will through time be reconstructed in compliance with the Forest Plan and Clean Water Act.

The application of BMPs and MMMs, including riparian buffers, would reduce the risks to beneficial uses of water from project activities. If cumulative effects were to occur, the most likely effect would be increased chronic sedimentation from increases in water yield and peak flow during high-intensity rain events. Peak flow changes, in particular, may cause increased sedimentation, changes in bedload transport, altered flow regimes, channel incision, undercuts and unstable banks, and channel width increases (Reid 1993).

It is assumed that protection of headwaters and tributaries to larger watersheds, along with implementation of effective non-point source conservation measures (BMPs), would provide protection of the entire watershed. If sedimentation is controlled through implementation of BMPs, the potential for project related sediment delivery to the immediate channel and channels downstream would be small.

Impacts on water quality in the analysis area could potentially occur under the following circumstances:

1. Failure to implement Best Management Practices, Riparian and Wetland Standards and Guidelines, and other required mitigation.
2. Extreme water yields resulting from abnormally high intensity, magnitude, and duration storm events.

3.6 Aquatic Biota

3.6.1 Introduction

Management of aquatic dependent species and habitat and maintenance and diversity of animal communities are important parts of the mission of the Forest Service (Forest and Rangeland 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 (MIS) to the degree consistent with multiple-use objectives established in each Forest Land Resource Management Plan (Forest Plan). 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 Forest Service 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 aquatic biota and their habitat.

The Plumas National Forest (PNF) aquatic species and their habitat considered include Regional Forester’s Sensitive herpetofauna and fish, and the federal threatened California red-legged frog. Amphibian species and their habitats addressed in this section are foothill yellow-legged frog, mountain-yellow legged frog, the California red-legged frog, and the northwestern pond turtle. Fish species addressed include the hardhead minnow.

Road and trail associated factors will be discussed here for herpetofauna and fisheries across the forest. Macroinvertebrates are addressed as MIS in the Terrestrial Biota section. Generally, site-specific studies on the species interaction with road and trail-associated factors are lacking in the literature. Where site-specific information or literature on road and trail associated factors to aquatic species is available, general information on potential impacts will be presented in this section. In addition, detailed information on affects of roads to downstream water quality is presented in the Soil and Watershed Resources section.

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

Direction relevant to the alternatives as they concern 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 species (TE), 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 under their jurisdiction. It is Forest Service policy to analyze impacts to TE to ensure management activities are not be likely to jeopardize the continued existence of a TE, 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.

- **Consultation**: The Forest has begun early involvement with the United States Fish and Wildlife Service (USFWS) as of February of 2008, and continues to communicate with the Service on an ongoing basis (pers. comm. A. Fesnock). Discussions to date have included the use of the Regional Programmatic Agreement that includes the Motorized Travel Management Project Design Criteria for 'No effect' or 'May Affect Not Likely to Adversely Affect' determination for the California red-legged frog (CRLF) (October 2006). Recommendations include incorporating the six design criteria specific to the CRLF into Alternative 4. Alternative 4 meets all the criteria to lead to a "May affect, not likely to adversely affect" determination for the CRLF. Currently the Forest is in "Early Involvement" with the US Fish and Wildlife Service. The Forest Service consults only on the Preferred Alternative (Alternative 5). Currently Alternative 5 does not meet the programmatic agreement because there are proposed designated trails within CARs. The Forest is consulting with the USFWS because there is the potential for direct and indirect effect to the CRLF by the preferred alternative. Mitigations have been developed (in consultation with the USFWS) to reduce impacts to CRLF and its habitat, and the Forest Service will comply with any terms and conditions set forth by the US Fish and Wildlife Service in the Biological Opinion.

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

Sierra Nevada Forest Plan Amendment (SNFPA). The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment identified the following Standards and Guidelines applicable to motorized travel management and aquatic resources, which will be considered during this analysis process:

- Riparian Habitat (Management Standard and Guideline #92): see discussion under Water Resources.
- Ensure that management activities do not adversely affect water temperatures necessary for local aquatic and riparian dependent species assemblages (Management Standard and Guideline #96).
- As appropriate, assess and document aquatic conditions following the Regional Stream Condition Inventory protocol prior to implementing ground disturbing activities within suitable habitat for California red-legged frog, Cascades frog, Yosemite toad, foothill and

mountain yellow-legged frogs, and northern leopard frog (Management Standard and Guideline #114).

- Bog and Fen Habitat (Management Standard and Guideline #118): Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles.
- The Aquatic Management Strategy, established in the SNFPA 2001 ROD and retained in the SNFPA 2004 ROD, uses a set of land allocations, specifically riparian conservation areas (RCAs) and critical aquatic refuges (CARs), that delineate aquatic, riparian, and meadow habitats, which are to be managed consistent with riparian conservation objectives (RCOs) and associated Standards and Guidelines.

California red-legged frog design criteria from the Regional Programmatic Agreement (October, 2006).

a. Routes or areas do not have the potential to capture surface run off and then deliver sediment into a stream associated with California red-legged frog.
b. In suitable California red-legged frog habitat, routes avoid Riparian Reserve and Riparian Conservation Areas except where necessary to cross streams. Crossing approaches get the riders in and out of the stream channel and riparian area in the shortest distance possible while meeting the gradient and approach length standards.
c. 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 wetlands (i.e. springs, wet meadows, ponds, marshes) – this design criteria was also used in the effects analysis of the foothill yellow-legged frog, northwestern pond turtle and mountain yellow-legged frog.
d. In habitat occupied by California red-legged frog, routes or areas do not have the potential to capture or divert stream flow. The approaches to stream crossings are downsloped toward the stream on both sides.
e. Areas are located outside of Riparian Reserve, Riparian Conservation Areas, meadows, and wetlands within California red-legged frog habitat.
f. No route or areas are within Critical Aquatic Refuges for California red-legged frog.

3.6.3 Effects Analysis Methodology

3.6.3.1 Impacts Relevant to Aquatic Biota Include

Vehicle use on and off established routes has affected or has the potential to affect aquatic species, including threatened, endangered, and sensitive species, by increasing human-caused mortality, causing changes in behavior due to disturbance, and habitat modification.

3.6.3.2 Assumptions Specific to the Aquatic Biota Analysis

In addition to the common assumptions mentioned in the introduction to Chapter 3, the following assumptions apply to the aquatic biota:

All vehicle types result in the same amount of disturbance effect on aquatic dependent species (unless there is local information enabling a separate analysis by vehicle type).

Aquatic species spend all or significant portions of their life cycles either in or moving through riparian habitats.

Habitat is already impacted in the short term. In the long term, habitat will remain the same on added trails, but will increase to at least some degree on non-added trails with ban of cross-country travel and subsequent passive restoration (see Soils template for further assumptions).

Occupancy is assumed in all non-surveyed suitable habitat.

Proposed designated trails determined to be “extreme” for resource concerns cannot be mitigated.

Ratings determined for soils and water resources effect water quality and the assumption is similar effects to TES herpetofauna and thus the same rating applies.

3.6.3.3 Data Sources

1. GIS layers of the following information: routes; habitats; and ‘designated’ or important aquatic areas (e.g., RCAs, CARs).
2. Site-specific surveys/assessment of any localized sensitive aquatic habitats with routes proposed to be added to the NFTS (e.g., wet meadows, stream crossings, riparian corridors)

3.6.3.4 Aquatic Biota Indicators

3.6.3.4.1 Mountain Yellow-Legged Frog, California Red-Legged Frog, Foothill Yellow-Legged Frog and Western Pond Turtle

Each indicator is designed to be calculated using the sources of information above, using Geographic Information System (GIS) queries. They are focused on assessing the effects of adding facilities to the NFTS. The effects of prohibition of cross-country travel and adding proposed designated trails to the NFTS are assessed quantitatively and qualitatively as described below. Baseline conditions include all existing National Forest System (NFS) roads, trails and areas on the PNF. The effects analysis includes baseline plus all existing unauthorized routes (Alternative 1) to various levels of proposed trail densities (Alternatives 2, 4 and 5) to no additional trails (Alternative 3). Forest-wide Riparian Conservation Areas (RCA) and Zones of Influence (ZOIs) for amphibians were determined by buffering all perennial streams and perennial waterbodies by 300 feet (RCA) and 500 feet (ZOI), and then breaking these RCAs and ZOIs by elevation for species. For California red-legged, foothill yellow-legged frogs and northwestern pond turtles, RCAs and ZOIs from 4,500 feet and below are identified as potential suitable habitat. For mountain yellow-legged (var. *Sierrei*); RCAs and ZOIs, 3,500 foot and above elevation are identified as potential suitable habitat. Critical Aquatic Refuges (CAR) across the Forest were analyzed via Geographic Information Systems (GIS). GIS analysis included evaluation of the 300 and 500 foot buffers intersected with the five alternatives and their respective trail locations. In addition, a 500’ buffer was placed around known occurrences of TES amphibians was intersected with the proposed OHV routes to determine effects. The frequency of perennial stream crossings within one mile[1] of each mountain yellow-legged frog (MYLF) occurrence was also analyzed.

3.6.3.4.2 Route and Trail Density within Riparian Conservation Areas, "Larger" (500') Zone of Influence, and Critical Aquatic Refuges

Native surface route and trail densities within RCAs, ZOIs, and CAR's were evaluated to compare the overall effects of all motorized trails and open unauthorized routes for the alternatives and in addition, within each 7th order watershed across the PNF. According to the Soil and Watershed Resources Report, native surface routes and trails have the greatest potential for off-site sediment delivery into streams and lakes. Therefore, this effects analysis includes the density of all native surface motorized routes and trails. Density provides a relative index to measure the potential indirect effects to aquatic species including TES amphibians, and northwestern pond turtles. Thresholds for density have not been established, however, density provides a relative way to compare the effects of the alternatives.

Miles of existing, unauthorized routes and proposed designated trails within or adjacent to TES aquatic biota habitat.

- Density as a measure of habitat effectiveness at the 7th order watershed level.
- Miles of proposed motorized trails at the forest-wide scale within the habitat for each species.

The indicators for a species habitat that are affected by motorized routes (including a route plus a biologically meaningful 'zone of influence' (e.g., 300 ft RCA, 500 ft ZOI):

- Miles of proposed designated trails within amphibian habitat at 300' of perennial streams, ponds and lakes above 3,500' elevation.
- Miles of proposed designated trails within amphibian habitat at 500' of perennial streams, ponds and lakes above 3,500' elevation.
- Miles of proposed designated trails within amphibian habitat at 300' of perennial streams, ponds and lakes below 4,500' elevation.
- Miles of proposed designated trails within amphibian habitat at 500' of perennial streams, ponds and lakes below 4,500' elevation.
- Number of stream crossings per HUC 7 (7th order) watershed within suitable species habitat.
- Miles of proposed designated trails within 500' of TES amphibians.
- Number of perennial stream crossings within one mile of known MYLF occurrences

3.6.3.4.3 Stream Crossing Density within RCAs

The 7th order watersheds across the PNF were evaluated for the crossing density of native surface motorized routes and trails within RCAs to compare direct, indirect and cumulative effects of proposed motorized trails (Alternatives 2, 4 and 5) and open unauthorized routes (Alternative 1), and the existing system trails (cumulative effects) for the project alternatives. Route crossing density provides a way to measure the potential direct and indirect effects on hardhead minnows and

[1] MYLF Telemetry study by MGW (2007) determined MYLF moved linearly along streams as far as approximately one mile.

herpetofauna. Direct effects include potential TES aquatic species mortality as a result of use of motorized crossings. Indirect effects include changes to channel and streambank characteristics and changes in vegetation structure. Sediment delivery from motorized routes and trails is also a potential indirect affect of stream crossings.

3.6.3.4.4 Hardhead Minnow

Site-specific Physical Impacts and Disturbance to Occupied Hardhead Streams

Proposed designated trails were evaluated to determine site-specific impacts to occupied hardhead streams for each of the alternatives; by analyzing the number of proposed designated trail miles within RCAs of occupied hardhead streams/lakes as well as the number of stream crossings within occupied RCAs. Other indicators were evaluated forest-wide for all aquatic species.

Route Miles within Riparian Conservation Areas

Miles of proposed native surface trails within RCAs of known hardhead streams/lakes were evaluated to compare the overall effects for each alternative. The number of proposed designated trail miles within RCAs of occupied hardhead streams and lakes provides a relative index to measure the potential indirect effects to hardhead habitat from increased sedimentation from trails.

Number of Stream Crossings within Riparian Conservation Areas

The number of proposed stream crossings within RCAs of known hardhead streams/lakes was evaluated to compare the direct and indirect effects for each alternative. The number of proposed stream crossings provides a relative index to measure the potential direct and indirect effects to hardhead and habitat. Direct effects include potential hardhead mortality as a result of use of motorized crossings of occupied streams. Indirect effects include changes to channel and streambank characteristics and changes in vegetation structure.

3.6.3.5 Aquatic Biota Methodology by Action:

Geographic Scope of the Aquatic Wildlife Resource Analysis. All “general” locations of the “action” alternatives have MYLF, FYLF and NWPT herptetofauna amphibian surveys completed to protocol (Fellers and Freel). These surveys have been completed previously for Herger-Feinstein Quincy Library Group (HFQLG) vegetation management projects or specifically for this EIS. Proposed designated trails on ridges and in unsuitable habitat for amphibians have not been surveyed. The focus of these amphibian surveys was to determine presence/absence of TES amphibians, to determine suitability of habitat, and assess the condition of the routes to this habitat. The CRLF site assessment surveys were completed to US Fish and Wildlife Protocol within the Jack’s CAR. CRLF occupancy is assumed on all unsurveyed habitat at 4,500-foot elevation and below. In addition, hydrological surveys on all new proposed NFS trails (Alternative 2 and 5) have been completed by hydrologists and technicians to date. These two alternatives include all unauthorized routes that are proposed to be added to the system under any of the action alternatives. The focus of these surveys is to determine the risk for the potential effects to aquatic biota, soil and water resources due to each individual unauthorized route. The goal of these surveys, and subsequent field visits and discussions, is to make one of four ratings for aquatic wildlife species[2] and soil and water impacts for each route. These ratings are the same for all species (TES herpetofauna) with the exception of the increased distance northwestern pond turtles travel away from streams (up to 500 feet) for egg laying. The ratings are based on OHV stream crossings and the routes rated moderate to high would be mitigated accordingly. The ratings are also based on the analysis made by the hydrologists, site conditions, and the potential for sedimentation into the streams. In addition, the ratings are based on known and potential populations of TES herpetofauna and suitability of habitat.

a. Low: The route was considered, a field visit was made and the aquatic wildlife and soil and water resource effects will not be adverse (assuming routine maintenance of the trail).

b. Moderate: The route was considered, a field visit was made and aquatic wildlife and soil and water resource effects are currently less than adverse. Site-specific mitigation is prescribed to prevent future potential adverse effects to the aquatic wildlife, soil and water resource. Site-specific mitigations may include addition or modification of route drainage features (out-sloping, rolling dips, waterbars, or ditch relief culverts); addition or modification of existing route stream crossing structures; relocation of short segments, a small distance from the existing route; and designation of acceptable seasons of use and vehicle class. These routes will be opened to the Public and mitigations have to be implemented within five years.

c. High: The route was considered, a field visit was made and aquatic biota, soil and water resource effects are currently adverse. Site-specific mitigations for these routes are comprised of the same list of mitigations presented above for the Moderate rating. However, mitigations for routes rated “High” are necessary to reduce current aquatic wildlife, soil and water resource effects to less than adverse. The biologists and watershed staff recommends that these routes may be added to the NFTS with this EIS but not be legal for traffic until these critical mitigations are in place and proper installation is verified by PNF staff.

d. Extreme: The route was considered, a field visit was made and a determination was made that the aquatic wildlife and soil and water resource effects are currently adverse. The route is not recommended by the biologists and watershed staff for inclusion on the NFTS. The reason for this recommendation is that mitigations to reduce aquatic wildlife, soil and water resource effects to less than adverse would not be economically feasible, meet safety standards, or would not be effective due to physical constraints (such as the route’s close proximity to streams, frequent stream crossings, steep slopes, or highly erosive soils).

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

Considerations: General discussion of direct/indirect effects if no action is taken and cross-country travel continues (with continued concentrated use of existing unauthorized routes and continued route proliferation in the long term). This includes likely degradation of riparian vegetation, increased bank

[2] The assumption is that the ratings for soils and water resources reflect the effects to water quality and thus equal effects to TES herpetofauna..

erosion, nutrient loading, sedimentation, hydrocarbon pollution, which in turn increases metabolic rate, respiration crushing, and oxygen demand of fish and amphibians (Jennings 1996). Sediment in spawning gravel increased by 2.6 – 4.3 times in watersheds with more than 4.1 miles of road per square mile (Cedarholm et al. 1981). Disturbance in aquatic systems is a particular problem for anadromous fish holding and spawning, reducing spawning success (Moyle et al. 1996). When the index of biotic integrity (IBI) was analyzed on 100 Sierra Nevada watersheds, IBI scores were negatively correlated with the percentages of area containing roads associated with streams (Moyle and Randall 1996). The IBI scores consisted of measures with six metrics e.g., native *ranid* frogs, native fishes, native fish assemblages, anadromous fishes, trout and stream fish abundance.

General discussion for all the action alternatives on the benefits of stopping cross-country travel and stopping future route proliferation. Include assumptions for passive recovery (increase in habitat) (this should be linked to the discussion under vegetation/hydro/soils) in the effects assessment.

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

Short-term timeframe: 1 year.
Long-term timeframe: 20 years.
Spatial boundary: dependent on species biology.
Indicator(s): (1) Miles of trails/areas open for motor vehicle use within or adjacent to aquatic resources; (2) Miles of trails/areas open for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources; (3) Density of trails open for motor vehicle use potentially affecting aquatic TES; (4) Miles of trails/areas open for motor vehicle use within riparian habitat, including meadows and streambanks; (5) Number of trails/areas open for motor vehicle use within habitats of known or historically occupied by TES herpetofauna.
Methodology: GIS analysis of trails in relation to habitat and important/sensitive aquatic areas.
Rationale: Literature indicates that placement of trails in relation to habitat can affect aquatic species through mortality, disturbance, and habitat modification (Moyle and Randall 1996, Trombulek and Frissell 2000, USDA Forest Service 2000).

3. **Cumulative Effects**

Considerations: Cumulative effects should be discussed in reference to the 2 ‘benchmark’ alternatives (“No-action” and the “Cross-country ban only”). Cumulative effects discussion for all alternatives should combine all direct/indirect effects of the alternatives with the existing system trails (Table 1) and the past/present, and reasonably foreseeable future actions (Table 31, Table 34, Table 40 and

Table 43).

For aquatic dependent species, the direct, indirect, and cumulative effects of each alternative are analyzed. Direct and Indirect effects can be assessed together and should be assessed in both the short term (within 1 year) and the long term (approximately 20 years). Cumulative effects are assessed only in the long term (approximately 20 years) and incorporate past/present (the current situation) and reasonably foreseeable future trails (quantitatively as much as possible), as well as a qualitative discussion of other past/present and reasonably foreseeable future actions potentially affecting these species (eg., timber sales, grazing, other recreational uses, etc.). The spatial boundary of these analyses is all the proposed and existing system trails by alternative and the TES herpetofauna habitat potentially affected within the Plumas National Forest. Analysis for each action alternative is separately addressing the effects of each of the four action alternatives.

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

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Indicator(s): (1) Miles of trails/areas open for motor vehicle use within or adjacent to aquatic resources; (2) Miles of trails/areas open for motor vehicle use with documented disturbances from motor vehicles that resulted in damage to aquatic resources; (3) Density of trails open for motor vehicle potentially affecting aquatic TES; (4) Miles of trails/areas open for motor vehicle use within riparian habitat, including meadows and streambanks; (5) Number of trails/areas open for motor vehicle use within habitats of known or historically occupied by TES herpetofauna.

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

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

3.6.4 Affected Environment

The PNF provides habitat for three species of TES amphibians and one Sensitive reptile (PNF Forest Plan, 1988). There is currently one aquatic wildlife species listed as Threatened under the ESA and three species listed as Forest Service Sensitive (Table 1). These species and their habitats on the PNF are described in detail in the Biological Evaluation/Biological Assessment (BE/BA) for this EIS, which can be found in the project record. In addition, there are two Aquatic Management Indicator Species (MIS) on the PNF. These species and their habitats are described in detail in the MIS report written for this EIS.

Existing information and knowledge about the distribution of the terrestrial and aquatic species on the PNF were used to develop the list of species and to develop species groups. Federally listed species, Forest Service Sensitive Species, MIS, and other species were selected and placed into species groups based on the potential for these species or their habitats to be affected by motor vehicle use on the PNF. Local knowledge and sources included corporate databases including distribution of special status species, vegetation maps, etc., which were used to develop species or habitat groups. Table 24 provides a list of all the special status species described by status, habitat indicator, and distribution on the PNF.

Riparian Conservation Areas and Critical Aquatic Refuges maintain riparian-dependent aquatic and terrestrial processes around running and still waters, and could function as corridors for movement of upland species. Riparian Conservation Areas are built around stream buffers that vary in width with the nature of the stream. Perennial streams and lakes have 300-foot buffer or top of inner gorge, whichever is greater, on each side of the stream. Seasonally flowing streams (intermittent and ephemeral streams) have a 150-foot buffer on each side of the stream, measured for the bank full edge of the stream. In addition, special aquatic features or perennial streams with riparian conditions extending more than 150 feet from edge of streambank or seasonally flowing streams with riparian conditions extending more than 50 feet from edge of streambank have a 300-foot buffer from the edge of the feature or riparian vegetation, whichever width is greater. These Riparian Conservation Areas and Critical Aquatic Refuges are the existing refugia for at-risk species, or are areas with high water quality.

Table 24. List of Plumas National Forest special status aquatic species by habitat indicator and distribution.

Species	Federally Listed Threatened	Forest Service Sensitive	Management Indicator Species	Habitat Indicator	Distribution on PNF
Pacific tree frog			X	Wet meadow and freshwater emergent wetlands	Forest-wide
California red-legged frog	X			Cold water ponds and stream pools with depths exceeding 0.7 meters (2.3 ft.) and with overhanging vegetation such as willows, as well as emergent and submergent vegetation.	Suitable habitat on Westside on PNF below 4,500 feet;. two known populations on PNF.
Foothill yellow-legged frog		X		Shallow, slow flowing water of rocky streams and rivers in a variety of habitats including riparian, mixed conifer, and wet meadow types below 6,000 feet elevation on the west slope of the Sierra Nevada.	Below 4,500 feet elevation on the west slope and transistion zone of the PNF.
Hardhead		X		Great Valley and Foothill belts, and in larger west-slope streams into the yellow pine belt.	Known within isolated stretches of the North Fork and Middle Fork Feather River.

Species	Federally Listed Threatened	Forest Service Sensitive	Management Indicator Species	Habitat Indicator	Distribution on PNF
Mountain yellow-legged frog		X		Low gradient (up to 4%) perennial streams and lakes above 4,500 feet elevation.	Locations above 3,500 feet on the PNF on the Feather River, Beckwourth and Mt. Hough Districts.
Northern leopard frog		X		Springs, slow flowing streams, marshes, bogs, ponds, canals, and reservoirs, usually in permanent and semi-permanent water in many habitat types and aquatic vegetation.	No known detection on the PNF. There will be no affect to this species by Alternative 1-5 and will not be addressed further in this analysis.
Northwestern pond turtle		X		Ponds, marshes, rivers, and streams with rocky or muddy bottom and aquatic vegetation/nest sites consist of sandy to very hard soil types, and can be as much as 325 feet from water (Zeiner et al. 1988).	Located on all Ranger Districts.
Benthic Macro-invertebrates[3]			X	Riverine and lacustrine habitats.	Forest-wide.

A total of 7 species are included in the aquatic species group assessment. These include 4 amphibian species, 1 aquatic invertebrate group[5], 1 fish species and 1 reptile species. These species were divided into wildlife groups[4] (some species occurred in more than one group) as described in Table 2. Species not included in this assessment are species whose habitat does not occur on the PNF (anadromous fish and northern leopard frog).

Table 2. Wildlife group and species represented within groups

Wildlife Group	Species
Riparian and wetland species [including lacustrine (lakes) and riverine habitat (rivers, streams)].	Bald eagle, great gray owl, greater sandhill crane, willow flycatcher, hardhead, California red-legged frog, foothill yellow-legged frog, mountain yellow-legged frog, northwestern pond turtle, Sierra Nevada red fox, western red bat, yellow warbler, aquatic macroinvertebrates

3.6.5 Environmental Consequences - General Effects

3.6.5.1 Aquatic Riparian

Trail construction and use also affects adjacent vegetation. Reductions in vegetation along trails resulting trail-associated recreation use may create edge effects that alter community structure due to soil compaction and increased solar radiation and wind. Increases in soil compaction combined with

3 Benthic Macro-invertebrates are analyzed in the Management Indicator Species section of the FEIS.

4 Additional Groups are described in the Terrestrial Wildlife Analysis Reports in the Project File

increases in solar radiation have the potential to increase soil temperatures and decrease soil moisture, reducing habitat suitability for aquatic, aquatic-dependent, and riparian-dependent species.

Potential trail associated impacts to aquatic and riparian associated species include:

- Mortality or injury resulting from a motor vehicle running over or colliding with an animal.
- Loss or degradation resulting fragmentation of habitat due to the establishment of roads, trails, or networks, and associated human activities. (Includes changes in sediment delivery, changes in water temperature, changes in channel morphology, and changes in hydrologic and vegetative condition of aquatic and riparian habitats, including streams, ponds, lakes, meadows, springs, and fens, and the associated riparian vegetation).
- Collection of live animals for use as pets (such as amphibians and reptiles) as facilitated by the physical characteristics of roads or trails or by road or trail access.
- A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise.
- Displacement of individual animals from a specific location that is being used for reproduction and rearing of young.

3.6.5.2 Fisheries

Increases in stream sediments have been correlated with decreased fry emergence, decreased juvenile densities, loss of winter carrying capacity, and increased predation of fish. The effects of roads and trails also include barriers to migration, changes in water temperature, and changes to streamflow regime. Culverts that are placed in improper locations at stream crossings can reduce or eliminate stream passage, and road crossings may be migration barriers to fish. Roads constructed adjacent to streams can also cause adverse effects to stream condition. Loss of riparian vegetation affects stream temperature and cover, which can have both negative and positive impacts on fish. Irregularly or unpredictable streamflows has the potential to impact fish densities by affect reproductive success and over wintering survival. High streamflow events following spawning can dislodge amphibian and fish egg masses or displace tadpoles, metamorphs, and young fry, and therefore lead to increased mortality to amphibian and fish populations.

Several studies have correlated road density or indices of roads to fish density or measures of fish diversity (Gucinski, et al. 2001). Impacts to fisheries include sedimentation of fines, changes in streamflow, changes in water temperature through loss of shade or changes in groundwater, migration barriers, introduction of exotic fish and invasive bull frogs, changes in channel geomorphology, and increased fishing pressure.

3.6.5.3 Aquatic Species and Habitat

Various studies have demonstrated that sediment delivery to stream channels in a forested environment is correlated to road surface type, physical characteristics of the adjacent areas (e.g., litter depth, coarse wood), soils (erodibility), the steepness of slope below the road, and vehicle usage (Chin and others 2004, Clinton and Vose 2003). Other factors that contribute to in-channel sediment delivery include the number of stream crossings on a channel, the condition of the stream approach, and the road length draining into the stream channel crossing. The relationships of roads and trails and effects to species are shown in the following table.

Table 25. Road and trail impact factors of aquatic species and their habitat.

Road and Trail – Associated Factors	Activity Type	Definition of Associated Factors
Collisions	Harvest	Mortality or injury resulting from a motor vehicle running over or colliding with an animal
Habitat loss and fragmentation	Habitat modification	Loss and resulting fragmentation of habitat due to the establishment of roads, trails, or networks, and associated human activities
Edge effects	Habitat modification	Changes to habitat microclimate associated with the edge induced by roads or trails
Snag or downed log reduction	Habitat modification	Reduction in density of snags and down logs due to their removal near roads as facilitated by road access
Collection	Harvest	Collection of live animals for use as pets (such as amphibians and reptiles) as facilitated by the physical characteristics of roads or trails or by road or trail access
Route for competitors and predators	Habitat modification	A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise
Disturbance at a specific site	Disturbance	Displacement of individual animals from a specific location that is being used for reproduction and rearing of young
Physiological response	Disturbance	Increase in heart rate or stress hormones when near a road or trail or network of roads or trails

3.6.5.4 Herpetofauna

Potential road and trail associated risk factors to the suitable habitat for frogs, particularly California red-legged frogs (CRLF), foothill yellow-legged frogs (FYLF), mountain yellow-legged frogs (MYLF), and northwestern pond turtles (NWPT), can cause the modification or loss of habitat or habitat components, primarily aquatic and adjacent riparian environments used for reproduction, cover, foraging, and aestivation. Egg survival can be impacted by roads and trails through increases in fine sediments within aquatic habitats and crush eggs in upland habitats (NWPT). Stream crossings and roads and trails that are within close proximity to streams and ponds have the potential to impact riparian vegetation, emergent vegetation, nutrient loading, and channel morphology and hydrology that are important habitat components for frog species and NWPT.

The degree to which trails and roads affect frogs and NWPTs and their habitat depends on many factors such as road density, road type, and traffic intensity. No studies have identified the impacts of wheeled vehicle use of roads or trails on foothill yellow-legged frogs or NWPTs. Most studies on road and trail associated factors address other amphibians (e.g., Fahrig et al. 1995, Mazerolle 2003). Several studies have shown that amphibian densities are inversely related to road density and traffic intensity (see Fahrig et al. 1995, Vos and Chardon 1998).

Direct impacts to frog populations and NWPTs from roads potentially include road mortality, direct loss of habitat, or creation of barriers. Mass mortalities of other species of frogs have been documented during dispersal where roads intersect natal/breeding habitat and non-breeding foraging habitat (Hine et al. 1981, Fahrig et al. 1995; Trombulak and Frissell 2000). Mortality from vehicles can reduce population size and reduce movement between resources and conspecific populations (Carr and Fahrig 2001). Road mortality is a considerable potential risk factor for foothill yellow-legged frogs because roads are common over the areas encompassing their historic range on the PNF, many of the roads presently have at least moderate traffic levels; and some observations suggest upslope seasonal movements by frogs likely intersect roads (Mark, T personal communication).

Roads can also impact populations of frogs by affecting their riparian or terrestrial habitat. Trombulak and Frissell (2000) identified eight physical characteristics of the environment that may be altered by roads: soil density, temperature, soil water content, light, dust, surface-water flow, pattern of run off, and sedimentation. The presence of roads is highly correlated with changes in the hydrologic and geomorphic processes that affect aquatic and riparian systems (Trombulak and Frissell 2000). Roads can influence both peak flows (floods) and debris flows (rapid movements of soil, sediment, and large wood stream channels) two processes, which have major influences on riparian vegetation (Jones et al. 2000) as well as aquatic and riparian patch dynamics critical to stream ecosystems (Pringle et al. 1988). California red-legged frogs, foothill yellow-legged frogs, and mountain-yellow legged frogs breed in streams, which can be affected by fluctuations in the frequency or magnitude of peak and debris flows of adjacent streams. Fluctuations causing reductions or excesses in available water could severely affect recruitment. Hydrologic effects are likely to persist for as long as the road remains a physical feature altering flow routing often long after abandonment and revegetation of the road surface (Trombulak and Frissell 2000).

Increased sedimentation from roads also impacts riparian habitat used by frogs. The knowledge of the impact of increased sediment load on amphibians is limited (Gillespie 2002). However, the negative impacts of increased sediments on aquatic species, including fish, macroinvertebrates, and periphyton, are well known (Power 1990, Newcombe and MacDonald 1991, Waters 1995). The transfer of sediment to streams and other water bodies at road crossings is also a consequence of roads and trails (Richardson et al. 1975). The surfaces of unpaved roads can route fine sediments to streams, lakes, and wetlands, increasing turbidity of the water (Reid and Dunne 1984). This disrupts stream ecosystems by inhibiting aquatic plants, macro-invertebrates, and fish. High concentrations of suspended sediment may directly kill aquatic organisms and impair aquatic productivity (Newcombe and Jensen 1996). The effects are heightened if the sediments contain toxic materials (Maxell and Hokit 1999). Increased sedimentation may also reduce availability of important food resources for tadpoles such as algae (Power 1990). Fine sediment deposits also tend to fill pools and smooth gravel beds, degrading habitats (Forman and Alexander 1998) and possibly the availability of oviposition sites or larval refugia (Welsh and Ollivier 1998). In addition, the consequences of past sedimentation are long term and cumulative, and cannot be mitigated effectively (Hagans et al. 1986). The only data addressing sedimentation effects on foothill yellow-legged frogs are from Oregon, where sedimentation emerged as one of the variables affecting foothill yellow-legged frog occupancy (Borisenko and Hayes 1999 in Mark’s, T., 2008).

The spread of chemicals is another way in which roads may impact frog and turtles. 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 contribute (Trombulak and Frissell 2000). The change of the chemical environment by roads may affect living organisms in several ways. For example, chemicals found in road de-icers may kill (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. Another example is the historic use of lead as a fuel additive that may have affected foothill yellow-legged frogs because lead has been shown to have sublethal effects on growth and behavior of northern leopard frog larvae (Chen et al. 2006). No data exist that specifically addresses the effects of road associated chemicals on CRLF (Mark's, T. 2008), MYLF, or WPT.

3.6.6 California Red-Legged Frog

3.6.6.1 Affected Environment

The California red-legged frog (CRLF) is federally listed as Threatened by the USFWS on the PNF. Currently, there are two known breeding populations of CRLF on the PNF. One at Hughes Place in the French Creek watershed, and one a Little Oregon Creek. There are no trails proposed within the Little Oregon Creek watershed and therefore no direct or indirect effects to the CRLF or its habitat will occur. Habitat site assessments (USFWS) are completed within the French Creek watershed. All known and potential CRLF habitat below 4,500' and affected by the proposed designated trails will either be surveyed to USFWS protocol (pers. comm., USFWS, 2008), or occupancy assumed.

The life history for CRLF dispersal habitats and distances can be found in the Federal Register: May 23, 1996 (Volume 61, Number 101, Rules and Regulations [Pages 25813-25833], Department of the Interior, 50CFR Part 17, RIN 1018-AC 34. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the California Red-legged Frog, Agency: Fish and Wildlife Service, Interior. Action: Final rule).

The historic range of the CRLF was limited to the coastal ranges, central valley, and the western slopes of the Sierra Nevada in California (Jennings 1996, Jennings and Hayes 1994). This proposed project is within this historic range. The current range of the CRLF extends into Butte County, but does not include Plumas County (USFWS 2000a, USDA-SNFPA, 2001). The PNF is not within critical habitat as designated in the Final Rule for CRLF Critical Habitat (Federal Register 50CFR17, Volume 71, No. 71, dated April 13, 2006). All federal land was excluded for critical habitat designation because it was determined that the Standards and Guidelines from the Sierra Nevada Forest Plan Amendment protected CRLF habitat (Federal Register 50 CFR17, pg. 19527).

Starting in 1995 to present the Plumas conducted amphibian surveys using "A Standardized Protocol for Surveying Aquatic Amphibians (Fellers and Freel 1995)". The Plumas conducted formal amphibian surveys in 1996 (Fellers 1997) and red-legged frogs were not located. Surveys conducted from 1997-1999 used the USFWS's protocol, as described in U.S. Fish and Wildlife Service's Guidance on Site Assessment and Field Surveys for California Red-legged Frogs (USFWS 1997), which requires two daytime and two night-time visits, as well as the Fellers protocol. These surveys occurred in areas identified as having the highest potentially suitable habitat attributes. Formal amphibian surveys were conducted for a land exchange in 1997, and a major breeding population of California red-legged frogs was located in the French Creek watershed (Butte County). This was the first known breeding population in the Sierra Nevada. Formal amphibian surveys were conducted in 1998 and 1999 by California Academy of Science across the Forest (Vindum and Koo 1999) and there were no confirmed sightings.

The emphasis for herpetofauna surveys on the Plumas were for “key” projects: Inventories have occurred for hydropower relicensing (~50-60 miles of streams and lakes), cooperative agreements with California Academy of Sciences (~85 miles) and a museum record search across the country for herpetofauna records, inventories for vegetation management and stream restoration projects, range allotments (~100 miles), and inventories for HFQLGFRA monitoring (~ 150 miles). Approximately 250-350 miles of habitat has been surveyed for herpetofauna on the PNF, resulting in only two confirmed reproducing population of CRLFs in the French Creek watershed and the Slate Creek Watershed. In 2000, CRLFs were found in Little Oregon Creek (Yuba County) on the Feather River District of the PNF. Suspected occurrences have been reported in Pinkard Creek, Woodleaf, Howland Flat area, Slate Creek, and East Branch Slate Creek, all of which are located on the Feather River Ranger District. The abundance and distribution of this species is not fully known, but there appears to be little optimally suitable breeding habitat across the Forest. Currently the Forest fisheries crew has completed CRLF site assessments in the French Creek watershed and all suitable CRLF will either be surveyed to USFWS protocol or assumed occupied.

3.6.6.2 Direct and Indirect Effects – All Alternatives

3.6.6.2.1 Route and Trail Miles within Riparian Conservation Areas and Zone of Influence

With implementation of Alternative 1 there is a very high number of miles existing trails and open unauthorized existing routes on the PNF and thus a greater negative effect; 88 miles of routes fall within 300 feet of perennial streams and 210 miles of routes are within the 500-foot buffer or ZOIs at 4,500 foot elevation and below on the Plumas National Forest. These figures dramatically drop in proposed designated trail miles with all other action alternatives. A moderate number of trail miles are proposed for Alternative 2, with 20 miles within the 300-foot buffer and 53 miles within the 500-foot buffer. This is approximately 25% of miles currently existing as unauthorized routes with an “open” Forest (Alternative 1), and a moderate direct and indirect effect to the California red-legged frog. A low number of trail miles are proposed with Alternatives 4 and 5 with 5 and 4 miles respectively, within the 300’ buffer and 3 and 8 miles respectively within the 500’ buffer below 4,500-foot elevation (Table 26 and Table 27). This is 1-6% of the number of miles currently existing as unauthorized routes with an “open” forest (Alternative 1) and a low direct and indirect effect to the California red-legged frog with the implementation of Alternatives 4 and 5. No additional system trails are proposed in Alternative 3.

Road miles are used as a relative index to measure the potential indirect effects to aquatic species including the California red-legged frog. As discussed above in the general effects section that to continue to allow open OHV travel throughout the Forest, may have a direct effect on the CRLF by potentially crushing the frog, tadpole, or eggs by a vehicle. Indirectly, the loss of riparian cover, soil compaction, increased access by predators due to lack of cover and habitat degradation are direct and indirect effects of the implementation of Alternative 1.

There is minimal impact to lakes and ponds by the No-action and all four action alternatives within the PNF (Table 26 and Table 27) and therefore there will be no further analysis. The proportion of a species habitat that is affected by motorized routes (including the routes plus a biologically meaningful ‘zone of influence’ (e.g., 300 ‘RCA, 500’ ZOI)

Table 26. Miles of open unauthorized routes (Alt. 1) or proposed trails (Alts 2-5) within amphibian habitat at 300’ of perennial streams, ponds and lakes below 4,500’ elevation.

Habitat	Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Perennial Streams	152,929	88	20.4	0 (10.6)[5]	2.7	4.25
Ponds Lakes	15,029	0.8	0.4	0 (0.1)	0.1	0.02

Table 27. Miles of open unauthorized routes (Alt. 1) or proposed trails (Alts 2-5) within amphibian habitat at 500’ of perennial streams, ponds and lakes below 4,500’ elevation

Habitat	Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Perennial Streams	346,459	210	53.3	0 (26.7)[6]	2.7	8.3
Ponds Lakes	18,130	1.4	0.65	0 (0.4)	0	0.2

3.6.6.2.2 Route and Trail Miles within Critical Aquatic Refuges

There are four Critical Aquatic Refuges (CARs) that were developed for known and potential populations of California red-legged frogs: Woodleaf, Pinkard, Oregon, and Jacks. Two populations of California red-legged frogs are known within the Oregon and Jack’s CARs. There are no routes or proposed trails in any alternative in the Oregon CAR and thus no direct or indirect effect to the CRLF will occur and no additional analysis is required within this CAR. The Jack’s CAR is of concern due to a breeding population and the number of trails proposed by the action alternatives within this CAR. Alternative 1 has the greatest impact to the CRLF with 47 miles of existing trails and open unauthorized routes in the Jack’s CAR with a known breeding population of CRLF (Table 28). The high density of unauthorized routes within the Jack’s CAR shows the potential impact of no control of the use of OHVs and the current open Forest situation. Currently, there are no existing designated and unauthorized routes adjacent to the known CRLF population in the Jack’s CAR. Currently, within Jack’s CAR there are no proposed designated trails in Alternative 4, 17 and 22 miles of proposed trails in Alternatives 5 and 2 respectively, with a potential moderate direct and indirect effect to the CRLF population. There are zero miles of proposed trails in Alternative 3, with a low direct and indirect effect to CRLF and its population. With suitable CRLF habitat scattered throughout the French Creek watershed there is a high potential of an OHV crushing a CRLF adult or metamorph directly affecting the species. In addition, there are 2.4 miles of existing designated trails within the Jack’s CAR. Only 0.4 miles of open unauthorized routes are included in Alternative 1 in the Woodleaf CAR with minimal impact, and no miles of proposed trails by the action alternatives (2 thru 5). There will be no direct or indirect effect to CRLF within the Woodleaf CAR. The Pinkard CAR was developed for a suspected CRLF detection; however, since then only FYLF and one MYLF have been

[5] Figures in parenthesis are the miles of existing designated motorized OHV trails on the Forest
[6] Figures in parenthesis are the miles of existing designated motorized OHV trails on the Forest

detected within this CAR. Four miles of existing and open unauthorized routes are proposed in Alternative 1 and 0.5 mile is proposed in Alternatives 2 with zero miles proposed in Alternative 3 thru 5. There will be a potential minimal direct or indirect effect to CRLF within the Pinkard CAR by all action alternatives. Overall there is minimal impact to the CAR for CRLF with Alternatives 3 and 4, and moderate to high impact to the Jack's CAR with the implementation of Alternatives 2 and 5, and a very high impact to the Jack's CAR with the implementation of Alternative 1.

Alternatives 3 and 4 are the only alternatives that meet the programmatic agreement with the USFWS to reach a "No effect, not likely to adversely effect CRLF and their population" determination. One of the criteria was to have zero miles of proposed designated trails within a known, occupied CRLF population within a CAR (USDA Forest Service 2006a, US Fish and Wildlife Service 2006). All action alternatives meet the Sierra Nevada Standards and Guidelines Forest Plan Amendment (USDA, 2004). One of these Guidelines is to conduct a peer review for projects that propose ground-disturbing activities in more than 15% of a CAR. All action alternatives affect only 0.1-0.3% of the Jack's CAR.

Table 28. Miles of proposed designated trails within Critical Aquatic Refuges (CARs), Plumas National Forest.

CARs	Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Lone Rock	21,450	6.5	2.6	0 (0.9)[7]	4.9	5.3
Boulder/Lowe	18,317	22	6.1	0 (1.2)	1.9	2.6
Rowland	39,833	31.6	2.7	0 (0)	1.5	5.2
Lakes Basin	37,783	13	2	0 (3.6)	2.2	2.7
Pinegrove	28,483	39.3	21.5	0 (3.4)	10.0	13.0
Pinkard	12,035	4.3	0.5	0 (0)	0	0
Woodleaf	20,756	0.4	0	0 (0)	0	0
Oregon	26,443	0	0	0 (0)	0	0
Jacks	26,743	46.7	22.1	0 (2.4)	0	17.2
Willow	8,828	4.6	1.3	0 (0.6)	0	.5
Rock	36,860	35	15.4	0 (9.2)	7.6	10.0
Bucks	58,138	14.9	4.2	0 (1.4)	1.7	3.6

With the exception of Alternatives 3 and 4, all the other action alternatives will not meet all six of the design criteria for CRLF found in the Programmatic Agreement between Region 5 and the USFWS that was developed to minimize effects to a no effect or a may affect, not likely to adversely affect. The Forest is currently in early consultation with USFWS and there is the potential to develop mitigations to reduce the potential effects to CRLF and their habitat. Proposed mitigations include stream crossings (small bridges, box culvert) seasonal closures, complete closures, implementation of Best Management Practices (BMPs).

[7] Figures in parenthesis are the miles of existing designated motorized OHV trails on the Forest

3.6.6.2.3 Number of Stream Crossings within RCAs

Alternative 1 poses the greatest risk to the CRLF from native surface motorized crossing densities with 221 perennial stream crossings (Table 29). Alternative 1 has the greatest chance of having a direct effect by potentially crushing a CRLF, tadpole or egg mass. Alternatives 5 and 2 have a potential for a moderate impact on CRLF and habitat with 33 and 64 perennial stream crossings, respectively, proposed across the Forest. Alternative 4 has the potential for a moderate-low impact on CRLF and its habitat with 17 perennial stream crossings proposed across the Forest. Alternative 3 proposes no new designated trails and therefore has only a cumulative impact by the existing designated route.

Table 29. Number of stream crossings on open unauthorized routes (Alt. 1) and proposed trails (Alts 2-5) by alternative on the Plumas National Forest.

Stream Type	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Perennial	221	64	0 (27)[8]	17	33
Intermittent	706	179	0 (94)	64	113
Total Crossings	**927**	**243**	**0 (121)**	**148**	**272**

A 500-foot buffer was placed around every occurrence of TES herpetofauna on the Forest and Table 30 displays the miles of route or trail that are within or adjacent to a known occurrence. Again Alternative 1 has the greatest potential for direct or indirect effects to CRLF and its habitat with 1.4 miles of open unauthorized routes within the two occurrences of CRLF on the Forest. Alternative 2 has the potential for a moderate direct or indirect effect to CRLF and its habitat. Alternatives 3 thru 5 have no trails proposed within 500 feet of known CRLF and their habitat.

3.6.6.3 Cumulative Effects

3.6.6.3.1 Short vs. Long-term Effects

In the short term (1 year), Alternative 1 would continue to have the potential for the greatest direct and indirect effect to CRLF and its habitat. In the long term (20 years), Alternative 1 would continue to degrade occupied and suitable CRLF habitat from 4,500 and below with a range of 88-210 miles (Table 27 and Table 28) of open unauthorized routes within the RCA and ZOI of the CRLF. With an “open” Forest (Alternative 1) these unauthorized routes would continue to be used and there would be no ability for the compacted, degraded soil and vegetative conditions to recover. There would be an immediate reduced direct effect by the closure of any trails within 500 feet of CRLF occurrence, reducing the chance for crushing any life stage of the CRLF. Alternative 1 would have a high potential for a direct and indirect effect to individual CRLF and their populations.

In the short term, Alternative 2 would have a reduced potential for a direct effect to individual CRLF’s by reducing the OHV trail density by 76%, therefore reducing the potential of crushing a

[8] Figures in parenthesis are the miles of existing designated motorized OHV trails on the Forest

CRLF by this same percentage. Indirectly, there would be a minimal change in the short term for recovery of unauthorized routes. In the long-term (20 years), the closure of 68-208 miles of unauthorized routes would have time to recover naturally and with OHV grants some could be manually restored by putting the trail back to the natural contour of the land, mulching, and seeding.

In the short term (1 year), Alternatives 4 and 5 would have a reduced potential for a direct effect to individual CRLF's by reducing the OHV trail density by approximately 96% within the RCA and ZOI, therefore reducing the potential of crushing a CRLF by this same percentage. Indirectly, there would be a minimal change in the short term (1 year) for recovery of the approximately 84-205 miles of the closed unauthorized routes within the RCA and ZOI of the CRLF. Again, in the long term (20 years), these 84-205 miles of unauthorized routes would have time to recover naturally and again recovery could be enhanced by manual treatment.

Alternative 3 proposed to close the Forest and add no new OHV designated trails to the current designated trail system; therefore, there would be a 100% reduction of unauthorized routes. There would be a reduced potential for a direct effect to individual CRLFs by the 100% reduction of unauthorized routes. Again, indirectly, there would be a minimal change in the short term (1 year) for recovery of the 88-210 miles of unauthorized routes, yet within the long term (20 years) these closed unauthorized routes would have time to recover naturally and again recovery could be enhanced by manual treatment.

The Plumas National Forest currently has 130 miles of designated motorized OHV trails. Cumulatively there are 10-27 miles of designated OHV trails within the RCA and ZOI's of potential habitat for the CRLF. Again, this adds cumulatively to direct, indirect and cumulative effects to the CRLF by the action alternatives.

Table 30. Unauthorized route (Alt. 1) and proposed trail miles (Alts. 2-5) within 500 feet of a known occurrence of a TES aquatic biota.

Species	Number of Known/Confirmed Occurrences	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
California Red-legged Frog	2	1.4	0.6	0	0	0

Past and current cumulative effects to riverine and lacustrine habitats include current and historic livestock grazing; reduced suitability of habitat through catastrophic wildfires; mining activities; and recreational activities including hunting, camping, and general recreation activities including all forms of motorized use including 4-wheeled drive vehicles, ATVs, and motorcycles.

The PNF currently has 42 active livestock grazing allotments including both cattle and sheep. Forest Plan Standards and Guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands. There are only three grazing allotments on the west side of the PNF; two are active. Suitable CRLF habitat occur within these allotments, and grazing activities can lead to habitat degradation and have the potential to contribute to cumulative effects to suitable CRLF habitat.

The California red-legged frog was once numerous and widely distributed in California. Initial declines of the California red-legged frog are attributed to over-harvesting (Jennings and Hayes 1985), and then later to the introduction of the bullfrog, which have out-competed and predated on the

CRLF. A variety of other past cumulative impacts to California red-legged frogs have affected the distribution and abundance of the California red-legged frog on the PNF, including historic mining and grazing; urban development and mining on private land; road building, water diversions; recreation and non-native species introduction. All these activities have the potential to alter California red-legged frog habitat through disturbance to vegetation, soils, hydrology, and the potential for introduction of exotic species. Activities on private land that comprise a significant on the PNF will continue to affect the species.

Although mining activities have the potential to adversely affect this species, suitable habitat has been created for this species (i.e. Little Oregon Creek mining tailings).

Appendix C provides a list and description of present, and reasonably foreseeable projects on Forest Service and private lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to riverine or lacustrine habitats within the PNF boundary. Mining and dredging activities have occurred and continue to occur on the Forest. Mining and dredging activities result in sedimentation that affect CRLF habitat and decreases water quality. Between 1990 and 2007, approximately 266,963 acres burned on the PNF, some of which have affected riverine and lacustrine habitat through increased levels of sedimentation.

Currently, there is a high demand for recreational use on the PNF due to its close proximity to urban centers (e.g. Oroville, Chico, Reno). The PNF provides a wide variety of recreational experiences including developed and dispersed camping, hiking, fishing, hunting, wildlife viewing, winter sports activities (downhill skiing, cross-country skiing, snowmobiling), summer OHV use, and a variety of other non-motorized use (equestrian use and mountain biking). Recreational use on the PNF has significantly increased compared to the past 20 to 30 years. Because of the proximity to urban areas and population growth, increased recreational use on the PNF is expected to continue to increase in the future including camping, hiking, fishing, wildlife viewing, hunting, and OHV use. Generally, the increase in recreational use on the PNF has the potential to cause an increase in negative interactions between humans and riverine and lacustrine habitats since most of the recreational facilities are located adjacent to lakes, streams and rivers. Future increase in recreational use on the PNF is expected, and therefore, increased disturbance to riverine and lacustrine habitat would be expected, particularly during the summer months.

Table 31 lists all the reasonably foreseeable future actions, including fuels, vegetation, recreation, range allotment plans, non-motorized trail development, and special use permit reissuances. Table 31 summarizes cumulative impacts from reasonably foreseeable projects and a description of the potential impact to riverine and lacustrine habitat.

Table 31. Direct, Indirect, and Cumulative Impact to riverine and lacustrine habitat from Reasonably Foreseeable Future Projects

Project type	Number of Projects	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
Mining/Suction Dredging	4 (Copper Penny, Dredger's delight, Phat Chance, Winkeye	Impacts from increased sediment delivery, decrease in water quality.	Mining/sution dredging add to cumulative impacts by decreasing habitat quality, mainly in riverine systems.
Hazard tree removal	Ongoing Forest-wide	Minimal impact. Short-term disturbance during harvest. Reduction of LWD within riverine habitats	None to minimal cumulative impact
Fish passage construction project	Ongoing , proposals, throughout Forest	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor.
Watershed Restoration	Ongoing , proposals, throughout Forest	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor.
Range Allotment permit renewal	1 (Strawberry Valley Allotment)	Stream bank trampling from livestock resulting in increases in sediment and decrease in water surface shade from browsing riparian shrubs.	Cumulative impacts from sediment and water surface shade are expected to be within forest plan standards (<20%).
Temporary OHV Forest Order	1 (Forest-wide)	Closed forest to cross-country travel. Lessened disturbance to habitat downstream of stream crossings	Overall benefit to macroinvertebrate habitat by eliminating effects to habitat quality.
Backcountry Discovery Trail	Forest-wide	Harrassment, collection, human disturbance, site degradation	Short and long-term cumulative impacts on individuals and their habitat.
Integrated Noxious Weed Control Program	Forest-wide	Toxicity and potentially reduced water quality. Individual frogs could be killed. Potential loss of individuals during Rx burn.	Short-term direct and indirect effects to individual CRLF, long-term enhancement of habitat by maintenance of native plant species.
Basin Group Selection	20 miles SE of Quincy, CA	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Short-term sedimentation, long-term protection from wildfire through fuel reduction
Slapjack Project	Southwest of Quincy, CA in the vicinity of Challenge, Clipper Mills, Feather Falls, Forbestown, and Dobbins, CA	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Short-term sedimentation, long-term protection from wildfire through fuel reduction
Watdog	Southwest of Quincy, CA in the Fall River and South Branch Middle Fork Feather River watersheds	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Short-term sedimentation, long-term protection from wildfire through fuel reduction
Sugarberry Project	South and east of Little Grass Valley Reservoir, from Gibsonville Ridge	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change,	Short-term sedimentation, long-term protection from wildfire through fuel reduction

Project type	Number of Projects	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
	in the north to the North Yuba River in the south	long-term reduction of fuels.	
Flea Hazardous Fuels Reduction Project	The Flea Project Area is bounded by the North Fork of the Feather River on the east and Little Butte Creek on the west, in the Wildland Urban Interface near Paradise, Magalia, Pulga, and Concow, CA.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Short-term sedimentation, long-term protection from wildfire through fuel reduction
Lower Middle Fork Feather River Water Quality Improvement Projects	South Fork of the Feather River	Meadow improvement, stream stabilization, and road improvments	Sedimentation and reduced water quality. Long-term improved water quality and aquatic species habitat

3.6.6.4 Summary of Effects

With analysis of route and trail miles within RCAs, ZOIs, and CARs, stream crossings, route and trail miles within 500’ of CRLF occurrences; Alternative 1 has the highest potential for direct, indirect and cumulative effects to CRLF, Alternative 2 has a moderate to high potential for direct, indirect and cumulative effects to CRLF’s, and Alternative 4 and 5 have a moderate to low potential for direct, indirect and cumulative effects to CRLF’s. Again, past and current cumulative effects to riverine and lacustrine habitats include current and historic livestock grazing; reduced suitability of habitat through catastrophic wildfires; mining activities; and recreational activities including hunting, camping, and general recreation activities including all forms of motorized use, including 4-wheeled drive vehicles, ATVs, and motorcycles.

These activities along with others described above will add to the direct and indirect effects of each alternative as described above.

3.6.6.5 Determinations

Alternatives 1, 2 and 5 may affect, and are likely to adversely affect individual California red-legged frogs and their habitat. These alternatives do not follow the six criteria in the programmatic agreement with USFWS (2006) to reach a no effect, not likely to adversely effect determination. This determination is based on 1) a range of 12-88 miles of existing unauthorized routes within Riparian Conservation Areas, and a range of 3-210 miles within the Zone of Influence (suitable CRLF habitat), 2) the 1.4 miles of route within 500 feet of the Hughes Pond CRLF population, 3) the range of 17-47 miles of route within Jacks Critical Aquatic Refuge that supports Hughes Pond CRLF population.

The existing condition under Alternative 5 includes 17 miles of proposed trails within the Jack’s CAR (with known CRLF population) which have the potential to capture surface run-off and deliver sediment into streams; there are proposed trails within Riparian Conservation Areas and Critical

Aquatic Refuges and within 500 feet of known and “assumed occupied” habitat; there are routes within “assumed occupied” habitat at 4,500 feet and below that have the potential to capture and divert stream flow, one OHV use area is proposed adjacent to the South Fork Feather River just below the dam at Sly Creek Reservoir and is within the RCA; and there are existing designated trails that will contribute cumulatively within the Jack’s CAR which was developed for the CRLF.

Alternative 4 will not affect individual California red-legged frogs or their habitat. This determination is based on 1) that Alternative 4 meets the six design criteria under the programmatic agreement between Region 5 of the Forest Service and the U.S. Fish and Wildlife Service; and 2) There are no proposed designated trails or existing system trails within 500 feet of a known CRLF occurrence; and 3) There is a 96% reduction of existing unauthorized motorized trails within potential CRLF habitat.

Alternative 3 would not affect the California red-legged frog or their habitat. This determination is based on the following; 1) no additional routes would be added to the NFS motorized trail system.

3.6.7 Foothill yellow-legged frogs and Northwestern Pond Turtle

3.6.7.1 Affected Environment

3.6.7.1.1 Foothill Yellow-Legged Frog

The foothill yellow-legged frog historically occurred in foothill and mountain streams to 6,000 feet (SNFPA 2001). Adults use both instream and riparian environments, though use of riparian areas and adjacent uplands is poorly understood. This species is found in or near rocky perennial streams and rivers in a variety of habitats, including riparian, mixed conifer and wet meadow types. It inhabits areas with moving water but tends to avoid areas with steep gradients (Zweifel 1955). These frogs prefer partial shade, shallow riffles, and cobble-sized or greater substrate (Hayes and Jennings 1988). On the PNF, this species is found in a few of the larger riverine systems, such as lower portions of the South Fork, Middle Fork and North Fork Feather River (NFFR), and Spanish Creek, but has also been found in smaller tributary streams of these larger systems, such as Bean Creek in the Meadow Valley Area.

Foothill yellow-legged frogs occur in most of the main drainages on the PNF up to approximately 4,500 foot elevation.

Key management activities, which the Forest Service can influence, are: dams and diversions, mining, livestock grazing, recreation, vegetation management and mechanical fuel treatment, roads, and locally applied chemical toxins (pesticides and herbicides); fire can directly affect amphibians (SNFPA 2001).

Current Status (FYLF)

The FYLF is a Forest Sensitive Species and exists throughout the major drainages on the PNF in the Westside and Transition Zones.

3.6.7.1.2 North Western Pond Turtle

On the PNF, occupied Northwestern pond turtle habitat exists primarily on the westside (Feather River Ranger District) and central (Mt. Hough Ranger District) areas of the Forest, although a sighting was recorded in Sierra Valley. The PNF database contains 61 records for pond turtles.

Current Status (NWPT)

The Northwestern pond turtle is a Forest Sensitive Species and exists throughout the major drainages on the PNF in the Westside and Transition Zones.

3.6.7.2 Direct and Indirect Effects-All Alternatives

Habitat for the Foothill yellow-legged frog is the same habitat as defined above for the CRLF, effects analysis is very similar as stated above for these two species.

3.6.7.2.1 Route and Trail Miles within Riparian Conservation Areas and Zone of Influence

Effects to the foothill yellow legged frog and the Northwestern pond turtle are the same as CRLF as discussed above. The only difference is there is a greater number of known occurrences of both species than the CRLF and therefore more individuals and populations with potential direct and indirect effects. Reference analysis above is related to Table 26 and Table 27 (miles of open routes or proposed trails within amphibian habitat at 300 foot RCA and 500-foot ZOI).

Table 32. Miles of open unauthorized routes (Alt. 1) or proposed trails (Alts. 2-5) within amphibian habitat at 300’ of perennial streams, ponds and lakes below 4,500’ elevation

Habitat	Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Perennial Streams	152,929	88	20.4	0 (10.6)[9]	5.1	4.25
Ponds Lakes	15,029	0.8	0.4	0 (0.1)	0.1	0.02

Table 33. Miles of open unauthorized routes (Alt. 1) or proposed trails (Alts. 2-5) within amphibian habitat at 500’ of perennial streams, ponds and lakes below 4,500’ elevation

Habitat	Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Perennial Streams	346,459	210	53.3	0 (26.7)[10]	2.7	8.3
Ponds Lakes	18,130	1.4	0.65	0 (0.4)	0	0.2

3.6.7.2.2 Route and Trail Miles within Critical Aquatic Refuges

Alternative 1 poses the greatest risk to the FYLF and NWPTs due to the greatest number of miles open for motor vehicles. Critical Aquatic Refuges with known or suspected FYLF and NWPTs occurrence are, Woodleaf, Pinkard, Oregon, Jacks, Willow, Rock, and Pinegrove (Table 34) Alternative 1 has the greatest impact to the FYLF and NWPTs with 47 miles of open unauthorized routes in the Jack’s CAR with a known breeding population of NWPTs.

[9] Figures in parenthesis are the miles of existing designated motorized OHV trails on the Forest
[10] Figures in parenthesis are the miles of existing designated motorized OHV trails on the Forest

The following analysis emphasized the three CARs with the greatest impacts by the five alternatives analyzed. The largest known populations of NWPTs occur in the Jack's CAR in two ponds. In the Jack's CAR there are 47 miles of unauthorized routes available for use in Alternative 1. There are zero proposed trails in Alternative 4, and a range of 17-22 miles proposed trails in Alternatives 5 and 2 (respectively) with a potential moderate direct and indirect effect. There are zero miles of proposed designated OHV trails in Alternatives 3 and 4 with no direct and indirect effect to FYLF and the NWPT and their populations.

The Rock CAR has FYLF at lower elevations (with mountain yellow-legged frogs in the upper elevations) and known and suspected NWPT throughout in suitable habitat. There are 35 miles of unauthorized routes available for use in Alternative 1 with a potential for a high direct and indirect effect to both the FYLF and NWPT, there are approximately 15 miles of proposed trails in Alternative 2 with a high to moderate potential for a direct and indirect effect to the FYLF and NWPT. There are 7.5-10 miles of proposed trails in Alternative 4 and 5 for a moderate potential for a direct and indirect effect to the FYLF and NWPT.

The Pinegrove CAR has FYLF at lower elevations (with MYLF in the upper elevation) and suspected NWPT throughout in suitable habitat. There are 39 miles of unauthorized routes available for use in Alternative 1 with the potential for a high direct and indirect effect to the FYLF and NWPT. There are approximately 21.5 miles of proposed designated trails in Alternative 2 with the potential for a high to moderate direct and indirect effect to the FYLF and NWPT. There are 10.0-13.0 miles of proposed designated trails in Alternative 4 and 5 with the potential for a moderate direct and indirect effect to the FYLF and NWPT. There are zero miles of proposed designated trails in Alternative 3 with a potential for no direct and indirect effect to the FYLF and NWPT.

Alternative 1 shows the resulting high density of undesignated OHV routes and the potential impact of no control of the use of OHVs and open cross-country travel. With the known population and suitable habitat scattered throughout the watershed there is a high likelihood of an OHV crushing a FYLF and NWPTs (near the streams) adult or young, directly affecting the species. NWPTs are known to travel up to 150 meters from perennial waterbodies. Overall there is minimal impact to the Critical Aquatic Refuges for FYLF and NWPT with Alternatives 4 and 5 within the CARs. Alternative 1 poses the greatest risk to the FYLF and NWPTs due to the greatest number of miles proposed for designation. Alternative 2 has the potential for a moderate to high direct and indirect effect to FYLF and NWPT within "key" CAR's on the Plumas National Forest. Alternative 3 would not have a direct or indirect effect on FYLF and NWPT in relation to miles of proposed trails within CARs. A detailed analysis of the Critical Aquatic Refuges can be found in the Biological Assessment and Evaluation in the project record.

Table 34. Miles of open unauthorized routes (Alt. 1) or proposed trails (Alts. 2-5) within Critical Aquatic Refuges (CARs), Plumas National Forest.

CARs	Acres	Alt 1	Alt 2	Alt 3[11]	Alt 4	Alt 5
Lone Rock	21,450	6.5	2.6	0 (0.9)	4.9	5.3
Boulder/Lowe	18,317	22	6.1	0 (1.2)	1.9	2.6
Rowland	39,833	31.6	2.7	0 (0)	1.5	5.2
Lakes Basin	37,783	13	2	0 (3.6)	2.2	2.7
Pinegrove	28,483	39.3	21.5	0 (3.4)	10.0	13.0
Pinkard	12,035	4.3	0.5	0 (0)	0	0
Woodleaf	20,756	0.4	0	0 (0)	0	0
Oregon	26,443	0	0	0 (0)	0	0
Jacks	26,743	46.7	22.1	0 (2.4)	0	17.2
Willow	8,828	4.6	1.3	0 (0.6)	0	.5
Rock	36,860	35	15.4	0 (9.2)	7.6	10.0
Bucks	58,138	14.9	4.2	0 (1.4)	1.7	3.6

3.6.7.2.3 Number of Stream Crossing within RCAs

Alternative 1 poses the greatest risk to the FYLF and the NWPT from native surface motorized crossing densities, with 221 perennial stream crossings (Table 35). Alternative 1 has the greatest chance of having a direct effect by potentially crushing a FYLF, tadpole or egg masses and NWPT eggs and young. Alternative 2 has a potential for a moderate to high impact on FYLF and NWPT and habitat with 64 perennial stream crossings proposed across the Forest. Alternatives 4 and 5 have the potential for a moderate to low impact on FYLF and NWPT and habitat with 17 and 33 perennial stream crossings, respectively, proposed across the Forest. Alternative 3 will not have a direct or indirect effect on FYLF and NWPT in relation to stream crossings.

Table 35. Number of stream crossings created by open unauthorized routes (Alt. 1) and proposed trails (Alt. 2-5) by alternative on the PNF

Stream Type	Alt 1	Alt 2	Alt 3[12]	Alt 4	Alt 5
Perennial	221	64	0 (27)	17	33
Intermittent	706	179	0 (94)	64	114
Total Crossings	**927**	**243**	**0 (121)**	**148**	**272**

A 500 foot buffer was placed around every occurrence of TES herpetofauna on the Forest and Table 33 displays the miles of route or trail that are within or adjacent.

[11] Figures in parenthesis are the miles of existing designated motorized OHV trails on the Forest
[12] Figures in parenthesis are the miles of existing designated motorized OHV trails on the Forest

Foothill Yellow-Legged Frog

There are 157 known occurrences (single and multiple frog sightings per occurrence) (Table 36). Alternative 1 has the greatest potential for a moderate direct or indirect effect to FYLF and its habitat with 4 miles of unauthorized routes within the 500 foot buffer of known occurrences. Alternatives 2 thru 5 have the potential for a low direct or indirect effect to FYLF and its habitat with a range of 0-0.5 miles proposed trails within 500 feet of known occurrences of FYLF.

Northwest Pond Turtle

There are 61 known occurrences (single and multiple pond turtle sightings per occurrence) (Table 36). Again, in relation to known and confirmed NWPT; Alternative 1 thru 5 have the greatest potential for a low direct or indirect effects to NWPT and its habitat with 0-1.6 miles of unauthorized routes within the 500-foot buffer.

Table 36. Miles of proposed trails (Alts. 2-5) and unauthorized routes (Alt. 1) within 500 feet of TES Amphibian and Reptile occurrences.

Species	Number of Known/Confirmed Occurrences	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Northwestern Pond Turtle	61	1.6	0.9	0	0	0.03
Foothill Yellow-legged Frog	157	4.2	0.2	0	0.5	0.5

3.6.7.3 Cumulative Effects

3.6.7.3.1 Short vs. Long-term Effects

In the short term (1 year), Alternative 1 would continue to have the potential for the greatest direct and indirect effect to FYLF and NWPT and its habitat below 4,500 foot elevation on the Plumas National Forest. In the long term (20 years), Alternative 1 would continue to degrade occupied and suitable FYLF and NWPT habitat with a range of 88-210 miles (Table 32 and Table 33) of unauthorized routes within the RCA and ZOI of the FYLF and NWPT. A minimum of 88-210 miles of unauthorized routes would continue to be used and there would be no ability for the compacted, degraded soil and vegetative conditions to recover. There would be immediately reduced direct effects by the closure of any trails within 500 feet of FYLF and NWPT occurrences, reducing the chance for crushing any life stage of the FYLF and NWPT.

In the short term; Alternative 2 would have a reduced potential for a direct effect to individual FYLF and NWPTs yet a minimal change in the short term for recovery of the 68-157 miles of closed unauthorized routes to recover. In the long term (20 years), these 68-157 miles of closed unauthorized routes would have time to recover naturally and with OHV grants some could be manually restored by putting the trail back to the natural contour of the land, mulching, and seeding.

In the short term (1 year) Alternatives 4 and 5 would have a reduced potential for a direct effect to individual FYLF and NWPTs yet, with a short term for recovery of the approximately 84-207miles of unauthorized inventoried OHV trails. Again, in the long term (20 years), these 84-207 miles of closed unauthorized routes would recover naturally and again recovery could be enhanced by manual treatment.

In Alternative 3, the short and long term 1,109 miles of unauthorized inventoried trails would have to recover naturally and again recovery could be enhanced by manual treatment.

The Plumas National Forest currently has 130 miles of designated motorized trails. Cumulatively there are 10-27 miles of designated OHV trails within the RCA and ZOI's of potential habitat for the FYLF and NWPT. Again, this adds cumulatively to direct, indirect and cumulative effects to the FYLF and NWPT and their populations by the action alternatives.

General discussion for the past and current cumulative effects to riverine and lacustrine habitats are described above in the CRLF section. Specific actions that effect the FYLF and NWPT are described in Table 37 lists all the reasonably foreseeable future actions, including fuels, vegetation, recreation, range allotment plans, non-motorized trail development, and special use permit re-issuance. The cumulative impacts from reasonably foreseeable projects and a description of the potential impact to riverine and lacustrine habitat are described for each action.

Table 37. Direct, Indirect, and Cumulative Impact to riverine and lacustrine habitat from Reasonably Foreseeable Future Projects

Project type	Location	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
Mining/Suction Dredging	(Copper Penny, Dredger's delight, Phat Chance, Winkeye	Impacts from increased sediment delivery, decrease in water quality.	Mining/suction dredging add to cumulative impacts by decreasing habitat quality, mainly in riverine systems.
Hazard tree removal	Ongoing Forest-wide	Minimal impact. Short-term disturbance during harvest. Reduction of LWD within riverine habitats	None to minimal cumulative impact
Fish passage construction project	Ongoing , proposals, throughout Forest	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor.
Watershed Restoration	Ongoing , proposals, throughout Forest	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Range Allotment permit renewal	(Strawberry Valley Allotment)	Stream bank trampling from livestock resulting in increases in sediment and decrease in water surface shade from browsing riparian shrubs.	Cumulative impacts from sediment and water surface shade are expected to be within Forest Plan standards (<20%).
Temporary OHV Forest Order	(Forest-wide)	Closed Forest to cross-country travel. Lessened disturbance to habitat downstream of stream crossings	Overall benefit to macroinvertebrate habitat by eliminating effects to habitat quality.
Backcountry Discovery Trail	Forest-wide	Harrassment, collection, human disturbance, site degradation	Short and long-term cumulative impacts on individuals and their habitat.
Integrated Noxious Weed Control Program	Forest-wide	Toxicity and potentially reduced water quality. Individual frogs could be killed. Potential loss of individuals during Rx burn.	Short-term direct and indirect effects to individual CRLF, long-term enhancement of habitat by maintenance of native plant species.
Basin Group Selection	20 miles SE of Quincy, CA	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change,	Short-term sedimentation, long-term protection from wildfire through fuel reduction

Project type	Location	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
		long-term reduction of fuels.	
Slapjack Project	Southwest of Quincy, CA in the vicinity of Challenge, Clipper Mills, Feather Falls, Forbestwon, and Dobbins, CA	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Short-term sedimentation, long-term protection from wildfire through fuel reduction
Watdog	Southwest of Quincy, CA in the Fall River and South Branch Middle Fork Feather River watersheds	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Short-term sedimentation, long-term protection from wildfire through fuel reduction
Sugarberry Project	South and east of Little Grass Valley Reservoir, from Gibsonville Ridge in the north to the North Yuba River in the south	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Flea Hazardous Fuels Reduction Project	The Flea Project Area is bounded by the North Fork of the Feather River on the east and Little Butte Creek on the west, in the Wildland Urban Interface near Paradise, Magalia, Pulga, and Concow, CA.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Short-term sedimentation, long-term protection from wildfire through fuel reduction
Lower Middle Fork Feather River Water Quality Improvement Projects	South Fork of the Feather River	Meadow improvement, stream stabilization, and road improvements	Sedimentation and reduced water quality. Long-term improved water quality and aquatic species habitat
Mabie DFPZ	South of Highway 70 and west of highway 89 near the communities of Graeagle, Portola, Clio, and Blairsden.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Freeman Project	West of Lake Davis up to Grizzly Ridge	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Camp 14 Salvage and Reforestation Project	The project is located approximately 12 miles northeast of Taylorsville, CA, about 2 miles east of Antelope Lake	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.

Project type	Location	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
Sulphur - Barry Stream Restoration Project	Middle Middle Fork Feather River HUC 5 Watershed	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long term improvement to water storage capacity and improved water quality
Clark's Creek Aspen Restoration and Ecosystem Enhancement Project	Situated in Clark's Creek, a 10,000 acre tributary watershed to Last Chance Creek, which flows to the North Fork of the Feather River.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Mills Peak Trail	Lakes Basin Recreation Area Beckwourth Ranger District PNF	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long term improvement to water quality
Smith Lake and Mt Elwell trails reroutes	Lakes Basin Recreation Area	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water quality
Grizz Project	Along Grizzly Ridge, approximately 5 miles from Spring Garden and 3.5 miles from Cromberg	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Jackson Project (old name Happy Jack Project)	Approximately 4-11 miles northwest of Portola and 1-7 miles north of Graeagle.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Ingalls DFPZ	Approximately 3 miles north of Lake Davis	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Last Chance Water Quality Improvement Projects	Last Chance watershed, Roads 25N66, 25N72, 25N78, 25N08, 25N65, 25N65A, 25N03	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long term improvement to water storage capacity and improved water quality
Red Clover Water Quality Improvement Projects	Red Clover watershed, Roads 24N03Y, 22N22Y, 25N05	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Frenchman Water Quality Improvement Projects	Frenchman watershed	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Lake Davis Water Quality Improvement Projects	Lake Davis watershed	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality

Project type	Location	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
Nelson-Onion Water Quality Improvement Projects	Nelson-Onion watershed	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Sulphur Creek and Barry Creek Meadow Restoration	Sulphur and Barry Creek at their confluence	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Red Clover and Poco Creeks Meadow Restoration	Red Clover and Poco Creeks	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Dotta Canyon Meadow Restoration	Dotta Canyon	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Last Chance (Meadowview) and Little Last Chance (Rowland Creek)	Meadowview and Rowland Creeks	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Middle Fork Whitetop Project	Middle Fork Feather River	Toxicity and potentially reduced water quality. Individual frogs could be killed. Potential loss of individuals during Rx burn.	Short-term direct and indirect effects to individual CRLF, long-term enhancement of habitat by maintenance of native plant species.
Phat Chance Mining Claim	Near Haskins Valley	Impacts from increased sediment delivery, decrease in water quality.	Mining decreases habitat quality, mainly in riverine systems.
Winkeye Mining Claims	Six miles northeast of LaPorte, CA in the Howland Flat area	Impacts from increased sediment delivery, decrease in water quality.	Mining decreases habitat quality, mainly in riverine systems.
South Fork Feather River Water Quality Improvement Projects	South Fork Feather River	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Empire Vegetation Management Project	North of Quincy, California	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Meadow Valley Defensible Fuel Profile Zone and Group Selection	Surrounding the community of Meadow Valley, CA	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Moonlight Road Relocation Project	The project is located about 10 miles north of Taylorsville, California on Forest Service Road	Potential sedimentation into riverine and lacustrine habitats	Short-term cumulative impacts from sediment are minor. Long-term improvement to water quality

Project type	Location	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
	28N03		
Moonlight Project Amendment	Proposed operations are in the area of Moonlight Valley	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Dredger's Delight and High Grade Placer Claims	Quincy Highway, on Thompson Creek	Impacts from increased sediment delivery, decrease in water quality	Mining decreases habitat quality, mainly in riverine systems.
Corridor Wildland Urban Interface (WUI) Fuels Reduction Project	The project is located adjacent to the community of Quincy within the ¼ mile WUI of Chandler Road and Highway 89.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Keddie Hazardous Fuels Reduction Project	Keddie Project is within the vicinity of Keddie Ridge, Round Valley Reservoir, and Mt. Jura. Communities within include Greenville, Crescent Mills, and Taylorsville, California.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Moonlight and Wheeler Fires Recovery and Restoration Project	The project area is located northeast of Greenville and north of Taylorsville in the Lights Creek and surrounding drainages.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Upper Indian Creek Water Quality Improvement Projects	Upper Indian Creek watershed, Roads 27N25Y, 27N19Y, 27N20Y, 27N22Y, 29N43	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality

3.6.7.4 Summary of Effects

With analysis of route and trail miles within RCAs, ZOIs and CARs, stream crossings, route and trail miles within 500’ of FYLF and NWPT occurrences; Alternative 1 has the highest potential for direct and indirect effects to FYLF and NWPTs, Alternative 2 has a moderate to high potential for direct and indirect effects to FYLF and NWPTs, and Alternative 4 and 5 have a low potential for direct and indirect effects to FYLF and NWPTs. Alternative 3 has no potential for direct and indirect effects to FYLF and NWPTs. Again, past and current cumulative effects to riverine and lacustrine habitats include current and historic livestock grazing; reduced suitability of habitat through catastrophic wildfires; mining activities; and recreational activities including hunting, camping, and general recreation activities including all forms of motorized use, including 4-wheeled drive vehicles, ATVs, and motorcycles. These activities along with others described above would add to the direct and indirect effects of each alternative as described above.

3.6.7.5 Determinations

3.6.7.5.1 Foothill yellow-legged frog

Alternative 1 may affect individuals and is likely to result in a trend toward listing or loss of viability for the foothill yellow-legged frog. This determination is based on (1) the allowance of cross-country travel and the potential proliferation of additional unauthorized routes within RCAs, ZOIs and within 500 feet of known FYLF occurrences, (2) the magnitude of effects is greater in every category for Alternative 1, including miles of route within RCA's, ZOIs, stream crossings, and route miles within known occurrences.

Alternatives 2, 4 and 5 may affect individuals, but are not likely to result in a trend toward listing or loss of viability for the foothill yellow-legged frog. This determination is based on (1) cross-country travel and the potential for proliferation of additional motorized routes are eliminated, (2) Miles of proposed designated trails are relatively low within CARs that contain FYLF, and (3) The miles of proposed designated trails within 500 feet of known occurrences are very low (< 1 mile).

Alternatives 3 would not affect the FYLF. This determination is based on (1) cross-country travel and the potential for proliferation of additional motorized routes are eliminated, there are no proposed designated trails.

3.6.7.5.2 Northwestern Pond Turtle

Alternative 1 may affect individuals, and is likely to result in a trend toward listing or loss of viability for the Northwestern Pond Turtle. This determination is based on (1) the allowance of cross-country travel and the potential proliferation of additional motorized routes within RCAs, ZOIs and within 500 feet of known NWPT occurrences, (2) the magnitude of effects is greater in every category for Alternative 1, including miles of route within RCAs, ZOIs, stream crossings, and route miles within known occurrences.

Alternatives 2, 4 and 5 may affect individuals, but are not likely to result in a trend toward listing or loss of viability for the Northwestern Pond Turtle. This determination is based on (1) cross-country travel and the potential for proliferation of additional motorized routes are eliminated, (2) Miles of proposed designated trails are relatively low within CARs that contain NWPT, and (3) The miles of proposed designated trails within 500 feet of known occurrences are very low (< 1 mile).

Alternative 3 would not affect the NWPT. This determination is based on 1) cross-country travel and the potential for proliferation of additional motorized routes are eliminated, 2) there are no proposed designated trails.

3.6.8 Mountain Yellow-Legged Frogs

3.6.8.1 Affected Environment

Mountain yellow-legged frogs in the Sierra Nevada occupy aquatic habitats for almost all their seasonal life history; they breed, rear, and overwinter in aquatic habitat. The northern species, *R. sierrae*, appears to occupy stream habitats more frequently, whereas the southern species, *R. muscosa*, often occupies lake habitats. Because mountain yellow-legged frog larvae overwinter at least one year, perennial aquatic habitats that do not freeze in the winter are needed for breeding and rearing. The species generally are thought to use perennial aquatic sites for overwintering, though this is not well-studied. Larvae and metamorphs to some level support a segment of the high-elevation food web: for example between invertebrates and garter snakes (*Thamnophis* spp.). Benthic invertebrates appear to be the primary food source of postmetamorphic life stages (juveniles and adults) in lake-dwelling populations. Postmetamorphic stages, known to move among aquatic sites seasonally, can rapidly colonize unoccupied habitat. Such movements may maintain proximate clusters of occupied sites that may function as metapopulations.

3.6.8.1.1 Prior to 1980

Historic mountain yellow-legged frog data for the PNF and vicinity are sparse. Prior to 1980, mountain yellow-legged frogs have been recorded from 6 general localities.

No data exist prior to the 1940s. In 1943, Margaret Storey collected mountain yellow-legged frogs from 3 localities in Sierra County: At the bridge over Slate Creek [CAS-SU 8602-8604]; 1 km north of Scales [CAS-SU 8611]; and Howland's Flat [CAS-SU 8612]). In 1947, D. V. Brown collected a juvenile mountain yellow-legged frog at Camp La Porte, the Boy Scouts of America camp at La Porte (CAS-SU 9528).

One collection dates from the 1950s; Walter Howard and Ed Jameson, Jr. collected a juvenile mountain yellow-legged frog 11.2 km north of Quincy in 1950 (CAS 218482).

The only other pre-1980 records from the vicinity of the PNF date from the 1960s. In 1960, 8 mountain yellow-legged frogs were collected from near LaPorte (CSUC 1115, 1253-1259). In 1961, 5 mountain yellow-legged frogs were collected from Big Grizzly Creek (CSUC 1107-1111; Koo and Vindum 1999).

3.6.8.1.2 1980 to Present

Based on re-survey of historically occupied sites, Jennings and Hayes (1994) indicated that the species appeared extirpated from several localities. Plumas National Forest surveys conducted from 1990 through 2004 have generally followed the Fellers and Freel (1995) protocol, but significant variation in survey effort has been applied. A handful of these surveys have recorded mountain yellow-legged frogs at 1-3 locations, and most observations have been of individual frogs; sites with even 2 or 3 individuals are rare (Twedt and Evans 1993; USFS 1994, 2000a; Fellers and Freel 1995; Fellers 1997b; Koo and Vindum 1999, 2002; Foster Wheeler 2001; Williams 2004). A number of surveys within the appropriate elevation range and habitat have failed to detect mountain yellow-legged frogs (Fellers 1996; Ganda 2001a, 2001b, 2001c, 2001d, 2001e; Ecosystems West 2001, NSR 2001, Klamath WR 2003, MandA 2004).

Based on surveys during the 1990s, analysis of amphibian survey data, and collected positive sightings from the PNF, 54 known sites currently have mountain yellow-legged frogs, but data on numbers of individuals are largely lacking (C. Davidson, pers. comm., 2001). Nine of these sites, all in Plumas County, are specimen-documented: meadow on Pinkard Creek (CAS 203170); tributary to Rock Creek (CAS 206093); small pond north of Pine Grove Cemetery (CAS 209668); Faggs

Reservoir (CAS 209370-209377); Silver Lake (CAS 209386); Rock Lake (209404) and its effluent (CAS 227668); outlet of Gold Lake (CAS 227259); upper Lone Rock Creek (CAS 227639); and Boulder Creek at Lowe Flat (CAS 227640).

Based on the most recent entries into the PNF Amphibian Database, between 2000 and 2003, of over 80 surveys conducted that included mountain yellow-legged frog as a target species, 34 surveys across 26 different sites recorded the species. Except for 1 site at which ca. 100 mountain yellow-legged frog larvae were found, 1 to 12 mountain yellow-legged frogs (various life stages) were recorded across remaining sites. The species appears to have disappeared from some of the relatively few historic sites on the PNF and species abundance now seems low.

From 2003 to 2006, the USFS SNAMP surveyed 9 watersheds on the PNF containing 50 sites. No sites had evidence of mountain yellow-legged frog breeding, and adults or juveniles were located at 2 (4 percent) of the sites surveyed. Only 1-2 mountain yellow-legged frogs were found on a given survey.

Also over the interval 2003-2006, CDFG conducted 86 surveys (see detail of survey approach in Status section) of 78 different sites with potential mountain yellow-legged frog habitat. Mountain yellow-legged frogs were detected at 16.7 percent (n = 13) of surveyed sites. The collective recent data indicate that mountain yellow-legged frogs are sparsely distributed on the PNF.

A three-year MYLF telemetry study began in July 2003 and ended in September of 2007. The objective of the study is to determine the dispersal behavior of the MYLF in relation to steams and adjacent terrestrial habitat. From this telemetry study, current findings include that the frogs are only associated directly within the drainage or just adjacent (23 meters away from stream); in the summer months each adult frog has been located very close to the same pool/territory; and in the fall, as temperatures decline, female frogs have been found to be moving downstream within the stream channel towards male frogs (Vance, personal com. 2004).

3.6.8.1.3 Current Status

Mountain yellow-legged frogs in the Sierra Nevada occur on both sides of the mountain axis between the headwaters of the Feather River and the headwaters of the Kern River between 1,100 m (3,609 ft.) and 3,810 m (12,500 ft.), but their eastside distribution appears to be restricted to the Tahoe Basin southward. *Rana sierrae* occupies the northern and central Sierra Nevada south to the vicinity of Mather Pass (Fresno County), whereas *R. muscosa* occupies the Sierra Nevada south of this area.

3.6.8.2 Direct and Indirect Effects

Habitat for the mountain yellow-legged frog is the same habitat as defined above for the CRLF, effects analysis is very similar as stated above for these two species.

3.6.8.2.1 Route and Trail Miles within Riparian Conservation Areas and Zone of Influence

With Alternative 1 (No-action Alternative) there is a very high number of miles on the PNF and thus a greater negative effect (Table 38); 196 miles of open routes are proposed within 300’ of perennial stream and 411 miles of open routes within the 500’ buffer. These figures dramatically drop in proposed trail miles with all action alternatives. A moderate number of miles are proposed with

Alternative 2 having 47 miles within the 300’ buffer and a range of 103 miles within the 500’ buffer. This is approximately 1/8 – 1/4 the number of miles that would continue to be used if the Forest remained open, and a moderate direct and indirect effect to the mountain yellow-legged frog. A low number of proposed designated route miles are proposed with Alternatives 4 and 5 with a range of 9-14 miles within the 300’ buffer and a range of 32-51 miles within the 500’ buffer above 3,500 foot elevation (Table 38 and Table 39) with the potential of a low direct and indirect effect to the MYLF and its habitat.

Road miles are used as a relative index to measure the potential indirect effects to aquatic species including the MYLF. As discussed above in the general effects section, to continue to allow open OHV travel throughout the Forest, may have a direct effect on the MYLF by potentially crushing the frog, tadpole, or eggs by a vehicle. Indirectly, the loss of riparian cover, soil compaction, increased access by predators due to lack of cover and habitat degradation are direct and indirect effects of the implementation of Alternative 1.

There is minimal impact to lakes and ponds by the No-action and all four action alternatives within the PNF (Table 38 and Table 39). Again, there will be no further analysis of effect to ponds.

The proportion of a species habitat that is affected by motorized routes or trails (including the routes or trails plus a biologically meaningful ‘zone of influence’ (e.g., 300 ft. RCA, 500 ft. ZOI)

Table 38. Miles of proposed trails (Alts. 2-5) and open unauthorized routes (Alt. 1) within amphibian habitat at 300’ of perennial streams, ponds and lakes above 3,500’ elevation.

Habitat	Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Perennial Streams	219,792	196	47	0 (26)	9.1	14.0
Ponds Lakes	5,565	0.8	0.4	0 (0.9)	0	0.2

Table 39. Miles of proposed trails (Alts. 2-5) and open unauthorized routes (Alt. 1) within amphibian habitat at 500’ of perennial streams, ponds and lakes above 3,500’ elevation

Habitat	Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Perennial Streams	488,617	411	103	0 (57.6)	14.7	25.5
Ponds Lakes	8,388	1.4	0.65	0 (1.3)	11	.02

3.6.8.2.2 Route and Trail Miles within Critical Aquatic Refuges

Alternative 1 poses the greatest risk to the MYLF due to the greatest number of miles proposed for designation. Critical Aquatic Refuges with known or suspected MYLF occurrence are, Lone Rock, Boulder/Lowe, Rowland, Lakes Basin, Pinegrove, Pinkard, Willow, Rock and Buck’s. Alternative 1 has the greatest impact to the MYLF with a range of 4-40 miles of unauthorized routes available for use in these CARs. The largest known populations of MYLF occur in Lone Rock, Boulder/Lowe, Lakes Basin, Rock, and Buck’s CARs. The miles of unauthorized routes within these CARs range from 6.5-35 for Alternative 1 with a high direct and indirect effect to MYLF and its habitat. This shows the potential negative impact of no control of the use with the current open Forest situation for OHVs. With the known population and suitable habitat scattered throughout the watershed there is a high likelihood of an OHV crushing a MYLF (near the streams) adult or metamorph directly affecting the species. MYLF are known to travel up to 23 meters from perennial waterbodies (MGW, 2007).

A detailed analysis of the Critical Aquatic Refuges can be found in the Biological Assessment and Evaluation written for this EIS, located in the project record. The Rowland, Pinegrove, Boulder/Lowe and Rock CARs are of concern to remain open (No-action) with such a high density of use in Alternative 1 with a range of 22-39 miles of open routes available for use , and therefore the potential for a very high direct and indirect effect. Pinegrove and Rock would have a high direct and indirect effect with the implementation of Alternatives 2 with a range of 15-22 miles of proposed designated trails available for use, with the implementation of Alternatives 4 and 5. Boulder/Lowe is of some concern of a moderate direct and indirect effects by the implementation of Alternatives 2, 4 and 5 with a range of 2-6 miles proposed trails. Alternatives 3 would have no direct or indirect effect on MYLF and its habitat within all the CARs with known or suspected MYLF populations. Overall, there is a predicted moderate to high direct and indirect effect to the Critical Aquatic Refuges for MYLF with all of the action alternatives (Table 40).

Table 40. Miles of proposed trails (Alts. 2-5) and open unauthorized routes (Alt. 1) within Critical Aquatic Refuges (CARs), PNF

CARs	Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Lone Rock	21,450	6.5	2.6	0 (0.9)	4.9	5.3
Boulder/Lowe	18,317	22	6.1	0 (1.2)	1.9	2.6
Rowland	39,833	31.6	2.7	0	1.5	5.2
Lakes Basin	37,783	13	2	0 (3.6)	2.2	2.7
Pinegrove	28,483	39.3	21.5	0 (3.4)	10.0	13.0
Pinkard	12,035	4.3	0.5	0	0	0.5
Woodleaf	20,756	0.4	0	0	0	0
Oregon	26,443	0	0	0	0	0
Jacks	26,743	46.7	22.1	0 (2.4)	0	17.2
Willow	8,828	4.6	1.3	0 (0.6)	0	0.5
Rock	36,860	35	15.4	0 (9.2)	7.6	10.0
Bucks	58,138	14.9	4.2	0 (1.4)	1.7	3.6

3.6.8.2.3 Number of Stream Crossings within RCAs

Alternative 1 poses the greatest risk to the MYLF from native surface motorized crossing densities with 221 perennial stream crossings and 706 intermittent stream crossings (Table 41). Alternative 1 has the greatest chance of having a direct effect by potentially crushing a MYLF, tadpole or egg masses with a potential very high impact. Alternatives 2 has a potential for a high to moderate impact on MYLF and habitat with a range of a 64 perennial stream crossings and 179 intermittent stream crossings proposed across the Forest. Alternatives 4 and 5 have the potential for a moderate to low impact on MYLF and its habitat with a range of 17-33 perennial stream crossings and 64-113 intermittent stream crossings proposed across the Forest.

Table 41. Number of stream crossings created by unauthorized routes (Alt. 1) and proposed trails (Alts. 2-5) by alternative on the Plumas National Forest.

Stream Type	Alt 1	Alt 2	Alt 3[18]	Alt 4	Alt 5
Perennial	221	64	0 (27)	17	33
Intermittent	706	179	0 (94)	64	113
Total Crossings	**927**	**243**	**0 (121)**	**81**	**146**

[18] Figures in parenthesis are the miles of existing designated motorized OHV trails on the Forest

A 500-foot buffer was placed around every occurrence of TES herpetofauna on the Forest and Table 27 displays the miles of route or trail that are within or adjacent. There are 154 known occurrences (single and multiple frog sightings per occurrence) (Table 42). Alternative 1 has the greatest potential for a moderate direct or indirect effect to MYLF and its habitat with 4 miles of unauthorized routes and proposed designated trails within the 500 foot buffer. Alternatives 2 thru 5 have the potential for a low direct or indirect effect to MYLF and its habitat with a range of 0-1.2 miles proposed designated trails within 500 feet of know occurrences of MYLF.

Table 42. Miles of proposed designated trails and unauthorized routes within 500 feet of mountain yellow-legged frog occurrences.

Species	Number of Known/Confirmed Occurrences	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Mountain Yellow Legged Frog	154	4.0	0.8	0	0.5	0.5

The Plumas National Forest completed a three-year telemetry study on MYLF on Bean Creek (~10 miles South West of Quincy, CA). The maximum linear movement along the stream of a MYLF was just under one mile. To determine a potential effect of an OHV crossing a stream a one mile buffer was placed around every occurrence of MYLF herpetofauna on the Forest. Table 19 displays the number of routes that cross perennial and intermittent streams within one mile of known MYLF occurrences. There are 154 known occurrences (single and multiple frog sightings per occurrence (Table 42). Alternative 1 has the greatest potential for a moderate direct or indirect effects to MYLF and its habitat with 16 perennial and intermittent stream crossings of open unauthorized routes within one mile of known MYLF occurrences. Alternatives 2 has a low direct or indirect effect to MYLF and it's habitat with 5 perennial and intermittent stream crossings of proposed motorized trails within one mile of known MYLF occurrences. Alternatives 4 and 5 have a low direct or indirect effect to MYLF and its habitat with 1 perennial and intermittent stream crossing of proposed motorized trails within one mile of known MYLF occurrences. Alternative 3 has no direct or indirect effect on MYLF and its habitat.

Table 43. Number of open routes (Alt. 1) or proposed trails (Alts 2-5) that cross perennial and intermittent streams within one mile of MYLF occurrences.

Species	Number of Known/Confirmed Occurrences	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Mountain Yellow Legged Frog	154	16	5	0 (3)[13]	1	1

3.6.8.2.4 Temporal Effects

Short-term (1 year) Alternative 1 would continue to have the potential for the greatest direct and indirect effect to MYLF and its habitat. In the long-term (20 years), Alternative 1 would continue to degrade occupied and suitable MYLF habitat from 3,500 and above. A minimum of 1,109 miles of unauthorized inventoried OHV trails would continue to be used and there would be no ability for the compacted, degraded soil and vegetative conditions to recover. There would be an immediate reduced direct effect by the closure of any trails within 500 feet of MYLF occurrence, reducing the chance for crushing any life stage of the MYLF. In the short term; Alternatives 2 and 5 would have a reduced potential for a direct effect to individual MYLFs, yet a minimal change in the short term for recovery of the 719-750 miles of closed unauthorized routes to recover. In the long term (20 years); these 719-750 miles of closed unauthorized routes would have time to recover naturally and with OHV grants some could be manually restored by putting the trail back to the natural contour of the land, mulching, and seeding. In the short term (1 year), Alternatives 3 and 4 would have a reduced potential for a direct effect to individual MYLF's, with a short term for recovery of the 846-1,109 miles of closed unauthorized routes. Again, in the long term (20 years); these 846-1,109 miles of closed unauthorized routes would have to recover naturally and again recovery could be enhanced by manual treatment.

3.6.8.3 Cumulative Effects

General discussion for the past and current cumulative effects to riverine and lacustrine habitats are described above in the CRLF section. Specific actions that affect the MYLF are described in Table 44 which lists all of the reasonably foreseeable future actions, including fuels, vegetation, recreation, range allotment plans, non-motorized trail development, and special use permit re-issuances. Table 44 summarizes cumulative impacts from reasonably foreseeable projects and a description of the potential impact to riverine and lacustrine habitat.

Table 44. Direct, Indirect, and Cumulative Impact to riverine and lacustrine habitat from reasonably foreseeable future projects.

Project type	Location	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
Mining/Suction Dredging	(Copper Penny, Dredger's delight, Phat Chance, Winkeye	Impacts from increased sediment delivery, decrease in water quality.	Mining/sution dredging add to cumulative impacts by decreasing habitat quality, mainly in riverine systems.
Hazard tree removal	Ongoing Forest-wide	Minimal impact. Short-term disturbance during harvest. Reduction of LWD within riverine habitats	None to minimal cumulative impact

[13] Figures in parenthesis are the miles of existing designated motorized OHV trails on the Forest

Project type	Location	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
Fish passage construction project	Ongoing , proposals, throughout Forest	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor.
Watershed Restoration	Ongoing , proposals, throughout Forest	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long term improvement to water storage capacity and improved water quality
Range Allotment permit renewal	(Strawberry Valley Allotment)	Stream bank trampling from livestock resulting in increases in sediment and decrease in water surface shade from browsing riparian shrubs.	Cumulative impacts from sediment and water surface shade are expected to be within Forest Plan standards (<20%).
Temporary OHV Forest Order	(Forest-wide)	Closed Forest to cross-country travel. Lessened disturbance to habitat downstream of stream crossings	Overall benefit to macroinvertebrate habitat by eliminating effects to habitat quality.
Backcountry Discovery Trail	Forest-wide	Harrassment, collection, human disturbance, site degradation	Short and long-term cumulative impacts on individuals and their habitat.
Integrated Noxious Weed Control Program	Forest-wide	Toxicity and potentially reduced water quality. Individual frogs could be killed. Potential loss of individuals during Rx burn.	Short-term direct and indirect effects to individual CRLF, long-term enhancement of habitat by maintenance of native plant species.
Basin Group Selection	20 miles SE of Quincy, CA	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Short-term sedimentation, long-term protection from wildfire through fuel reduction
Slapjack Project	Southwest of Quincy, CA in the vicinity of Challenge, Clipper Mills, Feather Falls, Forbestwon, and Dobbins, CA	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Short-term sedimentation, long-term protection from wildfire through fuel reduction
Watdog	Southwest of Quincy, CA in the Fall River and South Branch Middle Fork Feather River watersheds	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Short-term sedimentation, long-term protection from wildfire through fuel reduction
Sugarberry Project	South and east of Little Grass Valley Reservoir, from Gibsonville Ridge in the north to the North Yuba River in the south	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Flea Hazardous Fuels Reduction Project	The Flea Project Area is bounded by the North Fork of the Feather River on the east and Little Butte Creek on the west, in the	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Short-term sedimentation, long-term protection from wildfire through fuel reduction

Project type	Location	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
	Wildland Urban Interface near Paradise, Magalia, Pulga, and Concow, CA.		
Lower Middle Fork Feather River Water Quality Improvement Projects	South Fork of the Feather River	Meadow improvement, stream stabilization, and road improvments	Sedimentation and reduced water quality. Long-term improved water quality and aquatic species habitat
Mabie DFPZ	South of Highway 70 and west of highway 89 near the communities of Graeagle, Portola, Clio, and Blairsden.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Freeman Project	West of Lake Davis up to Grizzly Ridge	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Camp 14 Salvage and Reforestation Project	The project is located approximately 12 miles northeast of Taylorsville, CA, about 2 miles east of Antelope Lake	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Sulphur - Barry Stream Restoration Project	Middle Middle Fork Feather River HUC 5 Watershed	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long term improvement to water storage capacity and improved water quality
Clark's Creek Aspen Restoration and Ecosystem Enhancement Project	Situated in Clark's Creek, a 10,000 acre tributary watershed to Last Chance Creek, which flows to the North Fork of the Feather River.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Mills Peak Trail	Lakes Basin Recreation Area Beckwourth Ranger District PNF	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water quality
Smith Lake and Mt Elwell trails reroutes	Lakes Basin Recreation Area	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water quality
Grizz Project	Along Grizzly Ridge, approximately 5 miles from Spring Garden and 3.5 miles from Cromberg	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Jackson Project (old name Happy	Approximately 4-11 miles northwest of	Potential sedimentation into riverine and lacustrine habitats,	Potential sedimentation into riverine and lacustrine habitats,

Project type	Location	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
Jack Project)	Portola and 1-7 miles north of Graeagle.	short-term micro-climate change, long-term reduction of fuels.	short-term micro-climate change, long-term reduction of fuels.
Ingalls DFPZ	Approximately 3 miles north of Lake Davis	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Last Chance Water Quality Improvement Projects	Last Chance watershed, Roads 25N66, 25N72, 25N78, 25N08, 25N65, 25N65A, 25N03	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Red Clover Water Quality Improvement Projects	Red Clover watershed, Roads 24N03Y, 22N22Y, 25N05	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Frenchman Water Quality Improvement Projects	Frenchman watershed	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Lake Davis Water Quality Improvement Projects	Lake Davis watershed	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Nelson-Onion Water Quality Improvement Projects	Nelson-Onion watershed	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Sulphur Creek and Barry Creek Meadow Restoration	Sulphur and Barry Creek at their confluence	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Red Clover and Poco Creeks Meadow Restoration	Red Clover and Poco Creeks	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Longterm improvement to water storage capacity and improved water quality
Dotta Canyon Meadow Restoration	Dotta Canyon	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved waterquality
Last Chance (Meadowview) and Little Last Chance (Rowland Creek)	Meadowview and Rowland Creeks	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Middle Fork Whitetop Project	Middle Fork Feather River	Toxicity and potentially reduced water quality. Individual frogs could be killed. Potential loss of individuals during Rx burn.	Short-term direct and indirect effects to individual CRLF, long-term enhancement of habitat by maintenance of native plant

Project type	Location	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
			species.
Phat Chance Mining Claim	Near Haskins Valley	Impacts from increased sediment delivery, decrease in water quality.	Mining decreases habitat quality, mainly in riverine systems.
Winkeye Mining Claims	Six miles northeast of LaPorte, CA in the Howland Flat area	Impacts from increased sediment delivery, decrease in water quality.	Mining decreases habitat quality, mainly in riverine systems.
South Fork Feather River Water Quality Improvement Projects	South Fork Feather River	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Empire Vegetation Management Project	North of Quincy, California	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Meadow Valley Defensible Fuel Profile Zone and Group Selection	Surrounding the community of Meadow Valley, CA	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Moonlight Road Relocation Project	The project is located about 10 miles north of Taylorsville, California on Forest Service Road 28N03	Potential sedimentation into riverine and lacustrine habitats	Short-term cumulative impacts from sediment are minor. Long-term improvement to water quality
Moonlight Project Amendment	Proposed operations are in the area of Moonlight Valley	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Dredger's Delight and High Grade Placer Claims	Quincy Highway, on Thompson Creek	Impacts from increased sediment delivery, decrease in water quality.	Mining decreases habitat quality, mainly in riverine systems.
Corridor Wildland Urban Interface (WUI) Fuels Reduction Project	The project is located adjacent to the community of Quincy within the ¼ mile WUI of Chandler Road and Highway 89.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Keddie Hazardous Fuels Reduction Project	Keddie Project is within the vicinity of Keddie Ridge, Round Valley Reservoir, and Mt. Jura. Communities within include Greenville, Crescent Mills, and Taylorsville, California.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Moonlight and Wheeler Fires Recovery and	The project area is located northeast of Greenville and north of Taylorsville	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change,	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change,

Project type	Location	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
Restoration Project	in the Lights Creek and surrounding drainages.	long-term reduction of fuels.	long-term reduction of fuels.
Upper Indian Creek Water Quality Improvement Projects	Upper Indian Creek watershed, Roads 27N25Y, 27N19Y, 27N20Y, 27N22Y, 29N43	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Ingalls DFPZ	Approximately 3 miles north of Lake Davis	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Dixie Valley and Little Dixie Sheep Allotments	10 to 14 miles north-northeast of the city of Portola, California	Stream bank trampling from livestock resulting in increases in sediment and decrease in water surface shade from browsing riparian shrubs.	Cumulative impacts from sediment and water surface shade are expected to be within Forest Plan standards (<20%).
Red Clover and Poco Creeks Meadow Restoration	Red Clover and Poco Creeks	Short-term sediment disturbance during project implementation.	Short-term cumulative impacts from sediment are minor. Long-term improvement to water storage capacity and improved water quality
Canyon Dam Fuel Treatment Project	8—10 miles North of Greenville, California	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.	Potential sedimentation into riverine and lacustrine habitats, short-term micro-climate change, long-term reduction of fuels.
Copper Penny and Two Penny mining Plan of Operation	On or near Lights Creek, on the Mt. Hough Ranger District; the nearest town is Greenville	Impacts from increased sediment delivery, decrease in water quality.	Mining/suction dredging add to cumulative impacts by decreasing habitat quality,

3.6.8.4 Summary of Effects

With analysis of route and trail miles within RCAs BSAs, and CARs, stream crossings, route and trail miles within 500’ of MYLF occurrences; Alternative 1 has the highest potential for direct and indirect effects to MYLF, Alternative 2, 4 and 5 have a low potential for direct and indirect effects to MYLFs. Alternative 3 has no direct or indirect effects to MYLF. Again, past and current cumulative effects to riverine and lacustrine habitats include current and historic livestock grazing; reduced suitability of habitat through catastrophic wildfires; mining activities; and recreational activities including hunting, camping, and general recreation activities including all forms of motorized use, including 4-wheeled drive vehicles, ATVs, and motorcycles. These activities along with others described above would add to the direct and indirect effects of each alternative as described above.

3.6.8.5 Determinations

Alternative 1 may affect and is likely to adversely affect the mountain yellow-legged frog. This determination is based on (1) the allowance of cross-country travel and the potential proliferation of additional motorized routes within RCAs, BSAs and within 500 feet of known MYLF occurrences,

(2) the magnitude of effects is greater in every category for Alternative 1, including miles of route within RCAs, ZOIs, stream crossings, and route miles within known occurrences.

Alternatives 2, 4 and 5 may affect individuals, but are not likely to adversely affect the mountain yellow-legged frog. This determination is based on (1) cross-country travel and the potential for proliferation of additional motorized routes are eliminated, (2) Miles of proposed designated trails are relatively low within CARs that contain MYLF, and (3) The miles of proposed designated trails within 500 feet of known occurrences are very low (< 1 mile).

Alternative 3 will not affect the MYLF. This determination is based on (1) cross-country travel and the potential for proliferation of additional motorized routes are eliminated, (2) there are no existing system trails within 500 feet of known occurrences for MYLF, (3) system trail densities within RCA's and ZOI's are very low and insignificant ranging from 0.5 to 0.08 miles per square mile.

3.6.9 Hardhead Minnow

3.6.9.1 Affected Environment

Hardhead minnow (*Mylopharodon conocephalus*) are listed as Sensitive on the Region 5 Forester's Sensitive Species List (USDA Forest Service 1998). Hardhead are a cyprinid species endemic to California and are native to the Sacramento-San Joaquin system, Russian River and Napa River (Moyle 2002).

On the PNF, hardhead are known to inhabit the North Fork Feather River from Lake Oroville to the confluence with the East Branch North Fork Feather River, East Branch North Fork Feather River to the confluence of Rush Creek, Indian Creek from confluence with Spanish Creek to Flournoy Bridge, portions of Spanish Creek, portions of Greenhorn Creek, Middle Fork Feather River from Lake Oroville to the confluence of Humbug Creek near Portola, and South Fork Feather River from Ponderosa Reservoir to a natural migration barrier approximately 2 miles upstream. Hardhead are also known to inhabit Butt Valley Reservoir and Ponderosa Reservoir. Hardhead inhabit approximately 142 miles of stream on the PNF.

Route associated risk factors: Potential road and trail associated risk factors to hardhead include the immediate loss of individual fish at stream crossings and increases in sedimentation leading to the following: changes in water quality, changes in prey base, and changes to potential spawning bed capacity.

3.6.9.2 Direct and Indirect Effects

3.6.9.2.1 Site-Specific Physical Impacts and Disturbance to Occupied Hardhead Streams

Alternative 1 poses the greatest risk to hardhead where unauthorized routes and cross-country travel have the potential to impact occupied hardhead habitat. Cross-country travel has the potential to cause direct and indirect effects to hardhead habitat if streams are crossed by motor vehicles and if vehicles travel within the RCAs. Direct effects include potential hardhead mortality; indirect effects include increased sedimentation and changes to channel, stream bank characteristics and vegetation structure. The remaining action alternatives indirectly affect occupied hardhead streams by the potential to deliver sediment to streams, but the indirect effects are likely limited due to low mileage of proposed trails.

3.6.9.2.2 Route and Trail Miles within Riparian Conservation Areas

Table 45 shows the miles of open unauthorized routes and proposed trails within RCAs of known occupied hardhead habitat by alternative. Alternative 1 has the most miles of unauthorized routes within RCAs and poses the greatest risk to hardhead. Alternatives 4 and 5 have the least miles of proposed trails within RCAs. In Alternatives 2, 4 and 5 the effects would be limited to the Middle Fork Feather River. Alternative 3 has slightly more miles of proposed trails within RCAs than Alternative 2. Alternative 3 has more than double the miles of proposed trails within RCAs than Alternatives 4 and 5. In Alternative 3, there are portions of trails within RCAs of each occupied stream. Alternatives 4 and 5 pose the least risk to hardhead. Alternative 3 poses a slightly higher risk than Alternatives 2, 4, and 5, but Alternative 3 poses lesser risk to hardhead than Alternative 1.

Table 45. Miles of proposed trails (Alt. 2-5) and open unauthorized routes (Alt. 1) within 300' of known occupied Hardhead Minnow habitat on the PNF

Habitat	Strm Miles/ Lake Acres	Acres w/in RCA	Alt 1	Alt 2	Alt 3[1]	Alt 4	Alt 5
Perennial Streams	141.8	18,565	10.05	0.43	0 (0.75)	0.30	0.30
Ponds Lakes	2,074	623	0.02	0	0	0	0

[1] Alternative 3 has no proposed trails. The number of miles of existing motorized trails is in parentheses.

3.6.9.2.3 Number of Stream Crossings within RCAs

Table 46 shows the number of streams crossings by alternative for PNF. There are no stream crossings within RCAs of hardhead occupied streams in any of the alternatives. However, Alternative 1 allows cross-country travel, which could result in stream crossings which poses the greatest risk of direct impacts to hardhead.

Table 46. Number of stream crossings created by open routes (Alt. 1) and proposed trails (Alts. 2-5) by alternative on the Plumas National Forest.

Stream Type	Alt 1	Alt 2	Alt 3[1]	Alt 4	Alt 5
Perennial	221	64	0 (27)	17	33
Intermittent	706	179	0 (94)	64	113
Total Crossings	**927**	**243**	**0 (121)**	**81**	**146**

[1] Alternative 3 has no proposed trails. The number of miles of existing motorized trails is in parentheses.

3.6.9.3 Cumulative Effects

Past and current cumulative effects to hardhead include change of habitat and water quality due to pollution and sediment inputs from past logging and mining, loss of connectivity by hydropower projects, and competition with non-native species. Appendix C provides a list and description of present and reasonably foreseeable projects on the Forest and private lands within the PNF boundary.

Alternative 1 poses the greatest risk of adding direct and indirect impacts to existing cumulative impacts to hardhead from unauthorized routes and cross-country travel that may directly and indirectly affect streams currently occupied by hardhead. Alternative 1 has the highest number of route miles within RCAs. Under Alternative 1, unauthorized route proliferation would likely continue and increase at an accelerated rate in the future, potentially increasing sediment delivery and alteration of stream bank vegetation and hydrologic condition, which may affect the abundance of hardhead within localized areas in the future. Alternatives 2, 4, and 5 would slightly increase cumulative impacts to hardhead within the Middle Fork Feather River watershed. Alternative 3 would slightly increase cumulative impacts to hardhead within all occupied streams. Unmanaged cross-country travel would continue to occur and increase at an unknown rate under Alternative 1 where impacts to fisheries resources are uncertain. Under all other alternatives, cross-country travel would be prohibited. Over time, benefits to fisheries would be realized once unauthorized routes are closed and obliterated.

3.6.9.4 Summary of Effects

Analysis of route and trail miles within RCAs, ZOIs, and CARs, stream crossings, route and trail miles within 300’ of hardhead occupied streams show the following: Alternative 1 has the highest potential for direct and indirect effects to hardhead; Alternative 2 has low to moderate potential for direct and indirect effects to hardhead; Alternative 3 has no potential for direct and indirect effects to hardhead; and Alternatives 4 and 5 have very low potential for direct and indirect effects to hardhead. Past and current cumulative effects to riverine and lacustrine habitats include current and historic livestock grazing; reduced suitability of habitat through catastrophic wildfires; mining activities; and recreational activities including hunting, camping, and general recreation activities including all forms of motorized use, including 4-wheeled drive vehicles, ATVs, and motorcycles. These activities along with others described above will add to the direct and indirect effects of each alternative as described above.

3.6.9.4.1 Determination

Alternatives, 1, 2, 4 and 5, may affect individuals, but are not likely result in a trend toward Federal listing or loss of viability for hardhead minnow. Alternative 3 will not affect the hardhead minnow.

3.6.10 Summary of Effects Analysis of All Alternatives

Table 47. Summary of effects analysis across all alternatives.

Indicators – Aquatic Biota	**Rankings of Alternatives for Each Indicator[1]**				
	Alt. 1	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**
Miles of unauthorized routes within or adjacent to TES aquatic biota habitat.	1	2	5	4	3
Density of motorized routes and trails as a measure of habitat effectiveness at the 7th order watershed level.	1	2	5	4	3
Miles of motorized routes and trails and acres of areas at forest-wide scale and within the habitat for each species.	1	2	5	4	3
The proportion of a species habitat that is affected by motorized routes and trails (including the routes or trails	1	2	5	4	3

Indicators – Aquatic Biota	Rankings of Alternatives for Each Indicator[1]				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
plus a biologically meaningful 'zone of influence' (e.g., 300 ft.).					
Number hydrologically sensitive areas within 300 ft. (RCA width) of an added route or area.	1	2	5	4	3
Average for Aquatic Biota	**1**	**2**	**5**	**4**	**3**

[1] A score of 5 indicates the alternative is the best for aquatic biota related to the indicator; A score of 1 indicates the alternative is the worst for aquatic biota related to the indicator.

3.6.11 Summary of Determinations of All Alternatives

Table 48. Summary of Effects of Proposed Action on Threatened, Endangered, Proposed, and Sensitive Animal Species that Potentially Occur on the Plumas National Forest.

Species	Alternative 3	Alternative 2-,4 and 5	Alternative 1 No-action
FISH			
Hardhead Minnow (*Mylopharodon conocephalus*)	WNA	MAI	MAI
AMPHIBIANS			
California red-legged frog (*Rana aurora draytonii*)	NE	MALAA (Alt 2 and 5) MANLAA (Alt. 4)	MALAA
Foothill yellow-legged frog (*Rana boylii*)	WNA	MAI	LRTTFL
Mountain yellow-legged frog (*Rana muscosa*)	**NE**	**MALAA**	MALAA
REPTILES			
Northwestern pond turtle *(Clemmys marmorata marmorata*)	WNA	MAI	LRTTFL

Determinations: WNA = Will Not Affect, MAI = May Affect Individuals, but in not likely to result in a trend toward Federal listing or loss of viability, LRTTFL = May affect individuals, and is Likely to Result in a Trend Toward Federal Listing or loss of viability.
NE = No Effect, MALAA = May Affect, Likely to Adversely Affect, MANLAA = May Affect, Not likely to Adversely Affect.

3.6.11.1.1 California red-legged frog

Alternatives 1, 2 and 5 may affect and is likely to adversely affect the California red-legged frogs and their habitat. Alternative 4 meets all the criteria to lead to a "May affect, not likely to adversely affect" determination for the CRLF. Alternatives 3 will not affect the California red-legged frog or its habitat. This determination is supported by the USFWS Biologist's informal discussions to the PNF Trail Designation Analysis (in process, 6/2008).

In addition, impacts will be avoided or mitigated by complying with the Aquatic Management Strategy and assuring that all guidelines and RMOs are followed and met (Appendix A, SNFPA-ROD, 2004), Interdisciplinary Team agreed upon mitigation measures and terms and conditions (SMR's), implementation of the limited operating period and best management practices.

3.6.11.1.2 Foothill yellow-legged frog

Alternative 1 may affect individuals and is likely to result in a trend toward Federal Listing of the Foothill yellow-legged frog and its habitat. Alternatives 2, 4 and 5 may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the foothill yellow-legged frog. Alternative 3 will not affect FYLF.

3.6.11.1.3 Northwestern Pond Turtle

Alternative 1 may affect individuals and is likely to result in a trend toward Federal Listing of the Northwestern Pond Turtle and its habitat. Alternatives 2, 4 and 5 may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the Northwestern pond turtle. Alternative 3 will not affect the NWPT.

3.6.11.1.4 Mountain yellow-legged frog

Alternatives 1, 2, 4 and 5 may affect and is likely to adversely affect the mountain yellow-legged frog and its habitat. Alternatives 3 will not affect MYLF.

3.6.11.1.5 Hardhead Minnow

Alternatives 1, 2, 4 and 5 may affect but is not likely to adversely to result in a trend towards Federal listing or loss of viability for the Hardhead minnow. Alternative 3 will not affect the Hardhead Minnow.

3.6.12 Compliance with the Forest Plan and Other Direction

Compliance with the Forest Plan as amended (SNF ROD, 2004) would be met. Mitigations would be developed to mitigate any adverse conditions by the proposed alternatives for the CRLF.

3.7 Terrestrial and Riparian Species

3.7.1 Introduction

Management of wildlife species and habitat and maintenance of a diversity of animal communities is an important part of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976). Management activities on National Forest System (NFS) lands 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 (MIS) to the degree consistent with multiple-use objectives established in each Forest Plan. Management decisions related to public motorized travel can affect wildlife by increasing human-caused mortality, causing changes in behavior due to disturbance and habitat modification (Gaines et al. 2003, Trombulak and Frissell 2000, USDA Forest Service 1998). It is Forest Service policy to minimize damage to vegetation, avoid harassment to wildlife and avoid significant disruption of wildlife habitat while providing for motorized public use on NFS lands (FSM 2353.03(2)). Therefore, management decisions related to public motorized travel on NFS lands must consider effects to wildlife and their habitat.

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

Direction relevant to the alternatives and their effects to terrestrial 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), 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 with the United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service concerning TE species under their jurisdiction. It is Forest Service policy to analyze impacts to TE to ensure management activities are not be likely to jeopardize the continued existence of a TE, 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 species are animal and plant species identified by the Regional Forester for which population viability is a concern. The Forest Service develops and implements management practices to ensure that rare plants and animals do not become threatened or endangered and ensure their continued viability on National Forests. It is Forest Service policy to analyze impacts to sensitive species to ensure management activities do not create a significant trend toward federal listing or loss of viability. This assessment is documented in a Biological Evaluation (BE) and is summarized or referenced in this Chapter.

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

- California spotted owl and northern goshawk: Evaluate proposals for new roads, trails, off-highway vehicle routes and recreational and other developments for their potential to disturb nest sites (Management Standard and Guideline #82).
- Pacific fisher and American marten: Evaluate proposals for new roads, trails, off-highway vehicle routes and recreational and other developments for their potential to disturb den sites (Management Standards and Guidelines #87 and #89).
- Riparian habitat (Management Standards and Guidelines #92):
- Bog and fen habitat (Management Standards and Guidelines #118): Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans and vehicles.

3.7.3 Background

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

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

1. Increased terrestrial and aquatic species mortality from collision with vehicles.
2. Modification of animal behavior.
3. Alteration of the terrestrial and aquatic habitat.
4. Increased alteration and use of habitats by humans.

3.7.3.1 Mortality from Collision with Vehicles

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

Road and trail corridors may act as habitat sinks for wildlife that are attracted to corridors (Jalkotzy et al. 1997). Direct mortality of animals from vehicle collisions has been documented primarily in relation to paved roads and highways. Little scientific information is available about vehicle collisions on Forest roads or motorized trails, though some mortality from use of Forest roads and motorized trails is to be expected depending on the type of trail and the amount of use a trail receives. Indirect mortality along roads and trails is associated with human access. Wildlife populations of hunted and trapped species are subject to increased mortality due to better access by humans. Interior-forest birds breeding adjacent to roads and trails may receive higher nest predation by a variety of bird and mammal predators, and some songbird species have shown to have increased brown-headed cowbird parasitism rates.

3.7.3.2 Modification of Animal Behavior

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

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

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

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

The impacts of motor vehicles to terrestrial wildlife can include disturbance from noise generated by OHVs. Determining the effects of noise on wildlife is complicated because responses vary between species. The variation in responses is based upon the type of noise and its duration, frequency, the magnitude, location, the species life history characteristics, habitat type, season, activity at time of exposure and whether other environmental stresses are occurring coincident to exposure of noise (Busnel 1978 *In* Radle 2002, Steidl and Powell 2006). Effects of noise can cause physiological responses in wildlife including increased heart rate, altering metabolism and hormone balance. Behavioral responses can include head raising, body shifting, short distance movements, flapping of wings (birds) and escape behavior. Together these effects potentially can lead to bodily injury, energy loss, decrease in food intake, habitat avoidance and abandonment and reproductive loss. The vast majority of studies conducted on wildlife effects from road and trail-associated noise has been done for bird species.

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

3.7.3.3 Alteration of the Terrestrial and Aquatic Wildlife Habitat

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

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

3.7.3.3.1 Some Potential Effects of Habitat Alteration to Aquatic Species Habitats

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

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

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

Bury (1980) reported that motor vehicles crossing creeks pose some risk of gas and oil leaks into the creek. Oil and gas have been shown to have negative effects to the growth and survival in several frog species (Pollet and Bendell-Young 2000; Irwin et al. 1998, Lefcorte et al. 1996).

3.7.3.3.2 Some Potential Effects of Habitat Alteration to Terrestrial Wildlife Habitats

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

3.7.3.3.3 Increased Alteration and Use of Habitats by Humans

Several studies have indicated that high road densities result in adverse impacts on certain wildlife species. Impacts from high densities include excessive harvest including legal and illegal, disturbance/harassment from noise and habitat alteration. Brocke et al. (1988) reported that high road densities can elicit a variety of negative impacts of certain wildlife species. These effects include human disturbance. In Adirondack counties, the black bear population density index (based on the number of legal kill) showed a ten-fold decrease when road density increased by ten times. Other studies were cited as showing similar sensitivity to road density for other large predators and ungulates.

3.7.4 Effects Analysis Methodology

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

The species assessment presented here is organized by **Species Groups** divided along major habitat associations or life zones (for example terrestrial or aquatic). Projected effects of motor vehicle travel management on sets of species in these major groupings are described. In addition, individual species assessments are presented for federally listed species, Forest Service Sensitive Species and Management Indicator Species. More detailed information is also found in the Biological

Evaluation and Project-Level Management Indicator Species project report and the Sierra Nevada Management Indicator Species report.

The major habitat associations or life zones for each species utilizes the California Wildlife Habitat Relationships (CWHR) Model—a system developed jointly by the California Department of Fish and Game that classifies forest stands by dominant species types, tree sizes and tree densities and rates the resulting classes in regard to habitat value for various wildlife species or guilds. The table below shows trees size and canopy cover classes.

Table 49. CWHR Conifer Size and Canopy Closure definitions:

CWHR Tree Size			**CWHR Canopy Cover**		
CWHR	**Conifer Crown**	**dbh**	**CWHR**	**WHR Closure Class**	**Ground Cover**
1	Seedling Tree	<1”	**S**	Sparse Cover	10-24%
2	Sapling Tree	1-6”	**P**	Open Cover	25-39%
3	Pole Tree	6-11”	**M**	Moderate Cover	40-59%
4	Small Tree	12-24”	**D**	Dense Cover	60-100%
5	Medium/Large Tree	>24”			
6	Multi-layered Tree	Size class 5 over size class 4 or 3 trees w/ a 60% CC			

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

Step 1. Identify wildlife species and groups: Existing information and knowledge about the distribution of the terrestrial and aquatic species on the PNF were used to develop the list of species and to develop species groups. Federally listed species, Forest Service Sensitive Species, Management Indicator Species and other species were selected and placed into species groups based on the potential for these species or their habitats to be affected by motor vehicle use on the PNF. Local knowledge and sources included corporate databases including distribution of special status species, vegetation maps, etc., which were used to develop species or habitat groups. Table 50 provides a list of all of the special status species described by status, habitat indicator and distribution on the PNF.

A total of 29 species are included in the species group assessment. These include five amphibian species, one fish species, one reptile species, 13 bird species and nine mammal species. These species were divided into wildlife groups (some species occurred in more than one group) as described in Table 51. The Swainson’s hawk and greater sandhill crane are not included in this assessment as there are no records of these species nesting on the PNF, they are considered a rare occurrence and impacts for route designation are very unlikely. Analysis for Swainson’s hawk and greater sandhill crane can be found in the project level BA/BE. For more detailed discussion of turtles, frogs and fish, see the Aquatic Biota Section of this EIS.

Table 50 List of PNF special status species by habitat indicator and distribution (Aquatic species, such as turtles, frogs and fish are discussed in the Aquatic Biota Section).

Species	Federally Listed Threatened	Forest Service Sensitive	Management Indicator Species	Habitat Indicator	Distribution on PNF
American marten		X		Mature and late-successional conifer forest	Exclusive to the Lakes Basin Recreation Area on the Beckwourth District(BKRD).
Bald eagle		X		Mature conifer forest near large bodies of water	Nests near large reservoirs across the Forest
Fox sparrow			X	Shrubland (west slope chaparrel types)	Forest-wide within indicator habitat
Yellow warbler			X	Riparian	Forest-wide within indicator habitat
Sooty (blue) grouse			X	Late seral open canopy coniferous forest (5, S, P)	In transition zone to east side of Forest within indicator habitat
Northern flying squirrel			X	Late seral closed canopy coniferous forest (5M, 5D, 6)	Forest-wide within indicator habitat
Mountain quail			X	Early and mid seral coniferous forest	Forest-wide within indicator habitat
Pacific tree frog			X	Wet meadow	Forest-wide within indicator habitat
California spotted owl		X	X	Mature and late-successional conifer forest	Forest-wide
California wolverine		X		Mature and late-successional conifer forest	No confirmed detections on the PNF..
Great gray owl		X		Mature and late-successional conifer forest adjacent to meadows	Several recent detections on the west side of Lake Davis on the BKRD
Greater sandhill crane		X		Wet meadow, shallow lacustrine and fresh emergent wetland habitat	No known breeding populations occur on the PNF

Species	Federally Listed Threatened	Forest Service Sensitive	Management Indicator Species	Habitat Indicator	Distribution on PNF
Swainson's hawk		X		Prairies and farmland. Nests in isolated trees.	Not known to nest on the PNF.
Northern goshawk		X		Mature and late-successional conifer forest	Forest-wide
Mule deer			X	Early and mid-seral stage, all forest types, especially in hardwood and hardwood/conifer forest types	Forest-wide
Pacific fisher		X		Mature and late-successional conifer forest	Suitable habitat only, PNF falls within identified fisher distribution gap
Sierra Nevada red fox		X		Mature subalpine conifer forest and riparian/montane meadow	Suitable habitat, no known or verified detections
Willow flycatcher		X		Riparian shrub (willow) and wet meadow	Occurs at discreet willow/meadow habitat throughout the PNF.

Table 51. Wildlife group and species represented within groups from Table 50

Wildlife group	Species
Wide-ranging carnivores	wolverine, Sierra Nevada red fox
Ungulates	Mule deer
Coniferous forest associated species (early, mid, and late seral)	California spotted owl, northern goshawk, great gray owl, American marten, Pacific fisher, sooty grouse, N. flying squirrel, mountain quail.
Riparian and wetland species [including lacustrine (lakes) and riverine habitat (rivers, streams)]	Bald eagle, great gray owl, greater sandhill crane, willow flycatcher, hardhead, California red-legged frog, foothill yellow-legged frog, mountain yellow-legged frog, northwestern pond turtle, Sierra Nevada red fox, pacific tree frog, Western red bat, yellow warbler, aquatic macroinvertebrates

Step 2. Identify road and trail-associated factors: Several studies have identified a classification or conceptual model of responses from wildlife to road and trail-associated activities *(Knight and Cole and Liddle In* Gaines, et al. 2003). The causal factors were grouped by impact to wildlife into disturbance, habitat modification and harvest/mortality. (1) Disturbance is when an animal sees, hears, smells, or otherwise perceives the presence of a human but no contact is made and it may or may not alter its behavior. (2) Habitat modification occurs when habitat is modified through creation of a path, presence of food, or removal of vegetation. (3) Harvest/mortality is human-induced

where there is a direct and negative impact on the animal such as hunting, fishing, collision with vehicles and other incidental contact which results in impacts similar to those from hunting.

Based on a review of literature and local knowledge of selected species on the PNF, these three broad disturbance classifications were used for this assessment. Table 52 lists the road and trail-associated factors along with their disturbance type, activity type effects and affected wildlife groups.

Step 3. Processes and analyses: The assessment process to analyze the effects of motorized travel routes (road and trails) on the PNF was done in two primary steps: 1) the cumulative effects of travel routes to species groups were assessed based on a similar process completed by Gaines et al. 2003 and 3) the relative environmental risk of roads and trails to aquatic habitats was determined.

Table 52. Road and trail-associated factors with disturbance and activity type and affected wildlife group

Road and trail—associated factors[1]	Activity Type[2]	Definition of Associated factors	Wildlife group affected
Hunting and trapping	Harvest	Mortality from hunting or trapping as facilitated by road and trail access	Wide-ranging carnivores Ungulates
Poaching	Harvest	Increased illegal take of animals as facilitated by trails and roads	Wide-ranging carnivores Ungulates
Collisions	Harvest	Mortality or injury resulting from a motor vehicle running over or colliding with an animal	Wide-ranging carnivores Late successional species Aquatic-Riparian species Ungulates
Habitat loss and fragmentation	Habitat modification	Loss and resulting fragmentation of habitat due to the establishment of roads, trails, or networks and associated human activities	Wide-ranging carnivores Late successional species Aquatic-Riparian species Ungulates
Edge effects	Habitat modification	Changes to habitat microclimate associated with the edge induced by roads or trails	Late successional
Snag or downed log reduction	Habitat modification	Reduction in density of snags and down logs due to their removal near roads as facilitated by road access	Wide-ranging carnivores Late successional species
Collection	Harvest	Collection of live animals for use as pets (such as amphibians and reptiles) as facilitated by the physical characteristics of roads or trails or by road or trail access	Late successional Aquatic-Riparian species
Route for competitors and predators	Habitat modification	A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise	Wide-ranging carnivores Late successional Aquatic -Riparian species
Disturbance at a specific site	Disturbance	Displacement of individual animals from a specific location that is being used for reproduction and rearing of young	Wide-ranging carnivores Late successional Aquatic-Riparian associated Ungulates
Physiological response	Disturbance	Increase in heart rate or stress hormones when near a road or trail or network of roads or trails	Ungulates Late successional Aquatic-Riparian associated Wide-ranging species

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

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

Step 4. Analysis of effects: The information generated in step 3 was used to analyze the direct, indirect and cumulative effects of the alternatives on the wildlife groups. The analysis of the project alternatives focuses on the effects of two actions: (1) the prohibition of cross-country motor vehicle travel (Alternatives 2-5) and (2) adding facilities (unauthorized roads, trails and/or areas) to the National Forest Transportation System (NFTS).

3.7.4.1 Wildlife Analysis Assumptions

- All vehicle types result in approximately the same amount of disturbance effect to wildlife.
- The location of the route is equal to disturbance effects from that route (e.g., assume all trails provide the same level of disturbance.)
- Habitat is already impacted in the short term. In the long term, habitat will remain the same on proposed trails added to the NFTS; but will improve, at least to some degree on unauthorized routes that are not proposed for addition to the NFTS, with the prohibition of cross-country travel and subsequent passive restoration (under Alternatives 2-5).
- Alternative 1 is considered the worst case scenario, due to the fact that it allows unregulated cross country travel to continue, and that Alternatives 2-5 will improve habitat conditions over time by prohibiting cross country travel and designating use on a formal designated transportation system.
- The focus is on suitable habitat (the assumption is that site-specific species wildlife surveys have not been conducted). Therefore, suitable habitat is assumed occupied.

3.7.4.2 Wildlife Sources of Information

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

1. Bald Eagle – nesting territory sites.
2. California Spotted Owl – nest sites, Activity Centers, Protected Activity Centers, Home Range Core Areas, CWHR habitat types 4M, 4D, 5M, 5D and 6.
3. Northern Goshawk – nest sites, Protected Activity Centers, CWHR habitat types 4M, 4D, 5M, 5D and 6.
4. Forest Carnivores (marten, fisher, Sierra Nevada red fox and wolverine) – Draft Plumas Forest Carnivore Network, CWHR habitat types 4M, 4D, 5M, 5D and 6).
5. Other wildlife species (e.g. MIS) – appropriate CWHR habitat types.

3.7.4.3 Analysis Indicators

GIS queries were utilized to assess each indicator using the sources of information mentioned above. They are focused on assessing and disclosing the effects of each alternative presented in this EIS. The effects of prohibition of cross-country travel and addition of routes and facilities are assessed as described below.

- Miles of motorized routes and acres of areas to measure potential disturbance (at Forest-wide scale and within the habitat for each species group).

- Zone of influence [acres of a species (or species group's) key habitat that is affected by motorized routes].

3.7.5 Affected Environment and Environmental Consequences by Species Groups

This section describes both the affected environment and environmental consequences of the alternatives arranged by species groups: wide-ranging carnivores, ungulates, forest associated species and riparian associated species. Selected species represented within each group include Threatened, Endangered, Proposed, and Sensitive (TEPS) species and MIS are included. While not all of the species within the groups are necessarily analyzed in detail, each species group analysis provides enough information to infer impacts.

3.7.5.1 Affected Environment Description

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

3.7.5.2 Environmental Consequences Description

3.7.5.2.1 Direct and Indirect Effects Boundary

Direct and indirect effects of each alternative are analyzed on National Forest System (NFS) lands within the boundary of the Plumas National Forest (PNF). The analysis area includes motorized roads and trails, collectively referred to as routes. Routes include existing system routes and unauthorized routes (unclassified or user created routes and historic routes).

3.7.5.2.2 Cumulative Effects Boundary (Space and Time)

The cumulative effects analysis includes all motorized routes that occur within the boundary of the PNF on NFS lands. This cumulative effects geographic boundary pertains to all species groups.

The NFS lands encompass 1,204,225 acres and non-NFS lands encompass 273,308 acres within the boundary of the PNF. The total NFS and non-NFS lands within the boundary of the PNF comprises 1,477,533 acres. All NFS lands within the boundary of the PNF is an appropriate scale to analyze cumulative effects of terrestrial and aquatic species for activities associated with motorized roads and trails, since this area is sufficiently large to encompass wildlife habitat, movement patterns and home ranges for the groups of species being analyzed within the project area including old forest associated species, wide-ranging species, riparian associated species and others.

Within the cumulative effects boundary, cumulative effects are analyzed on the accumulation of all past, present and future actions including the existing NFTS (130 miles), existing unauthorized routes (1,109 miles) and any future routes that would be created within the next 20 years within the boundary of the PNF (NFS lands). Twenty years is a reasonable timeframe for estimating cumulative impacts of motorized routes in the reasonably foreseeable future. Past actions include routes that were created within the last 50 to 100 years and will be incorporated into the existing condition, such as roads that are closed or decommissioned. In addition, the timeframe for analyzing past cumulative effects for other activities such as timber harvest, grazing and non-motorized recreation is approximately 20 years prior.

3.7.5.2.3 Analysis Measures or Indicators

Indicators or measures are presented in the Environmental Consequences Section to compare and contrast the effects of the project alternatives. Measures or indicators were selected for project effects based on a thorough review of literature on the interaction between wildlife and motorized routes. Two primary analysis measures were used to compare project effects of each alternative: miles of routes proximal to a specific site (reproductive site or species presence) and Zone of Influence of motorized routes.

Density of Roads, Motorized Trails and Open Routes for Habitat Effectiveness

Road and/or motorized trail and route density has often been used as a surrogate to estimate habitat effectiveness or the direct and indirect effects of motorized travel on terrestrial wildlife. Road and/or trail and route density thresholds for wildlife have not been established on the PNF and thresholds for wildlife in the literature can vary by season and by geographic location. Therefore, road/trail density “thresholds” will not be used to determine effects of the project alternatives, but rather the density of roads, trails and open unauthorized routes is used for a relative comparison of the alternatives (Table 53). The density was determined at the scale of 7^{th} order watershed, since this scale is sufficiently large to accurately estimate the road and trail densities. Road/trail densities at a larger scale could potentially mask effects and therefore, underestimate effects to wildlife species. Route densities at any smaller scale may actually be amplified and therefore overestimate the effects to wildlife.

Table 53. Percent of PNF acreage with road, open unauthorized route and motorized NFS trail densities from 0->6 miles per square mile (averaged by 7^{th} order watershed).

Alternatives		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Wildlife						
Motorized Route Density Category (Percent of Forest Total)	0 Miles/Square Mile	0%	0%	0%	0%	0%
	0-2 Miles/Square Mile	21%	30%	35%	30%	30%
	2-4 Miles/Square Mile	59%	58%	59%	62%	58%
	4-6 Miles/Square Mile	19%	12%	6%	8%	12%
	>6 Miles/Square Mile	1%	0%	0%	0%	0%

Miles of Motorized Routes to Measure Potential Disturbance

Use of motorized routes has the potential to affect wildlife in a number of ways. Effects to wildlife may range from behavioral changes, increased stress or changes in reproductive success, as described previously. The number of miles of motorized routes is used to measure relative disturbance potential to terrestrial wildlife species on the PNF.

Forest-wide Miles of Motorized Routes

Overall miles of motorized routes on the PNF are used to compare differences in disturbance potential of motorized use between alternatives.

Miles of Motorized Routes (Species-specific Disturbance Potential at a Specific Site)

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

Zone of Influence [Amount of a Species (or Species Group's) Key Habitat that is Influenced by Motorized Routes]

Motorized routes have a Zone of Influence within which habitat effectiveness or suitability is reduced and wildlife population densities are lower (Trombulak and Frissell 2000, Gaines, et al. 2003). The effects to wildlife extend beyond the immediate road prism itself, into what can be referred to as a Zone of Influence adjacent to motorized roads and trails. The degree of effect of the various factors associated with roads and trails can be evaluated more effectively when considering the amount of a given species habitat that occurs within this Zone of Influence of motorized routes. Wildlife species behaviors and habitats are modified within various distances from motorized routes. The distances of the Zone of Influence for individual species that are used in the analysis of effects are based upon the best available science in the literature. Because there are limited data and studies for many species, assumptions and generalizations were made for some species where no data were available. The Zone of Influence is a relative index of habitat effectiveness that is used to compare alternatives.

3.7.5.3 Wide-ranging Carnivores

Large and mid-sized carnivores are unique in their response to human-induced habitat changes due to their large spatial habitat needs and their sensitivity to landscape patterns, including road edge effects and road density. (Buskirk and Zielinski 2003). The wolverine and the Sierra Nevada red fox may be considered to be sensitive to the presence of humans and human activities (Claar et al. 1999, Grinnell et al. 1937). Two species were included in the wide-ranging carnivore habitat assessment group–the wolverine (*Gulo gulo*) and the Sierra Nevada red fox (*Vulpes vulpes necator*).

The following is a summary of some of the potential trail and road associated effects to wide-ranging carnivores (Gaines et al. 2003):

- Increased illegal poaching of animals as facilitated by trails and roads.
- Mortality or injury resulting from a motorized vehicle running over or hitting an animal.
- Displacement of individual animals from a specific location that is being used for reproduction and rearing of young.

- Change in behavior and/or increased mortality of animals (euthanasia or shooting) due to increased contact with humans, as facilitated by road and trail access including recreational sites, such as campgrounds.
- Interference with dispersal or other movements as posed by a road or trail itself or by human activities on or near roads, trails, or networks.
- Loss and resulting fragmentation of habitat due to the establishment of roads, trails, or networks and associated human activities.
- A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise.
- Increase in heart rate or stress hormones when near a road or trail or network of roads or trails.

3.7.5.3.1 Effects Common to All Wide-ranging Species

Changes in Class of Vehicles

Responses to motor vehicle use varies by species and depends upon the type of vehicle, the intensity, timing, speeds and amount of motor vehicle use. For this analysis, it is assumed that all vehicle types result in the same disturbance to wildlife. Therefore, changes in the class of vehicles would not vary in their effects to wide-ranging wildlife species for all of the alternatives.

3.7.5.3.2 Cumulative Effects Boundary in Space and Time for Wide-ranging Species

The geographic boundary for analyzing cumulative effects to wide-ranging species (wolverine, Sierra Nevada red fox) are lands that fall within the boundary of the PNF including all NFS lands and non-NFS lands (private). The PNF boundary is sufficiently large to encompass the home ranges of wide-ranging species located on the PNF. In addition, the Forest boundary encompasses a wide variety of habitats used by these species -from early seral to late seral forests, subalpine and alpine habitats, meadows and riparian habitats. The timeframe for analyzing cumulative effects for wide-ranging species is approximately twenty years into the past and the into the future. Twenty years into the future is a reasonable amount of time to estimate potential cumulative impacts to wide-ranging species from future foreseeable activities.

3.7.6 Wolverine and the Sierra Nevada Red Fox: Affected Environment

The wolverine and the Sierra Nevada red fox are wide-ranging carnivores that use a variety of vegetation types, but appear to select areas that are relatively free from significant human disturbance. Both the wolverine and the Sierra Nevada red fox are designated by the Regional Forester in the Pacific Southwest Region of the Forest Service as Sensitive. In the Sierra Nevada, wolverine are known from over 4,000 feet elevation to over 10,000 feet elevation.

According to Aubrey et al. (2007), wolverine natal den sites are highly correlated with subalpine and alpine regions that have late persistent snow during April and May. Until recently, there have been no verified sightings of wolverine documented within the State of California since the 1920s, though several anecdotal wolverine observations have been reported throughout the Sierra Nevada. In February and March 2008, verified wolverine photographic detections were taken from remote controlled camera stations on the Tahoe National Forest between the towns of Truckee, California and Sierraville, California. Wolverine photographs were documented from four separate baited camera locations. Genetic results indicate the DNA evidence that has been collected to date is from a single individual and is a male. DNA testing also indicates this individual is not related to the wolverine population from the southern Sierra Nevada region, and it is also not related to wolverine populations in the Cascades region of Washington state (Mike Schwartz, personal communication). DNA results indicate that this particular wolverine has haplotype A, which is ubiquitous and shared with wolverine populations in the Rocky Mountains, Canada and Alaska. At this time, the origin of this individual is unknown. Given the results of DNA testing, three possibilities remain of this wolverine's origin: 1) it escaped from captivity, 2) it dispersed from the nearest known populations in the Rocky Mountains or 3) it is from a native northern Sierra Nevada population that was previously undetected by Grinnell, et al (1937).

Wolverines are known to be sensitive to humans and road associated factors, but are not necessarily affected by summer recreation trails (Gaines et al. 2003). Gaines et al. (2003) reported that wolverines may be displaced from natal dens in subalpine cirques as a result of winter recreation activities. Road and trail-associated factors that may affect wolverine include reduction in down logs, trapping, disturbance at a specific site and vehicle collisions. Road density can be used as a relative measure of human influence on the wolverine, though no empirical data exists which correlates motorized route density with wolverine population numbers due to the scarcity of research, the low population numbers and overall difficulty in studying this species that encompasses large home ranges. Studies indicate that home ranges in North America may vary from less than 38.6 square miles to over 347.5 square miles.

The current distribution and population status of the Sierra Nevada red fox is uncertain (CDFG 2004). A small population of Sierra Nevada red fox occurs in the Lassen Peak vicinity and represents the only verified detections of the subspecies in recent years. (Perrine 2005, Perrine et al. 2006). The Sierra Nevada red fox has not been verified to occur on the PNF, though habitat for this species occurs within subalpine conifer habitats interspersed with meadows. The nearest known population of the native Sierra Nevada red fox is the one located in the Lassen Peak vicinity (Lassen National Park and Lassen National Forest). Road construction and increased human settlement in the Sierra Nevada has the potential to facilitate the dispersal of non-native red foxes into the historic range of the Sierra Nevada red fox, by providing access to areas previously unavailable to the exotic foxes. Roads provide a potential travel corridor for valley foxes to move into Sierra Nevada red fox habitat. Although the tolerance of Sierra Nevada red fox to the presence of humans is unknown, it is evident that the non-native red foxes thrive in human-altered environments (Lewis et al. 1999, Kamler and Ballard 2002). In addition, urban development within the range of Sierra Nevada red fox may pose a risk to the species through an increased risk of predation from domestic pets, disease transmission, automobile collisions and other human-wildlife conflicts.

3.7.7 Wolverine and the Sierra Nevada Red Fox: Environmental Consequences

Route Density: Route density provides a relative measure of habitat effectiveness. Many literature references indicate that wolverine and red fox are primarily associated with remote, secluded areas and may be sensitive to human presence. Therefore, it would follow that as route density increases, human presence may also increase, which reduces “security habitat” for wolverine and red fox. To compare alternatives, route density categories from 0 to >6-miles/square mile are presented (see Table 53).

Zone of Influence: The Zone of Influence within 200 meters of routes was used as a measure for analyzing habitat fragmentation within mature to late-successional forest habitat as classified by 4M, 4D, 5M, 5D, and 6 CWHR types within the PNF. Furthermore, additional analysis of habitat fragmentation is presented within Old Forest Emphasis Areas (OFEAs) and within the Draft PNF Forest Carnivore Network which is presented in the section for Late-successional Forest Associated Species Group.

Disturbance to a Specific Site: The Sierra Nevada Forest Plan Amendment (2004) directs (in Standard and Guideline #32 on p. 32 of the ROD) that upon detection of a verified wolverine or Sierra Nevada red fox, management activities within 5 miles of the verified detection be analyzed. Activities associated with motorized routes represent potential direct disturbance to Sierra Nevada red fox or wolverine that may be using the area. However, no Sierra Nevada red fox or wolverine detections have occurred anywhere on the PNF. The recent Tahoe wolverine detections are more that 50 miles from the southern PNF boundary and no specific site disturbances are expected as a result of PNF management activities.

3.7.7.1 Direct and Indirect Effects

Route Density. Route density thresholds for wolverine and Sierra Nevada red fox have not been established and are hard to determine because of the rarity of these species and their elusive behavior patterns. Therefore, route densities across the PNF provides a relative measure of habitat effectiveness and/or the amount of security habitat available to the wolverine and the Sierra Nevada red fox at the broad landscape scale for which to compare the alternatives. The route density within 7th order watersheds was determined for all motorized routes including those on NFS lands and non-NFS lands. Since the wolverine is known to avoid areas within high concentrations of human presence, High security habitat and Moderately high security is best provided for where route densities are the lowest (e.g. 0 mi/sq mile or 0-2 mi/sq mile)(see Table 6). In addition, route densities are compared within mature and late-successional habitat types (CWHR types 4M, 4D, 5M, 5D and 6), Old Forest Emphasis Areas and within the Draft PNF Forest Carnivore Network (See Late-successional Forest Associated Species Section).

Error! Reference source not found. provides data on the percent of lands within the PNF with motorized road, trail and open route densities that range between 0 (High Security) and > 6-miles/square mile (Least Security). Alternative 1 has the lowest percentage of land (21%) in the High and Moderately high security categories, and the highest percentage of land (20%) in the Lower and

Least security categories. For the Moderate security category, Alternative 1 is similar to all of the action Alternatives at 59%. However, since Alternative 1 would allow cross country travel to continue, it poses the greatest direct and indirect risk to wolverine and Sierra Nevada red fox for all five alternatives.

All of the action alternatives (2-5) improve habitat conditions for the wolverine and Sierra Nevada red fox over Alternative 1 in that they provide a higher percentage of land in the High and Moderately High security level categories, and would also prohibit cross-country travel. Alternatives 2 and 5 are identical in their percentage of land base in the High and Moderately high security levels (30%), Moderate Security Level (58%) and in the Lower and Least security categories (12%). Alternative 4 maintains a similar percentage of land base in the High and Moderately high security levels (30%) as Alternatives 2 and 5. However, Alternative 4 is slightly better than Alternatives 2 and 5 in that it maintains more habitat in the Moderate security level category (62%), and less land base in the Lower and Least security categories (8%). Alternative 3 presents the least direct and indirect risk to wolverine and Sierra Nevada red fox of the five alternatives evaluated. Alternative 3 provides the highest percentage of land base (35%) in the High and Moderately High security levels for the wolverine and Sierra Nevada red fox. For the Moderate security level, Alternative 3 is similar to the other four alternatives with 59%. However, Alternative 3 contains the lowest percentage (6%) of land base within the Lower and Least security levels for all five of the alternatives.

Table 54. Percent of PNF with road, motorized trail and route densities between 0 and >6-miles/square mile

Motorized Route Density Category	Security Level	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
0 Miles/Square Mile	High Security	0%	0%	0%	0%	0%
0-2 Miles/Square mile	Moderately High Security	21%	30%	35%	30%	30%
2-4 Miles/Square mile	Moderate Security	59%	58%	59%	62%	58%
4-6 Miles/Square mile	Lower Security	19%	12%	6%	8%	12%
>6 Miles/Square mile	Least Security	1%	0%	0%	0%	0%

3.7.7.2 Cumulative Effects: Sierra Nevada Red Fox and Wolverine

3.7.7.2.1 Cumulative Effects of Motorized Routes

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

The cumulative effects to wolverine and Sierra Nevada red fox are evaluated by analyzing the effects of the alternatives in terms of route density, habitat fragmentation from past, present and reasonably foreseeable actions (Table 55). Past and present route densities are combined to represent the current existing condition. Since no thresholds of route density for these species have been established, route density is only used to compare the relative differences between the alternatives. Route densities categories >4 miles/square mile are used as a metric to compare relative route densities of the alternatives where human impacts of routes may render habitat less suitable and/or secure to wolverine and red fox.

3.7.7.2.2 Overall Cumulative Effects to California Wolverine and Sierra Nevada Red Fox from Past, Present and Reasonably Foreseeable Future Actions

The PNF currently has 42 active livestock grazing allotments including both cattle and sheep. The Forest Plan Standards and Guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands. Improved range conditions as a result of implementing the revised grazing Standards and Guidelines should benefit prey species for both the wolverine and red fox, especially as sight specific allotment management plans are developed.

Since the year 2000, more than 73,345 acres of vegetation management activities have occurred on the PNF. These activities primarily thinned, masticated and/or burned vegetation to reduce the potential for catastrophic wildfires. It is uncertain how vegetation treatments actually affect the wolverine as no empirical data exists on how vegetation management affects habitat quality for both the wolverine and the red fox. In general, management treatments which maintain or enhance habitat for deer should benefit the wolverine.

Table 55. Cumulative effects to Wolverine and Sierra Nevada Red Fox from Route Density, Habitat Fragmentation and Disturbance to a Specific Site

Alternatives	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Present and Past Effects					
Route Density - Total Combined Percent of PNF with route densities categories of 4 to 6 Miles/square mile (lower security) and >6 miles/square mile (least security habitat)	20%	12%	6%	8%	12%
Habitat Fragmentation - Total Percent of Forest within 200 meters of existing and proposed motorized routes (approximate percentage, some overlap on routes may occur)	14%	5%	3%	3.5%	4.6%
Future Effects					
Potential for route proliferation contributing to route density and habitat fragmentation into the future	High potential for increased route density and habitat fragmentatio	Low potential for increased route density and habitat fragmentation– Cross-	Low potential for increased route density and habitat fragmentation – Cross-	Low potential for increased route density and habitat fragmentation – Cross-	Low potential for increased route density and habitat fragmentatio

Alternatives	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	n in the future due to unmanaged cross-country travel	country route proliferation would be prohibited	country route proliferation would be prohibited	country route proliferation would be prohibited	n– Cross-country route proliferation would be prohibited
Cumulative Effects					
Overall Cumulative Effect of past, present and future motorized routes to wolverine and red fox	Highest cumulative effect from route density and percent of Forest fragmented by routes	Moderate cumulative effects of route density and habitat fragmentatio n. (similar to Alt 5)	Lowest cumulative effects of route density and habitat fragmentation.	Low Cumulative effects of route density and habitat fragmentation .	Moderate cumulative effects of route density and habitat fragmentatio n (similar to Alt 2)

Vegetation and fuels treatments generally do not increase forage quality and quantity for deer (wolverine prey species) because they do not usually result in reducing the canopy cover below 40% which would not necessarily increase the production of understory species important for deer foraging. These treatments may result in the short-term reduction in cover for the California wolverine and the Sierra Nevada red fox, though it is expected that in the longer term, habitat will be protected by reducing wildfire risk. Between 1990 and 2007, approximately 266,963 acres burned on the PNF, some of which have removed forested habitat for wide-ranging species.

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

The wolverine and the red fox are considered to be primarily associated with areas with low human influence, such as remote wilderness and roadless areas. Increased recreational use on the PNF in the near future has the potential to impact wolverine if den sites at high elevation subalpine and alpine areas are disrupted during the breeding period (January to June 30). Increases in recreational activities associated with motorized routes are generally not likely to affect subalpine and alpine areas considered to be suitable for wolverine and red fox denning habitat when they are covered by snow.

After considering all of the cumulative effects of past, present and reasonably foreseeable future impacts from vegetation/fuels projects, wildfires and recreation, the five alternatives are ranked in order of highest to lowest cumulative effect.

Alternative 1 poses the highest cumulative effect to the wolverine and red fox based on two primary factors; 1) the allowance of cross country travel and the potential for proliferation of additional routes across of the forest, and 2) provides the highest percentage (20%) of lower (route density category 4-6 mi/sq. mi.) and least (route density category >6 mi/sq. mi.) security level habitat on the PNF.

Alternatives 2 and 5 pose a moderate cumulative effect and improve habitat conditions for the wolverine and red fox compared to Alternative 1. This is based on two primary factors; 1) Alternatives 2 and 5 would prohibit cross country travel and the proliferation of additional routes across the forest, and 2) would reduce the percent of habitat in the lower and least security levels from 20% under Alternative 1 to 12%, and increase the amount of habitat in the High and Moderately High security levels from 21% under Alternative 1 to 30% under Alternatives 2 & 5.

Alternative 4 poses a low cumulative effects and improves habitat conditions for the wolverine and red fox compared to Alternative 1. This is based on two primary factors; 1) Alternative 4 would prohibit cross country travel and the proliferation of additional routes across the forest, and 2) would reduce the percent of habitat in the lower and least security levels from 20% under Alternative 1 to 8%, and increase the amount of habitat in the High and Moderately High security levels from 21% under Alternative 1 to 30% under Alternative 4.

Alternative 3 poses the lowest cumulative effects and improves habitat conditions for the wolverine and red fox compared to Alternative 1. This is based on two primary factors; 1) Alternative 3 would prohibit cross country travel and the proliferation of additional routes across the forest, and 2) would reduce the percent of habitat in the lower and least security levels from 20% under Alternative 1 to 6%, and increase the amount of habitat in the High and Moderately High security levels from 21% under Alternative 1 to 35% under Alternative 3.

3.7.7.2.3 Sensitive Species Determinations

Alternative 1 – This alternative may adversely affect, and is likely to result in a trend toward federal listing and a loss of viability for the California wolverine or the Sierra Nevada red fox. This determination is based on the rationale that cross country travel would continue in the future and lead to additional loss of habitat, an increase in habitat fragmentation, and result in an increase in the percent of habitat within the lower and least security level habitat categories over time.

Alternatives 2, 3, 4 and 5 - These alternatives may affect, but are not likely to adversely affect or result in a trend toward Federal listing or loss of viability for the California wolverine or the Sierra Nevada red fox within the planning area of the Plumas National Forest. This determination is based on the rationale that the action alternatives would prohibit current and future cross-country travel across the PNF, that habitat fragmentation and route densities would be considerably reduced compared to Alternative 1 (No-action), and that a higher percentage of habitat would be maintained at the High and Moderately High security level categories.

In the absence of a range wide viability assessment, this viability determination is based on local knowledge of this species as discussed previously in this evaluation and professional judgment.

3.7.8 Forest Associated Species (Late successional): Affected Environment

The late-successional forest group is comprised of the California spotted owl (*Strix occidentalis occidentalis)*, northern goshawk (*Accipiter gentilis*), great gray owl (*Strix nebulosa*), American marten (*Martes americana*) and Pacific fisher (*Martes pennanti*). These species are associated with late-successional forests that can be impacted by activities associated with trails and roads. Gaines et al. (2003), conducted a literature review where 71 late-successional forest associated wildlife species were identified that were negatively impacted by a variety of road and trail-associated factors. These impacts include habitat loss and fragmentation, road avoidance or displacement, harassment and others. Growing concern over habitat fragmentation for late-successional associated species has been expressed by individuals, environmental groups and agency biologists. In addition, studies have shown that species within this group are sensitive to disturbance.

According to the Sierra Nevada Forest Plan Amendment (2004), which amended the PNF Forest Plan (1988), habitat types that are important for late-successional/old forest associated species (e.g. spotted owl, goshawk, marten and fisher.) are California Wildlife Habitat Relationship (CWHR) 4M, 4D, 5M, 5D and 6 vegetation types (stands of trees ≥11” dbh with >40% canopy cover). In addition, the Sierra Nevada Forest Plan Amendment provides broad management direction for Old Forest Emphasis Areas where they are “managed to maintain or develop old forest habitat in areas containing the best remaining large blocks or landscape concentrations of old forest and areas that provide old forest functions (such as connectivity of habitat over a range of elevations to allow migration of wide-ranging old-forest-associated species.”

Finally, the PNF developed a Draft Carnivore Network based on suitable and potential suitable habitat for marten and fisher that provides another way of evaluating impacts to late-successional species and their habitats.

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

- Mortality or injury resulting from a motorized vehicle running over or colliding with an animal
- Loss and resulting fragmentation of habitat due to the establishment of roads, trails, or networks and associated human activities
- Changes to habitat microclimate associated with the edge induced by roads or trails
- Collection of live animals for use as pets (such as amphibians and reptiles) as facilitated by the physical characteristics of roads or trails or by road or trail access
- A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise
- Displacement of individual animals from a specific location that is being used for reproduction and rearing of young
- Increase in heart rate or stress hormones when near a road or trail or network of roads or trails

3.7.9 Forest Associated Species (Late-successional): Environmental Consequences

3.7.9.1 Effects Common to All Late-successional Species

3.7.9.1.1 Changes in Class of Vehicles

Responses to motor vehicle use vary by species and depend upon the type of vehicle, the intensity, timing, speeds and amount of motorized vehicle use. For this analysis, it is assumed that all vehicle types result in the same disturbance to all late-successional species. Therefore, changes in the class of vehicles would not vary in their effects to late-successional associated species for all of the alternatives.

3.7.9.2 Analysis Measures for Direct and Indirect Effects

Two primary metrics will be used to evaluate the effects of the alternatives to late-successional forest species as follows:

1. **Zone of influence**: the Zone of Influence is analyzed for each alternative to measure habitat fragmentation and other zonal effects associated with motorized routes and trails including noise disturbance, avoidance, edge effects, mortality, etc. The distance from routes used to calculate the Zone of Influence for selected species in the group was determined from a thorough review of available literature. For all species in this group, a Zone of Influence of 200-meters encompasses a greater array of potential route associated effects to old forest species including edge effects, habitat fragmentation and habitat effectiveness.
2. **Disturbance at a specific site**: Disturbance at a specific site was analyzed for California spotted owl and northern goshawk by determining the number of miles of proposed trails within Protected Activity Centers. Also, the number of miles occurring within ¼-mile of a reproductive site (nest site or nest grove) were evaluated by alternative under the species discussions for California spotted owl and northern goshawk, since disturbances within ¼-mile of a reproductive site have been shown to disrupt or cause reproductive failure to these species.

3.7.9.3 Analyzing for Cumulative Effects

This analysis of cumulative effects focuses on the cumulative effects associated with roads and trails including motorized on NFS lands. Other cumulative effects to old forest associated species include cumulative effects of vegetation management, fuels reduction, catastrophic wildfires, recreation, grazing and others. These cumulative effects are complex and difficult to quantify over space and time.

For this analysis, cumulative effects are simply the sum total of direct and indirect effects of the project alternatives plus the past and reasonably foreseeable future impacts of the existing NFS motorized trails. Adverse cumulative impacts include all of the unauthorized routes proposed for addition to the NFTS as trails and the existing NFS motorized trails. This analysis assumes all motorized routes or trails have the same impact on old forest species. Reasonably foreseeable impacts from motorized use are considered by assessing the potential for motorized route proliferation for each alternative.

3.7.9.3.1 Cumulative Effects Boundary

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

3.7.9.4 Late-successional Forest Habitat (CWHR types 4M, 4D, 5M, 5D and 6)

Zone of Influence**: For each of the alternatives, the Zone of Influence within late-successional forest habitat (CWHR 4M, 4D, 5M, 5D, 6) was determined to be 200 meters (**

Table 56). In general, a 60-meter Zone of Influence represents habitat fragmentation to old forest species as it relates to habitat components, such as snag and down log removal along routes for public fuelwood and public safety hazards. Delaney et al. (1999) found that old forest species, such as the spotted owl, were shown to be sensitive to noise disturbance generated by helicopters within a distance of 100 meters, therefore a 100-meter Zone of Influence can represent habitat effectiveness for old forest species. Gaines et al. (2003) reported that brown creepers and other forest interior bird species avoided an area within 200 meters of motorized routes. Potential impacts within a 200-meter Zone of Influence to late-successional associated species includes potential negative impacts including avoidance due to noise disturbance or edge effects, habitat fragmentation, introduction of invasive species (i.e. brown-headed cowbirds), microclimate changes and others. A 200-meter Zone of Influence will encompass all three distance scales.

Zone of Influence may vary by species and by species responses to route type, level of use and intensity. Since absolute thresholds of concern for any given species are difficult to determine due to limited research on effects of routes, a 200-meter Zone of Influence was selected that would represent the array of responses that route-associated factors might influence fitness or distribution of species in the group. Species-specific discussion in relation to the 200-meter Zone of Influence will be discussed in detail.

3.7.9.5 Direct and Indirect Effects

3.7.9.5.1 Zone of Influence at 200 meters

Comparing the Zone of Influence at 200 meters of routes/proposed trails within mature and late-successional forest as classified by CWHR types 4M, 4D, 5M, 5D and 6, provides a relative indication of how the alternatives affect habitat effectiveness for many late-successional forest associated species, such as forest carnivores (i.e. marten and fisher). As indicated above, a study by Gaines et al. 2003 indicated that forest interior bird species avoided an area within 200 meters of motorized routes. Potential impacts within a 200-meter Zone of Influence to late-successional associated species includes; avoidance due to noise disturbance or edge effects, habitat fragmentation, introduction of invasive species (i.e. brown-headed cowbirds), microclimate changes and others.

Table 8 displays the direct and indirect effects of the five alternatives analyzed and the amount of late-successional forest habitat that would be impacted by open unauthorized routes or proposed trail additions to the transportation system. Alternative 1 contributes considerably to reduced habitat effectiveness for old forest species where 126,276 acres of late-successional forest habitat would be negatively influenced by unauthorized routes. The amount of habitat affected would be expected to increase over time since cross country travel would be allowed to continue under Alternative 1. All the action alternatives (2-5) are expected to improve habitat effectiveness for late successional forest species compared to Alternative 1 due to the prohibition of cross country travel and the significantly reduced acres affected by each alternative. Alternatives 2 reduces habitat effectiveness for old forest associated species on approximately 38,431 acres, an improvement of 87,845 acres when compared to Alternative 1. Alternative 5 reduces habitat effectiveness for old forest associated species on approximately 27,451 acres, an improvement of 98,825 acres when compared to Alternative 1. Alternative 4 reduces habitat effectiveness for old forest associated species on approximately 16,741 acres, an improvement of 109,535 acres when compared to Alternative 1. Alternative 3 would not contribute to a direct or indirect reduction in habitat effectiveness for late-successional forest associated species at 200 meters as no unauthorized routes would be added to the system.

Table 56. Acres of CWHR 4M, 4D, 5M, 5D and 6 (Late-successional Forest) that lie within 200-meters of proposed trail additions or open unauthorized routes.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Acres of late-successional forest (CWHR 4M, 4D, 5M, 5D and 6) within a 200-meter Zone of Influence	126,276	38,431	0	16,741	27,451

3.7.9.6 Cumulative Effects -

3.7.9.6.1 200-meter Zone of Influence

Appendix C provides a list of Present and Reasonably Foreseeable Future Actions and descriptions of their project location and the actions involved that may be occurring on NFS lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to late-successional associated species within the cumulative effects boundary. See overall cumulative effects for spotted owl for a summary of cumulative effects from past, present and reasonably foreseeable projects for all late-successional species.

Zone of Influence: The cumulative effects to mature/late-successional forests (CWHR types 4M, 4D, 5M, 5D, 6) within a 200-meter Zone of Influence are compared for the five alternatives in Table 57.

Table 57. Cumulative Effects for Proportion of Late-successional Forest (CWHR 4M, 4D, 5M,5D, 6) within 200-meters of Routes

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and Indirect Effects of the alternatives					
Existing unauthorized routes or proposed trail additions	126,276	38,431	0	16,741	27,451

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Cumulative effects of past, present and proposed actions					
Existing motorized routes- NFS lands	16,471	16,471	16,471	16,471	16,471
Total Cumulative Effects					
Overall Cumulative Effects	**142,747**	**54,902**	**16,471**	**32,942**	**43,922**

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

When comparing the cumulative effects to late-successional forests within a 200-meter Zone of Influence by adding up all of the direct and indirect effects of the alternatives plus the cumulative effects of past, present and future actions, Alternative 1 poses the highest cumulative effects and the greatest risk to habitat connectivity associated with routes within late-successional forest habitat due to two primary factors; 1) Alternative 1 would contribute considerably and add to the proliferation of unauthorized routes since unmanaged cross-country motorized travel would continue into the future and would have a high likelihood of increasing in future years, and 2) Alternative 1 affects approximately 142,747 acres of late-successional forest habitat, which is significantly higher than any of the action alternatives (2-5).

All the action alternatives significantly reduce cumulative effects to late-successional forest habitat when compared to Alternative 1. Alternatives 2 and 5 reduce cumulative effects significantly down to 54,902 and 43,922 acres respectively, and pose a moderate risk to habitat connectivity associated with routes within late successional forest habitat. In addition to the significant reduction in acres affected under Alternatives 2 and 5, these action alternatives also prohibit cross country travel and the proliferation of additional routes across the Forest.

Alternative 4 further reduces cumulative effects down to 32,842 acres and represents a low risk to habitat connectivity associated with routes within late successional forest habitat. Alternative 4 also prohibits cross country travel and the proliferation of additional routes across the Forest.

Alternative 3 represents the alternative with the lowest cumulative effect and lowest risk to habitat connectivity associated with routes within late successional forest habitat. Alternative 3 would cumulatively affect only 16,471 acres of late-successional forest habitat, which is a reduction of over 126,006 acres when compared to the cumulative effects represented by Alternative 1. In addition, Alternative 3 prohibits cross country travel and the proliferation of additional routes across the Forest. Alternative 3 would pose the best scenario for late-successional forest species.

3.7.9.7 Direct and Indirect Effects in Old Forest Emphasis Areas

3.7.9.7.1 Zone of Influence in Old Forest Emphasis Areas (OFEAs)

The zones of influence within OFEAs are analyzed for the alternatives within 200 meters of unauthorized routes and proposed trails (Table 58).

3.7.9.7.2 200-Meter Zone of Influence

Comparing the Zone of Influence at 200 meters of unauthorized routes and proposed trails provide a relative indication of how the alternatives affect habitat effectiveness for late-successional forest associated species within OFEAs. Potential negative impacts within a 200-meter Zone of Influence to late-successional associated species includes avoidance due to noise disturbance or edge effects, habitat fragmentation, introduction of invasive species (i.e. brown-headed cowbirds), microclimate changes and others.

Table 10 provides data from the analysis conducted on a 200 meter zone of influence from unauthorized routes (Alternative 1) and proposed trails (Alternatives 2-5) to determine the amount of OFEAs that would have direct and indirect impacts. Alternative 1 would contribute to the highest reduced habitat effectiveness for old forest species where 91,865 acres of OFEAs would be directly and indirectly influenced by continued use of existing unauthorized routes. This level of impact would likely increase in future years due to the proliferation of additional routes across the landscape as cross country travel would be allowed under Alternative 1.

All of the action alternatives (2-5) significantly reduce direct and indirect impacts to late successional associated species within OFEA, plus prohibit cross country travel and the proliferation of additional routes across the landscape. Alternative 2 would have direct and indirect impacts on 22,966 acres of OFEA's, which represents a reduction of 68,899 acres from Alternative 1. Alternative 5 would have direct and indirect impacts on 17,225 acres of OFEAs, which represents a reduction of 74,640 acres from Alternative 1. Alternative 4 would have direct and indirect impacts on 8,612 acres of OFEAs, which represents a reduction of 83,253 acres from Alternative 1. Alternative 3 would not contribute to direct or indirect impacts to late successional associated species within OFEAs, since no new trails would be added.

Table 58. Acres of OFEAs occurring within the 200-meter Zone of Influence of unauthorized routes and proposed trails to be added to the system.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Acres of OFEAs within 200 meters of unauthorized routes and proposed trails.	91,865	22,966	0	8,612	17,225

3.7.9.8 Cumulative Effects from Zone of Influence in Old Forest Emphasis Areas (OFEAs)

The cumulative effects to OFEAs within a 200-meter Zone of Influence are compared for the alternatives (Table 59).

3.7.9.8.1 200-Meter Zone of Influence

Table 11 displays the data generated from analysis of cumulative effects to OFEA within a 200-meter Zone of Influence. Cumulative effects to OFEAs within a 200-meter Zone of Influence were determined by summing the direct and indirect effects of the alternatives and the cumulative effects of past, present and future actions,

Alternative 1 poses the highest cumulative effect to late successional species within OFEAs based on two primary factors; 1) the allowance of cross country travel and the potential for proliferation of additional routes across of the forest, and 2) cumulatively impacts 103,348 acres of OFEAs on the PNF.

Alternatives 2 and 5 pose a moderate cumulative effect by reducing impacts to late successional species within OFEAs when compared to Alternative 1. This is based on two primary factors: 1) Alternatives 2 and 5 would prohibit cross country travel and the proliferation of additional routes across the forest, and 2) would reduce the amount of OFEAs impacted from 103,348 acres under Alternative 1 down to 34,449 acres under Alternative 2 and down to 28,708 acres under Alternative 5.

Alternative 4 poses a low cumulative effect by reducing impacts to late successional species within OFEAs when compared to Alternative 1. This is based on two primary factors: 1) Alternative 4 would prohibit cross country travel and the proliferation of additional routes across the forest, and 2) would reduce the amount of OFEAs impacted from 103,348 under Alternative 1 down to 20,095 acres under Alternative 4.

Alternative 3 poses the lowest cumulative effects by reducing impacts to late successional species within OFEAs when compared to Alternative 1. This is based on two primary factors; 1) Alternative 3 would prohibit cross country travel and the proliferation of additional routes across the forest, and 2) would reduce the amount of OFEAs impacted from 103,348 under Alternative 1 down to 11,483 acres under Alternative 3. Alternative 3 would pose the best scenario for late-successional forest species within OFEAs.

Table 59. Cumulative Effects to Old Forest Emphasis Areas within a 200-meter Zone of Influence of All Routes within the Boundary of the PNF.

	Alt 1[1]	Alt 2	Alt 3	Alt 4	Alt 5
Direct and Indirect Effects of the alternatives					
Existing unauthorized routes or proposed trail additions	91,865	22,966	0	8,612	17,225
Cumulative Effects of past, present and proposed actions					
Existing motorized trails - NFS lands	11,483	11,483	11,483	11,483	11,483
Total Cumulative Effects					
Overall Cumulative Effects	**103,348**	**34,449**	**11,483**	**20,095**	**28,708**

[1]Alternative 1 includes the open existing unauthorized routes, while all action alternatives include proposed trails.

3.7.10 Spotted Owl: Affected Environment

The California spotted owl is designated by the Regional Forester as a Sensitive Species and is selected as an Management Indicator Species on the Plumas National Forest (PNF). The PNF has 277 designated California spotted owl Protected Activity Centers. Protected Activity Centers are delineated around spotted owl territorial pairs or territorial individuals. The Sierra Nevada Forest Plan Amendment (2004) provides direction to designate Protected Activity Centers (PACs) and Home Range Core Areas (HRCAs) by using CWHR types 6, 5D, 5M, 4D and 4M. These CWHR types are in essence considered suitable habitat (nesting and foraging) for California spotted owls. Pure eastside pine types are not considered suitable for California spotted owls. Currently, there are 549,028 acres of suitable California spotted owl habitat with CWHR types 6, 5D, 5M, 4D and 4M on the PNF (not including the pure eastside pine type).

The PNF has conducted surveys for spotted owl presence and reproductive status across the Forest since the early 1980s. Based on survey results to date, 277 Protected Activity Centers (PACs) and 268 Home Range Core Areas (HRCA) have been designated covering 278,747 acres within the PNF administrative boundary (Table 60). PACs and HRCAs are comprised of the best available habitat encompassing approximately 300 and 700 acres respectively.

Table 60. Number of California spotted owl Protected Activity Centers by Ranger District on the Plumas National Forest.

*Includes loss of 20 PACs as a result of the 2007 Moonlight Fire

Ranger District	Number of PACS
Mount Hough	116*
Feather River	124
Beckwourth	37
Total	**277**

3.7.11 Spotted Owl: Environmental Consequences

Gaines et al. (2003) reviewed studies on the Northern spotted owl and determined that road and trail associated factors that were likely to affect spotted owls were collisions, disturbance at a specific site, physiological response, edge effects and snag reduction. These same factors are expected to affect the California spotted owl in a similar way based upon available literature (Verner et al. 1992, Seamans 2005, Blakesley 2003).

Collisions: Collisions with vehicles are known to be a source of mortality for spotted owls. The degree to which this occurs on the PNF is unknown. However, at least two spotted owls were killed by vehicles on the Eldorado NF. The risk of spotted owl mortality from illegal shooting is also a possibility, but the degree to which this is happening is unknown as well.

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

A study by Wasser et al. (1997) found that stress hormone levels were significantly higher in male Northern spotted owls (but not females) when they were located <0.41 km (0.25 mi) from a major logging road compared to spotted owls in areas >0.41 km (0.25 mi) from a major logging road. It is not well understood how elevated stress hormones affect spotted owl populations. However, Mara and Holberton (1998) reported that chronic high levels of stress hormones (corticosterone) may have negative effects on reproduction or the physical condition of individual owls. Swartout and Steidl (2001) found hikers caused juvenile and adult spotted owls to flush at <12meters (< 39 feet) and <24 meters (79 feet), respectively. Mexican spotted owls did not elicit any response from hikers that exceeded a distance of 55 meters (180 feet).

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

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

3.7.11.1 Analysis Measures for Direct and Indirect Effects to Breeding Spotted Owls

Miles of open trails/routes and proposed trails within Spotted Owl Protected Activity Centers (PACs) and within 0.25-mile of Spotted Owl Activity Centers to Assess Potential Disturbance to Breeding Spotted Owls: The direct and indirect effects to breeding spotted owls may be measured by the amount of disturbance that may be generated from noise or other trail and road associated factors within 1) the designated **Protected Activity Centers (PACs)** and within 2) a **0.25-mile radius circle of spotted owl Activity Centers** (nest or nest stand). PACs are delineated surrounding each territorial spotted owl activity center detected since 1986. PACs are delineated to include known and suspected nest stands and encompass the best available 300 acres of habitat which include 2 or more canopy layers, trees in the dominant and co-dominant crown classes averaging 24” dbh or greater, at least 70 percent tree canopy cover and in descending order of priority, CWHR classes 6, 5D, 5M, 4D and 4M and other stands with at least 50% canopy cover. Activity Centers are known nest sites or suspected nest stands.

Zone of Influence within PACs and HRCAs to assess potential habitat fragmentation and edge effects: In addition, to determining the habitat fragmentation potential from zones of influence within suitable spotted owl habitat within CWHR types 4M, 4D, 5M, 5D, and 6, zones of influence were determined within spotted owl PACs and HRCAs within the 200-meters scale from open unauthorized routes and proposed trails.

3.7.11.2 Direct and Indirect Effects to Breeding Spotted Owls

3.7.11.2.1 Protected Activity Centers

The miles of proposed unauthorized motorized routes to be added to the travel management system are compared to determine how the various alternatives have the potential to impact breeding spotted owls from noise disturbance and other factors associated with motorized use.

Table 61 displays by alternative the analysis conducted to determine the total miles of unauthorized motorized routes and trails proposed for adding to the transportation system within spotted owl Protected Activity Centers (PACs), and the number and percentage of PACs affected.

Based on the data contained in Table 13, Alternative 1 results in the highest level of direct and indirect impacts within spotted owl PACs and to breeding spotted owls. Under Alternative 1, a total of 77 miles of unauthorized routes would impact approximately 139 PACS, and have the potential to directly and indirectly affect breeding across 50% of the known owl territories on the PNF. These direct and indirect effects are expected to increase under Alternative 1 since cross country travel would be allowed and the potential for proliferation of additional routes across the Forest.

All action alternatives (2-5) significantly reduce direct and indirect impacts to spotted owl PACs and breeding owls across the PNF. In addition, under Alternatives 2-5, cross-country travel is prohibited, which further reduces any direct or indirect impacts that may result from the proliferation of additional routes across the Forest.

Alternative 2 significantly reduces direct and indirect impacts to owl PACs and to breeding owls by reducing proposed trail miles within PACs by 50 miles (77 miles – 27 miles) and impacting 88 less owl PACs (139 – 51) when compared to Alternative 1. Alternative 2 also reduces the direct and indirect effects to breeding from 50% under Alternative 1 to 18% of the known owl territories on the PNF.

Alternative 5 significantly reduces direct and indirect impacts to owl PACs and to breeding owls by reducing proposed trail miles within PACs by 59 miles (77 miles – 18 miles) and impacting 104 less owl PACs (139 – 35) when compared to Alternative 1. Alternative 5 also reduces the direct and indirect effects to breeding from 50% under Alternative 1 to 13% of the known owl territories on the PNF.

Alternative 4 significantly reduces direct and indirect impacts to owl PACs and to breeding owls by reducing proposed trail miles within PACs by 67 miles (77 miles – 10 miles) and impacting 120 less owl PACs (139 – 19) when compared to Alternative 1. Alternative 4 also reduces the direct and indirect effects to breeding from 50% under Alternative 1 to just 7% of the known owl territories on the PNF.

Alternative 3 does not result in direct or indirect impacts to owl PACs or breeding owls since no proposed trails will be added to the transportation system.

Table 61. Miles of proposed trails and unauthorized routes[1] within California spotted owl Protected Activity Centers, number of PACs affected and percentage of total PACs affected on the Plumas National Forest.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles of proposed trails or open unauthorized motorized routes within spotted owl protected activity centers (PACs)	77	27	0	10	18
Number of spotted owl PACs intersected by proposed trails and open unauthorized routes	139	51	0	19	35
Percent of PACs affected by additions to the NFTS or open unauthorized routes (Total PNF PACs = 277)	50%	18%	0%	7%	13%

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

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

Table 14 displays the potential direct and indirect effects of the five alternatives on breeding spotted owls by showing the miles of unauthorized routes and proposed trails that lie within a 0.25-mile radius circle of a nest site or nest stand (e.g. Activity Center).

Based on the analysis conducted and the data displayed in Table 14, Alternative 1 results in the highest direct and indirect effects to breeding owls as a result of noise disturbance by allowing cross country travel to continue and the potential for proliferation of additional routes across the landscape, plus approximately 25.4 miles of unauthorized routes occurring within a 0.25 mile distance of owl activity centers.

All of the action alternatives (2-5) significantly reduce the magnitude of direct and indirect effects to breeding spotted owls as the result of two primary factors: 1) the prohibition of cross country travel and 2) the significantly reduced miles of proposed trail that would occur within 0.25 miles of an Activity Center. Alternative 2 would have direct and indirect effects to breeding owls by containing 9 miles of proposed trails that would lie within 0.25 miles of an owl activity center. This represents a reduction of 16.4 miles when compared to Alternative 1.

Alternative 5 would have direct and indirect effects to breeding owls by containing 6 miles of proposed trails that would lie within 0.25 miles of an owl activity center. This represents a reduction of 19.4 miles when compared to Alternative 1 .

Alternative 4 would have direct and indirect effects to breeding owls by containing 3.5 miles of proposed trails that would lie within 0.25 miles of an owl activity center. This represents a reduction of 21.9 miles when compared to Alternative 1.

Alternative 3 would have no effect on breeding spotted owls, as no trails are proposed to be added under this alternative.

Table 62. Miles of proposed trails and open unauthorized routes[1] within 0.25-Mile radius circle of California spotted owl Activity Center (nest site or nest stand)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles of proposed trails and open unauthorized routes within 0.25-mile radius circle of Activity Centers (nest site or nest stand)	25.4	9	0	3.5	6

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.11.3 Cumulative Effects to Spotted Owl Breeding Sites

3.7.11.3.1 Cumulative Effects Boundary (Space and Time)

The cumulative density of open motorized routes increases within the larger cumulative effects analysis area that includes private lands within the Forest. The cumulative effects geographic boundary for the California spotted owls includes all spotted owl Protected Activity Centers and their associated Activity Centers (nest site or nest stand) within the boundary of the PNF. This is an appropriate scale for determining cumulative effects to spotted owls, since the PNF boundary is sufficiently large and includes 277 spotted owl territories and their home ranges across the Forest. In addition, the PNF boundary encompasses an array of spotted owl habitat conditions from low elevation to high elevation, including several vegetation types from westside mixed conifer, ponderosa pine, true fir and eastside mixed conifer. The cumulative effects timeframe is the same as other species—20 years out into the future and approximately 20 years or more into the past.

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

Appendix C provides a list of Present and Reasonably Foreseeable Future Actions and descriptions of their project location and the actions involved that may be occurring on NFS lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to the California spotted owl within the cumulative effects boundary. In its Notice of Finding on a petition to list the California spotted owl, the U.S. Fish and Wildlife Service indicated that loss of habitat to stand-replacing wildfires and habitat modification for fuels reduction were the primary risk factors to California spotted owls occurring on NFS lands (USDI Fish and Wildlife Service 2006).

Between 1990 and 2007, wildfires resulted in burning approximately 266,963 acres of various habitats across the PNF. Some, but not all have resulted in impacts to spotted owl habitats. Since 2000, more than 73,345 acres of forest vegetation and fuels thinning and mastication projects were completed, which were designed to reduce the risk of additional habitat loss to wildfires. These treatments generally do not result in habitat removal, but may result in habitat quality changes. These wildfires and vegetation treatment projects have resulted in a reduction in the amount of and quality of spotted owl habitat on the PNF since 1988.

Thinning projects designed to reduce hazardous fuels will continue to be the primary activity affecting spotted owl habitat on the Plumas (Appendix C). Although these treatments may reduce habitat quality (i.e. nesting habitat reduced to foraging habitat), it expected that suitable habitat will be maintained and it is anticipated that these treatments will reduce the amount of spotted owl habitat potentially lost from future stand-replacing wildfires (USDA Forest Service 2004).

3.7.11.3.3 Assessing Cumulative Effects from Routes

Cumulative effects to breeding spotted owls are assessed by determining the sum total miles of all motorized trails and open routes PNF within spotted owl PACs and within 0.25-mile radius of spotted owl Activity Centers. For each alternative, cumulative effects are calculated by adding the total miles of proposed trails (direct and indirect impacts) with existing motorized trails (NFS lands).

3.7.11.3.4 Cumulative Effects to Breeding Owls within Protected Activity Centers

When considering the cumulative effects of all motorized NFS trails and open routes, Alternative 1 has the highest cumulative miles of routes (89.4 miles) within spotted owl PACs on the PNF and therefore poses the greatest overall potential risk and cumulative impacts to breeding spotted owls on the PNF (Table 63). Given the magnitude of potential effects upon spotted owl nest sites and habitat and considering the projections for future increases in recreation uses and OHV activity, Alternative 1 may, over time, contribute to cumulative effects upon spotted owl populations. Because Alternative 1 does not prohibit cross-country travel, there is a potential that route proliferation may add additional routes across the PNF and increase associated cumulative impacts upon spotted owls over time.

All of the action alternatives (2-5) result in significantly less cumulative effects to breeding spotted owls when compared to Alternative 1. This is do to two primary factors: 1) cross country travel is prohibited under all four of the action alternatives (2-5), and 2) all the action alternatives (2-5) have significantly reduced miles of proposed trails within spotted owl PACs.

Alternative 2 presents a moderate risk to breeding spotted owls, which cumulatively has approximately 39.4 miles of proposed trails and existing NFS motorized trails. This risk is significantly reduced compared to Alternative 1 and represents a reduction of 50 miles of routes within PACs.

Alternative 5 presents a moderate risk to breeding spotted owls, which cumulatively has approximately 30.4 miles of proposed trails and existing NFS motorized trails. This risk is significantly reduced compared to alternative 1 and represents a reduction of 59 miles of routes within PACs.

Alternative 4 presents a low risk to breeding spotted owls, which cumulatively has approximately 22.4 miles of proposed trails and existing NFS motorized trails. This risk is significantly reduced compared to Alternative 1 and represents a reduction of 67 miles of routes within PACs.

Alternative 3 presents the lowest risk to breeding spotted owls, which cumulatively has approximately 12.4 miles of existing NFS motorized trails. This risk is significantly reduced compared to alternative 1 and represents a reduction of 77 miles of routes within PACs. Alternative 3 would pose the best scenario for breeding spotted owls and PACs.

Table 63. Cumulative miles of motorized routes within spotted owl Protected Activity Centers

Route Miles	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and indirect effects of the alternatives					
Miles of open unauthorized routes or proposed trail additions	77	27	0	10	18
Cumulative effects of past, present and proposed actions					
Miles of existing motorized trails on NFS lands	12.4	12.4	12.4	12.4	12.4
Total Cumulative Effect					
Total cumulative impact (miles of all routes)	**89.4**	**39.4**	**12.4**	**22.4**	**30.4**

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.11.4 0.25-mile Radius Circle of Activity Centers (Nest Site or Nest Stand)

Table 16 presents the analysis of cumulative effects of route or trail miles the lie within the 0.25-mile radius circle of spotted owl activity centers (nest site or nest stand). The cumulative effects analysis for activity centers results in a similar conclusion and ranking of alternatives as the cumulative effects found for PACs.

Alternative 1 has the highest cumulative miles (29.8 miles) of motorized trails and open routes when compared to the four action alternatives (2-5). Alternative 1 clearly poses the greatest cumulative risk to nesting spotted owls by allowing continued cross-country travel and the potential for proliferation of additional routes across the PNF which could increase routes miles within 0.25 miles of an activity centers in the future.

All action alternatives (2–5) significantly reduce cumulative effects to breeding owls by having less routes miles within the 0.25-mile radius circle of activity centers, and by prohibiting cross country travel and the potential of additional routes across the PNF.

Alternative 2 poses a moderate risk to breeding spotted owls by having 13.4 miles of proposed and existing trails within 0.25 miles of an activity center. The risk under Alternative 2 is moderated due to the reduction of 16.4 miles of route when compared to Alternative 1.

Alternative 5 poses a moderate risk to breeding spotted owls by having 10.4 miles of proposed and existing trails within 0.25 miles of an activity center. The risk under Alternative 5 is moderated due to the reduction of 19.4 miles of route when compared to Alternative 1.

Alternative 4 poses a low risk to breeding spotted owls by having 7.9 miles of proposed and existing trails within 0.25 miles of an activity center. The risk under Alternative 4 is lowered due to the reduction of 21.9 miles of route when compared to Alternative 1.

Alternative 3 poses the lowest risk to breeding spotted owls by having only 4.4 miles of existing trail within 0.25 miles of an activity center. The risk under Alternative 3 is low due to the reduction of 25.4 miles of route when compared to Alternative 1. Alternative 3 would pose the best scenario for breeding spotted owls and activity centers.

Table 64. Cumulative miles of unauthorized routes or proposed trails within a 0.25 Mile Radius Circle of Spotted Owl Activity Centers (Nest Sites/Stand)

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and Indirect effects of the alternatives					
Miles of open unauthorized routes or proposed trail additions [1]	25.4	9.0	0	3.5	6
Cumulative effects of past, present and proposed actions					
Miles of existing motorized trails - NFS lands	4.4	4.4	4.4	4.4	4.4
Total Cumulative Effects					
Overall Cumulative Impact	**29.8**	**13.4**	**4.4**	**7.9**	**10.4**

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.11.5 Summary of Cumulative Effects to Breeding Spotted Owls

An analysis of breeding spotted owls on the PNF at two scales (within PACs and within a 0.25-mile radius circle), indicates that cumulative effects are significantly greater under Alternative 1 (No action) compared to all of the four action alternatives (2-5). In addition, under Alternative 1, unmanaged cross-country travel would continue to occur and potentially pose even greater threats to breeding spotted owl populations on the PNF as the potential for route proliferation adds additional routes in the future. Under all of the other alternatives (2-5), cross-country travel would be prohibited and cumulative effects would be significantly reduced.

3.7.11.6 Direct and Indirect Effects to Fragmentation and Edge Effects within California Spotted Owl Protected Activity Centers

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

3.7.11.6.1 Zone of Influence at 200 meters

Spotted owl Protected Activity Centers (PACs) are delineated land allocations (SNFPA 2004), comprised of the best available spotted owl habitat, which are managed specifically for sustaining viable populations of spotted owls. For all spotted owl PACs on the PNF, the effects of the project alternatives are analyzed for the amount of habitat fragmentation and edge effects occurring by considering the Zone of Influence within PACs at the spatial scale of within 200 meters of motorized trails or open unauthorized routes (Table 65). The 200-meter Zone of Influence represents all impacts which could occur to spotted owls. Since absolute noise disturbance thresholds of concern for California spotted owls have not been established, the best available science indicates that 100 meters and 200 meters may be important noise disturbance thresholds for spotted owls and other birds of prey (Delaney 1999, Delaney and Grubb 2001, Delaney and Grubb 2003). However, current ongoing studies on spotted owls and off-highway vehicle interactions in northern California should contribute to our scant knowledge on the effects of off-highway vehicles on spotted owls.

3.7.11.6.2 Zone of Influence at 200 meters

Table 17 displays the direct and indirect effects by showing the amount of PAC acres that fall within the 200-meter Zone of Influence of proposed trails and open unauthorized routes. Direct and indirect effects of Alternative 1 within spotted owl PACs show that 14,127 acres would have reduced habitat effectiveness for spotted owls. These acres would be expected to increase under Alternative 1 over time as cross country travel would still be allowed, and the potential for route proliferation and additional routes to be added across the PNF would still exist.

All of the action alternatives (2-5) significantly reduce impacts to PACs within the 200-meter zone of influence when compared to Alternative 1. In addition all of the action alternatives prohibit cross country travel and would further reduce any future potential impacts to PACs.

Alternative 2 would directly and indirectly affect habitat effectiveness on 3,740 acres within PACs. When compared to Alternative 1, this is a reduction of 10,387 acres.

Alternative 5 would directly and indirectly affect habitat effectiveness on 2,493 acres within PACs. When compared to Alternative 1, this is a reduction of 11,634 acres.

Alternative 4 would directly and indirectly affect habitat effectiveness on 1,412 acres within PACs. When compared to Alternative 1, this is a reduction of 12,715 acres.

Alternative 3 does not propose any new trails, therefore no direct and indirect effects to habitat effectiveness within PACs would occur under this alternative.

Table 65. Acres of California spotted owl PACs affected by a 200-meter Zone of Influence of proposed trails and open unauthorized routes that would have a reduction in habitat effectiveness.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Acres of spotted owl PACs within a 200-meter Zone of Influence of proposed trails and open unauthorized routes.	14,127	3,740	0	1,412	2,493

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.11.7 Cumulative Effects

3.7.11.7.1 Zone of Influence at 200 meters

The cumulative effects of unauthorized routes and proposed trails and their 200-meter Zone of Influence within spotted owl PACs are compared for the five alternatives (Table 66).

3.7.11.7.2 200-meter Zone of Influence

Table 66 displays the results of the cumulative effects analysis for the five alternatives analyzed for impacts to habitat effectiveness within PACs that result from motorized trails and open unauthorized routes on NFS lands. When comparing the cumulative effects of trails and/or routes and their 200-meter zone of influence to spotted owl PACs (by summing the direct and indirect effects of the alternatives and the cumulative effects of past, present and future actions), Alternative 1 has the highest overall cumulative impact to PACs by affecting habitat effectiveness on 15,789 acres. Alternative 1 also poses additional risk to habitat connectivity and other negative cumulative impacts associated (including noise disturbance) by allowing cross-country travel to continue into the future.

All action alternatives significantly reduce impacts to habitat effectiveness within PACs by prohibiting cross-country travel and reducing acres affected within PACs by over 10,000 acres, when compared to Alternative 1. For example, Alternative 2 contributes to overall cumulative impacts within PACs on just 5,402 acres. Alternative 5 has slightly less cumulative effects than Alternatives 2, with only 4,155 acres affected. Alternative 4 affects the lesser amount of spotted owl habitat with 3,075 acres. Alternative 3 represents the least impact to habitat effectiveness within PACs with 1,662 acres affected.

Table 66 Cumulative effects--proportion of spotted owl Protected Activity Centers within 200-meter Zone of Influence of all motorized trails and open routes.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and Indirect effects of the alternatives					
Open unauthorized routes or proposed trail additions [1]	14,127	3,740	0	1,413	2,493
Cumulative effects of past, present and proposed actions					
Existing motorized trails - NFS lands	1,662	1,662	1,662	1,662	1,662

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Total Cumulative Effects					
Overall Cumulative Effects	**15,789**	**5,402**	**1,662**	**3,075**	**4,155**

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.11.8 Cumulative Effects Summary to PACs at 200-meter Zone of Influence

Cumulative effects of habitat effectiveness within California spotted owl PACs were assessed by determining the amount of spotted owl PACs that are influenced by motorized trails and open routes on NFS lands. A 200-meter Zone of Influence was used to determine potential effects from the influence of noise, edge effects and habitat alteration associated with motorized trails and routes.

Alternative 1 poses the highest cumulative effects and greatest risk to habitat effectiveness within PACs at the 200-meter of Zone of Influence scale. Under Alternative 1 cumulative effects would result in 15,789 acres of PAC habitat with reduced habitat effectiveness. In addition, the risk is increased since Alternative 1 would still allow cross country travel and the potential for route proliferation to add additional routes across the PNF.

Alternatives 2 significantly reduces cumulative effects to habitat effectiveness and poses a low risk to habitat effectiveness within PACs. Alternative 2 results in 5,402 acres of cumulative effects to PACs and would prohibit cross country travel. The prohibition of cross country travel would reduce the risk of route proliferation into the future.

Alternative 5 significantly reduces cumulative effects to habitat effectiveness and poses a low risk to habitat effectiveness within PACs. Alternative 5 results in 4,155 acres of cumulative effects to PACs and would prohibit cross country travel. The prohibition of cross country travel would reduce the risk of route proliferation into the future.

Alternative 2 significantly reduces cumulative effects to habitat effectiveness and poses a low risk to habitat effectiveness within PACs. Alternative 2 results in 3,075 acres of cumulative effects to PACs and would prohibit cross country travel. The prohibition of cross country travel would reduce the risk of route proliferation into the future.

Alternative 3 significantly reduces cumulative effects to habitat effectiveness and poses a lowest risk to habitat effectiveness within PACs. Alternative 3 results in 1,662 acres of cumulative effects to PACs and would prohibit cross country travel. The prohibition of cross country travel would reduce the risk of route proliferation into the future. Alternative 3 would pose the best scenario for habitat effectiveness within PACs for the spotted owl.

3.7.11.9 Home Range Core Areas—Direct and Indirect Effects

3.7.11.9.1 Zone of Influence at 200 meters

Delineated California spotted owl Home Range Core Areas (HRCAs) are comprised of approximately 700 acres of the best available spotted owl habitat (SNFPA 2004) surrounding the ~300-acre core nest area (PAC). The HRCAs are delineated to represent spotted owl foraging habitat, whereas, PACs are delineated as spotted owl nesting habitat.

To evaluate habitat fragmentation, noise disturbance and edge effects on spotted foraging habitat or HRCAs, the Zone of Influence of proposed motorized trails and open unauthorized routes within spotted owl HRCAs was determined for each alternative within 200-meters (Table 67).

3.7.11.9.2 Zone of Influence at 200-meters

Table 19 displays the results of the direct and indirect impacts that were analyzed within the 200 meter Zone of Influence of open unauthorized routes and proposed trails within spotted owl HRCAs.

Alternative 1 directly and indirectly reduces habitat effectiveness on 35,607 acres within spotted owl HRCAs. All action alternatives (2-5) significantly reduce impacts to habitat effectiveness within HRCAs by over 25,000+ acres. Alternatives 2 results in a reduction of habitat effectiveness within spotted owl HRCAs on 9,391 acres. Alternative 5 results in a reduction of habitat effectiveness within spotted owl HRCAs on 6,456 acres. Alternative 4 results in a reduction of habitat effectiveness within spotted owl HRCAs on 3,522 acres. Alternative 3 proposes no additional proposed trails and, therefore, would have no direct and indirect effects within the 200-meter Zone of Influence in spotted owl HRCAs.

Table 67. Acres of California spotted owl Home Range Core Areas (HRCAs) within a 200-meter Zone of Influence of open unauthorized routes and proposed trails.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Acres of spotted owl HRCAs within a 200-meter Zone of Influence of open unauthorized routes and proposed trails	35,607	9,391	0	3,522	6,456

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.11.10 Cumulative Effects to Home Range Core Areas

3.7.11.10.1 Zone of Influence at 200 meters

The cumulative effects to spotted owl HRCAs within a 200-meter Zone of Influence are compared for the alternatives (

Table 68). As previously discussed, the cumulative effects analysis presented here only provides a relative comparison of cumulative effects to spotted owl foraging habitat in HRCAs from unauthorized routes and proposed trails.

3.7.11.10.2 200-meter Zone of Influence

Table 68 displays the cumulative effects of the alternatives of motorized routes on NFS lands within spotted owl HRCAs. When comparing the cumulative effects to HRCAs from routes and their associated 200-meter Zone of Influence (i.e., summing the direct and indirect effects of the alternatives and the cumulative effects of past, present and future actions), Alternative 1 has the highest cumulative impact where approximately 39,520 acres of foraging habitat within HRCAs would be affected. Alternative 1 would pose the highest risk to habitat connectivity and other negative cumulative impacts (i.e., noise disturbance) within spotted owl HRCAs due to continued route proliferation since unmanaged cross-country travel would continue into the future.

All the action alternatives significantly reduce cumulative effects to spotted owl foraging habitat within HRCAs. Alternative 2 contributes to overall cumulative impacts within HRCAs on 13,304 acres, which is a decrease of 26,216 acres from Alternative 1. Alternative 5 contributes to overall cumulative impacts within HRCAs on 10,369 acres, which is a decrease of 29,151 acres from Alternative 1. Alternative 4 contributes to overall cumulative impacts within HRCAs on 7,435 acres, which is a decrease of 32,085 acres from Alternative 1. Alternative 3 contributes to overall cumulative impacts within HRCAs on 3,913 acres, which is a decrease of 35,607 acres from Alternative 1.

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

The proportion of spotted owl Home Range Core Areas (HRCAs) within a 200-meter Zone of Influence of all motorized trails and open unauthorized routes within NFS lands was determined to assess the cumulative effects from the alternatives.

Alternative 1 poses the highest cumulative effects and greatest risk to spotted owl HRCAs that would be used for foraging spotted owls from route associated factors including noise, edge effects and habitat fragmentation based on two primary factors: 1) the amount of acres affected which total 39,520 acres, and 2) the continued allowance of cross country travel and the risk for potential addition of routes as a result of route proliferation.

Alternative 2 poses a moderate cumulative effect and risk to spotted owl HRCAs. This is based on two primary factors: 1) the amount of acres affected which total 13,304 acres, and 2) the prohibition of cross country travel and reduced risk of route proliferation across the PNF.

Alternative 5 poses a moderate cumulative effect and risk to spotted owl HRCAs. This is based on two primary factors: 1) the amount of acres affected which total 10,369 acres, and 2) the prohibition of cross country travel and reduced risk of route proliferation across the PNF.

Alternative 4 poses a low cumulative effect and risk to spotted owl HRCAs. This is based on two primary factors: 1) the amount of acres affected is low, 7,435 acres, and 2) the prohibition of cross country travel and reduced risk of route proliferation across the PNF.

Alternative 3 poses the lowest cumulative effect and risk to spotted owl HRCAs. This is based on two primary factors: 1) the amount of acres affected are the lowest at 3,913 acres, and 2) the prohibition of cross country travel and reduced risk of route proliferation across the PNF.

Table 68. Cumulative effects—acres of California spotted owl Home Range Core Areas that lie within a 200-meter zone of influence of unauthorized or proposed trails.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and Indirect effects of the alternatives					
Unauthorized routes or proposed trail additions [1]	35,609	9,391	0	3,522	6,456
Cumulative effects of past, present and proposed actions					
Existing motorized routes - NFS lands	3,913	3,913	3,913	3,913	3,913
Total Cumulative Effects					
Overall Cumulative Effects	**39,520**	**13,304**	**3,913**	**7,435**	**10,369**

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.11.11.1 Sensitive Species Determinations

Based on the spotted owl analysis of effects, the Biological Evaluation for this EIS made a determination for the California Spotted Owl.

Alternative 1 – This alternative may adversely affect, and is likely to result in a trend toward federal listing and a loss of viability for the California spotted owl. This determination is based on the rationale that cross country travel would continue in the future and lead to additional loss of habitat, an increase in habitat fragmentation, and result in high risk to spotted owl PACs and HRCAs.

Alternatives 2, 3, 4 and 5 - These alternatives may affect, but are not likely to adversely affect or result in a trend toward Federal listing or loss of viability for the California spotted owl within the planning area of the Plumas National Forest. This determination is based on the rationale that the action alternatives would prohibit current and future cross-country travel across the PNF, that risks to spotted owl PACs and HRCAs would be significantly reduced compared to Alternative 1 (No-action), and that a higher amount of owl nesting and foraging habitat would be maintained for the owl.

In the absence of a range wide viability assessment, this viability determination is based on local knowledge of this species as discussed previously in this evaluation and professional judgment.

3.7.12 Northern Goshawk: Affected Environment

The northern goshawk is designated as a Forest Service Sensitive Species in Region 5. There are currently 549,028 acres of suitable goshawk habitat on the PNF as defined by CWHR types 4 M, 4D, 5M, 5D and 6. Northern goshawk territories are managed on the Plumas National Forest as Protected Activity Centers (PACs) as prescribed by the Sierra Nevada Forest Plan Amendment (2004). To date, the Plumas National Forest has 156 known northern goshawk PACs (
Table 69).

Table 69. Number of northern goshawk Protected Activity Centers by Ranger District on the Plumas National Forest.

Ranger District	Number of PACs
Feather River	60
Beckwourth	48
Mt. Hough	48
Total Number of PACs	**156**
Total Acres of PACs	**32,995**

Collection: Collection, habitat loss or fragmentation, disturbance at a specific site, and edge effects were described by Gaines et al. (2003) as being road and trail-associated factors that potentially affect the northern goshawk.

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

Disturbance at a Specific Site: Human disturbance has the potential to cause goshawk to abandon nesting during the nesting and post fledging period (February 15 through September 15). Goshawk initiate breeding when the ground is still covered in snow and sometimes nests are located along roads and trails when they are not yet in use. Additionally, roads and trails provide flight access for goshawk. When the snow melts, these sites can potentially be areas of conflict as these roads and trails are used by people. Joslin and Youmans (1999) recommends maintaining low road densities to minimize disturbance to goshawk. Grubb et al. (1998) reported that vehicle traffic from roads did not elicit any discernable behavioral response from goshawk at distances exceeding 400-meters (0.25 mile) from nests.

Habitat Loss and Fragmentation and Edge Effects: a network of roads and trails can fragment goshawk habitat by reducing canopy closure (Beir and Drennan 1997, Daw and DeStefano 2001) and by reducing forest interior patch size. However, how habitat fragmentation from roads and trails affects goshawk habitat suitability is not well understood. Generally, the wider the road, the more the fragmentation. Maintenance level 2 roads and trails probably do not pose as much a risk to habitat fragmentation compared to maintenance level 3, 4, and 5 roads, since level 2 roads are more narrow than level 3, 4, and 5 roads. For obvious reasons, state and federal highways create the greatest habitat fragmentation due to the width of the road and associated edge effects.

3.7.13 Northern Goshawk: Environmental Consequences

3.7.13.1 Analysis Measures

Miles of proposed trails and open unauthorized routes within northern goshawk Protected Activity Centers (PACs) and within 0.25 mile of northern goshawk Activity Centers to assess disturbance to breeding northern goshawk: The direct and indirect effects to breeding northern goshawk will be measured by the amount of disturbance that may be generated from noise or other trail and road associated factors within (1) the designated Protected Activity Centers (PACs) and within (2) a 0.25-mile radius circle of goshawk Activity Centers (nest or nest stand). The PACs are delineated surrounding all known and newly discovered breeding territories on NFS lands on the PNF. The PACs are designated to include the latest documented nest site and location of alternate nests (SNFPA 2004). The PACs encompass the best available 200 acres of forested habitat which include two or more canopy layers, (1) trees in the dominant and co-dominant crown classes averaging 24” dbh or greater; (2) in westside conifer and eastside mixed conifer forest types, stands have at least 70 percent tree canopy cover; and (3) in eastside pine forest types, stands have at least 60 percent tree canopy cover. Activity Centers are known nest sites or suspected nest stands. Nest abandonment and failure can result from excessive noise disturbance, that may be associated with use of motorized routes.

Zone of Influence within PACs to assess potential habitat fragmentation and edge effects: In addition, to determining the habitat fragmentation potential from zones of influence within suitable goshawk habitat within CWHR types 4M, 4D, 5M, 5D, and 6 (See effects to late-successional forest habitats in effects common to all late-successional forest associated species), zones of influence were determined within goshawk PACs at 400 meters (0.25-mile) of open unauthorized routes and proposed trails.

3.7.13.2 Direct and Indirect Effects to Breeding Northern Goshawks

3.7.13.2.1 Protected Activity Centers

The miles of open unauthorized routes and proposed trails to be added to the NFTS are compared to determine how the various alternatives have the potential to impact breeding northern goshawks from noise disturbance and other factors associated with motorized use. Table 70 displays the total miles of open unauthorized routes or proposed trails that are within goshawk Protected Activity Centers (PACs) by alternative. It also displays the number and percentage of PACs affected by proposed trails or open routes for each alternative. There are a total of 156 goshawk PACs designated on the PNF.

Alternative 1 contributes significantly to direct and indirect effects to breeding goshawk, where cross-country motorized travel would continue, including motorized use on over 45 miles of unauthorized routes, where 54% of goshawk PACs (84 PACs) on the PNF would be subjected to disturbance from the continued use of unauthorized routes.

All action alternatives (2-5) significantly reduce impacts to breeding goshawks within PACs. Alternative 2 proposes approximately 13 miles of proposed trails to be added to the PNF transportation system that would contribute to direct and indirect effects to 17% of the PNF goshawk PACs (26 PACs). This is a reduction of over 30 miles and approximately 58 PACs, when compared to Alternative 1.

Alternative 5 proposes approximately 9 miles of proposed trails to be added to the PNF transportation system that would contribute to direct and indirect effects to 11% of the PNF goshawk PACs (18 PACs). This is a reduction of over 35 miles and approximately 66 PACs, when compared to Alternative 1.

Alternative 4 proposes approximately 5 miles of proposed trails to be added to the PNF transportation system that would contribute to direct and indirect effects to 6% of the PNF goshawk PACs (10 PACs). This is a reduction of over 40 miles and approximately 74 PACs, when compared to Alternative 1.

Alternative 3 does not propose any trails within goshawk PACs and therefore would not cause direct or indirect effects to breeding goshawk within PACs.

Table 70. Miles of proposed trails and open unauthorized routes within northern goshawk Protected Activity Centers on the Plumas National Forest.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles of proposed trails and open unauthorized routes within goshawk Protected Activity Centers (PACs)	45.1	13	0	5	9
Number of goshawk PACs Intersected by proposed trails and open unauthorized routes	84	26	0	10	18
Percent of goshawk PACs affected by proposed trails and open unauthorized routes (Total PNF Goshawk PACs = 156)	54%	17%	0%	6%	11%

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.13.2.2 0.25-Mile Radius Circle of Goshawk Activity Centers (Nest Site or Nest Stand)

Table 71 displays the potential direct and indirect effects of the alternatives on breeding goshawk within a 0.25-mile radius circle of goshawk Activity Centers (nest site or nest stand). Alternative 1 poses the greatest risk from noise disturbance to breeding goshawk by allowing continued cross-country motorized travel, including motorized use on over 29 miles of unauthorized routes within the 0.25-mile of goshawk Activity Centers.

All action alternatives (2-5) significantly reduce impacts to breeding goshawks by reducing route miles within 0.25 miles of goshawk activity centers. Alternative 2 would contribute to noise disturbance from motor vehicles to breeding goshawk on approximately 10.4 miles of proposed trails that would be added within the 0.25-mile radius circle of goshawk activity centers. Alternatives 5 would contribute direct and indirect impacts on 7.1 miles of proposed trails that would be added within 0.25 miles of goshawk activity centers. Alternative 2 would contribute 3.9 miles of proposed trails within the 0.25-mile radius circle of goshawk Activity Centers. Alternatives 3 does not directly or indirectly affect breeding goshawk within a 0.25-mile radius circle of known or suspected goshawk activity centers.

Table 71. Miles of proposed trails and unauthorized routes within a 0.25-mile radius circle of northern goshawk Activity Center (nest site or nest stand).

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles of proposed trails and unauthorized routes within a 0.25-mile radius circle of Activity Centers (nest site or nest stand)	29.8	10.4	0	3.9	7.1

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.13.3 Cumulative Effects to Breeding Goshawk

3.7.13.3.1 Cumulative Effects Boundary (Space and Time)

The cumulative effects geographic boundary for breeding goshawks includes all goshawk Protected Activity Centers and their associated Activity Centers (nest site or nest stand) within the boundary of the Plumas National Forest (PNF). This is an appropriate scale for determining cumulative effects to the goshawk, since the PNF boundary is sufficiently large and includes 156 goshawk territories. In addition, the PNF boundary encompasses an array of goshawk habitat conditions from low elevation to high elevation, including several vegetation types including westside mixed conifer, ponderosa pine, true fir (red fir and white fir), eastside mixed conifer, pure eastside pine, lodgepole pine and subalpine conifer. The cumulative effects timeframe is the same as other species—20 years out into the future and approximately 20 years or more into the past. In addition, cumulative effects of all past actions are incorporated into the existing condition (see discussion of cumulative effects).

3.7.13.3.2 Assessing Cumulative Effects

Cumulative effects to breeding goshawk are assessed by determining the sum total miles of all motorized trails (proposed and existing) and open unauthorized routes on the PNF within goshawk PACs and within 0.25-mile radius of goshawk Activity Centers. For each alternative, cumulative effects are calculated by adding the total miles of proposed trails or open unauthorized routes (direct and indirect impacts) with existing motorized trails (NFS lands only).

3.7.13.3.3 Protected Activity Centers

Table 24 displays the cumulative effects of all unauthorized routes, proposed trails and existing motorized trails on NFS lands. The data indicates that Alternative 1 has the most cumulative miles of routes (49 miles) within goshawk PACs on the PNF. Alternative 1 also continues the allowance of cross country travel, and therefore poses the greatest overall potential risk and cumulative impacts to breeding goshawk on the PNF.

All of the action alternatives significantly reduce cumulative effects to Goshawk PACs as a result of significantly less trail miles within PACs and the prohibition of cross country travel. Based on proposed and existing motorized trails, Alternative 2 has 16.9 miles that lie within goshawk PACs. Alternative 5 results in less cumulative miles within PACs within 12.9 miles. Alternative 4 results in 8.9 cumulative miles within Goshawk PACs. Alternative 3 results in the least amount cumulative effects to goshawk PACs within only 3.9 miles of existing trails.

Table 72. Cumulative miles of all open unauthorized routes, proposed trails and the existing NFS motorized trails within goshawk Protected Activity Centers on PNF.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and indirect effects of the alternatives					
Miles of open unauthorized routes or proposed trails to be added to system1	45.1	13	0	5	9
Cumulative effects of past, present and proposed actions					
Miles of existing NFS motorized trails	3.9	3.9	3.9	3.9	3.9
Total cumulative effects					
Total cumulative impact	**49**	**16.9**	**3.9**	**8.9**	**12.9**

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.13.3.4 0.25-mile Radius Circle of Activity Centers (Nest Site or Nest Stand)

Table 25 displays data from the analysis of cumulative effects within the 0.25-mile radius circle of goshawk Activity Centers (nest site or nest stand).

Alternative 1 has the most cumulative open route/trail miles (32.3 miles) and represents the highest cumulative effect to Goshawk activity centers. In addition, risk to Goshawk Activity Centers is increased under Alternative 1 since cross country travel would continue and the potential for route proliferation would add additional routes across the PNF.

All action alternatives (2-5) reduce cumulative effects significantly compared to Alternative 1. Alternative 2 reduces impacts to goshawk activity centers down to 12.9 miles. Alternative 5 further reduces cumulative effects down to 9.6 miles. Alternative 4 contains 6.4 miles of proposed trail within 0.25 miles of Activity Centers representing low cumulative effects to Goshawks. Alternative 3 does not add to the existing trail miles, but does represent 2.5 miles of existing trails that lie within 0.25 miles of a Goshawk Activity Center. Alternative 3 represents the least risk to nesting goshawk compared to all other alternatives.

Table 73. Miles of all unauthorized routes, proposed trails and the existing NFS motorized trails within 0.25-mile of goshawk Activity Centers (nest site or nest stand) on the Plumas National Forest.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and Indirect effects of the alternatives					
Miles of open unauthorized routes or proposed trail additions[1]	29.8	10.4	0	3.9	7.1
Cumulative effects of past, present and proposed actions					
Miles of existing motorized trails - NFS lands	2.5	2.5	2.5	2.5	2.5
Total cumulative effects					
Net cumulative impact	**32.3**	**12.9**	**2.5**	**6.4**	**9.6**

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.13.4 Direct and Indirect Effects to Fragmentation and Edge Effects within Northern Goshawk Protected Activity Centers

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

3.7.13.4.1 Zone of Influence at 400 meters (0.25 mile)

Goshawk Protected Activity Centers (PACs) are delineated land allocations (SNFPA 2004), comprised of the best available goshawk habitat, which are managed specifically for sustaining viable populations of goshawks. For all goshawk PACs on the PNF, the effects of the project alternatives are analyzed for the amount of habitat fragmentation and edge effects occurring by considering the Zone of Influence within goshawk PACs within 400 meters (0.25 mile) of unauthorized routes and proposed trails (Table 74). Although, absolute disturbance thresholds for goshawk are not readily available in the literature, Grubb et al. (1998) reported that goshawk were found to react negatively (flush) when noise associated with logging trucks were less than 400 meters (0.25 mile) from nests. Determining the acres of a goshawk PAC that is influenced by motorized trails or open routes within

400 meters (0.25 mile) gives a relative index of habitat fragmentation or habitat effectiveness at the site-specific goshawk territory scale.

Table 26 displays the direct and indirect effects to goshawk PACs within a 400-meter Zone of Influence of open unauthorized routes and proposed trails. The data indicates that Alternative 1 reduces habitat effectiveness and associated habitat fragmentation (including noise disturbance) within 14,188 PAC acres.

All the action alternatives (2-5) result in significantly reduced direct and indirect effects to Goshawk PACs. Alternative 2 reduces habitat effectiveness of within goshawk PACs by 3,959 acres. Alternatives 4 and 5 reduce habitat effectiveness within goshawk PACs on 1,650 and 2,640 acres, respectively. Of the action alternatives that add trails to the NFTS, Alternative 4 represents the least impact to goshawk PACs within the 400-meter zone of influence. Habitat effectiveness within goshawk PACs would not be affected by implementing Alternative 3, since to trails will be added under this alternative.

Table 74. Acres of PNF goshawk Protected Activity Centers that lie within a 400-meter Zone of Influence of all unauthorized routes or proposed trails.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and Indirect effects of the alternatives					
Acres of PNF Goshawk PACs within a 400 meter zone of influence.	14,188	3,959	0	1,650	2,640

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.13.4.2 Cumulative Effects within a 400-meter Zone of Influence

Table 75 displays the cumulative effects of the alternatives of proposed trails and open unauthorized routes on NFS lands. When comparing the cumulative effects of routes of goshawk PACs within a 400-meter Zone of Influence (by summing the direct and indirect effects of the alternatives and the cumulative effects of past, present and future actions), Alternative 1 has the greatest overall cumulative impact to goshawk PACs (15,838 acres) and poses the greatest risk to habitat connectivity and other cumulative impacts associated (including noise disturbance) with open routes within goshawk PACs. In addition, Alternative 1 would contribute to continued route proliferation because unmanaged cross-country motorized travel would allowed to continue into the future.

All the action alternatives significantly reduce cumulative effects to goshawk PACs as a result of two primary factors: 1) the prohibition of cross country travel, and 2) the significantly reduced amount of habitat affected within Goshawk PACs when compared to Alternative 1. Alternative 2 contributes to overall cumulative impacts within goshawk PACs on 5,609 acres, which represents a reduction from Alternative 1 of over 10,000 acres. Alternative 5 contributes to cumulative impacts on 4,290 acres, which represents a reduction of over 11,000 acres. Alternative 4 contributes to cumulative impacts on 3,300 acres which represents a reduction of over 12,000 acres. Alternative 3 contributes to cumulative effects on only 1,650 primarily due to existing trails.

Table 75. Cumulative effects—acres of goshawk Activity Centers that lie within a 400-meter (0.25-mile) Zone of Influence of unauthorized routes, proposed trails and existing NFS motorized trails.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and Indirect effects of the alternatives Unauthorized routes or proposed trail additions [1]	14,188	3,959	0	1,650	2,640
Cumulative effects of past, present and proposed actions Existing motorized trails - NFS lands	1,650	1,650	1,650	1,650	1,650
Total Cumulative Effects Overall Cumulative Effects	15,838	5,609	1,650	3,300	4,290

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.13.5 Cumulative Effects from Past, Present and Future Vegetation/Fuels and Past Wildfires

Appendix C provides a list of Present and Reasonably Foreseeable Future Actions and descriptions of their project location and the actions involved that may be occurring on NFS lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to the northern goshawk within the cumulative effects boundary.

Between 1990 and 2007, wildfires burned approximately 266,963 acres of various habitats across the PNF. Some, but not all, have resulted in impacts to spotted owl habitats. Since 2000, more than 73,345 acres of forest vegetation and fuels thinning and mastication projects were completed, which were designed to reduce the risk of additional habitat loss to wildfires. These treatments generally do not result in habitat removal, but may result in habitat quality changes. These wildfires and vegetation treatment projects have resulted in a reduction in the amount of and quality of spotted owl habitat on the PNF since 1988.

Thinning projects designed to reduce hazardous fuels will continue to be the primary activity affecting goshawk habitat on the Plumas (Appendix C). Although these treatments may reduce habitat quality (i.e. nesting habitat reduced to foraging habitat), it is expected that suitable habitat will be maintained and it is anticipated that these treatments will reduce the amount of goshawk habitat potentially lost from future stand-replacing wildfires (USDA Forest Service 2004).

3.7.13.6 Sensitive Species Determinations

Based on the analysis of direct, indirect and cumulative effects, the Biological Evaluation for this EIS made a determination for the Northern Goshawk.

Alternative 1 – This alternative may adversely affect, and is likely to result in a trend toward federal listing and a loss of viability for the Northern Goshawk. This determination is based on the rationale that cross country travel would continue in the future and lead to additional loss of habitat, an increase in habitat fragmentation, and result in high risk to Goshawk PACs and Activity Centers.

Alternatives 2, 3, 4 and 5 - These alternatives may affect, but are not likely to adversely affect or result in a trend toward Federal listing or loss of viability for the Northern Goshawk within the planning area of the Plumas National Forest. This determination is based on the rationale that the action alternatives would prohibit current and future cross-country travel across the PNF, that risks to Northern Goshawk PACs and Activity Centers would be significantly reduced compared to

Alternative 1 (No-action), and that a higher amount of nesting and foraging habitat would be maintained for the goshawk.

3.7.14 Forest Carnivores: American Marten, Pacific Fisher, Sierra Nevada Red Fox and Wolverine

Forest carnivores include the American marten, Pacific fisher, the Sierra Nevada red fox and wolverine. The Sierra Nevada red fox and the wolverine are addressed under the Wide-ranging Carnivore Group. This section will focus on the marten and fisher. Impacts to the marten and fisher will be considered together, since effects to these species are similar. More detailed information for these species can be found in the Biological Evaluation. Limited research or information on road and trail impacts to forest carnivores is available in the literature, but some information is available as described below for species considered here.

The PNF developed a Draft Forest Carnivore Network in 1988 by evaluating suitable marten and fisher habitat based on the home ranges of marten and fisher. The purpose of the Draft Forest Carnivore Network is to provide a framework for managing and maintaining linkages and connectivity for forest carnivore species including the marten, fisher, Sierra Nevada red fox and the wolverine. Forest carnivores are considered to be interior forest species where habitat fragmentation is a concern.

3.7.15 American Marten and Pacific Fisher: Affected Environment

3.7.15.1 American Marten

Martens prefer coniferous forest habitat with large diameter trees and snags, large down logs, moderate-to-high canopy closure and interspersed of riparian areas and meadows. Important habitat attributes are: vegetative diversity, with predominately mature forest, snags, dispersal cover and large woody debris (Allen 1987). Martens selected stands with 40-60% canopy closure for both resting and foraging and avoided stands with less than 30% canopy closure (Spencer et al. 1983). Martens generally avoid habitats that lack overhead cover, presumably because these areas do not provide protection from avian predators (Allen 1982, Bissonette et al 1988, Buskirk and Powell 1994, Spencer et al. 1983).

At a landscape scale, patches of preferred habitat and the distribution of openings with respect to habitat patches may be critical to the distribution and abundance of martens (Buskirk and Powell 1994). While marten use small openings and particularly meadows for foraging, these openings must occupy a small percent of the landscape. Martens have not been found in landscapes with greater than 25 percent of the area in openings (Hargis and Bissonette 1997; Potvin et al. 2000). As landscapes become fragmented, the combination of increasing isolation and decreasing patch size of suitable habitat compounds the effects of simple habitat loss (Andren 1994). For species like marten, this is likely to result in a decrease of greater magnitude than can be explained solely by the loss of suitable habitat. Marten may be a species that demonstrate exponential population declines at relatively low levels of fragmentation (Bisonette et al. 1997, *in* USDA Forest Service 2004).

3.7.15.2 Pacific Fisher

The PNF falls within an area considered to be a distribution gap within the range of the fisher (Zielinski et al. 2005). However, roads can impact fisher in ways similar to the marten through direct mortality and habitat fragmentation. Vehicular collision is a known source of fisher mortality (Heinemeyer 1993). Approximately 3.4 percent of 147 radio-collared fishers studied in Massachusetts (York 1996) and Maine (Krohn et al. 1994) were killed by vehicles. The risk of collision mortality increases with road density, but possibly increases with the density of highways and freeways where vehicle speeds are highest.

Suitable habitat for the fisher occurs primarily on the west side of the PNF. Roads can contribute to habitat fragmentation where the fisher generally avoids entering open areas that have no overstory or shrub cover; and roads and the associated presence of vehicles and humans, can cause animals to modify their behavior near roads (USDA Forest Service 2001). These indirect effects on fisher habitat could negatively affect the ability for fishers to be successfully reintroduced to the PNF. Previous studies have reported a negative correlation between detections of fisher and roads (Dark 1997, Golightly et al. 1997). Road construction associated with timber harvest activities could directly and indirectly affect fishers. If fishers avoid areas in proximity of roads, then these areas constitute habitat loss. Indirect effects would also include the effects on prey populations that may also avoid or be killed by vehicles.

Summary of road and trail associated factors to marten and fisher:

- Mortality or injury resulting from a motor vehicle running over or colliding with an animal.
- Loss and resulting fragmentation of habitat due to the establishment of roads, trails, or networks and associated human activities.
- Changes to habitat microclimate associated with the edge induced by roads or trails.
- Collection of live animals for use as pets as facilitated by the physical characteristics of roads or trails or by road or trail access.
- A physical human-induced change in the environment that provides access for competitors or predators that would not have existed otherwise.
- Displacement of individual animals from a specific location that is being used for reproduction and rearing of young.
- Increase in heart rate or stress hormones when near a road or trail or network of roads or trails.

Gaines et al. (2003) reported that marten may be affected by the following road and motorized trail-associated factors: trapping, collisions, displacement or avoidance, habitat loss or fragmentation, snag reduction, down log reduction, edge effects, movement barrier or filter and route for competitors.

Human-caused Mortality: Marten are known for their vulnerability to trapping in many parts of their range. In California, however, body-gripping traps have been banned since 1998 and, as a result, the likelihood of incidental capture of marten by legal fur trapping has been dramatically reduced. Illegal harvest threats remain and could increase in relation to greater accessibility. At present, illegal trapping or shooting of marten is not known to be a substantial source of mortality (USDA Forest Service 2001). The increased opportunity for poaching provided by increased public access may represent a substantial risk for fisher, based upon findings in the southern Sierra Nevada. Of nine recently documented fisher mortalities, two were suspected of being the result of poaching (USDI Fish and Wildlife Service 2004).

Collision: Highways and roads can result in the direct and indirect mortality of individual martens. Road collisions with vehicles have been identified as a source of marten mortality (Buskirk and Ruggerio 1994), including in the Sierra Nevada (Spencer 1981, Martin 1987). Marten road mortality on the PNF, may be of concern since State Highways 89 and 70 bisect their habitat. Collisions are much less likely to occur along the slower-speed native surface routes that are being proposed as trails in this project.

Habitat Loss and Fragmentation, Edge Effects, Movement Barriers, Displacement or Avoidance: Martens are known to be sensitive to changes in overhead cover, which can result from roads or trails (Hargis and McCullough 1984, Buskirk and Powell 1994). Roads and trails can fragment habitat, thus affecting the ability of marten to use otherwise suitable habitat on either side of the route.

The loss and fragmentation of suitable habitat by roads and development is thought to have played a significant role in both the loss of fishers from the central Sierra Nevada and its failure to recolonize this area (USFWS 2004). Campbell (2004, *in* USFWS 2004) found that sample units within the central and southern Sierra Nevada region occupied by fishers were negatively associated with road density. This relationship was significant at multiple spatial scales (from 494 to 7,413 acres). The USFWS (2004) concluded that, "vehicle traffic during the breeding season in suitable habitat may impact foraging and breeding activity" and that "hiking, biking, off-road vehicle and snowmobile trails, may adversely affect fishers." Dark (1997) found that fishers in the Shasta-Trinity National Forest used landscapes with more contiguous, unfragmented forests and less human activity.

Roads can fragment habitat and affect the ability of the animals to use otherwise suitable habitat on either side of the road and the associated presence of vehicles and humans, can cause animals to avoid otherwise suitable habitats near roads. Robitaille and Aubrey (2000), studied marten in an area of low road density and traffic (primarily logging roads) and found that marten use of habitat within 300 and 400 meters of roads was significantly less than habitat use at 700 or 800 meters distance. Although marten are detected in close proximity to roads, it appears that significantly less marten activity occurs within these zones.

If highways, with their high traffic speeds, jersey barriers and often steep side-slopes, limit the success and frequency of marten crossings, then the implications to marten dispersal may be of concern. State Highways 89 and 70 bisect marten habitat. If marten avoid these highways, then marten populations could become fragmented into small isolated populations.

Roads may decrease prey and food availability for marten and fisher (Allen 1987) due to prey population reductions from road kills and/or behavioral avoidance of roads. Occasionally one and two lane Forest roads with moderate levels of traffic should not limit marten movements.

Standards and Guidelines in the Sierra Nevada Forest Plan Amendment ROD (2004), provide management direction for habitat connectivity for old forest associated species to "minimize old forest habitat fragmentation" and "assess the potential impacts of projects on the connectivity of habitat for old forest associated species," particularly marten and fisher.

Routes for Competitors: Martens avoid habitats that lack overhead cover presumably because these areas do not provide protection from avian predators. Roads that are driven during the winter months may allow coyotes to enter into marten winter habitat, affecting marten through competition or direct mortality from predation. This has been identified as a significant threat within lynx habitat. Since both lynx and marten have unique morphologies that allow them to occupy deep snow habitats where they have a competitive advantage over carnivores, such as coyotes and bobcats, human modifications of this habitat, such as winter road use, over-the-snow travel and snowmobile trails, can eliminate this advantage and increase access for predators and competitors. This has been identified as a potentially significant risk factor in the Sierra Nevada worthy of further investigation.

Disturbance at a Specific Location (Meadows)—Marten Only: Various studies in the Sierra Nevada indicate marten have a strong preference for meadows and forest-meadow edges for foraging (USDA Forest Service 2001). Microtine rodents (meadow voles) are important for the marten diet and therefore, the quality of meadow habitat (especially meadows surrounded by mature lodgepole and red fir forests) influences the quality of marten habitat (Spencer et al. 1983). Routes that are adjacent to and intersect meadows can alter meadow hydrology and vegetation which may have a negative effect on prey abundance. The combination of route use and increased human activity, as well as the potential impacts of routes upon meadow vegetation, may result in loss of these more easily exploitable "prey patches."

3.7.16 American Marten and Pacific Fisher: Environmental Consequences

Based upon a review of the literature, fisher were found likely to be affected by the same road and motorized trail-associated factors as marten: trapping, poaching, collisions, displacement or avoidance, habitat loss or fragmentation, snag reduction, down log reduction, edge effects, movement barrier or filter and route for competitors (Gaines et al 2003, Buskirk and Rugerrio, 1994). The current absence of fisher on the PNF eliminates these risk factors, but this analysis will be conducted to analyze impacts of the alternatives to fisher if populations were to be re-established on the PNF.

Environmental consequences for marten and fisher are analyzed at three different scales - within late-successional habitat (CWHR types 4M, 4D, 5M, 5D and 6), Old Forest Emphasis Areas (OFEAs) and PNF Draft Forest Carnivore Network. Late-successional habitat (CWHR types 4M, 4D, 5M, 5D and 6) is considered to be suitable for marten (USDA 2004). The OFEAs, as previously described, are land allocations designated to manage for old forest dependent species, including marten. Although no management direction is specifically designated within the PNF Draft Forest Carnivore Network, the network provides a broad framework for considering habitat connectivity issues for forest carnivores, including the marten. These three scales are used for comparison, since habitat connectivity within these habitats are important considerations for marten populations. Although all three scales have considerable overlap because older forest types are included in all of them, there are slight differences between them because they were derived in different manners. The late-successional habitat types are comprised of individual patches of habitat types that may not necessarily be connected. Whereas, both the OFEAs and the Draft Carnivore Network incorporates larger blocks of older forest types.

3.7.16.1 Analysis Measures

Zone of Influence: Studies indicate marten habitat use declines within a distance exceeding 300 meters from roads. For this analysis, a Zone of Influence of 300 meters from motorized routes was determined and the proportion of marten habitat occurring within this zone was analyzed. Within this zone, changes to habitat such as fragmentation, edge effects and the reduction of snags and down wood, would also occur. These factors would be expected to influence a smaller area (probably about 60 meters) adjacent to motorized routes. Thresholds associated with this measure have not been established, but relative changes in habitat effectiveness for marten can be evaluated and compared.

3.7.16.2 Direct and Indirect Effects—American Marten and Pacific Fisher 300-meter Zone of Influence within Carnivore Network, OFEAs and Old Forest CWHR types (4M, 4D, 5M, 5D, and 6) and Cumulative Effects

3.7.16.2.1 Direct and Indirect Effects

Table 28 displays the acres of the Draft Carnivore Network, OFEAs and Old Forest CWHR types (4M, 4D, 5M, 5D, and 6) that fall within a 300-meter Zone of Influence from open unauthorized routes and proposed trails.

When increasing the Zone of Influence to 300 meters, substantially higher amounts of marten and fisher habitat are influenced by proposed trails or open unauthorized routes. Based on open unauthorized routes within a 300-meter Zone of Influence, Alternative 1 results in the greatest amount of habitat fragmentation and reduced habitat connectivity within the Carnivore Network, late-successional habitat and within OFEAs, where marten and fisher habitat suitability may be reduced. Alternative 1 results in a reduction in habitat connectivity within 71,346 acres of the Carnivore Network, a 155,023 acre reduction in habitat connectivity in Old Forest Emphasis Areas and a 137,257 acre reduction in habitat connectivity in Old Forest habitat types (CWHR 4M, 4D, 5M, 5D, 6).

All the action alternatives (2-5) significantly reduce direct and indirect effects to habitat connectivity within the three habitat categories found in Table 28 when compared to Alternative 1. Based on proposed trails and their a 300-meter Zone of Influence, Alternative 2 would reduce habitat connectivity for marten and fisher by 16,465 acres in the Carnivore Network, 40,191 acres in the Old Forest Emphasis Areas and 71,374 acres in the Old Forest habitat types (CWHR 4M, 4D, 5M, 5D, 6). Alternative 5 has slightly less impact to habitat connectivity for marten and fisher by having direct and indirect effects to 10,976 acres in the Carnivore Network, 28,708 acres in the Old Forest Emphasis Areas and 49,412 acres in the Old Forest habitat types (CWHR 4M, 4D, 5M, 5D, 6). Alternative 4 further reduces impacts to habitat connectivity for marten and fisher by having direct and indirect effects to only 5,488 acres in the Carnivore Network, 17,225 acres in the Old Forest Emphasis Areas and 27,451 acres in the Old Forest habitat types (CWHR 4M, 4D, 5M, 5D, 6). Alternative 3 would not reduce habitat connectivity for marten or fisher from existing conditions, since no proposed trails will be added under this alternative.

Table 76. Acres of the Draft Carnivore Network, OFEAs and Old Forest Habitat (CWHR 4M, 4D, 5M, 5D, 6) within a 300-meter "Zone of Influence" of Unauthorized Routes or Proposed Trails

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Carnivore Network	71,346	16,465	0	5,488	10,976
Old Forest Emphasis Areas (SNFPA)	155,023	40,191	0	17,225	28,708
Old Forest Habitat (CWHR 4M, 4D, 5M, 5D, 6)	137,257	71,374	0	27,451	49,412

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.16.3 Cumulative Effects to Carnivore Network, OFEAs and Old Forest CWHRs within the 300-meter Zone of Influence

The acres of Carnivore Network, OFEAs and Old Forest CWHR occurring within a 300-meter Zone of Influence for open unauthorized routes, proposed trails and existing motorized trails on NFS lands for all five of the alternatives are shown in Table 77, 78, and 79.

Based on the cumulative effects analysis, Alternative 1 would pose the highest risk to habitat fragmentation within the Carnivore Network, OFEAs and Old Forest habitat types, where considerable cumulative impacts would be added to existing cumulative effects to marten and fisher. Future route proliferation could substantially add to cumulative impacts due to unmanaged cross-country travel which would further add to habitat fragmentation which could seriously limit the distribution of marten and the future reestablishment potential of the fisher on the PNF. Alternative 1 would cumulatively affect 167,389 acres within the draft carnivore network, 338,754 acres within OFEAs, and 323,927 acres within Old Forest CHWR types.

All of the action alternatives (2-5) result in less cumulative effects to the draft carnivore network, OFEAs and Old Forest CWHR types. In addition, Alternatives 2-5 would prohibit cross country travel and reduce the risk of route proliferation adding routes to within these three key habitat categories. Compared to Alternative 1, Alternative 2 reduces acres impacted within the draft carnivore network by 55,000+ acres, within OFEAs by over 100,000+ acres and within Old Forest CWHR Types by over 60,000+ acres. Alternatives 5, 4 and 3 reduces cumulative effects to much lower levels (see the following three tables).

Table 77. Acres of Carnivore Network within a 300-meter Zone of Influence of open unauthorized routes, proposed trails and existing NFS trails.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and Indirect Effects of the alternatives					
Open unauthorized routes or proposed trail additions [1]	71,346	16,465	0	5,488	10,976
Cumulative Effects of Past, Present and Proposed Actions					
Existing motorized NFS trails - NFS lands	96,043	96,043	96,043	96,043	96,043
Total Cumulative Effects					
Overall Relative Cumulative Impact (Note: Some overlap may occur where route categories intersect)	**167,389**	**112,507**	**96,043**	**101,531**	**107,019**

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

Table 78. Acres of Old Forest Emphasis Areas within a 300-meter Zone of Influence

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and Indirect Effects of the alternatives					
Unauthorized routes or proposed trail additions [1]	155,023	40,191	0	17,225	28,708
Cumulative Effects of past, present and proposed actions					
Existing motorized NFS trails - NFS lands	183,731	183,731	183,731	183,731	183,731
Total Cumulative Effects					
Overall Relative Cumulative Impact	338,754	223,922	183,731	200,956	212,439

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

Table 79. Acres of Forest-wide old forest (CWHR 4, 5, 6) within 300-meter "Zone of Influence" of unauthorized routes, proposed trails and existing motorized NFS trails.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and indirect effects of the alternatives					
Unauthorized routes or proposed trail additions[1]	137,257	71,374	0	27,451	49,412
Cumulative effects of past, present and proposed actions					
Existing motorized NFS trails - NFS lands	186,670	186,670	186,670	186,670	186,670
Total cumulative effects					
Overall Relative Cumulative Impact	323,927	258,044	186,670	214,121	236,082

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.16.3.1 Cumulative Effects Summary

Appendix C provides a list of Present and Reasonably Foreseeable Future Actions and descriptions of their project location and the actions involved that may be occurring on NFS lands within the PNF boundary. Some, but not all, of these activities have contributed to effects on marten and have the potential to impact marten in the near future. In 2001 and 2004, the Forest Service amended Sierra Nevada Forest Plans to better address the needs of old forest-associated species (USDA Forest Service 2001 and 2004). In this assessment, the following key risk factors were identified for marten in the Sierra Nevada: (1) habitat alteration, particularly the removal of overhead cover, large diameter trees, or coarse woody material and (2) the use of roads and associated human access.

On the PNF, several activities have influenced these risk factors for marten. Past timber harvest and more recent fuels reduction treatments have reduced important habitat components in marten habitats. Between 2000 and 2007, vegetation treatments (including timber harvest) and fuels treatments (including mastication) on NFS lands have occurred on approximately 73,345 acres. These vegetation treatments have reduced habitat quality for marten and fisher by reducing canopy cover, structural complexity and coarse woody material within treated units. At the larger landscape scale, these treatments may affect the size and connectivity of patches of high quality habitat.

Alternative 1 has the greatest likelihood of contributing to substantial adverse cumulative effects upon marten populations and may affect the ability to reestablish fisher over time. This cumulative effects determination is based on the rationale that a significant number of acres are affected under the draft carnivore network, OFEAs and Old Forest CHWR types, and magnified by the allowance of continued cross country travel and the potential for route proliferation to add additional routes across the PNF.

Alternatives 2, 3, 4 and 5, result in substantially lower adverse cumulative effects to the draft carnivore network, OFEAs and Old Forest CWHR types. The cumulative effects under Alternatives 2, 3, 4 and 5, however, are expected be significantly lower than Alternative 1 over time, due to the prohibition of cross country travel and the reduced potential for route proliferation over time due to a formally designated trail system.

3.7.16.4 Sensitive Species Determinations

3.7.16.4.1 American Marten

Based on the analysis of direct, indirect and cumulative effects, the Biological Evaluation for this EIS made a determination for the American Marten.

Alternative 1 – This alternative may adversely affect, and is likely to result in a trend toward federal listing and a loss of viability for the American Marten. This determination is based on the rationale that cross country travel would continue in the future and lead to additional loss of habitat, an increase in habitat fragmentation, and result in high risk to key habitat within the Draft Carnivore Network, OFEAs and Old Forest CWHR types.

Alternatives 2, 3, 4 and 5 - These alternatives may affect, but are not likely to adversely affect or result in a trend toward Federal listing or loss of viability for the American Marten within the planning area of the Plumas National Forest. This determination is based on the rationale that the action alternatives would prohibit current and future cross-country travel across the PNF, that risks to Marten habitat within the Draft Carnivore Network, OFEAs and Old Forest CWHR types would be significantly reduced compared to Alternative 1 (No-action), and that a higher amounts of suitable habitat would be maintained for the Marten.

3.7.16.4.2 Pacific Fisher

Based on the analysis of direct, indirect and cumulative effects, the Biological Evaluation for this EIS made a determination for the Pacific Fisher.

Alternative 1 – This alternative will not affect the Pacific Fisher, since no Fisher have been found on the Plumas NF. However this alternative does present a risk to future Fisher reintroduction efforts on the PNF sine cross country travel would continue in the future and lead to additional loss of habitat, an increase in habitat fragmentation, and result in high risk to key habitat within the Draft Carnivore Network, OFEAs and Old Forest CWHR types.

Alternatives 2, 3, 4 and 5 - These alternatives will not affect the Pacific Fisher, since no Fisher have been found on the Plumas NF. However these alternatives would represent a low risk to future Fisher reintroduction efforts on the PNF since they would prohibit current and future cross-country travel across the PNF and that risks to suitable habitat within the Draft Carnivore Network, OFEAs and Old Forest CWHR types would be significantly reduced compared to Alternative 1 (No-action), and that a higher amounts of suitable habitat would be maintained.

3.7.17 Riparian Associated Species

The Riparian group includes both terrestrial and aquatic species that spend a part or their entire life cycle within or adjacent to riparian habitats. These include a large number of special status species on the PNF (Table 50 and Table 51). This section will provide general information on road and trail-associated impacts to bald eagles, willow flycatchers, great gray owls and greater sandhill crane and general riparian habitats that may be associated with this group. Species not included in detail here will be addressed in the Biological Evaluation and Management Indicator Species reports and are hereby incorporated by reference.

3.7.18 Riparian Associated Bird Species

3.7.18.1 Effects Common to All Riparian Associated Bird Species

Changes in Class of Vehicles: Responses to motor vehicle use varies by species and depends upon the type of vehicle, the intensity, timing, speeds and amount of motorized vehicle use. For this analysis, it is assumed that all vehicle types result in the same disturbance to riparian associated bird species. Therefore, changes in the class of vehicles would not vary in their effects to riparian associated bird species for all of the alternatives.

3.7.19 Bald Eagle: Affected Environment

On July 9, 2007, USDI Fish and Wildlife Service in a Final Rule announced that the bald eagle would be removed (delisted) from the Federal List of Endangered and Threatened Wildlife in the lower 48 states. Official delisting of the bald eagle occurred 30 days from the date of the Final Rule. The bald eagle will continue to be protected by the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. Upon delisting, the bald eagle was placed on the Regional Forester’s list of Sensitive Species.

Bald eagles nest near or adjacent to large bodies of water. Within the Plumas National Forest, sixteen bald eagle breeding territories have been identified within the PNF boundary including NFS lands and private land in recent years (see following table). Fourteen bald eagle territories with recent nesting activity are located on NFS lands. Two territories occur on private land at Round Valley Reservoir and Poe Powerhouse on the North Fork of the Feather River.

Table 80. Known bald eagle nest territories on the Plumas National Forest and private land within the Forest boundary.

Territory Name	District	Ownership
Antelope Lake I	Mt. Hough Ranger District	PNF
Antelope Lake II	Mt. Hough Ranger District	PNF
Bucks lake	Mt. Hough Ranger District	PNF
Butt II	Mt. Hough Ranger District	PNF
Butt Valley Dam	Mt. Hough Ranger District	PNF
Cool Springs	Mt. Hough Ranger District	PNF
Rocky Point	Mt. Hough Ranger District	PNF
Round Valley	Mt. Hough Ranger District	Private
Snake Lake	Mt. Hough Ranger District	PNF
Cow Creek	Beckwourth Ranger District	PNF
Frenchman	Beckwourth Ranger District	PNF
Bagley Pass	Beckwourth Ranger District	PNF
Mosquito Slough	Beckwourth Ranger District	PNF
Little Grass Valley	Feather River Ranger District	PNF
Poe Powerhouse	Feather River Ranger District	Private
Feather Falls	Feather River Ranger District	PNF

The road and trail-associated factors that have been identified for the bald eagle include poaching, disturbance at specific sites (nests and roost sites) and avoidance and displacement (Skagen et al. 1991, Stamaster and Newman 1978). Several studies reported that eagles avoid or are adversely affected by human disturbance during the breeding period and may result in nest abandonment and reproductive failure (Stalmaster and Newman 1978, Andrew and Mosher 1982, Fraser 1985, Fraser et al. 1985, Knight and Skagen 1987, Buehler et al. 1991, Grubb and King 1991, Grubb et al. 1992, Chandler et al. 1995, Grubb et al. 1995, Mathisen et al. 1997).

The response of bald eagles to human activities is variable. Individual bald eagles show different thresholds of tolerance for disturbance. The distance at which a disturbance causes bald eagles to modify their behavior also is affected by the site distance of the motorized use. For example, forested habitat can reduce the noise generated by motorized activity. In addition, if the noise-generating activity is hidden from the nest site, disturbance thresholds may be reduced. Some studies report that bald eagles seem to be more sensitive to humans afoot than to vehicular traffic (Grubb and King 1991, Hamann 1999). Anthony et al. (1989) found that the mean productivity of bald eagle nests was negatively correlated with their proximity to main logging roads and the most recently used nests were located in areas farther from all types of roads and recreational facilities when compared to older nests in the same territory. However, in 2005, a bald eagle nest was discovered near a well-used County road to access a popular reservoir used for recreational activities including fishing and boating. In addition, other studies indicate bald eagles can tolerate a certain amount of human disturbance (Harmata and Oakleaf 1992 *In* Gaines et al. 2003). Disturbance is most critical during: nest building, courtship, egg laying and incubation (Dietrich 1990). In general, recommended buffer distances to reduce potential disturbance to bald eagles during the breeding season have ranged from

300 to 800 meters (Anthony and Isaacs 1989, Fraser et al. 1985, McGarigal 1988, Stalmaster 1987, Mathisen et al. 1997). Grubb et al. (1992) found that eagles are disturbed by most activities that occur within 1,500 feet; and they take flight when activities occur within 600 feet. Grubb and King (1991) assessed pedestrian traffic and vehicle traffic on bald eagle nesting activities and recommended buffers of 550 meters for pedestrians and 450 meters for vehicles. The USDA Forest Service routinely institutes a Limited Operating Period for ground disturbing projects within 0.25 mile (400 meters) of bald eagle nest sites.

Nest site protection through area closures is one of the primary ways that the Forest Service has implemented measures to prevent the potential for nest failure and/or abandonment due to human disturbances (USFWS 1986). There is currently one seasonal area closure for bald eagle nest site protection at Little Grass Valley Reservoir on the Feather River Ranger District.

Roads and trails have the potential to indirectly affect bald eagles by degrading water quality, which may impact the distribution and abundance of fisheries upon which bald eagles prey.

3.7.20 Bald Eagle: Environmental Consequences

3.7.20.1 Analysis Measures

Disturbance at a Specific Site (Motorized Route Miles): Motorized route miles within a ¼-mile and a ½-mile of known bald eagle nest sites were determined to be sufficient enough to assess direct, indirect and cumulative effects.

3.7.20.2 Direct and Indirect Effects to Nesting Bald Eagles

Cross-country Travel: Cross-country travel will be prohibited within bald eagle habitat for all action alternatives. The prohibition of cross-country travel will prevent the proliferation of new unauthorized routes and will reduce disturbance associated with motorized use on these routes within foraging and nesting habitat for bald eagles. The prohibition of cross-country travel also results in a reduction of the total amount of roads and trails available for motorized use by closing all of the unauthorized routes in all of the action alternatives. The prohibition of cross-country travel will reduce the potential for disturbance to nesting bald eagles that may be vulnerable to activities associated with motorized cross-country travel. Alternative 1 does not prohibit cross-country motorized use and may result in increased disturbance to nesting bald eagles.

3.7.20.2.1 Additions to the National Forest System

Proposed Trail Miles

Disturbance to bald eagle nest sites from project alternatives is analyzed by determining the number of miles of unauthorized routes occurring between 0 and 400 meters and between 400 and 800 meters for each bald eagle territory. Factors associated with motorized routes at a distance between 0 to 400 meters of bald eagle nest sites will likely cause the greatest potential disturbance to nesting bald eagles during the nesting season. Disturbance from motorized routes between 400 and 800 meters away from nest sites will likely have a lesser effect since noise associated with vehicles diminishes at greater distances, but may still modify behavior of nesting eagles, particularly for foraging eagles.

Alternative 1 poses the greatest risk to nesting bald eagles on the Plumas NF. Alternative 1 would potentially impact two bald eagle territories where approximately ¾ of a mile of unauthorized routes would be open to motor vehicles within 400 meters of bald eagle nest sites. This ¾ mile impact would be split between 1/4 mile at Rocky Point and 1/2 mile at Snake Lake. These eagle territories would have open unauthorized routes within 400 meters of their nest site. An additional 2.7 miles would potentially affect bald eagle nest sites between 400 and 800 meters. The territories of Snake Lake, Rocky Point, and Butt II would receive the greatest amount of impacts at this distance.

Alternatives 2, 4, 5 are identical in the amount of direct and indirect impacts to nesting eagles, where only ¼ and ½ mile of motorized trails within 400 meter of nest sites at Snake Lake and Rocky Point, respectively, would be added.

Alternative 3 would pose the least impact, since it does not contain or add any proposed trails. All action alternatives (2-5) also prohibit cross-country travel within nesting and foraging Bald Eagle habitat which further reduces the risk to nesting bald eagles over Alternative 1.

3.7.20.3 Cumulative Effects to Nesting Bald Eagles

Cumulative effects to the bald eagle analyzes open unauthorized routes, proposed trails and the existing motorized NFS trails that occur on the PNF.

3.7.20.3.1 Cumulative Effects Boundary

The cumulative effects for the bald eagle include all of the bald eagle nest territories and surrounding bald eagle habitat that occur within the boundary of the PNF including both NFS lands and private lands. This geographic boundary is sufficiently large enough to analyze cumulative effects to bald eagles since their home ranges lie entirely within the boundary of the PNF. The spatial timeframe for analyzing cumulative effects goes back approximately 50 to 100 years into the past and approximately 20 to 50 years into the future.

3.7.20.3.2 Summary of Cumulative Effects Summary of Past, Present and Reasonably Foreseeable Actions

The development of reservoirs across the Forest on both NFS and non-NFS lands have created bald eagle foraging habitat. Cumulative effects to the bald eagle habitat around these reservoirs include disturbance from a variety of recreational activities including developed and dispersed camping, hiking, fishing, boating, motor vehicle use and others. A seasonal closure at Little Grass Valley Reservoir has been instituted to mitigate potential adverse recreational disturbance to nesting bald eagles. Bald eagles appear to be able to adapt to a certain amount of human disturbance and appear to be increasing on the Forest. The loss of nesting and foraging habitat from high levels of disease and drought-related bark beetle infestations has also affected the quality and quantity of bald eagle habitat. Present and future fuels and vegetation management prescriptions are designed to retain the larger tree component, so that bald eagle nest tree components should be available. In addition, large snags used for roost trees would also be retained. Forest thinning and fuels treatment projects are designed to prevent loss of bald eagle habitat over the long term.

3.7.20.3.3 Miles of Open Motorized Routes and Trails Within 0 to 400 Meters of Nest Sites

The direct and indirect effects of the project alternatives contribute to two of the four risk factors described above - degradation of wintering or breeding habitat through human development or habitat alteration and disturbance at nest and roost sites.

Under Alternative 1, cross-country travel would continue, including travel on approximately ¾ of a mile of unauthorized routes within 400 meters of a bald eagle nest site, which would potentially result in direct disturbance to nesting bald eagles. Because Alternative 1 does not prohibit motor vehicle cross-country travel, it is highly likely that future route proliferation and associated cumulative impacts would likely increase. Therefore the effects of Alternative 1, when combined with the effects of current and future recreation activity, may result in significant adverse cumulative effects to nesting bald eagles.

Action alternatives 2, 4 and 5 are expected to result in less cumulative effects to bald eagles than Alternative 1 since the cross country travel would be prohibited. Alternatives 2, 4 and 5 add about 2.1 miles of trails that would contribute to additional cumulative impacts to nesting bald eagles at Snake Lake and Rocky Point.

Alternative 3 would not add trails, however adverse impacts would continue from motorized use of approximately ¾ mile of existing NFS trail within 400 meters of bald eagle nest sites. However, since bald eagles have successfully reproduced at the Rocky Point territory, this amount of existing recreational use under alternative 3 does not appear to be affecting nesting success. The Snake Lake territory may be affected by past and existing recreational use under Alternative 3 due to the absence of nesting bald eagles since the late 1980s. Alternative 3 would also prohibit cross country travel which would benefit bald eagles by ultimately preventing additional disturbance to nesting bald eagles on the PNF.

3.7.20.3.4 Sensitive Species Determination

Based on the analysis of direct, indirect and cumulative effects, the Biological Evaluation for this EIS made a determination for the Bald Eagle.

Alternative 1 – This alternative may adversely affect, and is likely to result in a trend toward federal listing and a loss of viability for the Bald Eagle. This determination is based on the rationale that cross country travel would continue in the future and lead to additional impacts to nesting bald eagles over time.

Alternatives 2, 3, 4 and 5 - These alternatives may affect, but are not likely to adversely affect or result in a trend toward Federal listing or loss of viability for the Bald Eagle within the planning area of the Plumas National Forest. This determination is based on the rationale that the action alternatives would prohibit current and future cross-country travel across the PNF, that risks to Bald Eagles and eagle nest sites would be significantly reduced compared to Alternative 1 (No-action).

3.7.21 Willow Flycatcher: Affected Environment

On the PNF, the willow flycatcher (*Empidonax traillii* ssp. *trailii* and *E.t. brewsteri*) is designated by the Regional Forester as a Sensitive Species. In California, the willow flycatcher is a rare to locally uncommon, summer resident in wet meadow and montane riparian habitats at 600-2,500 meters (2,000-8,000 feet) in the Sierra Nevada and Cascade Range (CWHR 2005). Willow flycatcher populations in the Sierra Nevada are considered to be at risk (USDA Forest Service 2001). Historically, willow flycatchers were once common throughout the Sierra Nevada. The current distribution of the willow flycatcher has been drastically reduced compared to historic distributions. A ten year demographic analysis indicate the Sierra Nevada willow flycatcher populations are continuing to decline. With the exception of a few sites, the majority of areas where willow flycatchers have been located support low numbers of breeding territories and some as low as 1-2 pairs of breeding individuals.

Willow flycatcher breeding habitat is characterized as montane wetland shrub habitat where there is a prevalence of willows and montane meadows with standing or flowing water, or highly saturated soils throughout the nesting season (Green, et al. 2003). A study by Cain (2001) indicated that meadow wetness may assist in successful nesting by willow flycatcher, by inhibiting potential forest and edge predators from accessing willow flycatcher nests. Meadow wetness may also be important for willow flycatcher insect prey species.

The Willow Flycatcher Conservation Assessment (Green, et al. 2003) identified roads as one of the leading contributing factors responsible for the loss and degradation of willow flycatcher habitat. Specifically, roads (dirt-surfaced or paved), intercept surface and subsurface hydrologic flow. Meadow desiccation takes place when hydrologic flows become intercepted and redirected resulting in long-term habitat loss or degradation. Roads may have a negative impact on meadow hydrology, especially when roads bisect meadows and have associated drainage structures to maintain road conditions. Human disturbance associated with road and trail motorized use may also affect willow flycatcher nesting success. Roads also provide increased access to humans, which may directly and indirectly affect willow flycatcher productivity. Roads provide access for livestock grazing and often meadows occupied by willow flycatchers are key forage areas for livestock. Livestock grazing has long been identified as contributing to the decline in willow flycatcher populations as it relates to grazing impacts on willow and meadow habitat, as well as potential direct impacts from cattle coming in direct contact or destroying nest sites. Furthermore, brown-headed cowbirds are strongly associated with cattle. Cowbirds are known to parasitize willow flycatcher nests and ultimately may reduce overall willow flycatcher nesting success. Several grazing allotments on the PNF overlap “Occupied” and “Emphasis” willow flycatcher sites.

3.7.22 Willow Flycatcher: Environmental Consequences

3.7.22.1 Analysis Measures

Number of “Occupied” and “Emphasis” Willow Flycatcher Sites with Routes: To evaluate the effects of motorized routes on willow flycatcher habitat, the number of willow flycatcher “Occupied” and “Emphasis” habitat sites intersected by motorized routes was determined. The Sierra Nevada Framework Plan Amendment ROD (2004) designated “Occupied” and “Emphasis” habitats for willow flycatcher. “Occupied” habitat is defined by the presence or suspected presence of willow flycatcher(s) during the breeding season (between 15 June and August 1) (See SNFPA ROD 2004 for more detailed definition). “Emphasis” habitat are currently not occupied by breeding willow flycatchers, but are considered suitable nesting habitat, defined by meadows larger than 15 acres that have standing water on them June 1 and a deciduous shrub component. “Emphasis” habitats are particularly important so that willow flycatchers may have future refugia where their population can be distributed and expand in the future.

3.7.22.2 Direct and Indirect Effects

Direct and indirect effects of the alternatives are evaluated by determining the number of proposed trails that intersect delineated willow flycatcher habitat sites on the PNF.

Table 81 displays the direct and indirect effects to willow flycatcher “Occupied” and “Emphasis” habitat sites on the PNF that are potentially affected by the five project alternatives.

Under Alternative 1, open unauthorized routes (7.46 miles) would intersect 68 (25%) willow flycatcher habitat sites, resulting in both direct and indirect disturbance. Of these sites, 10 out of 28 habitats (36%) have been identified as “Occupied” willow flycatcher sites, where approximately 1.4 miles of unauthorized routes have the potential to adversely affect breeding willow flycatchers, including both direct disturbance to nesting willow flycatchers and indirect impacts to willow flycatcher habitat alteration and/or degradation where routes potentially affect vegetation and hydrology.

The action alternatives significantly reduce impacts to Occupied and Emphasis habitat sites compared to Alternative 1. Implementation of Alternatives 2, 4 and 5 would have no direct and indirect impacts to breeding willow flycatchers at “Occupied” sites. Within “Emphasis” habitat sites. Alternatives 2, 4 and 5 affect from 7 to 17 willow flycatcher “Emphasis” sites (3% and 8%). This represents a reduction of impacts from Alternative 1 that range from 41 to 51 less emphasis sites impacted by Alternatives 2, 4, and 5. Alternative 3 would not affect any willow flycatcher habitat sites. This alternative does not add any trails.

Table 81. Number of willow flycatcher habitat sites intersected by proposed trails and unauthorized routes[1] on the Plumas National Forest.

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
“Occupied” Habitat (28) (Unauthorized route and proposed trail miles)	10 (1.40)	0	0	0	0
“Emphasis” Habitat (242) (Unauthorized route and proposed trail miles)	58 (6.06)	17 (1.20)	0	7 (0.46)	12 (0.82)
Total	**68 (7.46)**	**17 (1.20)**	**0**	**7 (0.46)**	**12 (0.82)**

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.22.3 Cumulative Effects Boundary for Willow Flycatcher

The cumulative effects analysis geographic boundary for the willow flycatcher includes all willow flycatcher sites occurring within the PNF boundary, within NFS lands. The temporal scale for analyzing cumulative effects to willow flycatcher is approximately 20 years into the past and 20 years out into the future.

3.7.22.4 General Cumulative Effects to Willow Flycatcher Meadows

Cumulative impacts to the willow flycatcher include past, present and future impacts from livestock grazing, roads and recreational activities. The Forest Service has completed a Conservation Assessment of the Willow Flycatcher in the Sierra Nevada (Green et al. 2003), which identified meadow drying, loss of nesting and foraging substrates (riparian shrubs), increased predator access to meadow interiors and potential cowbird parasitism as among the key factors likely to be responsible for the decline of the willow flycatcher. Livestock management, recreation, water developments and roads are described as causative factors.

Historic livestock grazing has impacted montane meadows and is considered to be a primary factor that has influenced the suitability of willow flycatcher habitat and meadow habitat for birds in the Sierra Nevada (Graber 1996, Green et al. 2003, Menke et al. 1996). Many of the land/bird species utilizing these meadows feed upon insects that decline in response to removal of this herbaceous growth (Graber 1996). Poorly managed grazing in riparian areas can impact nesting densities of many bird species and particularly of habitat specialists such as the willow flycatcher, Lincoln's sparrow and white-crowned sparrow (RHJV 2004).

3.7.22.5 **Cumulative Effects from Motorized Routes to Willow Flycatcher Meadows**

Factors responsible for the decline of willow flycatcher populations in the Sierra Nevada are primarily thought to be the result of habitat change, particularly the alteration of riparian habitat hydrology, specifically caused by roads (Green et al. 2003).

Table 82 displays the cumulative impacts of existing trails, proposed trails and open unauthorized routes within habitats that are designated as either willow flycatcher "Occupied" or "Emphasis" habitat. Routes or trails intersecting "Occupied" habitat have the highest potential to impact breeding willow flycatchers.

3.7.22.6 "Occupied" Habitat

Alternative 1 poses the highest cumulative impact to breeding willow flycatchers. Alternative 1 directly and indirect affects 10 Occupied habitat sites with 1.4 miles of unauthorized routes, and an additional 0.45 miles of existing routes affect 2 additional Occupied habitat sites where direct and indirect impacts to meadow vegetation and hydrology could occur. Hydrologic condition is an important habitat component to consider for successful willow flycatcher breeding. Given the uncertainty of future route proliferation under Alternative 1, the future habitat alteration within "Occupied" habitat sites is potentially at risk and may ultimately affect willow flycatcher breeding success within "Occupied" habitats.

All of the action alternatives significantly reduce cumulative impacts to Occupied habitat sites. None of the remaining action alternatives (Alternatives 2 - 5) add direct or indirect impacts to "Occupied" willow flycatcher sites. However, existing trails under this alternatives will affect 2 Occupied habitat sites with 0.45 miles. The significant benefit to Occupied habitat under these alternatives is that cross country travel would be prohibited.

3.7.22.7 "Emphasis" Habitat

Alternative 1 poses the highest cumulative impact to the future colonization by willow flycatcher within "Emphasis" habitats, since unauthorized routes would intersect a total of 62 "Emphasis" sites for a total of about 6.7 miles.

All the remaining action alternatives (2-5) would result in substantially less cumulative impacts to willow flycatcher "Emphasis" habitats. The action alternatives (2-5) propose trail additions or have existing trails that would affect from 4 to 21 willow flycatcher "Emphasis" habitat sites with 0.60 to 1.8 miles of proposed and existing trails. The significant benefit to Emphasis habitat sites under these alternatives is that cross country travel would be prohibited.

3.7.22.8 Summary of Cumulative Effects to Willow Flycatcher Habitat: "Occupied" and "Emphasis" Meadows

Alternative 1 poses the highest cumulative effects and the greatest overall risk to known nesting sites (Occupied) and potentially suitable nesting sites (Emphasis) from unauthorized routes and existing motorized NFS trails. Alternative 1 results in willow flycatcher habitat being intersected 74 times for a total of about 8.5 miles of routes. Over 42% of habitats identified as "Occupied" are impacted by unauthorized routes, which could substantially alter the willow flycatcher habitat vegetation and hydrology and reduce breeding success at known nesting sites of a species that is at risk of extirpation. Alternative 1 would also allow cross country travel and the potential for additional routes to be added to Occupied and Emphasis habitat sites.

All the action alternatives (2-5) result in significantly less cumulative impacts to occupied and emphasis habitat sites, plus have the added benefit of prohibiting cross country travel. Overall cumulative impacts to "Occupied" and "Emphasis" habitats result in a proposed or existing trail intersecting a site 18 to 23 times for a total of between 1.87 and 2.25 miles.

Table 82. Willow Flycatcher Habitat Sites - Number of "Occupied" and "Emphasis" Habitats Intersected by Open Unauthorized Routes, Proposed Trails and Existing NFS Trails

	Alt.1*	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Direct and Indirect effects of the alternatives					
# "Occupied" Sites	10	0	0	0	0
Miles within "Occupied"	1.40	0.00	0	0.00	0.00
# "Emphasis" Sites	58	17	0	7	12
Miles within "Emphasis"	6.06	1.20	0	0.46	0.82
Total Number of Willow Flycatcher Sites Intersected by Unauthorized routes or proposed trail additions	68	17	0	7	12
Total Miles	7.46	1.20	0	0.46	0.82
Cumulative effects of past, present and proposed actions					
# "Occupied" Sites	2	2	2	2	2
Miles within "Occupied"	0.45	0.45	0.45	0.45	0.45
# "Emphasis" Sites	4	4	4	4	4
Miles within "Emphasis"	0.60	0.60	0.60	0.60	0.60

Total Number of Willow Flycatcher Sites Intersected by Existing NFS motorized trails	6	6	6	6	6
Total Miles	1.05	1.05	1.05	1.05	1.05
Grand Total Miles	**8.51**	**2.25**	**1.05**	**1.51**	**1.87**

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.22.9 Sensitive Species Determination

Based on the analysis of direct, indirect and cumulative effects, the Biological Evaluation for this EIS made a determination for the Willow Flycatcher.

Alternative 1 – This alternative may adversely affect, and is likely to result in a trend toward federal listing and a loss of viability for the Willow Flycatcher. This determination is based on the rationale that cross country travel would continue in the future and lead to additional impacts to Occupied and Emphasis habitat sites, loss of habitat, and result in high risk to Willow Flycatcher viability.

Alternatives 2, 3, 4 and 5 - These alternatives may affect, but are not likely to adversely affect or result in a trend toward Federal listing or loss of viability for the Willow Flycatcher within the planning area of the Plumas National Forest. This determination is based on the rationale that the action alternatives would prohibit current and future cross-country travel across the PNF, that risks to Flycatcher Occupied and Emphasis habitat sites would be significantly reduced compared to Alternative 1 (No-action), and that a higher amount of nesting and foraging habitat would be maintained for the flycatcher.

3.7.23 Great Gray Owl: Affected Environment

The great gray owl is listed as Sensitive on the Region 5 Forester’s Sensitive Species List (USDA Forest Service 1998). In the Sierra Nevada, great gray owls are found in mixed coniferous forest from 2,400 to 9,000 feet elevation where such forests occur in combination with meadows or other vegetated openings. Nesting usually occurs within 600 feet of the forest edge and adjacent open foraging habitat. Most nests are made in broken top snags (generally firs), but platforms such as old hawk nests, mistletoe infected limbs, etc. are also used. Nest trees or snags are generally greater than 21 inches dbh and 20 feet tall.

In the Sierra Nevada, pocket gophers and voles appear to be important prey species (Winter 1982, Reid 1989). Meadows appear to be the most important hunting habitat for great gray owls, where approximately 93% of their prey is taken (Winter 1981).

Recent great gray owl sightings in our area include several detections from 2004 to 2007 on the west side of Lake Davis on the Beckwourth Ranger District. A total of 45 great gray owl detections were recorded by contract survey crew Klamath Wildlife Resources, Inc. which included 14 pair detections. There were also two adults found on the Feather River Ranger District of the Plumas (8/97).

Roads and trails can potentially affect great gray owl habitat by affecting the condition of suitable great gray owl habitat in similar ways that affect willow flycatcher habitat, primarily through changes in meadow hydrology or when damage to meadow vegetation occurs. Compaction and meadow drying can cause changes in vegetation composition which can lead to changes in prey species abundance and distribution. Changes in prey availability and abundance can affect the reproductive success of great gray owls.

3.7.24 Great Gray Owl: Environmental Consequences

3.7.24.1 Analysis Measures

Number of Great Gray Owl Meadows Intersected by Miles of Proposed Trails and Unauthorized Routes: meadows identified as suitable for great gray owl foraging that are adjacent to suitable breeding habitat were assessed to determine the potential impact from unauthorized routes or trails. The number of great gray owl meadows intersected by unauthorized routes or trails were assessed for the alternatives.

3.7.24.2 Direct and Indirect Effects

3.7.24.2.1 Addition of Proposed Trails

Currently, great gray owls are not known to breed on the PNF. Although great gray owl sightings have been reported on the Forest, no confirmation of nesting has been identified at this time. Therefore, the action alternatives would have no direct impacts to breeding great gray owls, since great gray owls are not currently known to breed on the PNF.

Potential great gray owl habitat has been identified on the PNF. A total of 200 meadow sites on the Forest are considered suitable foraging habitat areas for the great gray owl. These potential foraging sites were evaluated to determine the potential direct and indirect effects to meadow vegetation and hydrology which may affect the suitability of potential great gray owl nesting/foraging habitat.

Alternative 1 poses the highest direct and indirect effects to potential great gray owl meadows where 38 meadows (19%) are intersected by unauthorized routes totaling approximately 8 miles. This amount of motorized routes could alter meadow vegetation and hydrology that would indirectly affect great gray owl breeding habitat where great gray owls forage, and where the potential for future occupancy of these areas may be limited.

Under the action alternatives (2-5) the direct and indirect effects to meadows are significantly reduced. The number of meadows affected are reduced by over 30 when Alternatives 2-5 are compared to Alternative 1. In addition the number of proposed trail miles within Great Gray owl meadows fall significantly as well. Alternatives 2-5 have 7 to 8 miles less of trail intersecting meadows than Alternative 1.

Table 83. Number of Great Gray Owl Meadows Intersected by Unauthorized routes or Proposed Trails

	Alt 1	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**
Number of Meadows *with* Intersections	38	7	0	3	5
Number of Meadows *without* Intersections	162	193	200	197	195
Unauthorized route or proposed trail miles	8.0	1.0	0	0.4	0.7

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.24.3 Cumulative Effects

The geographic boundary for analyzing great gray owl cumulative effects of the alternatives are the suitable great gray owl meadow habitat sites within the boundary of the PNF. Approximately 200 meadow sites have been identified as being suitable foraging habitat for the great gray owl that are adjacent to suitable great gray owl nesting habitat, which would provide a sufficient area to analyze impacts to great gray owls on the PNF. These meadows encompass a wide geographic distribution from eastside to westside and encompass a variety of vegetation diversity. The adjacent forest types surrounding these great gray owl meadow areas range from eastside pine, eastside mixed conifer, true fir types and, westside mixed conifer forests.

Great gray owls currently are not known to breed on the PNF; however, recent sightings on the Forest, indicate that the potential for breeding great gray owls is a reasonable expectation. The action alternatives, do not currently pose adverse direct or indirect effects to known breeding great gray owls and therefore, no cumulative impacts to great gray owls would occur. However, the project alternatives are analyzed for cumulative effects of motorized routes to suitable great gray owl foraging habitat that may affect the ability for great gray owls to occupy these sites in the future.

Alternative 1 poses the highest cumulative risk to suitable great gray owl foraging habitat where these suitable great gray owl meadows are intersected by unauthorized routes or existing motorized NFS trails on NFS lands 41 times for a total of 9 miles. The uncertainty of future motorized route proliferation could alter meadow vegetation and hydrology that would impact habitat conditions for great gray owl prey species in the long term. Considering the rate at which OHV activities on the PNF and current rate of OHV sales, this alternative could adversely affect the potential for great gray owls to occupy these sites in the near and distant future.

All of the action alternatives significantly reduce cumulative impacts to owl foraging habitat and meadow areas by having less meadows intersected (31 to 38 meadows sites) and less trail miles (7 to 8 miles). In addition, these alternative have the added benefit that they prohibit cross country travel and reduce the potential of route proliferation to add additional routes to the PNF. For example, Alternative 2 contributes to cumulative impacts to suitable great gray owl meadow sites, where these sites would be intersected by proposed and existing trails 10 times for a total of about 2 miles. Alternatives 4 and 5 add a small amount of cumulative impacts to great gray owl meadows where intersection by a proposed and existing trail occurs 6 and 8 times, respectively, to great gray owl habitat, impacting 1.4 and 1.7 miles, respectively. Alternative 3 would have no direct or indirect effects to great gray owl meadows as there are no proposed trail additions to the NFTS. Alternative 3 would only impact great gray owl meadows with existing routes where 1 mile intersects 3 meadows.

Table 84. Great gray owl suitable sites—number of meadows/meadow complexes intersected by unauthorized routes, existing trails and proposed trails[1].

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Direct and Indirect effects of the alternatives					
Unauthorized routes or proposed trail additions [1]					
Number of Potential GGO Meadow Sites Intersected by Routes	38	7	0	3	5
Miles	8	1	0	0.4	0.7
Cumulative effects of past, present and proposed actions					

Existing motorized routes - NFS lands					
Number of Potential GGO Meadow Sites Intersected by Routes	3	3	3	3	3
Miles	1	1	1	1	1
Total Cumulative Effects					
Number of Times GGO Meadows Intersected by Open Routes	**41**	**10**	**3**	**6**	**8**
Total Miles	**9**	**2**	**1**	**1.4**	**1.7**

[1]Alternative 1 includes the unauthorized routes, while all action alternatives include proposed trails.

3.7.24.3.1 Sensitive Species Determination

Based on the analysis of direct, indirect and cumulative effects, the Biological Evaluation for this EIS made a determination for the Great Gray Owl.

Alternative 1 – This alternative may adversely affect, and is likely to result in a trend toward federal listing and a loss of viability for the Great Gray Owl. This determination is based on the rationale that cross country travel would continue in the future and lead to additional impacts to owl meadow sites, loss of habitat, and result in high risk to owl occupancy.

Alternatives 2, 3, 4 and 5 - These alternatives may affect, but are not likely to adversely affect or result in a trend toward Federal listing or loss of viability for the Great Gray owl within the planning area of the Plumas National Forest. This determination is based on the rationale that the action alternatives would prohibit current and future cross-country travel across the PNF, that risks to meadow sites would be significantly reduced compared to Alternative 1 (No-action), and that a higher amounts of suitable meadow habitat would be maintained for the owl.

3.7.25 Selection of Project level Management Indicator Species

Management Indicator Species (MIS) for the Plumas National Forest (PNF) are identified in the 2007 Sierra Nevada Forests Management Indicator Species (MIS) Amendment (USDA Forest Service 2007a). The habitats and ecosystem components and associated MIS analyzed for this Project were selected from this list of MIS, as indicated in Table 85. In addition to identifying the habitat or ecosystem components (1st column), the CWHR type(s) defining each habitat/ecosystem component (2nd column) and the associated MIS (3rd column), the Table discloses whether or not the habitat of the MIS is potentially affected by this Project (4th column).

Table 85. Selection of Management Indicator Species for project-level habitat analysis for this Project.

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component	Sierra Nevada Forests Management Indicator Species *Scientific Name*	Category for Project Analysis [1]
Riverine and Lacustrine	lacustrine (LAC) and riverine (RIV)	aquatic macroinvertebrates	3
Shrubland (west-slope chaparral types)	montane chaparral (MCP), mixed chaparral (MCH), chamise-redshank chaparral (CRC)	fox sparrow *Passerella iliaca*	3
Oak-associated Hardwood and Hardwood/conifer	montane hardwood (MHW), montane hardwood-conifer (MHC)	mule deer *Odocoileus hemionus*	3
Riparian	montane riparian (MRI), valley foothill riparian (VRI)	yellow warbler *Dendroica petechia*	3
Wet Meadow	wet meadow (WTM), freshwater emergent wetland (FEW)	Pacific tree frog *Pseudacris regilla*	3
Early Seral Coniferous Forest	ponderosa pine (PPN), Sierran	mountain quail	3

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component	Sierra Nevada Forests Management Indicator Species *Scientific Name*	Category for Project Analysis [1]
	mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2 and 3, all canopy closures	*Oreortyx pictus*	
Mid Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures	mountain quail *Oreortyx pictus*	3
Late Seral Open Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P	Sooty (blue) grouse *Dendragapus obscurus*	3
Late Seral Closed Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), tree size 5 (canopy closures M and D) and tree size 6.	California spotted owl *Strix occidentalis occidentalis*	3
		northern flying squirrel *Glaucomys sabrinus*	3
Snags in Green Forest	medium and large snags in green forest	hairy woodpecker *Picoides villosus*	2
Snags in Burned Forest	medium and large snags in burned forest (stand-replacing fire)	black-backed woodpecker *Picoides arcticus*	2

[1] Category 1: MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.

Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.

Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

Black-backed Woodpecker (Category 2)–This Project is within a burned forest or within a portion of recent wildland fire area; however, no burnt snags will be affected as a part of the proposed action or alternatives. No removal of snags in burnt forests is proposed or planned under this project as an action. No effects to black-backed woodpecker habitat (burnt snags) as defined in Table 1 would occur as a result of this Project.

Hairy Woodpecker (Category 2)–This Project does contain snags in green forests; however, this habitat or ecosystem component will not be affected as a part of the proposed action or alternatives. No removal of snags in green forests is proposed or planned under this project as an action. No effects to Hairy Woodpecker habitat as defined in Table 1 would occur as a result of this Project.

The MIS whose habitat would be either directly or indirectly affected by this Project, identified as Category 3 in Table 85, are carried forward in this analysis, which will evaluate the direct, indirect and cumulative effects of the proposed action and alternatives on the habitat of these MIS. The MIS selected for project-level MIS analysis for this Project are: aquatic macroinvertebrates, fox sparrow, mule deer, yellow warbler, Pacific tree frog, mountain quail, Sooty grouse, California spotted owl and northern flying squirrel.

3.7.25.1 Oak Associated Hardwood and Hardwood Conifer – Mule Deer – MIS and Deer Herd Analysis: Affected Environment

The mule deer is the only species in the Ungulate Group. The mule deer is selected as MIS on the PNF and the rest of the Sierra Nevada. The Plumas Land Resource Management Plan (Forest Plan) (USDA Forest Service 1988) and subsequent amendments indicate that mule deer use a mix of all successional stages, but the defining habitat or ecosystem component for mule deer habitat includes oak-associated hardwood and hardwood-conifer (MHW and MHC). Most deer on the PNF migrate seasonally between higher elevation summer range and low elevation winter range. Although not required under the MIS analysis, a deer herd analysis is incorporated into this section since it responds to an internal issue of concern. In general, critical winter range, summer range and fawning habitats represent key habitats for deer where heavier use and higher quality habitats for wintering and summer use are expected to occur.

The PNF has four main deer herds within its administrative boundaries: Sloat, Bucks, Mooretown and Doyle. The Tehama and Loyalton/Truckee deer herds overlap with small portions of the PNF in the extreme north and south sections of the administrative boundaries and make up a relatively small percentage on a Forest-wide scale. Deer herd habitat types are displayed in Table 86.

Table 86. Acreage of deer habitat by type and property ownership on the Plumas National Forest.

Deer Habitat Type	National Forest System Land	Non-National Forest System Land	Total within the Forest Boundary
Critical Winter	18,246	3,188	21,434
Fawning	23,718	2,780	26,498
Holding Area	1,349	2,355	3,704
Summer	1,002,272	167,821	1,170,093
Winter	157,253	53,916	211,169
Total	1,202,838	230,060	1,432,898

Table 87 shows deer habitat acreage on NFS lands within deer habitat types for each of the primary deer herds (Sloat, Bucks, Mooretown and Doyle) occurring within the boundary of the PNF.

Table 87. Acreage of deer habitat by type for each major deer herd on the Plumas National Forest.

Deer Herd	Habitat Type	Acres
Sloat	Critical Winter	18,246
	Holding Area	1,349
	Summer	282,789
	Winter	61,793
Bucks	Summer	221,060
	Winter	95,460
Mooretown	Summer	149,421
Doyle	Fawning	23,718
	Summer	349,002

Many studies have been conducted on the interaction of road and trail-associated activities and mule deer and have shown that road and trail-associated factors have the potential to impact mule deer populations directly and indirectly, including mortality from vehicle-collisions, modification of behavior (avoidance or flight), mortality from hunting and poaching, habitat fragmentation, edge effects of roads and trails and others. Roads and trails can result in the disturbance or disruption of individuals in a deer population. Deer inhabiting areas near roads and trails may move away from the area when disturbed by humans. Several factors affect the degree to which trail and road associated human activities disrupt deer. This section will highlight some examples of the way in which roads and trails can affect individual deer and deer populations. Studies on both white-tailed deer and mule deer are included in the summaries.

3.7.25.1.1 Displacement or Avoidance

In general, mule deer will move away from, or flush, from an approaching person and will usually allow a person in or on a vehicle to get closer than a person on foot (Freddy et al. 1986, Wisdom et al. 2004). Wisdom et al. (2004) found that mule deer showed little measurable flight response to experimental OHV treatments but cautioned that deer may well be responding with fine-scale changes in habitat use (i.e. avoidance), rather than substantial increases in movement rates and flight responses. Several studies have found that mule deer avoid areas in proximity to roads. Deer avoid primary roads more than secondary or tertiary roads and also avoid roads more in open habitats as opposed to areas with vegetative or topographic cover (deVos et al. 2003).

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

Main roads were found to reduce deer use up to 0.5 miles (800 m), whereas secondary and primitive roads reduced deer densities from between 200 to 400 meters in these studies. Additional variables such as the amount and frequency of traffic and the spatial distribution of roads in relation to deer use, influence the degree of negative effects that roads have on deer use in forested habitats (Perry and Overly 1977, Johnson et al. 2000, deVos et al. 2003). Where disturbance causes deer to avoid areas within preferred habitats, animals may be forced into less preferred or lower quality habitats. Such shifts, particularly if repeated, can result in adverse impacts to the energy balance of individual deer and ultimately can decrease population productivity, especially on winter ranges (deVos et al. 2003).

3.7.25.1.2 Hunting and Poaching

Greater human access can increase opportunities for hunting as well as poaching of deer. During the hunting season, deer may become more wary of humans and disturbance to deer is greater when being hunted. In New York State, antlered deer were found to have longer flight distances than deer that were not hunted (Jalkotzky et al. 1997). Hunted deer populations tend to have stronger reactions to people on foot than motor vehicles. This may be due to the fact the deer can detect a vehicle from greater distances rather than getting surprised by quieter humans on foot. Roads and trails can facilitate deer harvest success. A study using 143 radio-collared deer in Minnesota revealed that deer mortality during the hunting season was 2-4 times higher for deer that lived 0.2 km from a road versus those that were at >0.3 km from a road. Major access routes radiating from urban centers into deer range provide increased opportunities for hunters.

Since hunting levels for deer are controlled through hunting zone quotas and tag limits established by the California Department of Fish and Game (CDFG), an increase in hunting opportunity or hunter success is unlikely to impact deer populations (deVos 2003). Hunting limits also take into account estimates of the amount of illegal kill and road kill occurring. Levels of illegal harvest are not presently described as a significant source of mortality for deer herds on the PNF (CDFG 2003, CDFG 1998).

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

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

3.7.25.1.3 Collisions

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

Deer and vehicle collisions probably differ by the type of road or trail, so care must be given when considering deer-vehicle collisions. The majority of deer-vehicle collisions occur in the early morning or late afternoon and evening hours, around dawn and sunset, when the deer are most active and when visibility is poor. More deer-vehicle collisions occur during the spring and fall when deer are migrating. In the fall, hunting may cause deer to be more wary and increase movement of deer. In the spring, vegetation tends to green up along roadsides and attract deer to roads. There are little to no data on deer road kills along Forest roads; however, roads maintained at a higher standard for passenger vehicle (maintenance levels 3, 4 and 5), where vehicle speeds are greatest, have the most potential to contribute to deer-vehicle collisions. Deer-vehicle collisions on roads and trails which are maintained for high clearance vehicles (maintenance level 2 roads) are probably not appreciable in number due to the lower speeds and the amount of use received by these roads.

Several studies indicated that mortality from deer-vehicle collisions differed by sex and age. In Pennsylvania, vehicle-caused mortality was significantly higher for fawns and yearlings than adults; and more adult females were killed than adult males (Jakotzy et al. 1997). Jakotzy et al. (1997) also cited that female deer in South Dakota were killed more often, except during the fall when male deer mortality was higher.

Summary of Trail and Road Associated Impacts to Mule Deer

- Mortality from hunting or trapping as facilitated by road and trail access.
- Increased illegal take of animals as facilitated by trails and roads.
- Mortality or injury resulting from a motor vehicle colliding with an animal.
- Loss and resulting fragmentation of habitat due to the establishment of roads, trails, or networks and associated human activities.
- Increased mortality of animals (euthanasia or shooting) due to increased contact with humans, as facilitated by road and trail access.
- Interference with dispersal or other movements as posed by a road or trail itself or by human activities on or near roads, trails, or networks.
- Spatial shifts in populations or individuals animals away from human activities on or near roads, trails, or networks.
- Displacement of individual animals from a specific location that is being used for reproduction and rearing of young.
- Increase in heart rate or stress hormones when near a road or trail or network of roads or trails.

3.7.25.2 Mule Deer: Environmental Consequences

3.7.25.2.1 Analysis Measures

Proposed Trail and Open Unauthorized Route Density

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

Miles of Proposed Trail and Open Unauthorized Routes

To assess the potential direct and indirect impacts to deer from motorized route associated disturbance including noise, hunting, poaching, etc., the miles of motorized routes to be added to National Forest Transportation System (NFTS) were determined for each alternative by key deer habitat type (summer, fawning, winter and critical winter) within each of the deer herds—Sloat, Bucks, Mooretown and Doyle.

Zone of Influence

Mule Deer were selected as a MIS for Oak associated hardwood and Hardwood-Conifer. The defining CWHR habitat types or ecosystem component is montane hardwood (MHW) and montane hardwood-conifer (MHC). These habitat types will be evaluated to determine the amount of habitat affected within a 200-meter zone of influence. This zone of influence is based upon the Rost and Bailey's study in Colorado, which indicated that deer were displaced within a 200-meter distance of secondary roads. A distance of 200 meters was applied to represent the Zone of Influence related to motorized trails, since the majority of PNF roads and trails are likely most similar to those roads addressed in the Colorado study area. The proportion of MHW and MHC habitat occurring within this Zone of Influence was determined for each Alternative. Thresholds associated with this measure have not been established, but relative changes in affected habitat can be evaluated and compared between the alternatives.

Seasonal Restrictions for Motor Vehicles

The 1988 Forest Plan recognizes that the restriction of motorized vehicle access within certain deer habitat areas is important to deer. Seasonal restrictions for deer have occurred in the Diamond Mountain area since 1984. A portion of the Diamond Mountain area is closed to motorized vehicles before and during deer hunting season within Hunt Zone X-6A. Selected roads within the Diamond Mountain Area are closed and vehicles are prohibited both on and off roads and trails. The closure has been implemented due to the high volume of vehicles in the Diamond Mountain area during deer season. This closure has been an ongoing cooperative effort between the California Department of Fish and Game, Plumas County Fish and Game Commission and the Plumas National Forest. This closure within the Diamond Mountain area would continue under all of the action alternatives.

3.7.25.2.2 Direct and Indirect Effects—Class of Vehicles

Mule deer responses to motor vehicle use vary depending upon the type of vehicle, the intensity, timing, speeds and amount of motor vehicle use. For this analysis, it is assumed that all vehicle types result in the same disturbance to mule deer. Therefore, changes in the class of vehicles would not vary in their effects to mule deer for all of the proposed alternatives.

3.7.25.2.3 Direct and Indirect Effects—Trail and Open Unauthorized Route Density

On the PNF, motorized route density was determined by deer herd and range type (i.e. summer, winter, etc.) (

Table 88).

Table 88 shows the average open unauthorized route, existing motorized trail and proposed trail densities within deer herd ranges under each alternative (calculated by dividing the total mileage on NFS lands in deer ranges by the square miles of NFS lands in deer ranges).

Table 88. Average open unauthorized route, existing trail and proposed trail densities (miles/square mile) on NFS lands within deer herd ranges on the PNF.

	Range Type	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Sloat Deer Herd	Summer	.56	.37	.15	.20	.27
	Holding Area	0	0	0	0	0
	Critical Winter	.88	.59	.21	.33	.41
	Winter	1.2	.58	.22	.36	.40
Bucks Deer Herd	Summer	.71	.41	.09	.18	.27
	Winter	.40	.37	.22	.25	.29
Mooretown Deer Herd	Summer	.36	.19	.05	.09	.10
Doyle Deer Herd	Summer	.66	.18	.02	.06	.09
	Fawning	.61	.20	.01	.08	.08

Sloat Deer Herd

Implementing Alternative 1 would have open unauthorized route densities and existing motorized trails that exceed densities within Alternatives 2, 3, 4 and 5 by about two to one within both summer, critical winter and winter range for the Sloat Deer Herd. Alternative 2 has the next highest level of existing and proposed trail densities for all deer herd range categories; summer, critical winter and winter. Alternative 3 has the least trail densities of all of the alternatives, since no new proposed trails are included. Alternative 4 has the least existing and proposed trail densities of the alternatives with trails in all ranges: summer, critical winter and winter. A holding area occurs within the PNF boundary for the Sloat Deer Herd. For all alternatives, there were no existing trails, unauthorized routes or proposed trails in this deer holding area. For the Sloat Deer Herd, Alternative 1 has the most impact to the herd and Alternative 3 has the least impact based on route and trail densities.

Bucks Deer Herd

Implementing Alternative 1 would have existing trail and open unauthorized route densities that exceed existing and proposed trail densities within Alternatives 2, 3, 4 and 5 by about two to one within both summer and winter range for the Bucks Deer Herd. Alternative 2 has the next highest level of trail densities for all deer herd range categories; summer and winter. Alternative 3 has the least trail densities for all range types within the Bucks Deer Herd. Alternative 4 has the second lowest proposed trail densities in summer winter range of all of the alternatives. For the Bucks Deer Herd, Alternative 1 has the most impact to the herd and Alternative 3 would have the least impact as a result of existing trail densities in both summer and winter range. Of the action alternatives with proposed trails, Alternative 4 presents the least risk followed by Alternative 5 and Alternative 2.

Mooretown Deer Herd

Implementing Alternative 1 would have existing trail and open unauthorized route densities that exceed existing and proposed trail densities under Alternatives 2, 3, 4 and 5 by about three to one within both summer range for the Mooretown Deer Herd. Alternative 2 has the second highest level of trail densities (0.14 mi/ miles^2) for summer range. Alternative 3 has the least (existing) trail densities (0.05 mi/miles^2) of all of the alternatives. Alternative 4 has less trail density (0.10 mi/miles^2) than Alternative 1 and 5, but about twice as much as the existing trail density under Alternative 3. For the Mooretown Deer Herd, Alternative 1 has the most impact to the herd and Alternative 3 has the least impact.

Doyle Deer Herd

Implementing Alternative 1 would have existing motorized trail and open unauthorized route densities that exceeded existing and proposed trail densities within Alternatives 2, 3, 4 and 5 by about three to one within both summer and fawning habitat for the Doyle Deer Herd. Alternative 2 has the second highest level of trail densities for all deer herd range categories; summer and fawning. Alternative 3 has the least (existing) trail densities of all of the alternatives. Alternative 4 has the least impact to summer range of the action alternatives and is similar to Alternative 5 in existing and proposed trail densities (0.08 mi/miles^2) in fawning habitat. For the Doyle Deer Herd, Alternative 1 has the most impact to the herd and Alternative 3 has the least impacts as a result of route and trail densities in both summer range and fawning habitat.

Trail and Open Unauthorized Route Density Summary

For all major deer herds occurring within the boundaries of the PNF, Alternative 1 would have the greatest existing trail and open unauthorized route densities compared to all of the action alternatives within essential summer (fawning) and winter (critical winter and winter) ranges. Alternative 2 would have the next highest level of trail densities within the deer ranges for the four main herds. Within critical summer and fawning areas, Alternative 1 poses a somewhat higher risk to all deer herds on the PNF and may therefore pose a greater risk in the ability for these deer herds to successfully reproduce and rear fawns, as compared to all of the action alternatives. Alternatives 3 and 4 have the least impacts to the Plumas deer herds within summer and winter ranges. Alternative 1 also has the greatest direct and indirect effects to winter ranges, especially within the Sloat Deer Herd, where Alternative 1 existing trail and open unauthorized route densities exceed the action alternatives by over one half to 0.8 mile/miles^2. Habitat effectiveness would be reduced to the greatest extent under Alternative 1, to the least extent under Alternatives 3 and 4, with Alternatives 2 and 5 having a moderate impact on habitat effectiveness.

3.7.25.2.4 Direct and Indirect Effects—Trail and Open Unauthorized Route Miles

Table 89 displays motorized open unauthorized route, existing trail and proposed trail miles for each deer herd, which gives another way to compare alternatives to assess the direct and indirect impacts to deer from motorized trails where access for hunting and poaching and disturbance and avoidance may occur. Existing trail, proposed trail and unauthorized route miles in key deer habitat (Summer, Fawning, Critical Winter, Winter Ranges) by deer herd are discussed below.

Table 89. Miles of open unauthorized routes, existing trails and proposed trails on NFS and private lands within deer herd winter ranges, critical winter ranges, critical summer and fawning areas on the PNF.

		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles of Motorized Open Routes and/or Trails Within Sloat Deer Herd	Summer	249	162	65	90	127
	Holding Area	0	0	0	0	0
	Critical Winter	25	17	6	10	12
	Winter	114	56	21	35	38
Miles of Motorized Open Routes and/or Trails within Bucks Deer Herd	Summer	245	139	30	68	105
	Winter	60	55	33	37	44
Miles of Motorized Open Routes and/or Trails within Doyle Deer Herd	Summer	361	96	11	39	57
	Fawning	23	7.5	0.5	3.5	3.5

Sloat Deer Herd

Within Summer Range, implementing Alternative 1 would have existing trails and open unauthorized route miles that exceed Alternative 5 by a two to one margin and exceed Alternatives 2, 3 and 4 by nearly 150 miles for the Sloat Deer Herd. There are no open unauthorized route or trail miles within the Holding Area for the Sloat herd under any of the five alternatives.

Within critical winter range, Alternative 1 has the most existing trail and open unauthorized route miles at 25 miles, followed by Alternative 2 with 11 miles of existing and proposed trail. Alternatives 4 and 5 range from 10 to 12 miles. Existing trail miles under Alternative 3 are the least with 6 miles. For winter range, Alternative 1 (114 miles) exceeds all other alternatives three to one. Alternatives 2, 4 and 5 are all similar (35 to 56 miles), with Alternative 3 having the least miles (21 miles of existing motorized trail) in winter range.

Alternative 1 poses the greatest risk to the Sloat Deer Herd on both summer and winter ranges, followed next by Alternative 2, 5 and 4. Alternative 3 poses the least risk to the Sloat Herd.

Bucks Deer Herd

For the Bucks Deer Herd, summer range is impacted the most by route miles. Within summer range, Alternative 1 has 245 miles of existing trail and open unauthorized routes with Alternatives 2 and 5 ranging from 139 miles to 105 miles of proposed and existing trails. Alternative 3 has the least amount of routes with 30 miles of existing motorized trails.

Within winter range, Alternative 1 has 60 motorized unauthorized route and existing trail miles, almost twice as much as Alternative 3, with 33 miles of existing trails. Alternatives 2 and 5 are similar with a range of 55 to 44 miles. Alternative 4 has the second lowest trail miles (37 miles) in winter range within the Bucks Herd. Within winter range, Alternative 1 has the highest number of route miles, where direct and indirect disturbance associated with motorized routes could occur when deer are stressed during the winter. In summary, Alternative 1 poses the greatest risk to the Bucks Deer Herd on winter ranges where resources may be scarce and deer may be stressed during the winter months. Alternative 3 presents the least risk to deer.

Overall, Alternative 1 has the greatest risk to both summer and winter range, while Alternative 3 has the least risk when route and trail miles in both summer and winter ranges are combined.

Mooretown Deer Herd

Alternative 1 existing trail and unauthorized route miles exceed Alternative 2 by a two to one ratio (84 miles/43 miles) (Table 90) in summer range for the Mooretown Deer Herd. The remaining action alternatives (Alternatives 3 and 4) range between 24 and 27 existing and proposed trail miles. Alternative 3 has the least amount of trail miles (11 miles existing motorized trail) of all of the action alternatives.

In summary, Alternative 1 poses the greatest risk to the Mooretown Deer Herd on summer range were Alternative 3 poses the least risk to summer range habitat for deer.

Doyle Deer Herd

Route miles for the Doyle Deer Herd are greatest under Alternative 1, where existing trail and open unauthorized route miles exceed all of the action alternatives by at least 264 miles (Alternative 5) within summer ranges (Table 90). Within fawning habitat, trail miles are similar for Alternatives 4 and 5 with Alternative 1 exceeding the remaining alternatives by 15 miles. Alternative 3 has the least miles in fawning habitat with 0.5 existing trail miles. Alternative 1 poses the greatest concern to the Doyle Deer Herd on both summer ranges and fawning habitat that are important to reproduction and rearing young during the summer months.

Alternative 1 poses the greatest risk of the alternatives within summer range and fawning habitat, where the Doyle Deer Herd are most vulnerable to factors associated with motor vehicles. Alternative 3 poses the least risk to summer range and fawning habitat for deer within the Doyle herd.

Table 90. Miles of open unauthorized routes, existing trails and proposed trails on NFS and private lands within deer herd winter ranges, critical winter ranges, critical summer and fawning areas on the PNF

		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles of Motorized Open Routes and Trails Within Sloat Deer Herd	Summer	249	162	65	90	127
	Holding Area	0	0	0	0	0
	Critical Winter	25	17	6	10	12
	Winter	114	56	21	35	38
Miles of Motorized Open Routes and Trails Within Bucks Deer Herd	Summer	245	139	30	68	105
	Winter	60	55	33	37	44

		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Miles of Motorized Open Routes and Trails Within Mooretown Deer Herd	Summer	84	43	11	24	27
Miles of Motorized Open Routes and Trails Within Doyle Deer Herd	Summer	361	96	11	39	57
	Fawning	23	7.5	0.5	3.5	3.5

3.7.25.2.5 Direct and Indirect Effects—Zone of Influence (Oak Associated Hardwood and Hardwood Conifer)

As stated above, deer were found to respond to disturbance associated with secondary motorized roads and trails within a 200-meter distance. Although, because deer may respond differently, depending on the type of route and the type of surrounding vegetation, analyzing for these variables can be complex. The amount of disturbance to deer depends upon the type of route, the intensity of use and the degree to which motorized activities overlap with deer use. The project alternatives only consider the addition of motorized trails to the National Forest Transportation System (NFTS) that are native surface, which have less volume of traffic and receive lower rates of speed. Therefore, a Zone of Influence within 200 meters of motorized trails and open unauthorized routes was used by to compare differences in the direct and indirect impacts between alternatives for Oak associated hardwood and hardwood/conifer habitat used by deer as represented by CWHR types MHW and MHC. Habitat affected was then compared to the amount of habitat available Sierra Nevada wide. Although major roads (i.e., paved and surfaced roads used by passenger vehicles which may receive higher use levels and rates of speed, including county roads, state highways, etc.) may have a greater Zone of Influence to deer than secondary motorized routes, a 200-meter Zone of Influence was used to analyze all existing motorized trails and routes consistently because using a greater Zone of Influence may result in excessive overlap in habitat when considering all motorized routes and therefore, overstate the effects of motorized routes. In addition, regardless of the amount of impact from a particular type of route (major or secondary), the impacts from existing trails and routes remain constant across all of the alternatives and therefore, the direct and indirect effects of adding new routes to the NFTS is demonstrated by the relative difference between each of the project alternatives.

Areas that are less influenced by motorized routes are considered “security habitat,” whereas, areas influenced by routes are considered “zones of influence” where deer are less secure. For alternative comparison purposes, a simple ranking system, such as the one developed by Gaines et al. (2003), is used. For this purpose, less than 25 percent of MHW and MHC habitat affected was ranked as a low level of road or trail influence, 25 to 50 percent of MHW and MHC habitat affected was ranked as a moderate level of influence and greater than 50 percent of MHW and MHC habitat affected was ranked as a high level of influence. Using this ranking system, all alternatives ranked low in the level of motorized trail and route influence on deer’s use of MHW and MHC habitat, where the effectiveness MHW and MHC habitat would be minimally affected. The section below describes how the alternatives rank in their influence on MHW and MHC habitats.

Alternative 1 poses the greatest risk to MHW and MHC habitats by affecting 2% (17,279 acres) of the habitat type Sierra Nevada wide. These 17, 279 acres will result in reduced habitat effectiveness from potential disturbance or avoidance behavior as a result of factors associated with motorized routes. Motorized proposed and existing trails under Alternatives 3, 4 and 5 are similar in the level of influence MHW and MHC habitats for deer. Within the 200-meter zone of influence MHW and MHC habitat are affected from 0.4% (2,980 acres) to 0.6% (4,890 acres). The effects from Alternatives 3, 4 and 5 represent almost 2/3 less of an impact on MHW and MHC habitat than Alternative 1. Alternative 3 poses the least effect on MHW and MHC habitats affecting only 2,980 acres. Alternative 2 represents the second highest level of impact to MHW and MHC habitats and half the impact of Alternative 1.

Table 91. Proportion of Oak-associated hardwood and hardwood/conifer habitat within a 200-meter "Zone of Influence" of Motorized Trails and Open Unauthorized Routes by alternative.

Mule Deer MIS Habitat	Habitat Type	SN Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	Oak-associated Harwood and Hardwood/Conifer	809,000	17,279	8,864	2,980	3,972	4,890
	Proportion of Habitat		2.0%	1.0%	0.4%	0.5%	0.6%
	Overall Habitat Ranking		**Low**	**Low**	**Low**	**Low**	**Low**

3.7.25.2.6 Overall Cumulative Effects from Present, and Reasonably Foreseeable Future Actions

Cumulative effects to mule deer include current and historic grazing of mule deer habitat; loss of habitat through catastrophic wildfires; timber and fuels management where cover and forage has been reduced or removed; and recreational activities including hunting, camping and general recreation activities including all forms of motorized use including 4-wheeled drive vehicles, ATVs and motorcycles.

Appendix C of this EIS provides a list and description of present and reasonably foreseeable projects on the Forest and private lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to the mule deer within the PNF boundary. Table 92 lists those projects that affect deer habitat. The PNF currently has 42 active livestock grazing allotments including both cattle and sheep. Forest Plan Standards and Guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands. Between 2000 and 2007, over 73,345 acres of forest vegetation and fuels projects were completed, which consisted primarily of thinning, group selection, mastication and/or burned vegetation to reduce the potential for catastrophic wildfires. The thinning treatments may result in the short-term reduction in cover for deer, though it is expected that in the longer term, habitat will be protected by reducing wildfire risk. These treatments generally do not increase forage condition for deer because they do not usually result in reducing the canopy cover below 40%, except for group selection harvest treatments on the Forest. Group selection harvests are expected to increase foraging habitat for mule deer. Many recent, current and future vegetation and fuels reduction projects are emphasizing habitat improvement for deer by removing competing conifers within oak habitats and aspen habitats which are designed to enhance mule deer foraging condition. Between 1990 and 2007, approximately 266,963 acres burned on the PNF, some of which have removed mule deer habitat initially, but in the long term created habitat for deer as natural succession progressed post fire.

Currently, there is a high demand for recreational use on the PNF due to its close proximity to urban centers (e.g. Oroville, Chico, Reno). The PNF provides a wide variety of recreational experiences including developed and dispersed camping, hiking, fishing, hunting, wildlife viewing, winter sports activities (e.g. downhill skiing, cross-country skiing, snowmobiling), summer OHV use and a variety of other non-motorized use (e.g. equestrian use, mountain biking). Recreational use on the PNF has significantly increased compared to the past 20 to 30 years. Because of the proximity to urban areas and population growth, increased recreational use on the PNF is expected to continue to increase in the future including camping, hiking, fishing, wildlife viewing, hunting and OHV use. Generally, the increase in recreational use on the PNF has the potential to cause an increase in negative interactions between humans and mule deer. Future increase in recreational use on the PNF is expected and therefore, increased disturbance to mule deer would be expected, particularly during the summer months. Table 92 lists all of the reasonably foreseeable future actions, including fuels, vegetation, recreation, range allotment plans, non-motorized trail development and special use permit reissuances. Table 92 summarizes cumulative impacts from present and reasonably foreseeable projects with a description of the potential impact to mule deer and their habitat.

Table 92. Direct, indirect and cumulative impact to mule deer from present and reasonably foreseeable future projects.

Project type	Number of Projects	Mule Deer Direct and Indirect Impact	Overall Cumulative Impact
Vegetation management/fuels reduction–thinning, group select, aspen enhancement	17 (Empire, Slapjack, Basin, Grizz, Freeman, Mabie, Clarks, Jackson, Ingalls, Big Hill, Watdog, Flea, Sugarberry, Meadow Valley, Canyon Dam, Corridor, Keddie)	Short-term disturbance from harvest activities, changes in cover, foraging habitat enhancement in aspen and oak habitats.	• Short-term adverse impacts during harvest. • Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires. • Beneficial cumulative effects from Group selection (increase in foraging habitat). • Improved Oak and Aspen habitat for Deer.
Hazard tree removal	2 (Moonlight, Camp 14)	Minimal impact. Short-term disturbance/displacement during harvest.	None to minimal cumulative impact
Watershed Restoration	1 (Sulphur Creek)	Short-term disturbance during implementation. Improve riparian and meadow habitat quality used for forage and fawning.	Beneficial cumulative impact by improving long-term forage and fawning habitat quality.
Range Allotment permit renewal	3 (Grizzly Valley, Grizzly Valley Community, Humbug	Impacts from incidental browsing of oak/hardwoods by livestock	Cumulative impact restricted to browsing of no more than 20% of annual growth of hardwood seedlings and advanced regeneration.
Temporary OHV Forest Order	1 (Forest-wide)	Closed Forest to cross-country travel. Lessened disturbance and displacement of deer.	Overall benefitted deer by reducing level of disturbance from OHV and preventing impacts to deer habitat within summer, winter and fawning fawning habitats
Plumas-Sierra Rural Electric Co-op	1 (Forest-wide)	Reduction of deer habitat from access road construction.	Reduction of deer habitat on 3 miles of road and disturbance/displacement of deer from road use.
Fire Recovery/Restoration	1 (Moonlight Wheeler)	Temporary disturbance/displacement during project implementation.	None to minimal. Project will result in temporary displacement and disturbance. Overall restoration will

Project type	Number of Projects	Mule Deer Direct and Indirect Impact	Overall Cumulative Impact
			be beneficial in accelerating cover for deer.

When considering all of the cumulative effects of present and reasonably foreseeable future impacts from grazing, vegetation/fuels projects, wildfires and recreation, Alternative 1 poses the greatest risk to the 4 major deer herds on the PNF, where impacts from open unauthorized route densities and the number of miles of open unauthorized routes, as well as the impacts to oak-associated hardwood and hardwood/conifer are the greatest. Alternative 2 represents the second highest level of impact and poses a moderate risk to deer as a result of adding cumulative effects to the effects of proposed trail densities, proposed trail miles and impacts to oak-associated hardwood and hardwood conifer. Alternatives 3, 4 and 5 pose the lowest risk to deer as a result of adding cumulative effects to the effects of proposed trail densities, proposed trail miles and impacts to oak-associated hardwood and hardwood conifer.

3.7.25.2.7 Summary of Mule Deer Status and Trend at the Bioregional Scale

The Forest Plan (as amended by the Sierra Nevada Forests MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the mule deer; hence, the oak-associated hardwood and hardwood/conifer effects analysis for this Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the mule deer. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008.

Habitat Status and Trend

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

Population Status and Trend

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

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Mule Deer Trend

The range of habitat affected consists of 2,980 acres (Alternative 3) to 17,279 acres (Alternative 1) of oak-associated hardwood and hardwood/conifer habitat. The other three alternatives fall within this range. This amount of habitat affected equals 0.4% to 2.0% of the habitat available Sierra Nevada wide. Based on the small percentage of habitat affected, this Project Area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of mule deer across the Sierra Nevada bioregion.

3.7.26 Spotted Owl: MIS Analysis

Aside from its listing as a Regional Forester as a Sensitive Species, the California spotted owl is designated as an MIS on the PNF. The Sierra Nevada MIS Amendment defined Late Seral Closed Canopy Coniferous Forest as the habitat component for the spotted owl. The corresponding CWHR types that define the habitat component are ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), with tree and canopy cover classes 5M, 5D and 6. Pure eastside pine types are not considered suitable for California spotted owls. Currently, there are 994,000 acres of these CWHR types on NFS lands in the Sierra Nevada. These habitat types, for the purpose of this MIS analysis, will be analyzed based on the amount of habitat affected within a 200-meter zone of influence.

3.7.26.1.1 Direct and Indirect Effects

Late seral closed canopy coniferous forest do occur in close proximity to open unauthorized routes, existing motorized trails and proposed trails (Table 93). Of the five alternatives analyzed for impacts to this MIS habitat type, Alternative 1 posed the highest level of impact affecting approximately 13% of the habitat Sierra Nevada wide. Under this alternative, 130,322 acres of late seral closed canopy coniferous forest habitat occurs within 200 meters of open unauthorized routes and existing motorized trails. The quality and use of this habitat type by spotted owls will be affected through increased noise levels, disturbance and displacement. Alternative 2 has the second highest level of effects (6.2%) to late seral closed canopy coniferous forest habitat. Alternative 4 poses the lesser risk than Alternatives 2 and 5 by affecting only 2.5% of the habitat. Alternative 3 poses the least risk to late seral closed canopy coniferous forest habitat by affecting only 1.8% of the habitat based on existing motorized trails.

Table 93. Proportion of California spotted owl Management Indicator Species habitat within a 200-meter "Zone of Influence" by motorized open unauthorized routes, existing trails and proposed trails.

California spotted owl MIS habitat	Habitat Type	SN Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	Late Seral Closed Canopy Coniferous forest	994,000	130,322	61,484	18,472	24,695	29,505
	Proportion of Habitat		13.0%	6.2%	1.8%	2.5%	3.0%
	Overall Habitat Ranking		**Low**	**Low**	**Low**	**Low**	**Low**

3.7.26.2 Overall Cumulative Effects from Present, and Reasonably Foreseeable Future

Cumulative effects to late seral closed canopy coniferous forests include loss of habitat through catastrophic wildfires; timber and fuels management where canopy cover and nesting and foraging habitat has been reduced or removed.

Appendix C of this EIS provides a list and description of present and reasonably foreseeable projects on the Forest and private lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to late seral closed canopy coniferous forests within the PNF boundary. Between 2001 and 2007, over 73,345 acres of forest vegetation and fuels projects were completed, which consisted of group selection, understory thinning, mastication and/or burned vegetation to reduce the potential for catastrophic wildfires. These treatments affect less than 10% of late seral closed canopy coniferous forest. These thinning treatments may result in the short-term reduction of late seral closed canopy coniferous forest, though it is expected that in the longer term, habitat will be protected by reducing wildfire risk. Between 1990 and 2007, approximately 266,963 acres have burned on the PNF, some of which has removed late seral closed canopy coniferous forest for the next 50-70 years.

Table 94 lists all of the present and reasonably foreseeable future actions, including fuels, vegetation and miscellaneous resource projects. Table 94 summarizes cumulative impacts from present and reasonably foreseeable projects and a description of the potential impact to late seral closed canopy coniferous forests.

Table 94. Direct, indirect and cumulative impact to spotted owls from reasonably foreseeable future projects.

Project type	Number of Projects	Spotted Owl Direct and Indirect Impact	Overall Cumulative Impact
Vegetation management/fuels reduction – thinning, group select	17 (Empire, Slapjack, Basin, Grizz, Freeman, Mabie, Clarks, Jackson, Ingalls, Big Hill, Watdog, Flea, Sugarberry, Meadow Valley, Canyon Dam, Corridor, Keddie	Small decreases (<10%) in late seral closed canopy coniferous forest outside of PACs/SOHAs.	Short-term adverse impacts during harvest. Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires.
Hazard tree removal	2 (Moonlight, Camp 14)	Minimal impact or disturbance during harvest.	No impact to late seral closed canopy coniferous forest
Temporary OHV Forest Order	1 (Forest-wide)	Closed Forest to cross-country travel. Lessened disturbance and displacement of owls.	Overall benefit to late seral closed canopy coniferous forest by eliminating effects to habitat quality.

When considering all of the cumulative effects of present and reasonably foreseeable future impacts from vegetation/fuels projects, wildfires and miscellaneous projects, Alternative 1 poses the greatest risk to late seral closed canopy coniferous forest (PPN, SMC, WFR, RFR, 5M, 5D and 6) by affecting more of this habitat type within the 200-meter zone of influence. Alternative 3 poses the least risk when cumulative effects are considered and added to the effects of this alternative to late seral closed canopy coniferous forest. All other action alternatives (2, 4 and 5) pose a moderate risk to late seral closed canopy coniferous forest.

3.7.26.2.1 Summary of California Spotted Owl Status and Trend at the Bioregional Scale

The Forest Plan (as amended by the Sierra Nevada Forests MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the California spotted owl; hence, the late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir and red fir) habitat effects analysis for this Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008).

Habitat Status and Trend

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

Population Status and Trend

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

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trends

This project will affect 130,322 acres of late seral closed canopy coniferous forest habitat under Alternative 1 (high) and 18,472 acres under Alternative 3 (low). Based on the acres affected within the 200-meter zone of influence, which range from 1.8% to 13% of the total habitat Sierra Nevada wide, this Project Area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of California spotted owl across the Sierra Nevada bioregion.

3.7.27 Northern Flying Squirrel: MIS Analysis

The Northern flying squirrel is designated as a MIS on the PNF. The Sierra Nevada MIS Amendment defined late seral closed canopy coniferous forest as the habitat component for the Northern flying squirrel. The corresponding CWHR types that define the habitat component are ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), with tree and canopy cover classes 5M, 5D and 6. Currently, there are 994,000 acres of these CWHR types across NFS lands in the Sierra Nevada . These habitat types, for the purpose of this MIS analysis, will be analyzed based on the amount of habitat affected within a 200-meter zone of influence.

3.7.27.1.1 Direct and Indirect Effects

Late seral closed canopy coniferous forest occurs in close proximity to open unauthorized routes, existing motorized trails and proposed trails. Of the five alternatives analyzed for impacts to this MIS habitat type, Alternative 1 posed the highest level of impact affecting approximately 13% of the habitat Sierra Nevada wide (Table 95). Under this alternative, 130,322 acres of late seral closed canopy coniferous forest habitat occurs within 200 meters of open unauthorized routes. The quality and use of this habitat type by spotted owls would be affected through increased noise levels, disturbance and displacement. Alternative 2 has the second highest level of effects (6.2%) to late seral closed canopy coniferous forest habitat. Alternative 4 poses the lesser risk than Alternatives 2 and 5 by affecting only 2.5% of the habitat. Alternative 3 pose the least risk to late seral closed canopy coniferous forest habitat by affecting only 1.8% of the habitat from existing trails.

Table 95. Proportion of Northern Flying Squirrel MIS habitat within a 200-meter “Zone of Influence” of open unauthorized routes, existing motorized trails and proposed trails.

Northern flying squirrel MIS habitat	Habitat Type	SN Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	Late Seral Closed Canopy Coniferous Forest	994,000	130,322	61,484	18,472	24,695	29,505
	Proportion of Habitat		13.0%	6.2%	1.8%	2.5%	3.0%
	Overall Habitat Ranking		**Low**	**Low**	**Low**	**Low**	**Low**

3.7.27.1.2 Overall Cumulative Effects from Present, and Reasonably Foreseeable Future

Cumulative effects to late seral closed canopy coniferous forests include loss of habitat through catastrophic wildfires; timber and fuels management where canopy cover and nesting and foraging habitat has been reduced or removed.

Appendix C of this EIS provides a list and description of present and reasonably foreseeable projects on the Forest and private lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to late seral closed canopy coniferous forests within the PNF boundary. Between 2001 and 2007, over 73,345 acres of forest vegetation and fuels projects were completed, which consisted of group selection, understory thinning, mastication and/or burned vegetation to reduce the potential for catastrophic wildfires. These treatments affect less than 10% of late seral closed canopy coniferous forest. These thinning treatments may result in the short-term reduction in late seral closed canopy coniferous forest, though it is expected that in the longer term, habitat will be protected by reducing wildfire risk. Between 1990 and 2007, approximately 266,963 acres have burned on the PNF, some of which has removed late seral closed canopy coniferous forest for the next 50-70 years.

Table 96 lists all of the present and reasonably foreseeable future actions, including fuels, vegetation and miscellaneous resource projects. Table 96

Table 96 summarizes cumulative impacts from present and reasonably foreseeable projects and a description of the potential impact to late seral closed canopy coniferous forests.

Table 96. Direct, indirect and cumulative impact to Northern flying squirrel from reasonably foreseeable future projects.

Project type	Number of Projects	Spotted Owl Direct and Indirect Impact	Overall Cumulative Impact
Vegetation management/fuels reduction–thinning, group select	**17** (Empire, Slapjack, Basin, Grizz, Freeman, Mabie, Clarks, Jackson, Ingalls, Big Hill, Watdog, Flea, Sugarberry, Meadow Valley, Canyon Dam, Corridor, Keddie)	Small decreases (<10%) in late seral closed canopy coniferous forest outside of PACs/SOHAs.	Short-term adverse impacts during harvest. Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires.
Hazard tree removal	**2** (Moonlight, Camp 14)	Minimal impact or disturbance during harvest.	No impact to late seral closed canopy coniferous forest
Temporary OHV Forest Order	**1** (Forest-wide)	Closed Forest to cross-country travel. Lessened disturbance and displacement of squirrels.	Overall benefit to late seral closed canopy coniferous forest by eliminating effects to habitat quality.

When considering all of the cumulative effects of present and reasonably foreseeable future impacts from vegetation/fuels projects, wildfires and miscellaneous projects, Alternative 1 poses the greatest risk to late seral closed canopy coniferous forest (PPN, SMC, WFR, RFR, 5M, 5D and 6) by affecting more of this habitat type within the 200-meter zone of influence. Alternative 3 poses the least risk when cumulative effects are considered and added to the effects of this alternative to late seral closed canopy coniferous forest. All other action alternatives (2, 4 and 5) pose a moderate risk to late seral closed canopy coniferous forest.

3.7.27.1.3 Summary of Northern Flying Squirrel Status and Trend at the Bioregional Scale

The Forest Plan (as amended by the Sierra Nevada Forests MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the Northern flying squirrel; hence, the late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir and red fir) habitat effects analysis for this project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008).

Habitat Status and Trend

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

Population Status and Trend Northern Flying Squirrel

The Northern flying squirrel has been monitored in the Sierra Nevada at various sample locations by live-trapping, ear-tagging, camera surveys, snap-trapping and radiotelemetry: 2002-present on the Plumas and Lassen National Forests (Sierra Nevada Research Center 2007) and 1958-2004 throughout the Sierra Nevada in various monitoring efforts and studies (see USDA Forest Service

2008, Table NOFLS-IV-1). These data indicate that Northern flying squirrels continue to be present at these sample sites and current data at the range-wide, California and Sierra Nevada scales indicate that the distribution of Northern flying squirrel populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trends.

This Project will affect 130,322 acres of late seral closed canopy coniferous forest habitat under Alternative 1 (high) and 18,472 acres under Alternative 3 (low). Based on the acres affected within the 200-meter zone of influence, which range from 1.8% to 13% of the total habitat Sierra Nevada wide, this Project Area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of Northern flying squirrel cross the Sierra Nevada bioregion.

3.7.27.2 Sooty (Blue) Grouse: MIS Analysis

The sooty grouse is designated as a MIS on the PNF. The Sierra Nevada MIS Amendment defined late seral open canopy coniferous forest as the habitat component for the sooty grouse. The corresponding CWHR types that define the habitat component are ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), with tree and canopy cover classes 5S and 5P. Currently, there are 75,000 acres of these CWHR types on NFS lands across the Sierra Nevada. These habitat types, for the purpose of this MIS analysis, will be analyzed based on the amount of habitat affected within a 200-meter zone of influence.

3.7.27.2.1 Direct and Indirect Effects

Based on the analysis conducted, Alternative 1 affects the most late seral open canopy coniferous forest within the 200-meter zone of influence (Table 97). Alternative 1 affects approximately 4,486 acres or 6.0% of the habitat available Sierra Nevada wide. Effects will be displayed in the form of disturbance, displacement or through avoidance of available late seral open canopy coniferous forest. Alternative 2 has the second highest effect with 2,040 acres (2.7%) of late seral open canopy coniferous forest being influenced by proposed trails. Alternatives 4 and 5 appear to have similar effects that range from 846 acres (1.1%) to 1,033 acres (1.4%). Alternative 3 affects late seral open canopy coniferous forest habitat the least with only 458 acres or 0.6% of the available habitat Sierra Nevada wide affected by existing trails.

Table 97. Proportion of sooty grouse MIS habitat within a 200-meter “Zone of Influence” of Open Unauthorized Routes, Existing Motorized Trails and Proposed Trails

Sooty grouse MIS habitat	Habitat Type	SN Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	Late Seral Open Canopy Coniferous Forest	75,000	4,486	2,040	458	846	1,033
	Proportion of Habitat		**6.0%**	**2.7%**	**0.6%**	**1.1%**	**1.4%**
	Overall Habitat Ranking		**Low**	**Low**	**Low**	**Low**	**Low**

3.7.27.2.2 Overall Cumulative Effects from Present, and Reasonably Foreseeable Future

Cumulative effects to sooty grouse include loss of habitat through catastrophic wildfires; timber and fuels management where cover and forage have been reduced or removed.

Appendix C of this EIS provides a list and description of present and reasonably foreseeable projects on the Forest and private lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to sooty grouse within the PNF boundary. Between 2001 and 2007, over 73,345 acres of forest vegetation and fuels projects were completed, which consisted of group selection, thinning, mastication and/or burned vegetation to reduce the potential for catastrophic wildfires. These vegetation treatments may have resulted in some limited increases in late seral open canopy coniferous forest since canopy cover is generally not reduced below 40%, except in group selection units where at least 10% of the canopy cover has been retained. However, these treatments are expected in the longer term to benefit this habitat type by reducing wildfire risk. Between 1990 and 2007, approximately 266,963 acres burned on the PNF, some of which has removed late seral open canopy coniferous forest.

Table 98 lists all of the reasonably foreseeable future actions, including fuels, vegetation and miscellaneous resource projects. Table 98 summarizes cumulative impacts from reasonably foreseeable projects and a description of the potential impact to late seral open canopy coniferous forest.

Table 98. Direct, indirect and cumulative impact to sooty grouse from reasonably foreseeable future projects.

Project type	Number of Projects	Sooty Grouse Direct and Indirect Impact	Overall Cumulative Impact
Vegetation management/fuels reduction – thinning, group select and aspen enhancement	17 (Empire, Slapjack, Basin, Grizz, Freeman, Mabie, Clarks, Jackson, Ingalls, Big Hill, Watdog, Flea, Sugarberry, Meadow Valley, Canyon Dam, Corridor, Keddie)	Direct and Indirect impacts limited due to treatments not reducing habitat below 40% canopy cover.	• Short-term adverse impacts during harvest. • Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires.
Hazard tree removal	2 (Moonlight and camp 14)	Minimal impact. Short-term disturbance during harvest.	None to minimal cumulative impact
Temporary OHV Forest Order	1 (Forest-wide)	Closed Forest to cross-country travel. Lessened disturbance and displacement of Grouse.	Overall benefit to late seral open canopy coniferous forest by eliminating effects to habitat quality.

When considering all of the cumulative effects of present and reasonably foreseeable future impacts from vegetation/fuels projects, wildfires and miscellaneous resource projects, Alternative 1 poses the greatest risk to late seral open canopy coniferous forest habitat on the PNF, when direct, indirect and cumulative effects are considered. Alternative 2 poses a slightly higher risk than Alternatives 4 and 5 to late seral open canopy coniferous forest, but all three are considered to pose a moderate risk when direct, indirect and cumulative effects are considered. Alternative 3 has the least risk to this habitat type when direct, indirect and cumulative effects are considered.

3.7.27.2.3 Summary of Sooty Grouse Status and Trend at the Bioregional Scale

The Forest Plan (as amended by the Sierra Nevada Forests MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the sooty grouse; hence, the late seral open canopy coniferous forest effects analysis for this Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the sooty grouse. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008).

Habitat Status and Trend

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

Population Status and Trend

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

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trend

This Project will affect 4,486 acres of late seral open canopy coniferous forest habitat under Alternative 1 (high) and 458 acres under Alternative 3 (low). Based on the acres affected, which range from 0.6% to 6% of the total habitat Sierra Nevada wide, this Project area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of sooty grouse across the Sierra Nevada bioregion.

3.7.28 Mountain Quail: MIS Analysis

The mountain quail is designated as a MIS on the PNF. The Sierra Nevada MIS Amendment defined two habitat components; early seral coniferous forest and mid seral coniferous forest for the mountain quail. The corresponding CWHR types that define the habitat component for Early Seral are ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR) and eastside pine (EPN) with tree sizes 1, 2 and 3 and all canopy closures. The corresponding CWHR types that define the habitat component for Mid Seral are ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR) and eastside pine (EPN) with tree size 4 and all canopy closures. Currently, there are 546,000 acres of Early Seral Coniferous Forest habitat and 2,766,000 acres of Mid Seral Coniferous Forest on NFS lands Sierra Nevada wide. These habitat types, for the purpose of this MIS analysis, will be analyzed based on the amount of habitat affected within a 200-meter zone of influence.

3.7.28.1.1 Direct and Indirect Effects

Based on the amount of habitat affected within the 200-meter zone of influence, Alternative 1 affects the most habitat for both early seral (21,665 acres) and mid seral (147,206 acres) coniferous forest. For early seral coniferous forest habitat, Alternative 2 affects 9,619 acres, the second most habitat of all of the action alternatives. Alternatives 4 and 5 have a similar level of effects to early seral coniferous forest that range from 2,701 acres (0.5%) to 4,162 acres (0.8%). Alternative 3 has the least effect on this habitat type since only 458 acres (0.1%) are affected by existing trails. For mid seral coniferous forest, Alternative 2 has the second highest effect on this habitat type with 51,786 acres (1.9%). Alternatives 4 and 5 have less of an effect on mid seral habitats than Alternative 2 and range from 19,113 acres (0.7 %) to 24,238 (0.9%). Alternative 3 has the least affect on mid seral habitat, with 11,008 acres (0.4%) being affected.

Table 99. Proportion of mountain quail MIS habitat (early seral) within a 200-meter "Zone of Influence" of open unauthorized routes, existing motorized trails and proposed trails.

Mountain quail MIS habitat	Habitat Type	SN Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	Early Seral Coniferous Forest	546,000	21,665	9,619	458	2,701	4,162
	Proportion of Habitat		**4.0%**	**2.1%**	**0.1%**	**0.5%**	**0.8%**
	Overall Habitat Ranking		**Low**	**Low**	**Low**	**Low**	**Low**

Table 100. Proportion of mountain quail MIS habitat (mid seral) within a 200-meter "Zone of Influence" of open unauthorized routes, existing motorized trails and proposed trails.

Mountain quail MIS habitat	Habitat Type	SN Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	Mid Seral Coniferous Forest	2,766,000	147,206	51,786	11,008	19,113	24,438
	Proportion of Habitat		**5.0%**	**1.9%**	**0.4%**	**0.7%**	**0.9%**
	Overall Habitat Ranking		**Low**	**Low**	**Low**	**Low**	**Low**

3.7.28.2 Overall Cumulative Effects from Present, and Reasonably Foreseeable Future

Cumulative effects to early and mid seral coniferous forest includes loss of habitat through catastrophic wildfires; timber and fuels management where habitat has been reduced or removed.

Appendix C of this EIS provides a list and description of present and reasonably foreseeable projects on the Forest and private lands within the PNF boundary. Between 2001 and 2007, over 73,345 acres of forest vegetation and fuels projects were completed, which consisted of group selection, thinning, mastication and/or burned vegetation to reduce the potential for catastrophic wildfires. These treatments generally modified some early or mid seral habitat for quail either through group selection or thinning. Group selection harvests generally increase the early seral habitat for quail. After group selection, the units or acres harvested result in a tree size 1 condition (early seral). Thinning treatments overall, modify some size class 4 stands to size class 3 stands, essentially moving mid seral habitat to early seral habitat. The burning and mastication treatments may result in the short-term reduction in cover for quail, though it is expected that in the longer term, early seral habitat will be created and protected by reducing wildfire risk. Between 1990 and 2007, approximately 266,963 acres burned on the PNF, most of which has created early seral conditions that have benefited quail.

Table 101 lists all of the reasonably foreseeable future actions, including fuels, vegetation and miscellaneous resource projects. Table 101 summarizes cumulative impacts from reasonably foreseeable projects and a description of the potential impact to quail habitat.

Table 101. Direct, indirect and cumulative impact to mountain quail from reasonably foreseeable future projects.

Project type	Number of Projects	Mountain Quail Direct and Indirect Impact	Overall Cumulative Impact
Vegetation management/fuels reduction – thinning, group select and aspen enhancement	17 (Empire, Slapjack, Basin, Grizz, Freeman, Mabie, Clarks, Jackson, Ingalls, Big Hill, Watdog, Flea, Sugarberry, Meadow Valley, Canyon Dam, Corridor, Keddie))	Short-term disturbance from harvest activities, increases in early seral habitat from group selection harvest and shifts in mid seral habitat toward early seral.	Short-term adverse impacts during harvest. Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires.
Hazard tree removal	2 (Moonlight and camp 14)	Minimal impact. Short-term disturbance during harvest.	None to minimal cumulative impact
Temporary OHV Forest Order	1 (Forest-wide)	Closed Forest to cross-country travel. Lessened disturbance and displacement of quail.	Overall benefit to early and mid seral coniferous forest by eliminating effects to habitat quality.
UC Berkeley Forestry Camp Permit Amendment	1	Loss of 25 trees from 4-25 inch DBH	None to minimal cumulative impact

When considering all of the cumulative effects of present and reasonably foreseeable future impacts from vegetation/fuels projects, wildfires and miscellaneous resource projects, Alternative 1 poses the greatest risk to early and mid seral coniferous forest habitat, where between 4% and 5% of early and mid seral coniferous forest habitat is affected and added with cumulative effects. Alternatives 2, 4 and 5 are similar in their effects to early and mid seral coniferous forest habitat when direct, indirect and cumulative effects are combined. Alternative 3 poses the least risk to early and mid seral habitat when direct, indirect and cumulative effects are combined.

3.7.28.2.1 Summary of Mountain Quail Status and Trend at the Bioregional Scale

The Forest Plan (as amended by the Sierra Nevada Forests MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the mountain quail; hence, the early and mid seral coniferous forest effects analysis for this project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the mountain quail. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008).

Habitat Status and Trend

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

Population Status and Trend

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

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Mountain Quail Trend

This Project will affect 168,871 acres of early and mid seral coniferous forest habitat under Alternative 1 (high) and 13,047 acres under Alternative 3 (low). Based on the acres affected, which range from 0.5% to 9% of the total early and mid seral habitat Sierra Nevada wide, this Project Area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of mountain quail across the Sierra Nevada bioregion.

3.7.28.3 Pacific Tree Frog: MIS Analysis

The Pacific tree frog is designated as a MIS on the PNF. The Sierra Nevada MIS Amendment defined wet meadow as the habitat component for the Pacific tree frog. The corresponding CWHR types that define the habitat component are wet meadow (WTM) and freshwater emergent wetland (FEW). Currently, there are 66,000 acres of these CWHR types on NFS lands throughout the Sierra Nevada. These habitat types, for the purpose of this MIS analysis, will be analyzed based on the amount of habitat affected within a 200-meter zone of influence on open unauthorized routes, existing motorized trails and proposed trails.

3.7.28.3.1 Direct and Indirect Effects

Based on the analysis conducted, direct and indirect effects in the form of disturbance, displacement and/or decrease in habitat quality based on the proximity of open unauthorized routes is greatest under Alternative 1, which results in effects to 1,249 acres of wet meadow or 2.0% of the habitat Sierra Nevada wide (Table 102). Alternatives 2, 3, 4 and 5 all pose a similar level of effects to wet meadow habitat by affecting 940 acres (1.4%) to 1,106 acres (1.7%) of wet meadow habitat available Sierra Nevada wide.

Table 102. Proportion of Pacific tree frog MIS habitat within a 200-meter “Zone of Influence” on open unauthorized routes, existing motorized trails and proposed trails.

Pacific Tree Frog MIS habitat	Habitat Type	SN Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	Wet Meadow	66,000	1,249	1,106	940	968	1,030
	Proportion of Habitat		**2.0%**	**1.7%**	**1.4%**	**1.4%**	**1.5.%**
	Overall Habitat Ranking		**Low**	**Low**	**Low**	**Low**	**Low**

3.7.28.3.2 Overall Cumulative Effects from Present, and Reasonably Foreseeable Future

Cumulative effects to Pacific tree frog habitat include current and historic livestock grazing; watershed/stream restoration projects and recreational activities including hunting, camping and general recreation activities including all forms of motorized use including 4-wheeled drive vehicles, ATVs and motorcycles.

The PNF currently has 42 active livestock grazing allotments including both cattle and sheep. Forest Plan Standards and Guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands. Wet meadows that are grazed are often maintained in the lower herbaceous height levels (i.e. 4-6 inches) affecting habitat quality in wet meadows.

Appendix C of this EIS provides a list and description of present and reasonably foreseeable projects on the Forest and private lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to wet meadows within the PNF boundary. Miscellaneous resource projects, such as watershed restoration or fish passage projects have a beneficial impact to wet meadow habitat and to Pacific tree frogs.

Currently, there is a high demand for recreational use on the PNF due to its close proximity to urban centers (e.g. Oroville, Chico, Reno). The PNF provides a wide variety of recreational experiences including developed and dispersed camping, hiking, fishing, hunting, wildlife viewing, winter sports activities (e.g. downhill skiing, cross-country skiing, snowmobiling), summer OHV use and a variety of other non-motorized use (e.g. equestrian use and mountain biking). Recreational use on the PNF has significantly increased compared to the past 20 to 30 years. Because of the proximity to urban areas and population growth, increased recreational use on the PNF is expected to continue to increase in the future including camping, hiking, fishing, wildlife viewing, hunting and OHV use. This increase is expected to affect wet meadows through encroachment of recreational use, dispersed camping and general public use.

Table 103 lists all of the reasonably foreseeable future actions, including recreation, range allotment plans and miscellaneous resource projects. Table 103 summarizes cumulative impacts from reasonably foreseeable projects and a description of the potential impact to wet meadow habitat.

Table 103. Direct, indirect and cumulative impact to Pacific tree frogs from reasonably foreseeable future projects.

Project type	Number of Projects	Pacific Tree Frog Direct and Indirect Impact	Overall Cumulative Impact
Fish passage construction project	2 (Long Valley Creek, Road 22N85Y)	Short-term disturbance during project implementation.	Beneficial watershed benefits and aquatic species passage.
Watershed Restoration	1 (Sulphur Creek)	Short-term disturbance during implementation. Improved riparian and meadow habitat quality.	Beneficial watershed and habitat quality.
Range Allotment permit renewal	3 (Grizzly Valley, Grizzly Valley Community, Humbug	Maintenance of lower herbaceous height levels (4-6 inches)	Wet meadow habitat maintained at lower habitat quality.

Project type	Number of Projects	Pacific Tree Frog Direct and Indirect Impact	Overall Cumulative Impact
Temporary OHV Forest Order	1 (Forest-wide)	Closed forest to cross-country travel. Lessened disturbance and displacement of pacific tree frogs.	Overall benefit to wet meadow habitat by eliminating effects to habitat quality.

When considering all of the cumulative effects of present and reasonably foreseeable future impacts from grazing, recreation and miscellaneous resource projects and adding those effects to direct and indirect effects, Alternative 1 poses the greatest risk to wet meadow habitats. Alternative 3 when direct, indirect and cumulative effects are combined pose the least risk to wet meadow habitat. Alternatives 2, 4 and 5 are very similar to Alternative 3, with the difference being that they affect a slightly higher amount of wet meadow acres.

3.7.28.3.3 Summary of Pacific Tree Frog Status and Trend at the Bioregional Scale

The Forest Plan (as amended by the Sierra Nevada Forests MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the Pacific tree frog; hence, the wet meadow effects analysis for this Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the Pacific tree frog. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008).

Habitat Status and Trend

There are currently 66,000 acres of wet meadow habitat on NFS lands in the Sierra Nevada. Within the last decade, the trend is stable.

Population Status and Trend

Since 2002, the Pacific tree frog has been monitored on the Sierra Nevada Forests as part of the Sierra Nevada Forest Plan Amendment (SNFPA) monitoring plan (USDA Forest Service 2006, 2007b; Brown 2008). These data indicate that Pacific tree frog continues to be present at these sample sites and current data at the range-wide, California and Sierra Nevada scales indicate that the distribution of Pacific tree frog populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Pacific Tree Frog Trend

This Project will affect 1,249 acres of wet meadow habitat (WTM and FEW) under Alternative 1 (high) and 940 acres under Alternative 3 (low). Based on the acres affected, which range between 1.4% and 2.0% of the total habitat Sierra Nevada wide, this Project Area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of Pacific tree frogs across the Sierra Nevada bioregion.

3.7.29 Yellow Warbler: MIS Analysis

The yellow warbler is designated as a MIS on the PNF. The Sierra Nevada MIS Amendment defined Riparian as the habitat component for the yellow warbler. The corresponding CWHR types that define the habitat component are montane riparian (MRI) and valley foothill riparian (VRI). Currently, there are 29,000 acres of these CWHR types on NFS lands throughout the Sierra Nevada. These habitat types, for the purpose of this MIS analysis, will be analyzed based on the amount of habitat affected within a 200-meter zone of influence on open unauthorized routes, existing motorized trails and proposed trails.

3.7.29.1.1 Direct and Indirect Effects

Based on the analysis conducted of Riparian habitat and the amount of habitat affected directly and indirectly as a result of habitat disturbance, displacement and/or reduced habitat quality, Alternative 1 affects 1,325 acres of riparian habitat or 4.6% of the habitat available Sierra Nevada wide (Table 104). Alternatives 2, 4 and 5 are similar in their effects to riparian habitat, were direct and indirect effects range from 363 acres (1.2%) to 554 acres (1.9%). Alternative 3 represents the least amount of riparian acres affected with 266 acres (0.9%).

Table 104. Proportion of yellow warbler MIS habitat within a 200-meter "Zone of Influence" on open unauthorized routes, existing motorized trails and proposed trails.

Yellow warbler MIS habitat	Habitat Type	SN Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	Riparian	29,000	1,325	554	266	363	414
	Proportion of Habitat		**4.6%**	**1.9%**	**0.9%**	**1.2%**	**1.4%**
	Overall Habitat Ranking		**Low**	**Low**	**Low**	**Low**	**Low**

3.7.29.1.2 Overall Cumulative Effects from Present, and Reasonably Foreseeable Future

Cumulative effects to yellow warbler include current and historic livestock grazing; loss of habitat through catastrophic wildfires; recreational activities including hunting, camping and general recreation activities including all forms of motorized use including 4-wheeled drive vehicles, ATVs and motorcycles.

The PNF currently has 42 active livestock grazing allotments including both cattle and sheep. Forest Plan Standards and Guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands.

Appendix C of this EIS provides a list and description of present and reasonably foreseeable projects on the Forest and private lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to riparian habitat within the PNF boundary. Between 1990 and 2007, approximately 266,963 acres burned on the PNF, some of which have removed riparian habitat.

Currently, there is a high demand for recreational use on the PNF due to its close proximity to urban centers (e.g. Oroville, Chico, Reno). The PNF provides a wide variety of recreational experiences including developed and dispersed camping, hiking, fishing, hunting, wildlife viewing, winter sports activities (e.g. downhill skiing, cross-country skiing, snowmobiling), summer OHV use and a variety of other non-motorized use (e.g. equestrian use, mountain biking). Recreational use on the PNF has significantly increased compared to the past 20 to 30 years. Because of the proximity to urban areas and population growth, increased recreational use on the PNF is expected to continue to increase in the future including camping, hiking, fishing, wildlife viewing, hunting and OHV use. Generally, the increase in recreational use on the PNF has the potential to cause an increase in negative interactions between humans and riparian habitats. Future increase in recreational use on the

PNF is expected and therefore, increased disturbance to riparian habitat would be expected, particularly during the summer months.

Table 105 lists all of the reasonably foreseeable future actions, including recreation, range allotment plans and miscellaneous resource projects. Table 105 summarizes cumulative impacts from reasonably foreseeable projects and a description of the potential impact to the yellow warbler and riparian habitat.

Table 105. Direct, indirect and cumulative impact to yellow warbler riparian habitat from reasonably foreseeable future projects

Project type	Number of Projects	Yellow Warbler Riparian Habitat Direct and Indirect Impact	Overall Cumulative Impact
Fish passage construction project	2 (Long Valley Creek, Road 22N85Y)	Short-term disturbance during project implementation.	No cumulative impact.
Watershed Restoration	1 (Sulphur Creek)	Short-term disturbance during implementation. Improved riparian and meadow habitat quality.	Beneficial cumulative impact by improving long-term riparian habitat quality.
Range Allotment permit renewal	3 (Grizzly Valley, Grizzly Valley Community, Humbug	Impacts to riparian shrubs and seedlings from livestock browsing. Reduction in available habitat.	Cumulative impact from livestock grazing on riparian shrubs and seedlings up to 20% (2004 SNFPA Standard and Guideline)
Temporary OHV Forest Order	1 (Forest-wide)	Closed Forest to cross-country travel. Lessened disturbance and displacement of yellow warblers.	Overall benefit to wet meadow habitat by eliminating effects to riparian habitat quality.

When considering all of the cumulative effects of present and reasonably foreseeable future impacts from grazing, wildfires, recreation and watershed/stream projects, Alternative 1 poses the greatest risk to riparian habitat where 1,325 acres are directly and indirectly affected. Alternatives 2, 4 and 5 are all similar in impacts when direct, indirect and cumulative effects are considered. Alternative 3 represents the least risk to riparian habitats when direct, indirect and cumulative effects are considered.

3.7.29.1.3 Summary of Yellow Warbler Status and Trend at the Bioregional Scale

The Forest Plan (as amended by the Sierra Nevada Forests MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the yellow warbler; hence, the riparian habitat effects analysis for this project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the yellow warbler. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008).

3.7.29.1.4 Habitat Status and Trend

There are currently 29,000 acres of riparian habitat on NFS lands in the Sierra Nevada. Within the last decade, the trend is stable.

3.7.29.1.5 Population Status and Trend

The yellow warbler has been monitored in the Sierra Nevada at various sample locations by avian point counts and breeding bird survey protocols, including Lassen NF (Burnett and Humple 2003, Burnett et al. 2005) and Inyo NF (Heath and Ballard 2003) point counts; on-going California Partners in Flight monitoring and studies (CPIF 2004); 1992 to 2005 – Sierra Nevada Monitoring Avian Productivity and Survivorship (MAPS) stations (Siegel and Kaschube 2007); and 1968 to present–BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that yellow warblers continue to be present at these sample sites and current data at the range-wide, California and Sierra Nevada scales indicate that the distribution of yellow warbler populations in the Sierra Nevada is stable.

3.7.29.1.6 Relationship of Project-Level Habitat Impacts to Bioregional-Scale Yellow Warbler Trend

This Project will affect 1,325 acres of riparian habitat under Alternative 1 (high) and 266 acres under Alternative 3 (low). Based on the acres affected, which range from 0.9% to 4.6% of the total habitat Sierra Nevada wide, this Project Area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of yellow warbler across the Sierra Nevada bioregion.

3.7.29.2 Fox Sparrow: MIS Analysis

The fox sparrow is designated as a MIS on the PNF. The Sierra Nevada MIS Amendment defined shrubland (west-slope chaparral types) as the habitat component for the fox sparrow. The corresponding CWHR types that define the habitat component are montane chaparral (MCP), montane hardwood-conifer (MCH) and chamise-redshank chaparral (CRC). There is no chamise-redshank chaparral on the PNF. Currently, there are 922,000 acres of these CWHR types on NFS lands across the Sierra Nevada. These habitat types, for the purpose of this MIS analysis, will be analyzed based on the amount of habitat affected within a 200-meter zone of influence on existing and proposed motorized trails and open unauthorized routes.

3.7.29.2.1 Direct and Indirect Effects

Based on the analysis conducted for shrubland habitat, Alternative 1 affects the most habitat within the 200-meter zone of influence (Table 106). Direct and Indirect effects from existing trails and open unauthorized routes include decrease in habitat quality from disturbance, displacement and/or avoidance of habitat as a result of motor vehicle use. Approximately 21,214 acres of shrubland habitat or 2.3% of the habitat Sierra Nevada wide will be affected by existing trails and open unauthorized routes. Alternative 2 has the second highest effect on shrubland habitat, resulting in direct and indirect effects to habitat ranging from 8,911 acres. Alternatives 4 and 5 have less effects on shrubland habitat than Alternative 2 with 3,224 acres and 4,054 acres of shrubland habitat affected Sierra Nevada wide. Alternative 3 results in the least amount of acres affected from existing trails with 2,249 acres or 0.2% of the available habitat Forest-wide.

Table 106. Proportion of fox sparrow MIS habitat within a 200-meter "Zone of Influence" of existing and proposed trails and open unauthorized routes.

Fox sparrow MIS habitat	Habitat Type	SN Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	Shrubland (west-slope chaparral types)	922,000	21,214	8,911	2,249	3,224	4,054
	Proportion of Habitat		**2.3%**	**0.9%**	**0.2%**	**0.3%**	**0.4%**
	Overall Habitat Ranking		**Low**	**Low**	**Low**	**Low**	**Low**

3.7.29.2.2 Overall Cumulative Effects from Present,and Reasonably Foreseeable Future

Cumulative effects to shrubland include current and historic livestock grazing; loss of habitat through catastrophic wildfires; timber and fuels management where shrubland habitat has been reduced or removed.

The PNF currently has 42 active livestock grazing allotments including both cattle and sheep. Forest Plan Standards and Guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands.

Appendix C of this EIS provides a list and description of present and reasonably foreseeable projects on the Forest and private lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to shrubland habitat within the PNF boundary. Between 2001 and 2007, over 73,345 acres of forest vegetation and fuels projects were completed, which primarily included group selection, thinning, mastication and/or burned vegetation to reduce the potential for catastrophic wildfires. These treatments generally affect shrubland habitat through prescribed burning of the DFPZ understory and mastication of shrubland for fuels reduction. With the exception of group selection silviculture treatments do not usually result in an increase in shrubland habitat since canopy cover is not reduced below 40%. Group selection harvests are expected to increase shrubland habitat on a small scale across the landscape. These vegetation treatments may result in the short-term reduction in isolated pockets of shrubland, though it is expected that in the longer term, habitat will be protected by reducing wildfire risk. Between 1990 and 2007, approximately 266,963 acres burned on the PNF, some of which removed shrubland habitat initially, but over time shrubland habitat was created as post fire succession progressed.

Table 107 lists all of the reasonably foreseeable future actions, including fuels, vegetation, range allotment plans and miscellaneous resource projects. Table 107 summarizes cumulative impacts from reasonably foreseeable projects and a description of the potential impact to shrubland habitat.

Table 107. Direct, indirect and cumulative impact to fox sparrow from reasonably foreseeable future projects.

Project type	Number of Projects	Fox Sparrow Direct and Indirect Impact	Overall Cumulative Impact
Vegetation management/fuels reduction – thinning, group select and aspen enhancement	17 (Empire, Slapjack, Basin, Grizz, Freeman, Mabie, Clarks, Jackson, Ingalls, Big Hill, Watdog, Flea, Sugarberry, Meadow Valley, Canyon Dam, Corridor, Keddie)	Short-term disturbance from harvest activities (mastication, prescribed burning) and future development of habitat from Group Selection.	Short-term adverse impacts during masitication, prescribed burning. Creation of habitat from Group Selection units that are not re-planted. Long-term beneficial cumulative effects by reduced risk of habitat loss from high severity wildfires.
Hazard tree removal	2 (Moonlight, Camp 14)	Minimal impact, limited to disturbance during harvest.	None to minimal cumulative impact
Temporary OHV Forest Order	1 (Forest-wide)	Closed Forest to cross-country travel. Lessened disturbance to habitat and displacement of fox sparrows.	Overall benefit to shrubland habitat by eliminating effects to habitat quality.
Range Allotment Permit Renewal	3 (Grizzly Valley, Grizzly Valley Community, Humbug	Impacts from incidental browsing of shrubland by livestock	Miminal cumulative impact from incidental browsing

When considering all of the cumulative effects of present and reasonably foreseeable future impacts from grazing, vegetation/fuels projects, wildfires and miscellaneous resource projects, Alternative 1 poses the greatest risk to shrubland habitat on the PNF, when the 21,214 acres of shrubland habitat being affected are weighed with cumulative effects. Alternatives 4 and 5 are all similar to their effects to shrubland habitat and pose a low to moderate risk when direct and indirect effects are weighed with cumulative effects. Alternative 2 poses a moderate risk to shrubland habitat and Alternative 3 poses the least risk to shrubland habitat when cumulative effects are weighed with direct and indirect effects.

3.7.29.2.3 Summary of Fox Sparrow Status and Trend at the Bioregional Scale

The Forest Plan (as amended by the Sierra Nevada Forests MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the fox sparrow; hence, the shrubland effects analysis for this project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the fox sparrow. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008).

Habitat Status and Trend

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

Population Status and Trend

The fox sparrow has been monitored in the Sierra Nevada at various sample locations by avian point counts and breeding bird survey protocols, including: 1997 to present–Lassen National Forest (Burnett and Humple 2003, Burnett et al. 2005); 2002 to present–Plumas and Lassen National Forests

(Sierra Nevada Research Center 2007); on-going monitoring through California Partners in Flight Monitoring Sites (CPIF 2002); 1992 to 2005–Sierra Nevada Monitoring Avian Productivity and Survivorship (MAPS) stations (Siegel and Kaschube 2007); and 1968 to present–BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that fox sparrows continue to be present at these sample sites and current data at the range-wide, California and Sierra Nevada scales indicate that, although there may be localized declines in the population trend, the distribution of fox sparrow populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Fox Sparrow Trend

This Project will affect 21,214 acres of shrubland habitat under Alternative 1 (high) and 2,249 acres under Alternative 3 (low). Based on the acres affected, which range from 0.2% to 2.3% of the total habitat Sierra Nevada wide, this Project Area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of fox sparrow across the Sierra Nevada bioregion.

3.7.30 Aquatic Macroinvertebrates: MIS Analysis

The aquatic macroinvertebrates are designated as a MIS on the PNF. The Sierra Nevada MIS Amendment defined lacustrine and riverine as the habitat component for macroinvertebrates. The corresponding CWHR types that define the habitat component are lacustrine (LAC) and riverine (RIV). Currently, there are 658 miles of perennial stream and 341 miles of intermittent stream (RIV) and approximately 14,200 acres of lakes, ponds and reservoirs (LAC) with these CWHR types on the PNF. These habitat types, for the purpose of this MIS analysis, riverine (RIV) will be analyzed based on effects to habitat which is defined as the miles of stream affected by proposed route stream crossings on intermittent and perennial streams and the amount of lacustrine habitat affected within a 200-meter zone of influence on proposed routes. Effects to riverine and lacustrine habitat include; elevated sediment delivery to aquatic systems that affect water quality (i.e. increases in turbidity) and changes in substrate morphology that potentially could influence in-stream primary production and macroinvertebrate assemblages that provide forage for trout. Aquatic macroinvertebrates assemblages have been shown to be negatively impacted by stream crossings. One study found (Hawkins et al. *In*: Gucinski, et al. 2001) that aquatic insect larvae (mayflies, stoneflies and caddisflies) assemblages were negatively related to the number of stream crossings above a site. Another study (Newbold et al. 1980 *In*: Gucinski, et al. 2001) found that macroinvertebrate assemblages differed significantly above and below stream crossings. Landscape analyses suggests that road and trail associated factors can affect the frequency, timing and magnitude of disturbance to habitat, which may influence aquatic invertebrate community structure and species diversity.

3.7.30.1.1 Direct and Indirect Effects

As discussed above, habitat quality will be reduced as a result of increases in sediment and a decrease in water quality as a result of stream miles affected by route stream crossings and acres of lacustrine habitat that fall within a 200-meter zone of influence. Based on the analysis conducted, Alternative 1 has the highest level of impact to macroinvertebrate habitat (Table 108). Alternative 1 affects habitat on 27.6 miles of perennial stream, 88.2 miles of intermittent stream and 84 acres of lacustrine habitat within a 200-meter zone of influence of lakes, ponds and reservoirs. Alternatives 4 and 5 have similar effects to both riverine habitat, affecting 5.5 to 7.5 miles of perennial stream habitat, 19.7 to 25.8 miles of intermittent stream habitat. Alternative 2 represents the second highest scale of effects to riverine habitat by affecting 11.4 miles of perennial stream and 34 miles of intermittent stream. Effects to lacustrine habitat are relatively equal under Alternatives 2 and 5. Alternative 3 effects the least amount of riverine habitat with 3.4 miles of perennial stream and 11.7 miles of intermittent stream and the least amount of impact to lacustrine habitat by affecting 71 acres of habitat within the 200-meter zone of influence of existing trails.

Table 108. Proportion of aquatic macroinvertebrate MIS habitat intersected by proposed routes (riverine) and within a 200-meter "Zone of Influence" (lacustrine) on existing and proposed trails and open unauthorized routes.

Aquatic Macroinvertebrate MIS habitat	Habitat Type	Stream Miles/Acres	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
	RIV – Perennial (miles)	658	27.6	11.4	3.4	5.5	7.5
	RIV – Intermittent (miles)	341	88.2	34	11.7	19.7	25.8
	LAC –Lacustrine (acres)	14,200	84	104	71	84	101
	Proportion of Habitat	**RIV**	**11.6%**	**4.5%**	**1.5%**	**2.5%**	**3.3%**
		LAC	**0.6%**	**0.7%**	**0.5%**	**0.6%**	**0.7%**
	Overall Habitat Ranking		**Low**	**Low**	**Low**	**Low**	**Low**

3.7.30.1.2 Overall Cumulative Effects from Present, and Reasonably Foreseeable Future

Cumulative effects to riverine and lacustrine habitats include current and historic livestock grazing; reduced suitability of habitat through catastrophic wildfires; mining activities; and recreational activities including hunting, camping and general recreation activities including all forms of motorized use including 4-wheeled drive vehicles, ATVs and motorcycles.

The PNF currently has 42 active livestock grazing allotments including both cattle and sheep. Forest Plan Standards and Guidelines, as amended by the Sierra Nevada Forest Plan Amendment (USFS 2004), for grazing are generally reducing the amount of grazing impacts on rangelands.

Appendix C of this EIS provides a list and description of present and reasonably foreseeable projects on NFS land and private lands within the PNF boundary. Some, but not all, of these activities will contribute to impacts to riverine or lacustrine habitats within the PNF boundary. Mining and dredging activities have occurred and continue to occur on the Forest. Mining and dredging activities result in sedimentation that affect macroinvertebrate habitat and decreases water quality. Between 1990 and 2007, approximately 266,963 acres burned on the PNF, some of which have affected riverine and lacustrine habitat through increased levels of sedimentation.

Currently, there is a high demand for recreational use on the PNF due to its close proximity to urban centers (e.g. Oroville, Chico, Reno). The PNF provides a wide variety of recreational experiences including developed and dispersed camping, hiking, fishing, hunting, wildlife viewing, winter sports activities (e.g. downhill skiing, cross-country skiing, snowmobiling), summer OHV use and a variety of other non-motorized use (e.g. equestrian use, mountain biking). Recreational use on the PNF has significantly increased compared to the past 20 to 30 years. Because of the proximity to urban areas and population growth, increased recreational use on the PNF is expected to continue to increase in the future including camping, hiking, fishing, wildlife viewing, hunting and OHV use. Generally, the increase in recreational use on the PNF has the potential to cause an increase in negative interactions between humans and riverine and lacustrine habitats since most of the recreational facilities are located adjacent to lakes, streams and rivers. Future increase in recreational use on the PNF is expected and therefore, increased disturbance to riverine and lacustrine habitat would be expected, particularly during the summer months.

Table 109 lists all of the reasonably foreseeable future actions, including fuels, vegetation, recreation, range allotment plans, non-motorized trail development and special use permit reissuances. Table 109 summarizes cumulative impacts from reasonably foreseeable projects and a description of the potential impact to riverine and lacustrine habitat.

Table 109. Direct, indirect and cumulative impact to riverine and lacustrine habitat from reasonably foreseeable future projects.

Project type	Number of Projects	Riverine and lacustrine Direct and Indirect Impact	Overall Cumulative Impact
Mining/Suction Dredging	5 (Copper Penny, Moonlight, Dredger’s delight, Phat Chance, Winkeye	Impacts from increased sediment delivery, decrease in water quality.	Mining/sution dredging add to cumulative impacts by decreasing habitat quality, mainly in riverine systems.
Hazard tree removal	2 (Moonlight and Camp 14)	Minimal impact. Short-term disturbance during harvest.	None to minimal cumulative impact
Fish passage construction project	2 (Long Valley Creek, Road 22N85Y)	Short-term sediment disturbance during project implementation.	Short term cumulative impacts from sediment are minor.
Watershed Restoration	1 (Sulphur Creek)	Short-term sediment disturbance during project implementation.	Short term cumulative impacts from sediment are minor.
Range Allotment permit renewal	3 (Grizzly Valley, Grizzly Valley Community, Humbug	Stream bank trampling from livestock resulting in increases in sediment and decrease in water surface shade from browsing riparian shrubs.	Cumulative impacts from sediment and water surface shade are expected to be within Forest Plan Standards (<20%).
Temporary OHV Forest Order	1 (Forest-wide)	Closed Forest to cross-country travel. Lessened disturbance to habitat downstream of stream crossings	Overall benefit to macroinvertebrate habitat by eliminating effects to habitat quality.

When considering all of the cumulative effects of present and reasonably foreseeable future impacts from grazing, vegetation/fuels projects, wildfires, mining and recreation, Alternative 1 poses the greatest risk to the riverine habitats on the PNF. Alternative 2 poses the next highest level of effects to riverine habitat and poses a moderate risk when direct and indirect effects are considered with cumulative effects. Alternative 4 poses the second lowest level of risk to riverine habitat and Alternative 3 poses the least risk of all of the alternatives. For lacustrine habitat, Alternative 3 poses the lowest risk when direct and indirect effects are considered with cumulative effects. Alternatives 1, 2, 4 and 5 are similar in effects and all pose a moderate level of risk to lacustrine habitats.

3.7.30.1.3 Summary of Aquatic Macroinvertebrates Status and Trend at the Bioregional Scale

The Forest Plan (as amended by the Sierra Nevada Forests MIS Amendment) requires bioregional-scale Index of Biological Integrity and Habitat monitoring for aquatic macroinvertebrates; hence, the lacustrine and riverine effects analysis for this project must be informed by these monitoring data.

The sections below summarize the biological integrity and habitat status and trend data for aquatic macroinvertebrates. This information is drawn from the detailed information on habitat and population trends in the Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2008).

Habitat and Index of Biological Integrity Status and Trend

Aquatic habitat has been assessed using Stream Condition Inventory (SCI) data collected since 1994 (Frasier et al. 2005) and habitat status information from the Sierra Nevada Ecosystem Project (SNEP) (Moyle and Randall 1996). Index of Biological Integrity is assessed using the River Invertebrate Prediction and Classification System (RIVPACS) and macroinvertebrate data collected since 2000 (see USDA Forest Service 2008, Table BMI-1). These data indicate that the status and trend in the RIVPACS scores is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Habitat Trend

This Project will affect 104 acres of lacustrine habitat (LAC) under Alternative 2 (high) and 71 acres under Alternative 3 (low). This project will affect 115.5 miles of riverine habitat (RIV) under Alternative 1 (high) and 15.1 miles of habitat under Alternative 3 (low). Based on the acres of lacustrine habitat affected and miles of riverine habitat affected, this project area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of macroinvertebrates across the Sierra Nevada bioregion.

3.8 Botanical Resources

3.8.1 Introduction

The purpose of this section is to present a summary of the effects of the proposed trails on botanically sensitive resources on the PNF. Throughout this section, the term “rare species” is used to refer to Federally Endangered, Threatened and Candidate plant species and Forest Service Region 5 Sensitive vascular plants, bryophytes and fungi. A complete discussion of effects to these species, as well as to PNF special interest species, is provided in the Biological Assessment/Evaluation of Potential Effects to Threatened, Endangered and Sensitive Plant Species located in the project record.

Of the Forest Service Regions, the Pacific Southwest Region contains the largest assemblage of sensitive plant species in relation to its land base. Of the more than 8,000 vascular plant species that occur in California, well over half have been documented on National Forest System (NFS) lands. In addition, over 100 of these plant species are found only on NFS lands and nowhere else in the world (Powell 2001). This high level of botanical diversity is due in large part to the wide range of environmental conditions (i.e. topography, geology, soils, climate and vegetation) found on National Forests in California.

An important part of the mission of the Forest Service (Resource Planning Act of 1974, National Forest Management Act of 1976) is the management of rare species and their associated habitats. Management activities on NFS lands must be planned and implemented so that they do not jeopardize the continued existence of Federally Threatened or Endangered species or lead to a trend toward listing or loss of viability for Forest Service Sensitive species. In addition, management activities should be designed to maintain or improve habitat for rare species and natural plant communities to the degree consistent with the multiple-use objectives established in the Forest Plan.

Motor vehicle travel has the potential to affect rare species and their associated habitats. Effects include, but are not limited to: death or injury to individuals; habitat modification or fragmentation; decreased habitat quality; increased risk of weed introduction and spread; elevated risk to pollinators; loss of native vegetation; over collection; and other factors that reduce or eliminate plant growth and reproduction (Trombulek and Frissell 2000). It is Forest Service policy to minimize damage to soils and vegetation and to avoid significant disruption to plant and wildlife habitat while providing for motorized use on NFS lands (FSM 2353.03(2)); therefore, management decisions related to motorized travel on NFS lands must consider the effects to rare species and their habitats.

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

Direction relevant to the alternatives as they affect botanical resources includes:

E.O. 13112 Invasive Species 64 FR 6183 (February 8, 1999). To prevent and control the introduction and spread of invasive species. The Forest Service will not authorize, fund or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species unless the agency has determined that the benefits of such actions clearly outweigh the potential harm caused by invasive species and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

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

Sierra Nevada Forest Plan Amendment (SNFPA). The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment identified the following direction applicable to motorized travel management and botanical resources:

- **Noxious weeds management** (Standards and Guidelines #36-49). See Noxious Weed section.
- **Wetland and Meadow Habitat** (Standards and Guidelines #70): See Water Resources section.
- **Riparian Habitat** (Standards and Guidelines #92): See Water Resources section.
- **Bog and Fen Habitat** (Standards and Guidelines #118): Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans and wheeled vehicles.
- **Sensitive Plant Surveys** (Corrected Errata, April 19, 2005): Conduct field surveys for Threatened, Endangered and Sensitive plant species early enough in the project planning process that the project can be designed to conserve or enhance Threatened, Endangered and Sensitive plants and their habitat. Conduct surveys according to procedures outlined in the Forest Service Handbook (FSH 2609.25.11). If additional field surveys are to be conducted as part of project implementation, survey results must be documented in the project file (Standards and Guidelines #125). The standards and guidelines provide direction for conducting field surveys, minimizing or eliminating direct and indirect impacts from management activities and adherence to the Regional Native Plant Policy (USDA Forest Service 2004).

Plumas National Forest Land and Resource Management Plan (USDA Forest Service 1988). The Forest Plan provides management direction for all Plumas National Forest Sensitive plants; that direction is to “maintain viable populations of sensitive plant species” (USDA Forest Service 1988, page 4-34). The Forest Plan also provides forest-wide standards and guidelines to:

- protect Sensitive and Special Interest plant species as needed to maintain viability;
- inventory and monitor Sensitive plant populations on an individual project basis; and

- develop species Management Guidelines to identify population goals and compatible management activities/prescriptions that will maintain viability.

3.8.3 Effects Analysis Methodology

3.8.3.1 Geographic Area Evaluated for Impacts on Botanical Resources

Two geographic areas were chosen to analyze the effects of the proposed trails on botanical resources:

- Direct and indirect effects to rare species under the four action alternatives were assessed using the area within 100 feet of proposed trails. In general, direct effects are most likely to occur within a zone of 30 feet on either side of the trail due to the need for parking and pulling off to allow for another vehicle to pass. Indirect effects are most likely to occur within a zone of 100 feet or an additional 70 feet beyond the 30-foot zone.
- The No-action alternative, which allows for cross-country travel, was assessed using the entire PNF. The Forest boundary was also used to analyze cumulative effects to rare species for all alternatives.

Those species located within these two geographic areas were considered to have the highest potential to be impacted or influenced by adding trails to the NFTS. Conversely, species outside of the analysis area (that is, those species that are only considered to have “potential” to occur on the PNF) were not considered to have a high likelihood of being impacted by the proposed project either directly, indirectly or cumulatively.

3.8.3.2 Analysis Methodology

The analysis of effects on rare plant species was a three-step process (FSM 2672.43). In the first step, all listed or proposed rare species that were known or were believed to have potential to occur in the analysis area were identified. This list was developed by reviewing the U.S. Fish and Wildlife List for the Plumas National Forest (U.S. Fish and Wildlife Service 2008), USDA Forest Service Region 5 Sensitive Species List (USDA Forest Service 2006), Plumas National Forest rare plant records and vegetation maps and California Natural Diversity Database records (CNDDB 2008).

The second step was field reconnaissance surveys. To date, field surveys have been conducted on approximately 287 miles of proposed trails (Vollmar 2007, USDA Forest Service 2007, USDA Forest Service 2008 a, b and c). An additional 66 miles of proposed system trail and 10 miles of existing system trails (USDA Forest Service 2003a) have also been surveyed under past management projects. For those 25 miles of trail that had not been surveyed at the time of this analysis, information from the PNF rare plant records and CNDDB were used to analyze the potential effects to known rare species occurrences. In addition, potential habitat was estimated for each sensitive species using (a) the known range of the species, (b) an estimated potential dispersal distance, (c) broad vegetation types and (d) existing available data representing more refined habitat types (i.e. serpentine, fens, streams, etc.).

Field surveys were designed around the flowering period and ecology of the rare plant species identified in step one. For each rare plant site found, information was collected that described the size of the occurrence and habitat characteristics and identified any existing or potential threats. Location information was collected using a Global Positioning System (GPS).

All of this information was used in step three of the analysis—conflict determination. Data were imported into a Geographic Information System (GIS) and used to analyze proximity to trails, identify detrimental effects and develop mitigation measures.

3.8.3.3 Data Sources

1. Route-specific botanical data (e.g. rare species, meadows, special aquatic features, habitats, etc.), including results of route-specific surveys of rare species.
2. Route inventories collected in Step 1 of Travel Management and associated tabular data sets.
3. GIS layers of the following data: routes, habitats, plant communities, soils, geology, meadows, etc.
4. CNDDB records
5. Scientific literature

3.8.3.4 Assumptions Specific to Botanical Resources Analysis

In addition to those listed at the beginning of Chapter 3, the following assumptions were used in the analysis of botanical resources:

1. Vehicle use on and off established trails has affected or has the potential to affect rare plant populations, either directly by damage or death to individual plants from motor vehicles (stem breaking, crushing, etc.) or indirectly by altering the habitat through soil disturbance, changes in hydrologic function or by the introduction of non-native, invasive plant species that can out-compete sensitive species for water, sunlight and nutrients.
2. Motor vehicle use is unlikely to impact certain rare plant habitats due to the steep or rocky nature of the surrounding terrain; motor vehicle use is more likely to impact other rare plant habitats, such as meadows, which exist on gentle slopes or flat terrain with little or no vegetation or natural barriers to motor vehicles.
3. Without specific prevention and/or control measures, invasive non-native plants (weeds) will continue to spread along and within surfaced and un-surfaced motor vehicle roads/trails/areas.
4. Motor vehicle use of un-surfaced roads/trails/areas will increase sediment production and erosion. As use increases, sediment production and erosion will increase.

3.8.3.5 Botanical Resources Methodology by Action

1. **Direct/indirect effects of the prohibition of cross-country motorized vehicle travel.**

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Forest.

Indicator(s):

- Miles of unauthorized routes within or adjacent to rare plant sites.
- Acres of rare plant sites within 100 feet of an existing unauthorized route.
- Total number of rare plant sites within 100 feet of an existing unauthorized route.

- Miles of unauthorized routes within fen, wet meadow, serpentine, riparian, barren, interior forest and open forest habitats.

In addition, the following indicator measures were used to analyze the impacts to Research Natural Areas and proposed and existing Special Interest Areas on the Forest:

- Miles of existing unauthorized routes within Research Natural Areas or Special Interest Areas.

Methodology: GIS analysis of existing unauthorized routes.

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

Short-term timeframe: 1 year.
Long-term timeframe: 20 years.
Spatial boundary: Plumas National Forest. In general, direct effects are most likely to occur within a zone of 30 feet on either side of the trail and indirect effects are most likely to occur within a zone of 100 feet.
Indicator(s):
Summary of Indicator Measures

- Number and miles of proposed trails open for public motor vehicle use within or adjacent to Sensitive rare species sites.
- Acres of rare plant sites within 100 feet of a proposed trail.
- Total number of rare plant sites within 100 feet of a proposed trail.

In addition, the following indicator measures were used to analyze the impacts to designated Research Natural Areas and proposed and existing Special Interest Areas on the Forest:

- Miles of proposed trails open for public motor vehicle use within Research Natural Areas or Special Interest Areas.

Methodology: GIS analysis of proposed trails and sensitive plant locations.

3. **Changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].**

The timeframe, spatial boundary, indicators and methodology would be the same as those listed under number 2 above.

4. **Cumulative Effects**

Short-term timeframe: not applicable; cumulative effects analysis will be done only for the long-term time frame.
Long-term timeframe: 20 years.
Spatial boundary: Plumas National Forest.
Indicator(s):

- The percentage of sensitive species sites impacted by the proposed trails, in comparison to the total number of known sites on the Forest.
- The number of rare plant locations documented along existing motorized NFS trails.

Methodology: GIS analysis of all trails and sensitive plant sites/habitat.

3.8.4 Affected Environment

The Plumas National Forest is situated at the northern end of the Sierra Nevada mountain range, just south of the Cascades. The lower elevation foothills of the Forest are characterized by oak woodlands on the south-facing slopes, which are dominated by interior live oak (*Quercus wislizenii*), canyon oak (*Quercus chrysolepis*), manzanita (*Arctostaphylos* sp.) and gray pine (*Pinus sabiniana*). The lower elevation north-facing slopes are characterized by mixed conifer forests with a diverse understory of tanoak (*Lithocarpus densiflorus*), black oak (*Quercus kelloggii*), big leaf maple (*Acer macrophyllum*) and madrone (*Arbutus menziesii*). Moving eastward, the elevation increases and the foothills quickly give way to montane chaparral and mixed conifer forests that line the deep canyons of the North, Middle and South forks of the Feather River and its tributaries.

Closer to the crest of the Sierra Nevada, the vegetation type transitions to a mixed conifer forest characterized by ponderosa pine (*Pinus ponderosa*), sugar pine (*Pinus lambertiana*), white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*) and incense cedar (*Calocedrus decurrens*) in the overstory and scattered black oak and dense white fir in the understory. Jeffery pine (*Pinus jeffreyi*) and lodgepole pine (*Pinus contorta*) are occasionally found occupying shallower soils. Red fir (*Abies magnifica*) forests occur above 5,500 feet in elevation and are often mixed with sugar pine. In some of the higher elevation stands, red fir may co-occur with lodgepole pine, western white pine (*Pinus monticola*) and mountain hemlock (*Tsuga mertensiana*). On the drier, eastern slope of the Sierra, the heavily forested stands give way to broad valleys surrounded by sagebrush scrub, scattered juniper, eastside pine and mixed conifer forest.

Within these broader vegetation types there are a number of other, less geographically defined, plant communities that provide important habitat for rare plant species. These include: riparian corridors, meadows, seeps, fens, rock outcrops and serpentine soils.

3.8.5 Rare Species

Table 110 lists all Federally Threatened, Candidate and Region 5 Sensitive vascular plant, moss, lichen and fungi species that are known or thought to have potential to occur on the Plumas National Forest. Also included are the listing, number of PNF occurrences and habitat grouping for each species.

Table 110. Federally Threatened, Candidate and Region 5 Sensitive plant and fungi species known or thought to have potential to occur on the Plumas National Forest.

Species	Common Name	PNF Status[1]	Global Rank/ CNPS Rank[2]	Number of PNF Occurrences[3]	Habitat Guild[4]
Allium jepsonii	Jepson's onion	S	G1 / 1B.2	15	S
Arabis constancei	Constance's rock cress	S	G3 / 1B.1	55	S
Astragalus lemmonii	Lemmon's milkvetch	S	G2 / 1B.2	P	MS
Astragalus lentiformis	lens-pod milk-vetch	S	G2 / 1B.2	67	O
Astragalus pulsiferae* var. *coronensis	Modoc Plateau milk vetch	S	G4T3 / 4.2	3	O
Astragalus pulsiferae* var. *pulsiferae	Pulsifer's milk-vetch	S	G4T2 / 1B.2	12	O
Astragalus webberi	Webber's milk-vetch	S	G1 / 1B.2	12	O
Balsamorhiza macrolepis* var. *macrolepis	big-scale balsamroot	S	G3G4T2 / 1B.2	HI	MS, O, S
Botrychium ascendens	upswept moonwort	S	G2G3 / 2.3	P	MS, R, F
Botrychium crenulatum	scalloped moonwort	S	G3 / 2.2	P	MS, R, F
Botrychium lineare	Moonwort	S	G1 / 1B.3	P	MS, R
Botrychium lunaria	common moonwort	S	G5 / 2.3	P	MS, R, F
Botrychium minganese	Mingan moonwort	S	G4 / 2.2	4	MS, R
Botrychium montanum	western goblin	S	G3 / 2.1	3	MS, R, F
Botrychium pinnatum	northern moonwort	S	G4 / 2.3	P	MS, R
Bruchia bolanderi	Bolander's bruchia	S	G3 / 2.2	10	MS, R
Buxbaumia viridis	buxbaumia moss	S	None	1	R
Calycadenia oppositifolia	Butte County calycadenia	S	G3 / 4.2	7	O, S
Calystegia atriplicifolia* ssp. *buttensis	Butte County morning-glory	S	G5T3 / 1B.2	3	O
Clarkia biloba* ssp. *brandegeae	Brandegee's clarkia	S	G4G5T2 / 1B.2	1	O
Clarkia gracilis* ssp. *albicaulis	white-stemmed clarkia	S	G5T2 / 1B.2	2	O

Species	Common Name	PNF Status[1]	Global Rank/ CNPS Rank[2]	Number of PNF Occurrences[3]	Habitat Guild[4]
Clarkia mildrediae* ssp. *mildrediae	Mildred's clarkia	S	G3T3 / 1B.3	30	O
Clarkia mosquinii	Mosquin's clarkia	S	G1 / 1B.1	45	O
Cudonia monticola	large cudonia (fungi)	S	None	P	IF
Cypripedium fasciculatum	clustered lady's-slipper	S	G3 / 4.2	135	IF
Cypripedium montanum	mountain lady's-slipper	S	G4 / 4.2	22	IF, R
Dendrocollybia racemosa	branched collybia (fungi)	S	None	P	IF
Eleocharis torticulmis	California twisted spikerush	S	G1 / 1B.3	1	F, MS
Eriogonum umbellatum* var. *ahartii	Ahart's sulphur flower	S	None	11	S
Fissidens aphelotaxifolius	brook pocket-moss	S	GU / 2.2	P	R
Fissidens pauperculus	fissidens moss	S	G3? / 1B.2	2	R
Fritillaria eastwoodiae	Butte County fritillary	S	G3Q / 3.2	69	O
Helodium blandowii	Blandow's bog-moss	S	G5 / 2.3	P	F, MS
Hydrothyria venosa	hydrothyria lichen	S	None	20	R
Ivesia aperta* var. *aperta	Sierra Valley ivesia	S	G2T2 / 1B.2	18	MS
Ivesia sericolueca	Plumas ivesia	S	G2 / 1B.2	14	MS
Ivesia webberi	Webber's ivesia	FC	G2 / 1B.1	HI	MS
Lewisia cantelovii	Cantelow's lewisia	S	G3 / 1B.2	27	B
Lewisia kelloggii* ssp. *hutchisonii	Hutchison's lewisia	S	G4T2T3 / 3.3	5	B, O
Lewisia kelloggii* ssp. *kelloggii	Kellogg’s lewisia	S	None	P	O
Lomatium roseanum	adobe parsley	S	G2G3 / 1B.2	4	B
Lupinus dalesiae	Quincy lupine	S	G3 / 4.2	260	O
Meesia longiseta	meesia moss	S	None	P	F, MS
Meesia triquetra	three-ranked hump-moss	S	G5 / 4.2	10	F, MS
Meesia uliginosa	broad-nerved hump-moss	S	G4 / 2.2	1	F, MS
Mielichhoferia elongata	elongate copper-moss	S	None	P	B, S
Monardella follettii	Follett's monardella	S	G1 / 1B.2	34	S
Monardella stebbinsii	Stebbin's monardella	S	G1 / 1B.2	7	S

Species	Common Name	PNF Status[1]	Global Rank/ CNPS Rank[2]	Number of PNF Occurrences[3]	Habitat Guild[4]
Oreostemma elatum	Plumas alpine-aster	S	G2Q / 1B.2	14	F, MS, R
Packera eurycephala* var. *lewisrosei	cut-leaved ragwort	S	G4T2 / 1B.2	31	S
Packera layneae	Layne's ragwort	FE	G2 / 1B.2	4	S
Penstemon personatus	closed-throated beardtongue	S	G2 / 1B.2	23	O
Penstemon sudans	Susanville beardtongue	S	G2G3 / 1B.3	3	O
Phaecollybia olivacea	olive phaeocollybia (fungi)	S	G2 / None	P	IF
Pyrrocoma lucida	sticky pyrrocoma	S	G3 / 1B.2	46	MS
Sedum albomarginatum	Feather River stonecrop	S	G2 / 1B.2	15	S

Status: FE – Federally listed Endangered, FC – Federal Candidate species, S – Forest Service Sensitive

Global Rank: G1-Critically Imperiled; G2-Imperiled; G3-Vulnerable; G4-Apparently secure; G5-Secure (NatureServe 2008)/CNPS Rank: 1B- Rare, Threatened or Endangered in California and Elsewhere; 2-Rare, Threatened or Endangered in California, But More Common Elsewhere, 3-About Which We Need More Information, 4-Plants of Limited Distribution (California Native Plant Society 2008).

Occurrences are defined as plants of the same species estimated to be separated by less than a quarter mile. HI=Historic Locations. P=Potential species (i.e. it has not been documented on the PNF).

[4]. Habitat guilds: Fens (F), Meadows and Seeps (MS), Riparian areas (R), Serpentine (S), Barren (B), Interior Forest (IF), Open habitat (O)

3.8.5.1 Rare Vascular Species

The PNF provides habitat for over 2,000 vascular plant taxa (Clifton 2005), which represents approximately 35 percent of the California flora (Hickman 1993). Of these, 43 are on the PNF Sensitive Species List.

The only Federally Threatened plant species known to occur on the PNF is *Packera layneae* (Layne's butterweed). This species grows in open rocky areas on gabbro and serpentine-derived soils that are between 650 and 3,300 feet in elevation. The PNF has four occurrences, totaling approximately 12 acres. In 2006, the U.S. Fish and Wildlife Service developed route designation design criteria for *Packera layneae* in order to achieve a "No effect" or "May affect not likely to adversely affect" determination. This design criterion stated that no unauthorized or unclassified routes or areas would be added to the NFTS that were "within Layne's butterweed occupied habitat, adjacent unoccupied habitat and a 500 foot buffer" (U.S. Fish and Wildlife Service 2006). This criterion has been met under all of the action alternatives; none of the proposed trails are within 500 feet of occupied or adjacent unoccupied habitat.

Two additional species of federal concern that have the potential to occur on the PNF are the Federally Threatened *Orcuttia tenuis* (slender Orcutt grass) and the Candidate species *Ivesia webberi* (Webber's ivesia). *Orcuttia tenuis* is limited to relatively deep vernal pools with clay soil. *Ivesia webberi* is found in open areas of sandy volcanic ash to gravelly soils in sagebrush and eastside pine. Based on soil and geology maps and field surveys, no suitable habitat for these two species occurs within 100 feet of a proposed trail.

3.8.5.1.1 Existing Conditions Related to Direct and Indirect Impacts to Rare Vascular Plants

- There are 24 Sensitive vascular plant species (306 locations) documented within 100 feet of an existing system trail or unauthorized route on the Forest (Table 111).
- All of the Sensitive vascular plant species with known occurrences on the PNF (34 of the 43 rare vascular species) have the potential to be affected by cross-country motorized vehicle travel.

Table 111. Number of rare species locations within 100 feet of an unauthorized route or existing system trail on the Plumas National Forest.

Species	Species Type[1]	Habitat Grouping[2]	Number of rare species locations within 100'	
			Unauthorized Routes	Existing System Trail
Allium jepsonii	V	S	7	
Arabis constancei	V	S	18	
Astragalus lentiformis	V	O	37	
Astragalus pulsiferae* var. *coronensis	V	O	3	
Astragalus pulsiferae* var. *pulsiferae	V	O	7	
Astragalus webberi	V	O	2	
Botrychium sp.	V	MS, R	1	
Calycadenia oppositifolia	V	S, O	4	

Species	Species Type¹	Habitat Grouping²	Number of rare species locations within 100’	
			Unauthorized Routes	Existing System Trail
Calystegia atriplicifolia ssp. buttensis	V	O	1	
Clarkia mildrediae* ssp. *mildrediae	V	O	36	6
Clarkia mosquinii	V	O	13	1
Cypripedium fasciculatum	V	IF	17	1
Cypripedium montanum	V	R, IF	2	
Eriogonum umbellatum* var. *ahartii	V	S	7	
Fritillaria eastwoodiae	V	O	9	
Hydrothyria venosa	B	R	4	
Ivesia aperta* var. *aperta	V	MS	7	
Ivesia sericolueca	V	MS	7	
Lewisia cantelovii	V	B	2	
Lewisia kelloggii* ssp. *hutchisonii	V	O, B	1	1
Lupinus dalesiae	V	O	54	
Monardella follettii	V	S	16	1
Packera eurycephala* var. *lewisrosei	V	S	15	
Penstemon personatus	V	O	11	
Pyrrocoma lucida	V	MS	19	
		TOTAL	**300**	**10**

¹Vascular (V); Bryophyte (B)

² Fens (F), Meadows and Seeps (MS), Riparian areas (R), Serpentine (S), Barren (B), Interior Forest (IF), Open habitat (O)

3.8.5.2 Rare Bryophytes (Mosses and Lichens)

There are currently nine Sensitive mosses known or thought to have potential to occur on the PNF. These mosses are generally habitat specific and occur in wetland/riparian areas or in rocks with heavy metals (e.g. *Mielichhoferia elongata*). Lichens are a combination of two different types of organisms (fungi and algae) growing together in a symbiotic relationship. One rare lichen *Hydrothyria venosa* is known to occur on the PNF.

3.8.5.2.1 Existing Conditions Related to Direct and Indirect Impacts to Rare Bryophytes

- There is one Sensitive lichen (4 locations) documented within 100 feet of an unauthorized route on the Forest (Table 111).
- All of the Sensitive bryophyte species with known occurrences on the PNF (six of the 10 rare bryophyte species) have the potential to be affected by cross-country motorized vehicle travel.

3.8.5.3 Rare Fungi

Fungi are organisms without chlorophyll that digest other organic matter. There are three rare fungi known to occur on or adjacent to PNF lands; these are *Cudonia monticola*, *Dendrocollybia racemosa* and *Phaeocollybia olivacea*. Information regarding the distribution and ecology of these fungi on the PNF is incomplete.

3.8.5.3.1 Existing conditions related to direct and indirect impacts to rare bryophytes

- There are no known fungi documented within 100 feet of an existing system trail or unauthorized route on the Forest.
- All of the fungi with known occurrences on the PNF (one of the three rare fungi species) have the potential to be affected by cross-country motorized vehicle travel.

3.8.6 Aggregating Rare Species for Analysis of Effects

While the 56 rare species on the PNF vary widely in their ecological requirements and life history characteristics, many occur in similar broad habitat types where the effects of motor vehicle use are comparable. For purpose of this analysis, PNF rare species were assigned to plant-habitat groupings or “guilds” (USDA Forest Service 2003b). Rare species often occur in more than one habitat grouping; for example a species may occur in a spatially-defined group, such as a riparian forest, while also relying on the availability of a temporally brief habitat, such as tree-fall gaps, for seedling establishment (USDA Forest Service 2003b). The following groupings have been selected to represent the rare species being addressed in this analysis:

- **Fens (F)**— includes species found in wetland sites sub-irrigated by cold water, with substantial accumulations of peat.
- **Meadows and seeps (MS)**— includes species growing in openings with more or less dense grasses, sedges and herbs that grow under moist or saturated conditions.
- **Riparian areas (R)—**includes species found along the margins of perennial, intermittent or ephemeral streams, natural lakes, reservoirs or ponds.
- **Serpentine (S)**— includes those species restricted to serpentine rocks and soils that contain high levels of heavy metals and low availability of plant nutrients.
- **Barren (B)**—includes those species found in very open, sparsely vegetated and in some cases barren communities, e.g. rock fields, ridge tops, talus slopes and cliffs.
- **Interior Forest (IF)**— includes species inhabiting shaded, protected microclimates and undisturbed substrates.
- **Open Habitats (O)**— includes species inhabiting open forest types, edge-habitats or light gaps.

3.8.6.1 Habitat Group Descriptions

The following describes the seven habitat groupings and lists the rare plant species assigned to each group.

3.8.6.1.1 Fens (F)

Fens are groundwater-fed wetland ecosystems that develop where perennially saturated soils and cool temperatures slow the decomposition of plant material, allowing it to accumulate and form organic soils, called peat (Cooper, Chimner and Wolf 2005). Fens are considered significant resources due to their unique hydrologic characteristics (USDA Forest Service 2004a); ability to support high levels of biodiversity, including rare species (USDA Forest Service 2004a); relative rarity across the Sierra Nevada (Bartolome, Erman and Schwarz 1990); and ability to remain relatively stable for long periods of time, storing plant and climatic data over millennia (Chimner and Cooper 2002).

Fens are thought to be one of the most sensitive wet habitats in the Sierra Nevada (Rundel, Parsons and Gordon 1977). They are inherently tied to hydrological processes and it has been demonstrated that small-scale disturbances caused by water diversions, channels, trails and other management actions can have substantial impacts on their hydrologic and biotic integrity (Woods 2001, Cooper et al. 1998, Weixelman 2007).

Over seventy fens have been documented on the PNF, ranging in size from 0.04 acre to over 15 acres. Twenty nine of these (39 percent) are located in the Bucks Lake Wilderness, where motor vehicle travel is prohibited. The inventory of fens across the forest is not complete.

Rare species in this guild are: *Botrychium ascendens*, *Botrychium crenulatum, Botrychium minganense, Botrychium montanum, Eleocharis torticulmis, Helodium blandowii, Meesia longiseta, Meesia triquetra, Meesia uliginosa and Oreostemma elatum.*

3.8.6.1.2 Meadows and Seeps (MS)

Meadows and seeps are characterized by the presence of grasses, rushes, sedges and herbaceous plants that thrive, at least seasonally, under moist or saturated conditions. They occur at all elevations, are found on many different substrates and may be surrounded by grasslands, forests or shrub lands. Meadows and seeps provide valuable habitat for a diversity of plants and wildlife and perform essential ecological and hydrological functions. Due to their high levels of biological diversity, these habitats are often destination spots for Forest users.

Meadows and seeps are limited in number and distribution and have not been well documented or mapped on the PNF; therefore, quantification of the amount (acreage) of this habitat affected by the proposed trails is limited. The PNF vegetation maps estimate that there are approximately 2,520 acres of meadow habitat across the forest.

Rare species occurring in the meadow and seep guild are: *Astragalus lemmonii, Balsamorhiza macrolepis* var. *macrolepis, Botrychium ascendens, Botrychium crenulatum, Botrychium lineare, Botrychium lunaria, Botrychium minganese, Botrychium montanum, Botrychium pinnatum, Bruchia bolanderi, Eleocharis torticulmis, Helodium blandowii, Ivesia aperta* var. *aperta, Ivesia sericolueca, Ivesia webberi, Meesia longiseta, Meesia triquetra, Meesia uliginosa, Oreostemma elatum and Pyrrocoma lucida*.

3.8.6.1.3 Riparian Areas (R)

These are areas immediately bordering the edges of streams, rivers, lakes or other water sources. Riparian vegetation is often characterized by species that are intolerant of high moisture stress and tolerant of seasonal flooding, such as willow and aspen. It can be found under dense canopies of mixed conifer forest, in aspen groves and along the borders of streams in montane meadows. Most riparian forest stands are even-aged, reflecting their flood-mediated, episodic reproduction.

Riparian areas are often hotspots for plant and wildlife diversity. Riparian vegetation plays a vital role in the ecological functioning of the riparian system, which includes: stabilization of the stream bank; moderation of stream light intensity and water temperatures; delivery of large woody debris to stream habitats; filtration of sediment; and maintenance of water quality. The PNF has over 16,000 miles of ephemeral, intermittent and perennial streams.

Species found in riparian habitats include: *Botrychium ascendens, Botrychium crenulatum, Botrychium lineare, Botrychium lunaria, Botrychium minganense, Botrychium montanum, Botrychium pinnatum, Bruchia bolanderi, Buxbaumia viridis, Cypripedium montanum, Fissidens aphelotaxifolius, Fissidens pauperculus, Hydrothyria venosa and Oreostemma elatum.*

3.8.6.1.4 Serpentine Plant Communities (S)

This guild includes plants that grow on serpentine (ultramafic) rocks and soils. Serpentine soils are characterized by low levels of key plant nutrients such as calcium, nitrogen and phosphorous and exceptionally high levels of iron, magnesium and toxic trace elements. Serpentine soils are generally shallow and rocky, with low water-holding capacity and rooting depths. The vegetation in these plant communities tends to be sparse, slow-growing and stunted.

The harsh conditions in serpentine communities give rise to a unique and diverse assemblage of plant species, a high number of which are serpentine-endemics or rare. California's serpentine flora is considered the richest in the temperate zone; it consists of hundreds of species that are largely or entirely confined to serpentine substrates (Safford, Viers and Harrison 2005). Motor vehicles negatively affect this plant community and the rare species it supports by reducing vegetative cover, creating disturbed soils that are vulnerable to increased erosion and by introducing weeds.

On the PNF, serpentine soils occur primarily in bands along the western slopes of the Forest. An accurate inventory of the serpentine soils on the PNF has not yet been completed; however, bedrock geologic maps for the forest (Elder and Reichert 2005) estimate that the PNF contains approximately 56,554 acres of serpentine soils.

Rare species restricted to serpentine rocks or soils are: *Allium jepsonii, Arabis constancei, Balsamorhiza macrolepis* var. *macrolepis, Calycadenia oppositifolia, Eriogonum umbellatum* var. *ahartii, Mielichhoferia elongata, Monardella follettii, Monardella stebbinsii, Packera eurycephalus* var. *lewisrosei, Packera layneae and Sedum albomarginatum.*

3.8.6.1.5 Barren (B)

This guild is characterized by open, sparsely vegetated habitats that include rock outcrops, ridge tops, cliffs and talus slopes. The plant species that grow in these harsh environments are adapted to little soil, limited nutrients and low water availability. Species in this guild are also generally poor competitors. In many of these areas, particularly where the terrain is steep, the habitat is highly susceptible to erosion.

Rare species restricted to barren communities are: *Lewisia cantelovii, Lewisia kelloggii ssp. hutchisonii, Lomatium roseanum* and *Mielichhoferia elongata*.

3.8.6.1.6 Interior Forest (IF)

Plant and fungi species that are dependent on interior or late-seral forest communities rely on shade, protected microclimates and infrequently disturbed substrates. Because of mycorrhizal associations, species that are dependent on interior forest are generally intolerant of edge effects that change the temperature, moisture and other microclimate conditions. Threats to the species in this guild include activities that disrupt litter and duff; alter soil characteristics; reduce shade and moisture; and create openings and bare soil that increase the risk of weed introduction and spread.

Sensitive species dependent on these habitats include: *Cudonia monticola, Cypripedium fasciculatum, Cypripedium montanum, Dendrocollybia racemosa and Phaecollybia olivacea.*

3.8.6.1.7 Open Habitats (O)

The species in this guild are found in a wide variety of open habitat types that include: open forests (i.e. those with less than 40 percent canopy cover); forest margins, such as stabilized roadsides and old skid trails; small openings or gaps; and large openings resulting from natural events or management activities (i.e. mechanical tree removal or road construction). Species in this guild vary in their degree of tolerance to disturbance activities. A number of the species in these habitats tend to be disturbance followers that increase with infrequent, small-scale disturbances.

Species associated with open habitats include: *Astragalus lentiformis, Astragalus pulsiferae* var. *coronensis, Astragalus pulsiferae* var. *pulsiferae, Astragalus webberi, Balsamorhiza macrolepis* var. *macrolepis, Calycadenia oppositifolia, Calystegia atriplicifolia* ssp. *buttensis, Clarkia biloba* ssp. *brandegeae, Clarkia gracilis* ssp. *albicaulis, Clarkia mildrediae* ssp. *mildrediae, Clarkia mosquinii, Fritillaria eastwoodiae, Lewisia kelloggii* ssp. *hutchisonii, Lewisia kelloggii* ssp. *kelloggii, Lupinus dalesiae, Penstemon personatus and Penstemon sudans.*

3.8.6.2 Other Botanical Resources

3.8.6.2.1 Research Natural Areas

Research natural areas are part of a national network of ecological areas designated in perpetuity for research, education and to maintain biological diversity on NFS lands (USDA Forest Service 2005c). Research natural areas (RNA) provide essential baseline or reference condition information that land managers use to evaluate long-term ecological change, ecosystem sustainability and the success of land management activities in equivalent systems (Andrews 1994). The guiding principle in management of a RNA is the perpetuation of unmodified conditions and the prevention of activities that directly or indirectly modify ecological processes (USDA Forest Service 2005c).

FSM 4063.3 outlines protection and management standards within a RNA. These standards do not permit roads, trails, fences or signs on an established RNA unless they contribute to the objectives or to the protection of the area.

There are two RNAs on the PNF, Mud Lake RNA and Mt. Pleasant RNA. The Mud Lake RNA was established to preserve two isolated stands of the special interest species Baker cypress (*Cupressus bakeri*). The Mt. Pleasant RNA was established to preserve red fir (*Abies magnifica*) forest and fen ecosystems and is within the Bucks Lake Wilderness where motorized vehicle use is prohibited.

Existing Conditions Related to Direct and Indirect Impacts to Research Natural Areas

- There are 0.3 miles of unauthorized routes within the Wheeler Peak unit of the Mud Lake RNA (Table 112), which contains the world's largest specimen of Baker Cypress (diameter at breast height of 56 inches).

3.8.6.2.2 Special Interest Areas

Special Interest Areas (SIA) have been designated (or proposed for designation) to protect and where appropriate foster public use and enjoyment of areas with scenic, historical, geological, botanical, zoological, palentological or other special characteristics (Meyer 1991). FSM 2372.4 outlines protection and management standards within a SIA. These standards specify that (a) roads and trails be located without disturbing the special features of the established area and that (b) roads and trails are kept to the minimum necessary for public enjoyment. There are six designated and 12 proposed SIAs on the PNF.

Existing Conditions Related to Direct and Indirect Impacts to Special Interest Areas

- There are approximately 41.6 miles of unauthorized routes and existing system trail within designated and proposed SIAs (Table 112).

Table 112. Miles of unauthorized routes and existing system trails within Plumas National Forest Research Natural Areas and Special Interest Areas.

Special Interest Area	PNF Status[1]	Number of Occurrences within 100'	
		Unauthorized Routes	Existing System Trail
Brady's Camp	P	4.9	
Butterfly Valley	E	3.5	0.04
Eastern Escarpment	P	6.0	
Fales Basin	P	0.3	
Fowler Lake	P	0.1	
Little Last Chance Canyon	E	0.02	
Little Volcano	P	0.2	
McRae Meadow	P	10.3	5.6
Mount Fillmore	P	1.3	4.0
Red Hill	P	4.9	
Mud Lake RNA	E	0.3	
Soda Rock	E	0.2	
Grand total		**32**	**9.6**

[1] P = Proposed SIA, E = Existing SIA

3.8.7 Environmental Consequences—General Types of Impacts

3.8.7.1 Direct Effects

Direct effects occur when plants are physically impacted. Vehicles traveling on or parking off of the trail surface can result in death, altered growth or reduced seed set through physically breaking, crushing or uprooting plants (Wilshire, Shipley and Nakata 1978, Cole and Bayfield 1993). Off-highway vehicle use on trails can reduce perennial and annual plant cover, plant density and above-ground biomass (Hall 1989).

Direct effects are dependent upon the intensity and timing of disturbance. For example, direct impacts to an annual plant that has already gone to seed would not be as adverse as direct impacts to an annual plant that has not set seed (Ouren et al. 2007). Effects are also dependent upon the number of plants at a specific location and the proportion of the occurrence impacted. Repeated damage to sensitive species and other native plants can lead to the degradation of habitat and eventually to the replacement of native plant species, including sensitive plants, with species more adapted to frequent disturbance, such as invasive weeds.

3.8.7.2 Indirect Effects

Indirect effects on rare species are effects that are separated from an action in either time or space. Indirect effects from off-highway vehicle use may include changes in vegetation composition by creating edge habitats (Lovich and Bainbridge 1999 *in* Ouren et al. 2007). Adverse indirect effects are more likely to occur to those species that are intolerant of disturbance, such as those in the Interior Forest habitat group. In contrast, for those species that tolerate or are dependent upon some level of disturbance, such as those species in the Open Habitat group that inhabit gaps and forest openings, routes and trails may have less detrimental indirect effects.

Off-highway vehicles have been shown to accelerate plant invasions (von der Lippe and Kowarik 2007) by reducing native plant vigor and cover (Brooks 1995 in Ouren et al. 2007), creating a competition-free habitat open to invasion (Frenkel 1970) and acting as a vector for seed dispersal. Once established, noxious weeds have the potential to impact rare species indirectly through allelopathy (the production and release of plant compounds that inhibit the growth of other plants) (Bais et al. 2003), as well as through direct competition for nutrients, light and water (Bossard, Randall and Hoshovsky 2000).

Indirect effects to rare plants and native vegetation from off-highway vehicle use are often tied to soil impacts. Soil compaction, erosion and modification of soil properties can affect the distribution, abundance, growth rate, reproduction and size of plants (Ouren et al. 2007). For example, studies conducted in the Mohave Desert found significantly less plant cover (Davidson and Fox 1974) and density (Vollmer and others 1976) in areas frequented by off-highway vehicles.

Soil compaction, caused by repeated off-highway vehicle use, can result in reduced seed germination (Williams 1967 *in* Davidson and Fox 1974), seedling survival, soil water infiltration (Wilshire, Shipley and Nakata 1978), plant and root growth (Phillips and Kirkham *in* Davidson and Fox 1974). The effects of soil erosion on plants can include undercutting of root systems as trails are enlarged by erosion; creation of new erosion channels in areas not used by vehicles; wind erosion of adjacent destabilized areas; burial of plants by debris eroded from areas of use; and reduction of the biological capability of the soil by physical modification and stripping of fertile layers (Wilshire, Shipley and Nakata 1978).

Dust from motorized vehicle use has also been shown to decrease native plant cover and vigor by reducing rates of photosynthesis, respiration, transpiration (Spellerberg and Morrison 1998 *in* Ouren et al. 2007) and water-use efficiency. On heavily traveled roads, dust impacts have been documented up to 10 meters (32 feet) from the roadside and dust layers of up to 10 cm thick found on mosses and other vegetation of low stature (Walker and Everett 1987 *in* Ouren et al. 2007).

3.8.7.3 Cumulative Effects

A cumulative effect can result from the incremental effect of the current action when added to the effects of past, present and reasonably foreseeable future actions. These effects are considered regardless of what agency or person undertakes the other actions and regardless of land ownership on which the other actions occur. An individual action when considered alone may not have a significant effect, but when its effects are considered in sum with the effects of other past, present and reasonably foreseeable future actions, the effects may be significant (40 CFR 1508.7 and 1508.8 and FSH 1909.15 section 15.1).

One crucial step in assessing cumulative impacts on a particular resource is to compare the current condition of the resource (rare plants) and the projected changes as a result of management activities (such as off-highway vehicle use along a trail) to the natural variability in the resources and processes of concern (MacDonald 2000). This assessment is particularly difficult for rare plant species because long-term data are often lacking. In addition, the habitats in which many rare plant species are presently found have a long history of disturbance, making an undisturbed reference difficult to find. For some rare plants, particularly those that do not tolerate disturbance or are found under dense canopy conditions, minimizing on-site change is an effective way of reducing the potential for larger-scale cumulative impact (MacDonald 2000). If the greatest impact on a rare species is both local and immediate, then this is the scale at which the effect is easiest to detect (MacDonald 2000).

The additive effects of past actions (such as off-highway vehicle use, wildfires, wildfire suppression, timber harvest, mining, nonnative plant introductions and ranching) have shaped the present landscape and corresponding populations of rare plants. However, data describing the past distribution and abundance of rare plant species is extremely limited, making it impossible to quantify the effects of historic activities on the resources and conditions that are present today. Rare plant surveys did not begin until the early 1980s on the PNF. In many cases, even when project-level surveys were conducted, there is very little documentation that describes whether past projects avoided or protected rare plant species during project implementation. In addition to these unknowns, changes have been made to the PNF Sensitive species list. Therefore, in order to incorporate the contribution of past activities into the cumulative effects of the proposed trail project, this analysis uses the current abundance and distribution of rare plant species as a proxy for the impacts of past actions.

Undeniably, past, present and future activities have and will continue to alter rare plant populations and their habitats to various degrees. These activities include off-highway vehicle use, grazing, timber harvest, fire suppression, prescribed fire, mining, recreational use, road construction and noxious weed infestation. However, the approach taken in this analysis is that, if direct and indirect adverse effects on rare plant species from motor vehicle routes or trails are minimal or would not occur, then they would not contribute substantially to cumulative effects on the species.

Present and future activities that are associated with the proposed trail system could impact rare species growing along or in the vicinity of a trail. These activities may include routine maintenance, such as brushing, signing, cleaning or clearing of debris or increased levels of dispersed camping or recreation along and near trails. Monitoring of road and trail conditions, which is required (see Chapter 2), will detect if resource damage is occurring to sensitive species and will instigate the development of species-specific mitigations or trail closure. The effects of other types of future projects (i.e. vegetation management) would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

Flagging and avoiding rare plants is one of the most frequently used management strategies for reducing the cumulative impacts to known occurrences. While flag-and-avoid management can be effective in reducing cumulative impacts in most projects, it is not a practical mitigation for proposed trails; therefore, alternatives that minimize adverse effects are preferable to alternatives that do not.

3.8.8 Environmental Consequence—Effects of Alternatives on Rare Plant Species and Botanical Resources

The following sections provide a discussion of the direct, indirect and cumulative effects of each alternative on rare species, rare plant habitats and sensitive botanical resources. It is important to note that the analysis below represents what is known about motor vehicle impacts along unauthorized routes at this point in time. Adding a trail to the NFTS is expected to increase and concentrate motor vehicle use; this has the potential to increase negative impacts to those rare species and habitats found along established trails. Trails and rare plant occurrences will need to be re-evaluated on a continual basis to assess and address detrimental resource affects.

Only those rare species with the potential to be affected directly or indirectly by the proposed project (that is, those within 100 feet of a proposed trail) are discussed in detail in this document. The number of rare species locations within 100 feet of an existing system trail or unauthorized route is displayed in Table 111; the number of locations within 100 feet of a proposed trail is displayed by action alternative in Table 6. The remainder of the effects discussion or more specifically the analysis presented for Alternative 1, is focused on the more general effects to rare species and habitat groupings from motorized vehicle use. The following table summarizes the number of miles within each of the rare plant habitat types.

Table 113. Approximate number of miles of open unauthorized routes, existing system trails and proposed trails that occur within rare plant habitat types.

Habitat Type	Measure (miles)	Alternative				
		1 (No-action)	2	3	4	5
Riparian Areas[1]	Proposed trails		81		27	50
	Existing System Trails	34	34	34	34	34
	Unauthorized Routes	344				
	Total Miles	**378**	**115**	**34**	**61**	**84**
Wet Meadows[2]	Proposed trails		0.5			0.4
	Existing System Trails	1	1	1	1	1
	Unauthorized Routes	1.5				
	Total Miles	**2.5**	**1.5**	**1**	**1**	**1.4**
Serpentine Areas	Proposed trails		10		4	6.5
	Existing System Trails	3	3	3	3	3
	Unauthorized Routes	37				
	Total miles	**40**	**13**	**3**	**7**	**9.5**
Barren Habitats[2]	Proposed trails		2		0.75	1
	Existing System Trails	8.4	8.4	8.4	8.4	8.4
	Unauthorized Routes	11				
	Total miles	**19.4**	**10.4**	**8.4**	**9.15**	**9.4**
Interior Forest[3]	Proposed trail		207		75	139
	Existing System Trail	72	72	72	72	72
	Unauthorized Routes	625				
	Total miles	**697**	**279**	**72**	**147**	**211**
Open Habitat[4]	Proposed trail		112		59	85
	Existing System Trail	38	38	38	38	38
	Unauthorized Routes	346				
	Total miles	**384**	**150**	**38**	**97**	**123**

[1] Riparian Areas are defined here as ephemeral, intermittent or perennial streams.

[2] It is important to note that these numbers are an estimate; this habitat type is not well mapped on the Forest.

[3] Interior Forest is defined here as CWHR 4M, 4D, 5M, 5D and 6M.

[4] Open Forest ecosystems are defined here as CWHR 1-3: M, D, S, P, X and 4P, 4S, 5P, 5S.

In addition to rare plant species and habitats, the affects to two additional botanical resources are also discussed in the analysis below; these resources are Research Natural Areas and Special Interest Areas. The number of existing and unauthorized route miles within PNF SIAs and RNAs is displayed in Table 112; the number of proposed trail miles is displayed by action alternative in Table 116.

3.8.8.1 Alternative 1—No-action

Alternative 1 has the greatest negative effect on rare species and habitats. The largest impact of this alternative is from cross-country travel, which has the potential to affect all but the most inaccessible rare species and habitats.

Under this alternative, it is impossible to quantify when and where rare plant species and habitats will be impacted by motorized vehicles; therefore, the analysis below uses the approximately 1,109 miles of unauthorized routes as a representation of current motorized vehicle use on the Forest (Table 114). Due to the potential scope of these effects, the analysis of this alternative also focuses on a discussion of effects to plant groups, rather than to individual species.

3.8.8.1.1 Direct/Indirect Effects

Table 114. Summary of rare species indicator measures for Alternative 1 (No-action).

Indicator Measure	Value
Miles of unauthorized routes within or adjacent to rare plant sites	30 miles
Acres of rare plant sites within 100 feet of an existing unauthorized route	509 acres
Total number of rare plant sites within 100 feet of an existing unauthorized route	304 sites

Fens

Implementation of Alternative 1 has the highest risk of direct and indirect effects to rare species dependent upon fen ecosystems, primarily due to the allowance for cross-country travel. At present, there are no known rare fen species occurrences within 100 feet of an unauthorized route; however, at least one unauthorized route comes within 100 feet of one fen and vehicle tracks have been documented in close proximity to another. Motor vehicle use has been listed as a potential threat to almost all of the fens outside of the Bucks Lake Wilderness (PNF Fen Inventory files 2008).

Motor vehicle use within or in close proximity to fen habitats, has the potential to disrupt key hydrologic processes essential to maintaining the integrity of the fen system. In situations where the hydrologic function of a fen has been disrupted and the water table lowered, the peat quickly oxidizes and decomposes. This reduces the peat depth, alters hydrologic patterns, increases the risk of pocket gopher invasion and can result in shifts in species diversity and composition (Cooper 1990 *in* Weixelman 2007). All of these factors can have detrimental effects to rare fen species.

Meadows and seeps

Implementation of Alternative 1 and the allowance for cross-country travel, provides the greatest access to meadows (Table 113) and seeps; it also carries the highest risk of direct and indirect effects to rare species dependent upon meadow and seep ecosystems. Meadows and seeps often have high scenic value, which makes them a destination spot for motorized recreation and tends to concentrate use in these areas. There are currently four rare Meadow and Seep species, with a total of 34 locations, within 100 feet of an unauthorized route or existing system trail (Table 111). Unauthorized routes often lack water bars or other design features that slow water flow, decrease erosion and prevent sedimentation into the meadows and seeps situated adjacent to routes. Motorized vehicle use results in soil disturbance, soil compaction and removal of vegetation in and around routes; all of these can have a substantial impact on the hydrologic and biotic integrity of the meadow and seep ecosystems. Meadows and seeps are also highly susceptible to invasion from noxious weed species that thrive under wet conditions, such as Canada thistle (*Cirsium arvense)* and perennial pepperweed (*Lepidium latifolium*).

Riparian Areas

Alternative 1 has highest number of existing unauthorized routes and system trails (378 miles) within riparian ecosystems (Table 113). There are also three rare Riparian species, with a total of seven locations, within 100 feet of existing unauthorized routes or system trail (Table 111). These factors, in combination with the allowance for cross-country travel, result in Alternative 1 carrying the highest risk of effects to rare species within riparian systems. Unauthorized routes have not been designed to reduce impacts to riparian ecosystems. Motor vehicles traveling on and off of these routes negatively impact riparian species and habitats by reducing the vegetative cover in and around trails, compacting soils, increasing erosion, altering patterns of water flow and reducing water quality by depositing petroleum products and/or sediment into streams. Removal of vegetation can alter the microclimate and lead to warmer and drier conditions that are not favored by the rare species in this guild. Riparian areas, like meadows and seeps, are highly susceptible to invasion from noxious weed species that thrive under wet conditions, such as Canada thistle (*Cirsium arvense)* and perennial pepperweed (*Lepidium latifolium*).

Serpentine areas

Alternative 1 has an estimated 40 miles of unauthorized routes and existing system trail within serpentine areas (Table 113). There are also six rare Serpentine species, with a total of 67 locations, within 100 feet of an unauthorized or existing system trail (Table 111). Serpentine areas often lack natural barriers to motor vehicles (i.e. dense vegetation), which makes this habitat type particularly inviting to cross-country travel. All of these factors result in Alternative 1 carrying the highest risk of effects to rare species within Serpentine areas.

Serpentine soils are generally shallow and rocky, with low water-holding capacity and rooting depths. These conditions inhibit plants from developing deep root systems and also increase the vulnerability of serpentine soils to erosion (Whittaker 1954). Motor vehicles negatively affect this unique plant community and the rare species that it supports by creating disturbed soils that are highly vulnerable to increased erosion. In areas where motor vehicle use has occurred, vegetation and soil recovery rates are generally very slow (Harrison et. al 2006). While these nutrient-poor ecosystems tend to be less invaded by non-native species than other habitat types (Harrison 1999), motor vehicles still increase the risk of noxious weed introduction and spread in these communities.

Barren Habitats

Alternative 1 has the highest estimated number of unauthorized routes (11 miles) on rock outcrops, ridge tops, cliffs and talus slope ecosystems (Table 113). Two rare species, with a total of four locations, also occur within 100 feet of unauthorized or existing system trail (Table 111). These factors, in combination with the allowance for cross-country travel, result in Alternative 1 carrying the highest risk of effects to rare species within these “barren” ecosystems.

Some of the species in this group (i.e. *Lewisia cantelovii*) grow in sites that are inaccessible to motor vehicles, such as steep cliffs or rocky habitats. In these areas, where natural barriers to motor vehicle use exist, the likelihood of direct impacts from this alternative is much lower than it is for rare species that grow in more accessible habitat types (i.e. forest openings or serpentine areas). In contrast, other species in this group, such as *Lewisia kelloggii* ssp. *hutchisonii*, grow in flatter, more open terrain, where the risk of direct effects from motor vehicle travel is much higher.

In many of these ecosystems, particularly where the terrain is steep, disturbance from motor vehicles can increase the rates of erosion, causing significant indirect impacts to rare species. In addition, plants dependent on Barren habitat types generally do not compete well with other vegetation; therefore, weed introduction or spread can be a significant risk in those areas with more developed soils.

Interior Forest Habitats

Implementation of Alternative 1 has the highest risk of direct and indirect effects to rare species dependent upon interior forest ecosystems. Alternative 1 has 697 miles of unauthorized routes and existing system trail within interior forest habitats (Table 113). There are also two rare Interior forest orchid species, with a total of 19 locations, within 100 feet of unauthorized or existing system trail (Table 111).

Rare species that are dependent upon interior forest communities often require shade, protected microclimates and infrequently disturbed substrates. Many of these species, particularly the *Cypripedium* species, have complex mycorrhizal associations that require sufficient organic matter in the duff layer. Motor vehicle use within interior forest habitats can alter the temperature, moisture and other microclimate conditions; disrupt underground mycorrhizal networks; disturb litter and duff layers; change soil characteristics; and create open areas of bare soil that increase the risk of weed introduction and spread. Increased route and road density in interior forest habitat also has the potential to fragment rare plant populations that are dependent upon closed canopy systems.

The species in the Interior Forest habitat group may not be as impacted by cross-country travel as those in the previously discussed species groups (i.e. meadows or serpentine species) due to the higher density and size of trees or other natural barriers to motor vehicle travel that exist in this habitat type; however, the Interior Forest species are also highly intolerant of disturbances, such as those from motor vehicles. This latter factor greatly increases the risk to these species from Alternative 1.

Open Habitats

The species in this guild are found in a wide variety of open habitat types that include open forests, forest margins, stabilized roadsides, old skid trails and forest openings or gaps. Because many of these habitats are ephemeral in nature or occur along habitat edges, a quantification of some of these habitat types cannot be completed. An estimate of the number of miles within open forest habitat is presented in Table 113. In general, these habitats are highly accessible to and utilized by motor vehicles. In addition, many of these types (i.e. stabilized roadsides, forest margins) are often created as a result of motor vehicle travel. This grouping contains the largest number of species (12) and locations (168) within 100 feet of an unauthorized or existing system trail (Table 111).

In general, the rare species in this plant association colonize open areas, multiply rapidly and persist for a short while. They are often poor competitors and may persist only until stronger competitors move in and shade them out. Many are well adapted to take advantage of the high-light intensities found along routes. Species in this guild vary in their degree of tolerance to disturbance activities; many tend to be disturbance-followers that increase with infrequent, small-scale disturbances.

The edge of routes may provide open habitat for some rare species; however, any beneficial effect to these species (i.e. increased light or low levels of competition) could easily be overcome by negative direct effects such as repeated trampling or death of individuals; continual soil disturbance, which could lead to soil erosion and degradation of the seedbed; and noxious weed introduction and spread. Open habitats are highly susceptible to noxious weed invasions, particularly from species such as yellow starthistle (*Centaurea solstitialis*), knapweed (*Centaurea* species) or annual grasses such as medusahead (*Taeniatherum caput-medusae*).

3.8.8.1.2 Cumulative Effects

Implementation of Alternative 1 would not improve conditions for rare species or their habitats. Unmanaged motorized vehicle use on the PNF has the potential for negative direct and indirect effects to all of the rare species known to occur on the Forest (Table 1); therefore, the potential for cumulative effects to these species is high.

Under this alternative, motor vehicles traveling on and off of unauthorized routes would continue to trample, kill and uproot rare species. Indirect effects to rare species and their associated habitats could include reduction of native plant cover, creation of edge-habitats, increased rutting, erosion and soil compaction. One of the largest potential impacts from cross-country motor vehicle travel is the increased risk of noxious weed introduction and spread. Noxious weeds reduce the quality of native (including rare plant) habitat by displacing native species, altering nutrient and fire cycles, degrading soil structure and decreasing the quality and availability of forage for wildlife (Bossard, Randall and Hoshovsky 2000). Noxious weeds are spread by roads, motorized trails, recreational activities (such as camping, hiking, horseback riding and hunting) and ongoing land management activities. Under this alternative, all but the most inaccessible habitats are at risk of noxious weed invasion and spread from cross-country motor vehicle travel.

Many of the PNF plant communities (discussed above) have been degraded or altered by historic human activities. Riparian areas, fens, meadows, seeps and springs on the PNF have been altered by water diversions, habitat type conversion (i.e. meadow to annual grassland), intense grazing by domestic livestock and construction of roads and trails. Serpentine areas and barren, rocky habitats have been impacted by gold and gravel mining, timber harvest, road construction and recreation. Interior or late-successional forests across the Sierra Nevada have been altered by past timber management practices, wildfire suppression and road construction. Open or early to mid-successional forests, have also been heavily impacted by past timber management practices, which tended to favor removal of larger, more dominant trees (i.e. overstory removal). This management practice, as well as the suppression of wildfire, has resulted in a greater number of dense forests that are dominated by small trees and a reduction in open forest habitat across the landscape. Forest openings or edges, which are not a specific habitat type, are continually being created as trees or other vegetation die. While the specific amount of habitat reduction or alteration is unknown, it can be presumed that these activities and others have impacted rare species directly, indirectly and cumulatively by reducing the amount of suitable habitat across the PNF.

Past management activities, such as timber harvest, have also created skid trails and temporary roads that often contribute to cross-country travel and the creation of unauthorized routes. The number of Forest users and subsequently the number of unauthorized routes, continues to grow each year with many having negative impacts to rare species and their habitats. Under this alternative, these negative impacts would not be addressed or mitigated and would continue to occur at an increased rate. These routes and use areas lack the planning and design features that are important for limiting disturbance and damage to sensitive botanical resources.

The effects of present and future projects on rare species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

Cumulative Effects to Other Botanical Resources Under Alternative 1

Under this alternative, motorized vehicle use would continue to occur within the Mud Lake Research Natural Area and the 18 PNF Special Interest Areas (Table 113). These areas were designated (or proposed for designation) to protect significant geological, botanical and/or historical features. Unmanaged motorized vehicle use within these areas has the potential to significantly degrade or disturb these special features.

3.8.9 Action Alternatives (2 thru 5)—Summary of Environmental Consequences for Individual Species

The following sections provide a discussion of the direct, indirect and cumulative effects of each alternative on those rare species with the potential to be affected directly or indirectly by the proposed project (that is, those within 100 feet of a proposed trail). These sections also provide information on the abundance, distribution (both on a global and local scale) and habitat specificity for each of the rare species (organized by habitat grouping) found within 100 feet of a proposed trail. Sections of the PNF rare species management prescriptions (USDA Forest Service 2007) that are relevant to trails are also provided. The PNF species management prescriptions are based on field visits, monitoring and professional observations; individual species conservation assessments and guides; and known species ecology.

In general, the types of impacts to rare species would be similar to those described under Alternative 1 (No-action); however, due to the prohibition of cross-country travel, the action alternatives would negatively affect far fewer rare species (Table 115), rare plant habitats (Table 113) and Special Interest Areas (Table 116). In general, the greater the number of motorized vehicle trails (and miles) proposed, the higher the risk and severity of negative impacts to rare species and their associated habitats.

Table 115. The number of rare plant locations within 100' of a proposed trail displayed by action alternative.

Species	Habitat Grouping[1]	Action Alternatives		
		2	4	5
Allium jepsonii	S	2		2
Arabis constancei	S	2	1	1
Astragalus lentiformis	O	8	1	4
Astragalus pulsiferae var. *pulsiferae*	O	3		
Botrychium sp.	MS, R	1		
Calycadenia oppositifolia	S, O	2		2
Clarkia mildrediae ssp. *mildrediae*	O	11	4	7
Clarkia mosquinii	O	1		
Cypripedium fasciculatum	IF	6	5	5
Eriogonum umbellatum var. *ahartii*	S	7		
Hydrothyria venosa	R	2		1
Ivesia aperta var. *aperta*	MS	2		2
Ivesia sericolueca	MS	2		
Lewisia kelloggii ssp. *hutchisonii*	O, B	1		
Lupinus dalesiae	O	22	11	15
Monardella follettii	S	3	1	2
Penstemon personatus	O	2		1
Pyrrocoma lucida	MS	2		2
TOTAL		**79**	**23**	**44**

[1]Fens (F), Meadows and Seeps (MS), Riparian areas (R), Serpentine (S), Barren (B), Interior Forest (IF), Open habitat (O)

Table 116. Miles of proposed trails within Plumas National Forest Special Interest Areas displayed by action alternative.

Special Interest Area	PNF Status[1]	Action Alternative		
		2	4	5
Brady's Camp	P	2.8		1.5
Butterfly Valley	E	0.2		0.2
Fowler Lake	P	0.1		
McRae Meadow	P	1.2	1.2	1.2
Grand total		**4.4**	**1.2**	**3**

[1] P = Proposed SIA, E = Existing SIA

3.8.9.1 Meadows and Seeps

The following four meadow and seep species occur within 100 feet of a proposed trail: *Botrychium sp., Ivesia aperta* var*. aperta*, *Ivesia sericolueca and Pyrrocoma lucida*.

Botrychium (moonworts)*Botrychium* are small, inconspicuous, perennial ferns that are commonly referred to as moonworts. Some of these species are widely distributed across North America. In California, *Botrychium* have been reported from the Oregon border as far south as the San Bernardino mountain range (Laeger 2002). Despite this wide range, *Botrychium* occurrences are often scattered and consist of only a few individuals.

In California, *Botrychium* are most often found in high latitudes and high elevation montane or forest habitats. Within these habitat types, *Botrychium* occur in meadows, springs and fens; along stream banks and alpine lakeshores; and in wet crevices in outcrops (Laeger 2002). Important habitat requirements include sufficient canopy cover, soil moisture organic matter and because *Botrychium* are closely associated with mycorrhizal fungi at all life stages, the avoidance of root and mycorrhizal disturbance.

Population trends are difficult to define for *Botrychiums* because individuals do not appear above ground every year. Threats from management activities include grazing and trampling by livestock; road construction and maintenance; recreation, including off-road vehicles use; changes in the hydrologic regime; and harvesting of plants as special forest products. The dispersal strategies and population dynamics (i.e. metapopulation dynamics) of these species make it particularly important to protect unoccupied suitable habitat. Although many of these species may be found in areas of old disturbance (greater than 10 years old), continuous, heavy soil disturbance can be very detrimental (Laeger 2002).

The *Botrychium's* small size, inconspicuous growth form and potential for dormancy make survey and identification particularly challenging. On the PNF, fifteen sites have been identified as supporting unidentified *Botrychium* species (i.e. where the taxonomy has yet to be confirmed). *B. ascendens, B. crenulatum, B. lineare, B. lunaria* and *B. pinnatum* have not been documented on the PNF but are considered to have the potential to occur. *B. minganese* and *B. montanum* have been found on the PNF.

PNF management prescription: Protect all plant occurrences from ground disturbance. Maintain hydrologic conditions in riparian areas where these plants occur. Do not allow machinery in occupied habitat. Develop a monitoring strategy for habitat enhancement activities as needed.

Evaluate other activities on a site-by-site basis considering species abundance, population size and known species ecology.

Direct and Indirect Effects

One *Botrychium* location was documented within 100 feet of a trail proposed under Alternative 2 (Table 117). Due to the difficulty of identification, a species determination for this *Botrychium* has not been made; therefore, for the purposes of this analysis this species will be treated as one of the eight PNF Sensitive *Botrychium* species (Table 1) and protected according to the management prescription described below.

Table 117. *Botrychium* occurrences within 100' of the proposed trails under Alternative 2.

Occurrence	Route ID	Number of acres with potential for impact			Action Alternatives		
		Within 0-30' route	Within 30-100'	Size of Occurrence (acres)	2	4	5
6	17M05	0.1	0.01	0.11	X		

Due to its close proximity to the route proposed under Alternative 2, the individuals within Occurrence 6 are at a high risk of direct impacts (i.e. trampling or death) from motor vehicle use. This small occurrence contains only eight individuals; all of which are located along the banks of a small spring that crosses the proposed trail. Soil disturbance from motor vehicle use, particularly when it occurs on a regular basis, could have an adverse effect on the *Botrychium* at this site.

The habitat where this species is found is particularly sensitive to the impacts of motor vehicle use. Motor vehicles can disrupt key hydrologic processes, alter the timing and direction of water flow and infiltration and increase rates of erosion. This habitat is also highly susceptible to invasion from aggressive noxious weed species that thrive under wet conditions, such as Canada thistle (*Cirsium arvense)* and perennial pepperweed (*Lepidium latifolium*).

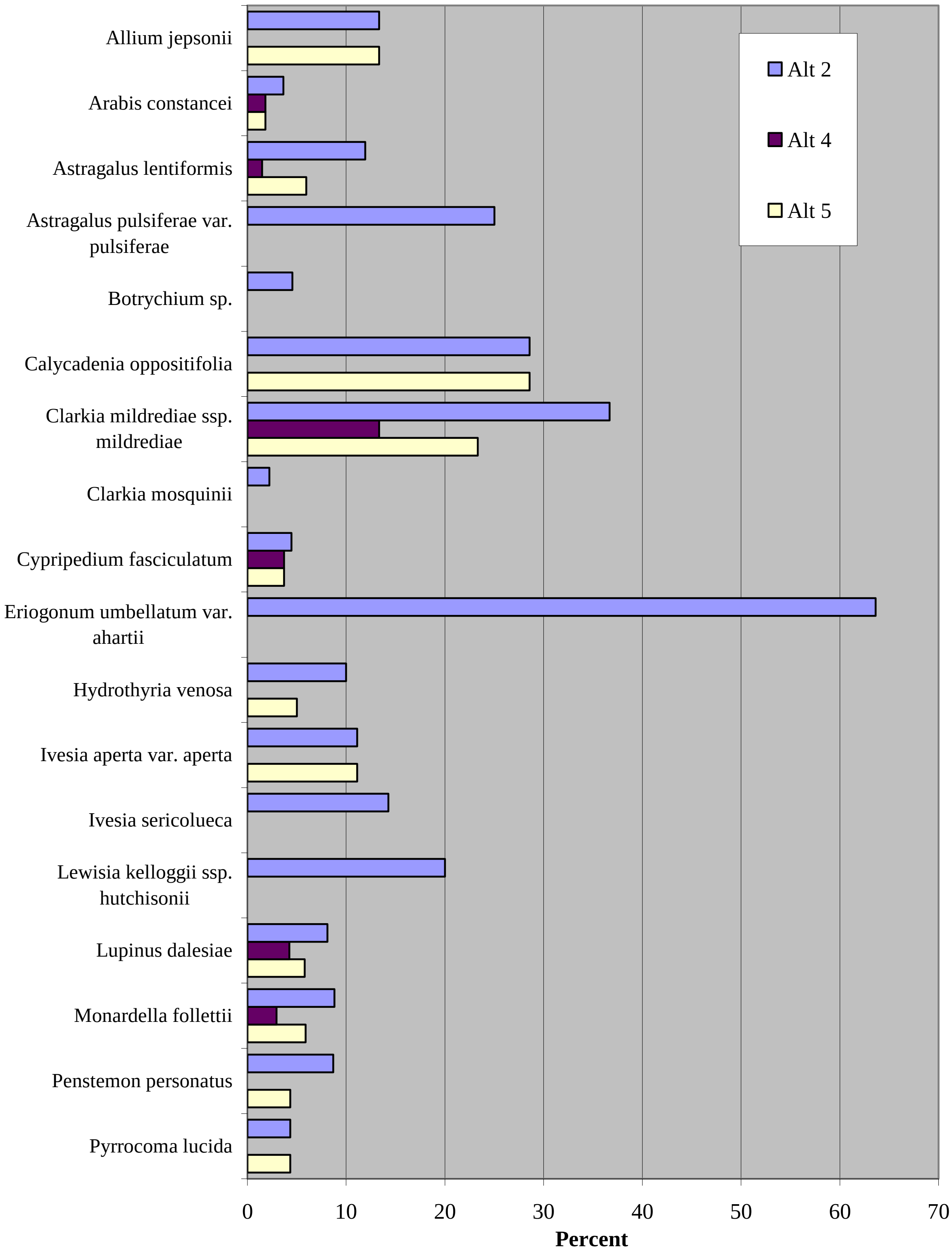
There would be no direct or indirect effects to the *Botrychium* from implementation of Alternatives 3, 4 or 5.

Cumulative Effects

Past activities, such as grazing by domestic livestock and construction of roads and trails, have resulted in water diversions and habitat type conversions of seeps, springs and meadows across this species' range. These past management activities have likely had a negative impact on *Botrychium* individuals and areas of suitable habitat.

Implementation of the action alternatives would reduce impacts to this species by banning cross-country travel; however, Alternative 2 would not eliminate the impacts to all occurrences or areas of suitable habitat. The occurrence that may be impacted by use of the proposed trails represents approximately five percent of all known *Botrychium* occurrences on the PNF (Figure 6).

Figure 6. Percentage of Plumas National Forest occurrences impacted by the proposed trails.



The proposed trail appears to be relatively well-established; therefore, the largest impact to this occurrence most likely occurred at the time the route was created or constructed. Continued use of this route would likely threaten the individuals within this occurrence, by directly impacting individuals and indirectly increasing rates of erosion. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

There are no direct or indirect effects to *Botrychium* from implementation of Alternatives 3, 4 or 5; therefore, the cumulative effects from these alternatives would be negligible.

3.8.9.1.1 *Ivesia aperta* var. *aperta* (Sierra Valley Ivesia)

This species has a limited range that consists of scattered occurrences in Washoe County, Nevada and Plumas, Lassen and Sierra counties in California. On the PNF, *Ivesia aperta* var. *aperta* has been documented at 18 locations. Thirty three occurrences have been recorded from Bureau of Land Management (BLM), Forest Service, State and private lands adjacent to the PNF (CNDDB 2008).

Ivesia aperta var. *aperta* is found in sagebrush plant communities at the eastern base of the Sierra Nevada. Within these communities, it is associated with meadow flats, meadow borders, rocky ephemeral stream channels, gentle rocky slopes with sparse vegetative cover and vernal pools (USDA Forest Service 1992). This species appears to be in decline across its range. Threats include livestock grazing and trampling, road construction and maintenance, mining, fire suppression activities (fire camps) and off-highway vehicle use. Off-highway vehicles impact this species and habitat by compaction of soils and physical damage to the plants. Observations have shown that motorized vehicle trails on the PNF have removed “strips” from *Ivesia* populations (USDA Forest Service 1992).

<u>PNF management prescription</u>**:** At least 30 percent of the known occurrences within a project area should be protected from all ground-disturbing actions. Avoid impacting more than 50 percent of the known individuals within a project area over any 10 year period. To the degree possible, incorporate known aspects of the species’ ecology into design elements of proposed actions to protect or enhance species viability. Evaluate activities and use mitigations consistent with Riparian Management Objectives (HFQLG FEIS) or Riparian Conservation Objectives (Sierra Nevada Forest Plan Amendment ROD, p. 32-35) depending on which standards apply, species abundance, population size, geographic distribution and known species ecology. In general, strive to avoid direct impacts.

Direct and Indirect Effects

Two locations of *Ivesia aperta* var. *aperta* are situated within 100 feet of a trail proposed under Alternatives 2 and 5, shown in the following table.

Table 118. Locations of *Ivesia aperta* var. *aperta* within 100 feet of the trails proposed under the Action Alternatives

Occurrence ID	Route ID	Number of acres with potential for impact			Action Alternatives		
		Within 0-30' route	Within 30-100'	Size of Occurrence (acres)	2	4	5
2	16M04A	0.4	1	125	X		X
10	15M04	0.5	1.1	9	X		X

Ivesia aperta var. *aperta* individuals within 30 feet of a proposed trail will have a high probability of direct effects (i.e. trampling or death) from motor vehicle use; however, because this species is dependent upon wet meadow habitats and is less likely to inhabit the drier conditions associated with the trail bed or shoulder, indirect effects to adjacent habitats are most likely to have an adverse impact.

The habitat where this species is found is particularly sensitive to the impacts of motor vehicle use. Motor vehicle use within or in close proximity to this habitat has the potential to disrupt key hydrologic processes, which could have adverse indirect effects on the species. Ruts caused by motor vehicles in wet meadows can alter the timing and direction of water flow and infiltration. Increased rates of erosion and creation of head-cuts can also become so severe that a large portion of wet meadow habitat is degraded. These habitats are also highly susceptible to invasion from aggressive noxious weed species that thrive under wet conditions, such as Canada thistle (*Cirsium arvense)* and perennial pepperweed (*Lepidium latifolium*).

There would be no direct or indirect effects to *Ivesia aperta* var. *aperta* from implementation of Alternatives 3 or 4.

Cumulative Effects

Past activities, such as grazing by domestic livestock and construction of roads and trails, have resulted in water diversions and habitat type conversions of meadows across this species' range. These past management activities have likely had a negative impact on *Ivesia aperta* var. *aperta* individuals and areas of suitable habitat.

At present, the two *Ivesia aperta* var. *aperta* occurrences that are potentially impacted by the proposed trails are also impacted by ongoing livestock grazing. Preliminary monitoring of this species has shown lower recruitment numbers and higher mortality levels in areas that are grazed by domestic livestock (M. Friend, personal communication). Occurrence 10 also has a channel headcut, which may accelerate the hydrologic degradation of the habitat. These conditions, in combination with motor vehicle use on the proposed trails, have the potential to negatively impact *Ivesia aperta* var. *aperta* habitat and threaten individuals.

Implementation of the action alternatives would reduce impacts to this species by banning cross-country travel; however, Alternatives 2 and 5 would not eliminate the impacts to all occurrences or areas of suitable habitat. The two occurrences that may be impacted by use of the proposed trails represent approximately eleven percent of all known occurrences on the PNF (Figure 6) and four percent of the known occurrences in California (CNDDB 2008).

Both of the proposed trails appear to be relatively well established; therefore, the largest impact to these two *Ivesia aperta* var. *aperta* occurrences most likely occurred at the time the route was created or constructed. Adding these trails to the NFTS under the action alternatives would have some negative impact on this species; however, it would likely not reduce the overall viability of *Ivesia aperta* var. *aperta* due to the small proportion of the two occurrences affected (less than eighteen percent) and the relatively small amount of suitable habitat potentially impacted. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

There are no direct or indirect effects to *Ivesia aperta* var. *aperta* from implementation of Alternatives 3 or 4; therefore, the cumulative effects from these alternatives would be negligible.

3.8.9.1.2 *Ivesia sericolueca* (Plumas Ivesia)

This species has a limited range that consists of scattered occurrences in Washoe County, Nevada and Plumas, Lassen, Nevada and Sierra counties in California. *Ivesia sericolueca* has been recorded at 14 locations on the PNF and 52 occurrences outside of the PNF on County, Forest Service, State and private lands (CNDDB 2008).

This plant is found in vernally wet portions of meadows and alkali flats and in vernal pools. These habitats are not widespread and are sensitive to changes in hydrology and impacts from erosion. *Ivesia sericolueca* has a downward trend across its range due to low levels of reproduction and high levels of disturbance at known sites. Threats to this species include recreation activities, off-highway vehicle use, firewood gathering, target shooting, livestock grazing, mining, fire suppression, military practice camps, timber harvest activities, changes in hydrology and erosion.

PNF management prescription: At least 30 percent of the known occurrences within a project area should be protected from all ground-disturbing actions. Avoid impacting more than 50 percent of the known individuals within a project area over any 10 year period. To the degree possible, incorporate known aspects of the species' ecology into design elements of proposed actions to protect or enhance species viability. Evaluate activities and use mitigations consistent with Riparian Management Objectives (HFQLG FEIS) or Riparian Conservation Objectives (Sierra Nevada Forest Plan Amendment ROD, p. 32-35) depending on which standards apply, species abundance, population size, geographic distribution and known species ecology. In general, strive to avoid direct impacts.

Direct and Indirect Effects

Two locations of *Ivesia sericolueca* occur within 100 feet of a trail proposed under Alternative 2 (Table 119). No occurrences of this species are impacted under any of the other action alternatives.

Table 119. Locations of *Ivesia sericolueca* within 100’ of a trail proposed under Alternative 2.

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30’	Within 30-100’		2	4	5
5	13M10	0.6	1.1	52	X		
6	13M10	0.04	0.4	17	X		

Ivesia sericolueca individuals within 30 feet of a proposed trail will have a high probability of direct effects (i.e. trampling or death) from motor vehicle use; however, because this species is dependent upon wet meadow habitats and is less likely to inhabit the drier conditions associated with the trail bed or shoulder, indirect effects to adjacent habitats are most likely to have an adverse impact.

Ivesia sericolueca occupies habitats that are particularly sensitive to the impacts of motor vehicle use. Motor vehicle use within or in close proximity to this habitat has the potential to disrupt key hydrologic processes, which could have adverse indirect effects on the species. Ruts caused by motor vehicles in wet meadows can alter the timing and direction of water flow and infiltration. Increased rates of erosion and creation of head-cuts can also become so severe that a large portion of wet meadow habitat is degraded. These habitats are also highly susceptible to invasion from aggressive noxious weed species that thrive under wet conditions, such as (*Cirsium arvense)* and perennial pepperweed (*Lepidium latifolium*).

There would be no direct or indirect effects to *Ivesia sericolueca* from implementation of Alternatives 3, 4 or 5.

Cumulative Effects

Past activities, such as grazing by domestic livestock and construction of roads and trails, have resulted in water diversions and habitat type conversions of meadows across this species’ range. These past management activities have likely had a negative impact on *Ivesia sericolueca* individuals and areas of suitable habitat.

Current livestock grazing on the PNF impacts occurrences of *Ivesia sericolueca* by reducing recruitment levels and increasing mortality rates (M. Friend, personal communication). This management activity, in combination with motor vehicle use along some of the proposed trails, may accelerate the hydrologic degradation of suitable habitat for this species across the Forest.

Implementation of the action alternatives would reduce impacts to this species by banning cross-country travel; however, Alternative 2 would not eliminate the impacts to all occurrences or areas of suitable habitat. The two occurrences that may be impacted by use of the proposed trail represent approximately 14 percent of all known occurrences on the PNF (Figure 6) and three percent of the known occurrences in California (CNDDB 2008).

The proposed trail (13M10) is relatively well established; therefore, the largest impact to these two occurrences most likely occurred at the time the route was created or constructed. Adding this trail to the NFTS under Alternative 2 would have some negative impact on this species; however, it would likely not reduce the overall viability of *Ivesia sericolueca* due to the small proportion of the two individual occurrences affected (less than three percent) and the relatively small amount of suitable habitat potentially impacted. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

There are no direct or indirect effects to *Ivesia sericolueca* from implementation of Alternatives 3, 4 or 5; therefore, the cumulative effects from these alternatives would be negligible.

3.8.9.1.3 *Pyrrocoma lucida* (sticky Pyrrocoma)

This perennial tap rooted species is known from 76 occurrences in Sierra, Plumas, Yuba and Lassen counties (CNDDB 2008). It is endemic to the eastern portion of the Beckwourth Ranger District of the PNF, the Sierra Valley area on the Sierraville Ranger District of the Tahoe NF and adjacent private lands. The PNF currently has 46 occurrences.

Pyrrocoma lucida is found in vernally saturated soils of alkaline clay meadows within sagebrush scrub habitats below 6,000 feet. Within these habitats it occurs in the drier sagebrush-meadow ecotones rather than in the perennially wet meadows. It is also found in ephemeral drainages and swales, roadside ditches and historic railroad ditches.

The trend for this species is not known. Documented occurrences are numerous and individuals are estimated to exceed 383,000 plants with over half occurring on state or federal lands. In spite of this substantial number of occurrences and abundance of individuals, nearly every occurrence is disturbed by one or more factors. Threats include reservoir development, meadow restoration, off-highway vehicle use, recreation activities, fire suppression camps, military camps, prescribed burning and other fuel treatments, activities associated with timber harvest (i.e. landings), fuel wood gathering, grazing and land exchanges.

PNF management prescription: At least 30 percent of the known occurrences within a project area should be protected from all ground disturbing actions. Avoid impacting more than 50 percent of the known individuals within a project area over any 10 year period. To the degree possible, incorporate known aspects of the species' ecology into design elements of proposed actions to protect or enhance species viability. Evaluate activities and use mitigations consistent with Riparian Management Objectives (HFQLG FEIS) or Riparian Conservation Objectives (Sierra Nevada Forest Plan Amendment ROD, pp. 32-35) depending on which standards apply, species abundance, population size, geographic distribution and known species ecology. In general, strive to avoid direct impacts.

Direct and Indirect Effects

Two locations of *Pyrrocoma lucida* occur within 100 feet of a trail proposed under Alternatives 2 and 5 (Table 120).

Table 120. Locations of *Pyrrocoma lucida* within 100' of the trails proposed under the Action Alternatives

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
4	16M04A		0.2	63	X		X
5	16M04	0.05	0.4	100	X		X

Pyrrocoma lucida is found along the edges of vernally moist meadows and alkali flats. Because of their sparse vegetation and open terrain, these habitats are particularly inviting to motor vehicle use. The trails within the vicinity of these two occurrences are both well-established roads/trails; therefore, the likelihood of individuals occurring within the trail is relatively low. Motor vehicles pulling off of the trail to park may directly affect individuals within Occurrence 5 if plants occupy the area between 0-30 feet of the trail.

Indirect effects to this species include increased risk of noxious weed invasion, particularly from aggressive noxious weed species that thrive under wet conditions, such as Canada thistle (*Cirsium arvense)* and perennial pepperweed (*Lepidium latifolium*). Motor vehicle use within or in close proximity to this habitat can also disrupt key hydrologic processes, alter the timing and direction of water flow and infiltration and increase rates of erosion.

There would be no direct or indirect effects to *Pyrrocoma lucida* from implementation of Alternatives 3 or 4.

3.8.9.1.4 Cumulative Effects

Past activities, such as grazing by domestic livestock and construction of roads and trails, have resulted in water diversions and habitat type conversions of meadows across this species' range. These past management activities have likely had a negative impact on *Pyrrocoma lucida* individuals and areas of suitable habitat. Current livestock grazing within occurrences, in combination with motor vehicle use along some of the proposed trails, may accelerate the degradation of habitat for this species across the Forest.

Implementation of the action alternatives would reduce impacts to this species by banning cross-country travel; however, Alternatives 2 and 5 would not eliminate the impacts to all occurrences or areas of suitable habitat. The two occurrences that may be impacted by use of the proposed trail represent approximately four percent of all known occurrences on the PNF (Figure 6) and three percent of the known occurrences in California (CNDDB 2008).

The proposed trails are relatively well-established; therefore, the largest impact to these two occurrences most likely occurred at the time the route was created or constructed. Adding these trails to the NFTS under the action alternatives would have some negative impact on this species; however, it will likely not reduce the overall viability of *Pyrrocoma lucida* due to the small proportion of the two individual occurrences affected (less than 0.5 percent) and the relatively small amount of suitable habitat potentially impacted. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

There are no direct or indirect effects to *Pyrrocoma lucida* from implementation of Alternatives 3 or 4; therefore, the cumulative effects from these alternatives would be negligible.

3.8.9.2 Riparian Areas

One riparian species, *Hydrothyria venosa,* occurs within 100 feet of a proposed trail.

3.8.9.2.1 *Hydrothyria venosa* (Veined Water Lichen)

This aquatic lichen has a broad distribution that includes five eastern states, Oregon, Washington, British Columbia and California. In California, it is found in streams along the western slope of the Sierra Nevada and northern Coast ranges. Twenty occurrences of *Hydrothyria venosa* have been documented on the PNF. Outside of the PNF, 25 occurrences are known from the Forest Service and State Park lands. Where populations do occur, individuals are generally few in number.

Hydrothyria venosa is found in cold, unpolluted streams in mixed conifer forests. It is in decline throughout its historic range. Threats to this species include activities that change the water chemistry, alter the stream channel or significantly alter the riparian vegetation. These changes increase the water temperature and/or increase flows that scour the gravel and rocks where this lichen is attached. Management activities of concern include grazing, off-highway vehicles, sedimentation from roads, herbicides, dispersed camping and recreational water use.

PNF management prescription: Protect all locations from disturbance. Maintain hydrologic conditions in streams where occurrences are found. Coordinate stream activities up and downstream of known occurrences. Consider a protection buffer to maintain canopy cover. If the establishment of a no-disturbance buffer is appropriate, consider the following when determining the size and shape of the buffer: site conditions, topographic position, slope, aspect, stand structure (including canopy height), intensity of the proposed management activity and proximity to water.

Direct and Indirect Effects

Two locations of *Hydrothyria venosa* occur within 100 feet of the trails proposed under Alternatives 2 and 5 (Table 121).

Table 121. Locations of *Hydrothyria venosa* within 100’ of the trails proposed under the Action Alternatives

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30’	Within 30-100’		2	4	5
6	5M20		0.04	42	X		X
11	5M28	0.5	0.2	1.6	X		

This aquatic lichen requires perennial streams, with relatively stable water flows and clear, cool water (Dillingham 2005). This lichen also cannot tolerate too much physical disruption; therefore, those individuals in Occurrence 11 that occupy portions of the stream that intersect the proposed trail will likely be negatively impacted (i.e. killed) by motor vehicle use.

Adding the proposed trails to the NFTS could also indirectly impact the two occurrences listed above if use of the trails result in alteration of the stream channel, removal of riparian vegetation or modification of the water chemistry. These changes can increase the water temperature and/or increase flows that scour the gravel and rocks where this lichen is attached.

There would be no direct or indirect effects to *Hydrothyria venosa* from implementation of Alternatives 3 or 4.

Cumulative Effects

This species has likely lost individuals and suitable habitat in the past as a result of management activities that include water diversions, habitat type conversion and construction of roads and trails. Implementation of the action alternatives would reduce impacts to *Hydrothyria venosa* by banning cross-country travel; however, Alternatives 2 and 5 would not eliminate the impacts to occurrences or areas of suitable habitat.

The two occurrences that may be impacted by use of the proposed trails represent approximately 10 percent of all known occurrences on the PNF (Figure 6) and four percent of the known occurrences in California (CNDDB 2008). Adding these trails to the NFTS under Alternatives 2 and 5 would have some negative impact on this species and its habitat. These impacts would likely not reduce the overall viability of *Hydrothyria venosa* due to the small number of occurrences affected and the relatively low amount of suitable habitat potentially impacted. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

There are no direct or indirect effects to *Hydrothyria venosa* from implementation of Alternatives 3 or 4; therefore, the cumulative effects from these alternatives would also be negligible.

3.8.9.3 Serpentine Plant Communities

The following five serpentine species are within 100 feet of a proposed trail: *Allium jepsonii*, *Arabis constancei*, *Calycadenia oppositifolia*, *Eriogonum umbellatum* var. *ahartii and Monardella follettii.*

3.8.9.3.1 *Allium jepsonii* (Jepson's onion)

This plant is known from 23 occurrences in eastern Butte and Tuolumne Counties in the northern Sierra Nevada (CNDDB 2008). In Butte County, it grows on serpentine soils in foothill woodland or mixed conifer forest. On the PNF, this plant is known from fifteen occurrences that are found on steep, relatively undisturbed, serpentine outcrops between 1,400 and 3,800 feet in elevation in the western portion of the Forest. Most occurrences are small, containing only hundreds of individuals.

The trend for this plant on the PNF appears to be stable for those plants located on rock outcrops; however, population numbers may fluctuate in serpentine soils located off of outcrops depending on climatic fluctuation. In Butte County threats to this species include road construction and for the few occurrences not on rock outcrops, timber harvest, prescribed burning and off-highway vehicle use.

PNF management prescription: Protect all plant occurrences from ground disturbance. Evaluate activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

There are two occurrences of *Allium jepsonii* within 30-100 feet of the trails proposed under Alternatives 2 and 5 (Table 122).

Table 122. Locations of *Allium jepsonii* within 100' of the trails proposed under the Action Alternatives

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
2	5M02		0.2	11.1	X		X
5	5M05		0.02	0.2	X		X

The two *Allium jepsonii* occurrences are situated more than 30 feet from the system trails proposed under Alternatives 2 and 5; therefore, the potential for direct effects to individuals is low. There is some potential for indirect effects, such as increased erosion and noxious weed invasion; however, only a small portion (less than 10 percent) of each occurrence is located within 100 feet of the proposed trails, making the potential for significant effects to the entire occurrence low.

There would be no direct or indirect effects to *Allium jepsonii* from implementation of Alternatives 3 or 4.

Cumulative Effects

This rare onion is found on rocky, low productivity, serpentine soils and has not been observed in areas of recent or high disturbance. This species has likely lost individuals and suitable habitat over the past 150 years as a result of ground disturbing activities such as gold and gravel mining, timber harvest, road construction and recreation. Implementation of the action alternatives would reduce impacts to *Allium jepsonii* by banning cross-country travel; however, Alternatives 2 and 5 would not eliminate the impacts to all occurrences or areas of suitable habitat.

The two *Allium jepsonii* occurrences that may be indirectly impacted by use of the proposed trails represent approximately 13 percent of all known occurrences on the PNF (Figure 6) and nine percent of the known occurrences in California (CNDDB 2008). Based on the low likelihood of direct effects to the known occurrences and the relatively small amount of suitable habitat impacted, it is predicted that implementation of the action alternatives would not reduce the overall viability of *Allium jepsonii*. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

There would be no direct or indirect effects to *Allium jepsonii* from implementation of Alternatives 3 or 4; therefore, cumulative effects from these alternatives would also be negligible.

3.8.9.3.2 *Arabis constancei* (Constance's Rock Cress)

This species occurs on undisturbed serpentine-derived soils in scattered locations on the PNF and southernmost part of the Lassen National Forest, in Plumas and Sierra counties. There are 55 occurrences on the PNF that occur in several parallel bands of serpentine. Only one occurrence is known from outside of the PNF; it is found on the Lassen National Forest (CNDDB 2008). Occurrences are found between 3,200 and 6,600 feet in elevation and range in size from a few individuals on small serpentine outcrops to over a hundred individuals within larger areas of productive serpentine soil.

The known occurrences of this plant seem to be stable if they have not been impacted; however, many of the known occurrences have been impacted by various activities including mining, road building, timber harvest, off-highway vehicle use and recreation activities.

PNF management prescription: Protect all plant occurrences from ground disturbance. Evaluate activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

There are two occurrences of *Arabis constancei* within 30-100 feet of the trails proposed under Alternatives 2, 4 and 5 (Table 123).

A review of the PNF files indicates that this species has a very low tolerance to soil disturbance. It may be found occupying very old areas of disturbance, but it is not found in new areas of disturbance.

The potential for direct effects to individuals is low in the two *Arabis constancei* occurrences because individuals are situated more than 30 feet from the proposed trails. There is some potential for indirect effects, such as increased erosion and noxious weed invasion; however, only a small portion (less than three percent) of each occurrence is located within 100 feet of the proposed trails, making the potential for significant effects to the entire occurrence low.

Table 123. Locations of *Arabis constancei* within 100' of the trails proposed under the Action Alternatives.

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
12C2	8M11		0.03	1.3	X	X	X
43	8M13		0.3	12	X		

There would be no direct or indirect effects to *Arabis constancei* from implementation of Alternative 3.

Cumulative Effects

This species has likely lost individuals and suitable habitat over the past 150 years as a result of ground disturbing activities such as gold and gravel mining, timber harvest, road construction and recreation. Implementation of the action alternatives will reduce impacts to *Arabis constancei* by banning cross-country travel; however, Alternatives 2, 4 and 5 would not eliminate the impacts to all occurrences or areas of suitable habitat.

The two *Arabis constancei* occurrences that may be impacted by use of the proposed trails represent approximately four percent of all known occurrences on the PNF (Figure 6) and in California (CNDDB 2008). It is predicted that implementation of action Alternatives 2, 4 and 5 would not reduce the viability of *Arabis constancei* due to this relatively small scale of potential impact; the low likelihood of direct effects to the two occurrences that are within 30-100 feet of the proposed trails; and the relatively small proportion of the occurrence affected (less than three percent). The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

There are no direct or indirect effects to *Arabis constancei* from implementation of Alternative 3; therefore, the cumulative effects from this alternative would also be negligible.

3.8.9.3.3 *Calycadenia oppositifolia* (Butte County calycadenia)

Calycadenia oppositifolia is an annual herb that is restricted to a narrow band of habitat in the foothills of the Sierra Nevada and Cascade Mountain Range in Butte County, California. There are seven occurrences on the PNF.

Calycadenia oppositifolia is found in grassy openings in woodland, chaparral and forested habitats below 3,100 feet in elevation. It often occurs on shallow, serpentine soils, but can also be found on volcanic or granitic parent materials. Threats to this species include livestock grazing, road construction and maintenance, off-highway vehicle use and urban development. *Calycadenia oppositifolia* has been observed in disturbed areas; however, the greatest concentrations of the species have been found in undisturbed openings (State of California, Department of Water Resources 2004).

PNF management prescription: Protect occurrences from ground disturbance before seed set. Evaluate any disturbance outside the growing season to determine if effect would be detrimental to the species. For any other activities, evaluate on a site-by-site basis considering the species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

Two occurrences of *Calycadenia oppositifolia* occur within 30-100 feet of the trails proposed under Alternatives 2 and 5 (Table 124).

Table 124. Locations of *Calycadenia oppositifolia* within 100’ of the trails proposed under the Action Alternatives.

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30’	Within 30-100’		2	4	5
6	5M02		1.4	18.2	X		X
12	5M01		0.3	0.3	X		X

Field surveys of the proposed trails did not find *Calycadenia oppositifolia* individuals growing directly in or along the trail (L. Janeway, personal communication 2008); therefore, the potential for direct effects to individuals is low. There is some potential for negative indirect effects, particularly in Occurrence 12, which has 100 percent of its individuals located within 100 feet of the trail and occurs in open and highly accessible habitat. Negative impacts to individuals within this location could result in the elimination of the entire occurrence.

There would be no direct or indirect effects to *Calycadenia oppositifolia* from implementation of Alternatives 3 or 4.

Cumulative Effects

Past ground disturbing activities, such as off-highway vehicle use, mining, logging and road building, have most likely affected *Calycadenia oppositifolia* individuals and areas of suitable habitat. It is unclear to what extent these past activities have affected this species due to the fact that it has been observed growing in both disturbed and undisturbed habitats (State of California, Department of Water Resources 2004).

Implementation of the action alternatives will reduce impacts to *Calycadenia oppositifolia* by banning cross-country travel; however, Alternatives 2 and 5 would not eliminate the impacts to all occurrences or areas of suitable habitat. The two *Calycadenia oppositifolia* occurrences that may be impacted by use of the proposed trails represent approximately 29 percent of all known occurrences on the PNF (Figure 6). This relatively substantial percentage of occurrences affected increases the risk of negative cumulative impacts to *Calycadenia oppositifolia*; however, this species' tolerance for disturbance, in combination with the low likelihood of direct impacts, makes the overall risk to the species' viability much lower. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

There are no direct or indirect effects to *Calycadenia oppositifolia* from implementation of Alternatives 3 or 4; therefore, the cumulative effects from these alternatives would also be negligible.

3.8.9.3.4 *Eriogonum umbellatum* var. *ahartii* (Ahart's sulphur flower)

This newly described sub-shrub species is restricted to Butte, Yuba and Plumas Counties in California. Eleven occurrences have been recorded on the PNF and an additional three occurrences are on Lassen NF lands that are administered by the PNF.

This species occurs on serpentine slopes in open chaparral and mixed conifer forests. The current trend for this species is unknown. Threats include timber harvest, off-highway vehicle use, prescribed burning and road construction on public lands.

PNF management prescription: Protect all plant occurrences from ground disturbance. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

Seven locations of *Eriogonum umbellatum* var. *ahartii* occur within 100 feet of the trails proposed under Alternative 2 (Table 125). No occurrences of this species are impacted under any of the other action alternatives.

Table 125. *Eriogonum umbellatum* var. *ahartii* occurrences within 100' of Alternative 2 proposed trails.

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
10	7M09	0.07	0.007	0.07	X		
11 (1)	7M10		0.04	0.04	X		
11 (2)	7M10	0.3	0.3	0.7	X		
11 (3)	7M10		0.04	0.04	X		
11 (4)	7M10		0.2	0.8	X		
11 (5)	7M10	0.002	0.04	0.04	X		
11 (6)	7M10	0.02	0.02	0.04	X		

The response of this serpentine sub-shrub to disturbance is presently unknown. While it is found in open, rocky habitats, it has not been observed in recently disturbed areas. Surveys of trails 7M09 and 7M10 did not observe individuals in the trails and motor vehicle disturbance was not observed to extend beyond the trails (L. Janeway, personal communication 2008). These two factors lower the probability of direct disturbance to *Eriogonum umbellatum* var. *ahartii* individuals.

As seen in Table 125, all seven locations are at risk of indirect effects from motorized vehicle use under this alternative. Five of these locations are small, with 100 percent of their occurrence at risk of being indirectly impacted. Indirect effects, such as erosion or noxious weed invasion, within these small sites could result in the elimination or degradation of the entire sub-occurrence.

There are no direct or indirect effects to *Eriogonum umbellatum* var. *ahartii* from implementation of Alternatives 3, 4 or 5.

Cumulative Effects

Little is known about the past distribution and abundance of this newly described species, making it difficult to determine the effects of past management activities on this species. As is the case with many of the serpentine species, *Eriogonum umbellatum* var. *ahartii* has most likely been affected by historic ground disturbing activities, such as off-highway vehicle use, mining, logging and road building. Implementation of the action alternatives will reduce impacts to *Eriogonum umbellatum* var. *ahartii* by banning cross-country travel; however, Alternative 2 will not eliminate the impacts to all occurrences or areas of suitable habitat.

The seven occurrences that may be impacted by use of the proposed trails under Alternative 2 represent approximately 64 percent of all known occurrences on the PNF (Figure 6) and 50 percent of the known occurrences in California (CNDDB 2008). This large percentage of occurrences with the potential to be impacted greatly increases the risk of negative cumulative impacts to *Eriogonum umbellatum* var. *ahartii* under Alternative 2. There are no direct or indirect effects to *Eriogonum umbellatum* var. *ahartii* from implementation of Alternatives 3, 4 or 5; therefore, the cumulative effects from these alternatives would be negligible.

The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

3.8.9.3.5 *Monardella follettii* (Follett's monardella)

This species is known from Plumas County in the northern Sierra Nevada and from one historic occurrence in Nevada County that has not been relocated since 1916. There are currently 35 known occurrences in California (CNDDB 2008), 34 of which occur on the PNF.

The PNF occurrences occur within a band of serpentine that extends from Meadow Valley to Red Hill. Plants are often found in open, rocky areas and openings in mixed conifer forest. Occurrences range in size from a few individuals to thousands of individuals scattered over a large area. Threats to this species include off-highway vehicle use, rock collection and mining, timber harvest, road construction and maintenance and canopy closure resulting from fire suppression.

PNF management prescription: Protect 50 percent of known occurrences within a project area from ground disturbance. Favor protection of locations that have open tree and shrub canopies (less than 50 percent cover) over those with closed tree and shrub canopies. Favor allowing ground disturbance and prescribed fire in areas of dense shrub or tree cover. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

Three occurrences of *Monardella follettii* occur within 100 feet of the trails proposed under Alternatives 2, 4 and 5 (Table 126).

This perennial herb is found in undisturbed and disturbed sites, such as abandoned roads, skid trails and on old landings (Griggs 2001). Occurrences of this species often cover large areas that range from 1-100 acres and individuals within occurrences are often abundant and patchily distributed.

Table 126. Locations of *Monardella follettii* within 100’ of trails proposed under the Action Alternatives.

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30’	Within 30-100’		2	4	5
1S	8M23	0.003	0.2	27	X		X
4	8M13		0.3	8	X		
9	8M11	3.0	6.6	183	X	X	X

Although this species is found in areas of disturbance, any beneficial affect of these open sites (i.e. increased light or low levels of competition) could easily be overcome by the negative direct effect of repeated trampling or death of individuals. Two of the occurrences are in close proximity to the proposed trails. Within these occurrences, those individuals that are within 30 feet of the trail would likely be negatively impacted by motor vehicle use. Indirect effects, such as increased erosion and noxious weed invasion, may also negatively impact all of the three occurrences.

Cumulative Effects

Monardella follettii individuals and areas of suitable habitat have likely been affected by past ground disturbing activities, such as off-highway vehicle use, mining, logging and road building; however, the ability of this species to colonize both previously disturbed and undisturbed sites suggests that at least some of these past management activities may not have been detrimental to the species.

Implementation of the action alternatives would reduce impacts to *Monardella follettii* by banning cross-country travel; however, Alternatives 2, 4 and 5 would not eliminate the impacts to all occurrences or areas of suitable habitat. One large *Monardella follettii* occurrence (11B) occurs along an existing system trail; use of this trail and any associated impacts to this occurrence would continue under all of the action alternatives.

As noted above, the close proximity of this species to the proposed trails would increase the probability of negative direct effects, which may outweigh the positive indirect effects to the species (i.e. increased light availability or low levels of competition). The three *Monardella follettii* occurrences that may be impacted by use of the proposed trails represent approximately nine percent of all known occurrences on the PNF (Figure 6) and in California (CNDDB 2008). These factors, in combination with the large size (between 8 and 183 acres) of the *Monardella follettii* occurrences and consequently the relatively low number of individuals with potential to be directly and indirectly affected, reduce the overall negative impact to this species from adding the trail to the NFTS. The effects of present and future projects on *Monardella follettii* would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

3.8.9.4 Barren Habitats

One barren habitat species, *Lewisia kelloggii* ssp. *huchinsonii,* occurs within 100 feet of a proposed trail.

3.8.9.4.1 *Lewisia kelloggii* ssp. *huchinsonii* (Hutchinson's lewisia)

In California, *Lewisia kelloggii* ssp. *huchinsonii* occurs at 18 sites ranging from the southern Cascade Range to the central Sierra Nevada (USDA Forest Service 2008). On the PNF, it is limited to five occurrences, all of which occur in the southwestern portion of the forest in an area of approximately 20 square miles.

This species is found in granitic gravel on ridge tops and flats, sparsely vegetated by Jeffrey pine and lodgepole pine woodlands, with patches of upland sedge (*Carex* sp.) and rock garden wildflowers. One of the largest threats to this species is off-highway vehicles, which travel easily across the flat open terrain where *Lewisia kelloggii* ssp. *huchinsonii* is found. Other threats include horticultural collection, camping, hiking and activities that compact soil and trample plants.

PNF management prescription: Protect all plant occurrences from ground disturbance that result in soil displacement. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

One occurrence of *Lewisia kelloggii* ssp. *huchinsonii* occurs within 30-100 feet of a proposed system trail (Table 127).

Table 127. Locations of *Lewisia kelloggii* ssp. *huchinsonii* within 100' of the trails proposed under the Action Alternatives.

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
5	9M24		0.06	0.4	X		

This species is found in gravelly, exposed sites with sparse vegetation and little to no natural barriers to motor vehicle use. The response of this species to disturbance is presently unknown; however, motor vehicles have been identified as a significant threat to this species (USDA Forest Service 2005a).

The distance to the trail makes the likelihood of direct effects to individuals low; however, the small size of the occurrence, its isolation from other occurrences and the fragility of the habitat increase the potential for indirect effects to this occurrence. The substrate where *Lewisia kelloggii* ssp. *huchinsonii* occurs is highly susceptible to erosion; therefore, effects from soil erosion may be a concern at this site.

There are no direct or indirect effects to *Lewisia kelloggii* ssp. *huchinsonii* from implementation of Alternatives 3, 4 or 5.

Cumulative Effects

Scientific research recently identified this species as being genetically distinct from other subspecies of *Lewisia kelloggii* (USDA Forest Service 2008); this recent distinction means that little is actually known about this species' past distribution or about how management activities have affected individuals or areas of suitable habitat. The presence of this species in areas that are susceptible to erosion and off-highway vehicle use suggests that past ground disturbing management activities have likely had a negative effect on *Lewisia kelloggii* ssp. *huchinsonii.*

Implementation of the action alternatives would reduce impacts to *Lewisia kelloggii* ssp. *huchinsonii* by banning cross-country travel; however, Alternative 2 would not eliminate the impacts to all occurrences or areas of suitable habitat. One occurrence of *Lewisia kelloggii* ssp. *huchinsonii* (#2) occurs along an existing system trail; use of this trail and any associated impacts to this occurrence would continue under all of the action alternatives.

The *Lewisia kelloggii* ssp. *huchinsonii* occurrence that may be impacted by use of trail proposed under Alternative 2 represents approximately 20 percent of all known occurrences on the PNF (Figure 6) and 6 percent of the occurrences documented in California (CNDDB 2008). Inclusion of this route under Alternative 2 is likely to have a negative impact on this occurrence. This relatively large percentage of occurrences with the potential to be impacted greatly increases the risk of negative cumulative impacts to *Lewisia kelloggii* ssp. *huchinsonii* under Alternative 2. There are no direct or indirect effects to *Lewisia kelloggii* ssp. *huchinsonii* from implementation of Alternatives 3, 4 or 5; therefore, the cumulative effects from these alternatives would be negligible.

The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

3.8.9.5 Interior Forest Habitat

One Interior Forest species, *Cypripedium fasciculatum,* occurs within 100 feet of a proposed trail.

3.8.9.5.1 *Cypripedium fasciculatum* (Clustered Lady's Slipper)

This orchid has a wide distribution that extends from British Columbia, south to the Sierra Nevada and Coast Ranges of California and east to the Rocky Mountains. While the distribution of this species is broad, occurrences are often small and widely scattered. In California, the highest distribution of *Cypripedium fasciculatum* is on the Klamath and Plumas National Forests. There are 135 occurrences on the PNF; these range in size from two to over 3,000 stems. A total of 200 occurrences have also been recorded on the Six Rivers, Shasta-Trinity, Klamath, Mendocino and Tahoe National Forests (Kaye and Cramer 2005).

In California, *Cypripedium fasciculatum* is most commonly associated with mixed conifer forests in the mid-to-late stages of successional development. The best conditions for this species are thought to exist when crown canopy cover is between 50 and 75 percent, with 60 percent being optimal (Kaye and Cramer 2005). It appears that the optimum habitat conditions for *Cypripedium fasciculatum* are not found in early successional communities (Kagan 1990). This species has an apparent intolerance to intense disturbance that directly reduces the duff layer. It is usually found in areas that have not been disturbed or in areas where the disturbance was light or in the distant past. Mycorrhizal fungi play a pivotal role in the biology of orchids. Several stages in the orchid's life cycle, particularly the early stages of seedling development, depend on mycorrhizal fungal symbioses.

Threats include any direct ground disturbance from activities such as timber harvest, intense fire, recreational activities, livestock grazing, road and trail maintenance and illegal collection. Given this species' complicated life history, narrow range of environmental factors necessary for establishment, apparent intolerance to intense disturbance and occurrence on private lands, the trend for this species is thought to be declining.

PNF management prescription: Buffer all plant occurrences by approximately 100 feet from ground disturbance to maintain canopy closure, hydrologic conditions and mycorrhizal relationships. Do not advertise locations, to minimize poaching. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

Six occurrences of *Cypripedium fasciculatum* occur within 100 feet of the trails proposed under Alternatives 2, 4 and 5 (Table 128)

Table 128. Locations of *Cypripedium fasciculatum* within 100' of the trails proposed under the Action Alternatives.

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
31	7M16	0.0001	0.3	8	X	X	X
51	8M35		0.02	0.02	X	X	X
126	5M28	0.001	0.00005	0.02	X	X	X
132	8M26		0.0001	0.001	X	X	X
135A	9M55	0.0001	0.3	0.0001	X	X	X
137	9M20	0.02		0.02	X		

Formal studies of the response of *Cypripedium fasciculatum* to disturbance are limited; however, this orchid is most commonly found in areas that have not been disturbed or in areas where the disturbance was light or in the distant past. Several stages in the orchid's life cycle, particularly the early stages of seedling development, depend on mycorrhizal fungal symbioses; therefore, occurrences are usually found in those areas where suitable conditions for the fungi exist (i.e. sites that are moist, shady and have adequate organic matter). *Cypripedium fasciculatum* is most frequently found in late successional, closed-canopy stands and is much less common in early to mid-successional forests. The habitat that this species is dependent upon makes it highly unlikely that individuals would inhabit or colonize the open sites associated with trail beds or shoulders.

At this time, no individuals are known to occur within any of the proposed trails. There are however, four occurrences documented within 0-30 feet of a proposed trail. Individuals within these occurrences may be at risk of direct effects (i.e. trampling or death) from motor vehicle use.

The close proximity (within 100 feet) of these six occurrences to the trails greatly increases the potential for negative edge effects, such as reduced shade, moisture and duff levels, which could alter the orchid's microhabitat conditions. Adding these trails to the NFTS would also provide access to these orchid occurrences, which could increase the potential for illegal collection.

Cumulative Effects

Cypripedium fasciculatum has likely lost individuals and a considerable amount of suitable habitat over the last 150 years due to human activities related to mining, logging, road building, fire suppression and homesteading. All of these activities have, to one extent or another, resulted in a reduction in canopy cover, modification of stand dynamics, alteration in fire frequency and intensity and change in microclimate conditions.

Implementation of the action alternatives would reduce impacts to *Cypripedium fasciculatum* by banning cross-country travel; however, Alternatives 2, 4 and 5 would not eliminate the impacts to all occurrences or areas of suitable habitat. One occurrence of *Cypripedium fasciculatum* (#31B) occurs along an existing system trail and many of the trails proposed under the action alternatives are old skid trails or temporary roads; this suggests that the largest impact to these six *Cypripedium* *fasciculatum* occurrences most likely occurred at the time the route, skid trail or temporary road was created or constructed.

The six occurrences impacted by use of the proposed trails represent approximately four percent of all known occurrences on the PNF (Figure 6) and two percent of the occurrences documented on National Forests in California (Kaye and Cramer 2005). It is predicted that implementation of action Alternatives 2, 4 and 5, would not reduce the overall viability of *Cypripedium fasciculatum* due to this relatively small scale of potential impact.

The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

3.8.9.6 Open Habitats

The following eight Open Habitat species are within 100 feet of a proposed trail: *Astragalus lentiformis, Astragalus pulsiferae* var. *pulsiferae, Calycadenia oppositifolia, Clarkia mildrediae* ssp. *mildrediae, Clarkia mosquinii, Lewisia kelloggii* ssp. *hutchisonii, Lupinus dalesiae and Penstemon personatus.* The individual species discussion for *Calycadenia oppositifolia* is included above under the “Serpentine plant communities” section. *Lewisia kelloggii* ssp. *hutchisonii* is discussed under the “Barren habitat” section.

3.8.9.6.1 *Astragalus lentiformis* (lens-pod milk-vetch)

This perennial herb is limited to Plumas County. There are presently 67 documented occurrences of this species on the PNF, all of which are located within the eastern portion of the Forest. Two occurrences occur outside of the PNF on private land (CNDDB 2008). This plant is found on bare, xeric volcanic soils in flat to gently sloping sagebrush/pine woodlands between 4,900 and 6,400 feet in elevation. It is considered an edaphic specialist.

The tolerance of this milk-vetch to disturbance is presently unknown. This species has been observed growing in areas that have been disturbed; however, the intensity, extent and frequency of the disturbance have not been quantified. Certain levels of soil displacement and disturbance may be beneficial. Threats to this species include fire suppression, livestock grazing, timber harvest, road construction, mining, reservoir construction and utility line construction. Although this species recruits after disturbance, it is unknown to what extent these activities cause local extinction and seed burial.

PNF management prescription: Protect at least 30 percent of all known occurrences within a project analysis area from all disturbances associated with management activities. In small populations (containing less than 50 individuals or less than one-quarter acre) avoid ground disturbance. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

There are nine locations of *Astragalus lentiformis* within 100 feet of the trails proposed under Alternatives 2, 4 and 5 (Table 129)

Table 129. Locations of *Astragalus lentiformis* within 100' of trails proposed under the Action Alternatives.

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
13	13M08	8.5	18	341.9	X		
13B	13M10	0.1	0.004	0.07	X		
14/39	13M09	1.3	3.1	232.6	X	X	X
	13M09A	0.3	1.1		X		
31	14M05	1.6	3.7	95.3	X		X
	14M06	3	6.4		X		X
41	13M32	0.003	0.2	24.2			X
43	13M10		0.01	0.02	X		
68	13M08	0.1	0.01	0.07	X		
69	13M10	0.1	0.01	0.09	X		
70	13M10	0.5	0.9	1.7	X		

Astragalus lentiformis is a perennial herb that is found in both undisturbed and disturbed sites. In general, this species appears to respond favorably to light-to-moderate disturbance and PNF botanists have observed this species growing directly in roadbeds. Surveys conducted during the summer of 2007 also noted individual plants growing in the center of and along the edge of the proposed trails (Vollmar 2007). While past management has demonstrated that certain levels of soil displacement and disturbance may be beneficial, the intensity and frequency of disturbance that is tolerable to this species has not been fully quantified.

The *Astragalus lentiformis* occurrences that are within 30 feet of the trail may be directly affected by the proposed trails. Some individuals are likely to have their vigor and productivity reduced or to be killed by motor vehicles parking or driving over them. None of the locations have 100 percent of their individuals within 0-30 feet of the trail; however, those occurrences that contain less than 50 individuals or are less than one-quarter acre are at a high risk of being negatively impacted.

A number of the occurrences listed in Table 129 are large and/or have additional sub-occurrences in the vicinity that are not at risk of being impacted under these alternatives. All of the occurrences also have a portion of their occurrence between 30-100 feet from the edge of the trail, where direct effects are less likely to occur. Individuals that are greater than 30 feet from the trail may benefit from the indirect effects (i.e. increased light or low levels of competition) of the trail. Some negative indirect effects, such as increased erosion and noxious weed invasion, could negatively impact these occurrences.

There would be no direct or indirect effects to *Astragalus lentiformis* from implementation of Alternative 3.

Cumulative Effects

The ability of *Astragalus lentiformis* to colonize both previously disturbed and undisturbed sites suggests that this species may have benefited from past management activities that created open conditions and increased light reception to the understory. Suitable habitat for this locally abundant species has likely been impacted by past timber management practices, which generally favored removal of larger, more dominant trees (i.e. overstory removal). This management practice, as well as the suppression of wildfire, has resulted in a greater number of dense forests that are dominated by small trees and a reduction in open forest habitat across the landscape.

Implementation of the action alternatives would reduce direct impacts to this species by banning cross-country travel; however, Alternatives 2, 4 and 5 would not eliminate the potential for direct impacts to all occurrences. The close proximity of this species to the proposed trails would increase the probability of negative direct effects, which may outweigh the positive indirect effects to the species (i.e. increased light availability or low levels of competition).

The nine locations of *Astragalus lentiformis* that may be impacted by use of the proposed trails represent approximately 13 percent of all known occurrences on the PNF (Figure 6) and 13 percent of the known occurrences in California (CNDDB 2008).

Adding these trails to the NFTS under the action alternatives may have some negative direct impacts to this species; however, these will likely not reduce the overall viability of *Astragalus lentiformis* due to its ability to tolerate and even thrive, in disturbed sites; the large occurrence size and close proximity to adjacent sub-occurrences; and the low amount of suitable habitat potentially impacted. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

There are no direct or indirect effects to *Astragalus lentiformis* from implementation of Alternative 3; therefore, the cumulative effects from this alternative would also be negligible.

3.8.9.6.2 *Astragalus pulsiferae* var. *pulsiferae* (Pulsifer's milk-vetch)

Pulsifer’s milk-vetch is known to occur in Lassen, Modoc, Plumas and Sierra Counties in California, as well as in two counties in the state of Nevada. This species is presently known from a total of 16 occurrences, 12 of which are located on the PNF (CNDDB 2008).

Pulsifer’s milk-vetch typically occupies steep, sandy or gravelly slopes in Great Basin scrub, pinyon and juniper woodlands and lower montane coniferous forests between 4,200 and 6,000 feet in elevation. It is considered to be an “unusual edaphic” species, which means that it is often more influenced by soil conditions than by light regimes (USDA Forest Service 2003b). In many cases, the substrate where this species occurs inhibits the growth of other species, resulting in a lower accumulation of biomass. Although this species recruits after disturbance, it is unknown to what extent these activities cause local extinction and seed burial.

PNF management prescription: Protect at least 30 percent of all known occurrences within a project analysis area from all disturbances associated with management activities. Protect all plant occurrences from soil displacement activities. Allow for at least 5 years rest between disturbance prescriptions to the same occurrence. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

Three occurrences of *Astragalus pulsiferae* var. *pulsiferae* occur within 100 feet of the trails proposed under Alternative 2 (Table 130). No occurrences of this species are impacted under any of the other action alternatives.

Table 130. Locations of *Astragalus pulsiferae* var. *pulsiferae* within 100' of the trails proposed under the Action Alternatives.

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
3	15M01	0.02		0.02	X		
3A	15M01	0.8	1.6	17	X		
	15M01A	0.4	1.26		X		
7C	12M16	0.02		0.02	X		

Astragalus pulsiferae var. *pulsiferae* is found in sandy or gravelly sites with sparse vegetation and little to no natural barriers to motorized vehicle use. Although plants have been located in old road beds, they are more often found scattered across lightly vegetated side slopes. This species has been shown to recruit after disturbance; however, it is unknown at what extent soil disturbing activities cause extirpation and seed burial.

All three of these occurrences are at high risk of direct effects from motor vehicle use along these trails. Individuals may be killed or damaged by vehicles parking on or driving over them. Soil displacement can easily dislodge individuals, bury seeds and damage or destroy seedlings (USDA Forest Service 2005d). Due to their small size and close proximity, the death of individuals in Occurrences 3 and 7C could result in the elimination of the entire sub-occurrence. Occurrence 3A is large enough (only 25 percent has the potential to be directly or indirectly affected) that impacts would likely not result in a significant negative effect over the entire occurrence. Indirect effects to these three occurrences include increased risk of noxious weed introduction and spread, soil erosion and soil compaction.

There would be no direct or indirect effects to *Astragalus pulsiferae* var. *pulsiferae* from implementation of Alternatives 3, 4 or 5.

Cumulative Effects

Suitable habitat for this species has likely been impacted by past management practices, such as overstory removal and wildfire suppression, which has resulted in a greater number of dense forests that are dominated by small trees and a reduction in open forest habitat across the landscape. The ability of *Astragalus pulsiferae* var. *pulsiferae* to colonize previously disturbed sites suggests that this species may benefit from some management activities that create open habitat conditions; however, it is also not known to what extent or intensity this species is able to survive soil-disturbing activities.

Implementation of the action alternatives would reduce direct impacts to this species by banning cross-country travel; however, Alternative 2 would not eliminate the potential for direct impacts to all occurrences. The close proximity of this species to the proposed trails would increase the probability of negative direct effects, which may outweigh any positive indirect effects to the species such as increased light availability or lower levels of competition.

Livestock grazing has historically occurred in the area where occurrence 3 and 3A are found. Monitoring of these sites in 1994 documented some disturbance from cattle; however, the steepness of the site was thought to prevent heavy grazing and access to *Astragalus pulsiferae* var. *pulsiferae* individuals. This present management activity, in combination with motor vehicle use on the proposed trails, may have the potential to negatively impact habitat and threaten individuals.

The three *Astragalus pulsiferae* var. *pulsiferae* that may be impacted by use of the proposed trails represent approximately 25 percent of all known occurrences on the PNF and 19 percent of the known occurrences in California (CNDDB 2008). Implementation of action Alternative 2 would likely have some negative direct impacts to this species; however, it is predicted that it would not reduce the overall viability of *Astragalus pulsiferae* var. *pulsiferae* due to the species' ability to recruit after disturbance, its presence in areas of disturbance (i.e. road cuts), the large occurrence size or close proximity to adjacent sub-occurrences and the relatively small scale of potential impact.

There are no direct or indirect effects to *Astragalus pulsiferae* var. *pulsiferae* from implementation of Alternatives 3, 4 or 5; therefore, the cumulative effects from these alternatives would be negligible.

3.8.9.6.3 *Clarkia mildrediae* ssp. *mildrediae* (Mildred's clarkia)

This annual plant is limited to eastern Butte County and western Plumas County in the northern Sierra Nevada and southern Cascades of California. There are 30 *Clarkia mildrediae* ssp. *mildrediae* occurrences on the PNF, the majority of which are located in the Feather River Canyon. Ten occurrences are found outside of the Forest boundary.

This species occurs in cismontane woodland and in lower montane coniferous forest, usually on sandy granitic substrate. The current trend for this species is unknown; however, most occurrences appear to be stable (USDA Forest Service 2005b). Wildfire suppression has likely restricted the amount of suitable habitat for this species. As a result, most occurrences are found on road cut banks, where there is minimal plant competition and open light conditions. This increases the potential for impact from road widening and maintenance activities. Activities that create soil disturbance may negatively impact plants and the soil seed bank.

PNF management prescription: Protect occurrences from ground disturbance before seed set. Evaluate ground disturbance outside the growing season; however, in general, disturbance (without major habitat alteration) after plants had set seed could occur. Canopy removal in and adjacent to occurrences is encouraged to open the habitat. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

There are 11 locations of *Clarkia mildrediae* ssp. *mildrediae* within 100 feet of the trails proposed under Alternatives 2, 4 and 5 (Table 131).

Table 131. Locations of *Clarkia mildrediae* ssp. *mildrediae* within 100' of the trails proposed under the Action Alternatives

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
0	5M29	0.02		0.02	X	X	X
8	5M23	0.01	0.01	70.6	X		
8A (1)	5M23	8.2	1.5	17.5	X		
	5M26	0.3	0.01		X	X	X
8A (2)	5M27	0.4	0.6	1.8	X		
8A (3)	5M28	0.1	0.3	0.5	X	X	X
8A (4)	5M28		0.08	1.2	X	X	X
8C	5M21		0.2	14.8	X		
	5M24	1.3	2.0		X		X
8D (1)	5M20	0.02		0.02	X		X
8D (2)	5M20		0.01	0.02	X		X
8D (3)	5M21		0.02	0.02	X		
8D (4)	5M21	0.01	0.01	0.02	X		

This early seral species is found in very exposed, sunny openings and road cuts on erodible, granitic soils. It has primarily been observed in areas of past disturbance, but is not found in areas of recent disturbance.

All of the *Clarkia mildrediae* ssp. *mildrediae* occurrences that are within 30 feet of the trail may be directly affected by the proposed trails. Some individuals are likely to have their vigor and productivity reduced or to be killed by motor vehicles. The two locations, (8D (1) and 0) that have almost 100 percent of their individuals within 0-30 feet of the trail have the highest risk of negative effects. The death of individuals within these locations could result in the elimination of the entire occurrence.

The remaining sites have a portion of their occurrence between 30-100 feet from the edge of the trail, where direct effects are less likely to occur. Individuals that are greater than 30 feet from the trail may benefit from the indirect effects (i.e. increased light or low levels of competition) of the trail. Due to their proximity to the trail, negative indirect effects, such as increased erosion and noxious weed invasion, may also negatively impact these occurrences.

Cumulative Effects

The ability of *Clarkia mildrediae* ssp. *mildrediae* to colonize both previously disturbed and undisturbed sites suggests that this species has benefited from past management activities that created open conditions and increased light reception to the understory. Past wildfire suppression activities have likely restricted the amount of suitable habitat for this species.

Implementation of the action alternatives would reduce direct impacts to this species by banning cross-country travel; however, Alternatives 2, 4 and 5 would not eliminate the potential for direct impacts to all occurrences. Six locations of *Clarkia mildrediae* ssp. *mildrediae* have been documented along one of the existing system trails; use of this trail and any associated impacts to these locations would continue under all of the action alternatives. The close proximity of this species to the proposed trails would increase the probability of negative direct effects, which may outweigh the positive indirect effects to the species (i.e. increased light availability or low levels of competition).

The nine locations of *Clarkia mildrediae* ssp. *mildrediae* that may be impacted by use of the proposed trails represent approximately 30 percent of all known occurrences on the PNF (Figure 6) and 23 percent of the known occurrences in California (CNDDB 2008). Adding these trails to the NFTS under the action alternatives may have some negative direct impacts to this species; however, these would likely not reduce the overall viability of *Clarkia mildrediae* ssp. *mildrediae* due to its ability to tolerate and even thrive, in disturbed sites. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

3.8.9.6.4 *Clarkia mosquinii* (Mosquin's clarkia)

This annual species occurs in the foothill woodland and lower elevation mixed conifer forest of Butte and Plumas Counties. This species was thought to be extinct when the only known location was eliminated with the formation of Lake Oroville. *Clarkia mosquinii* was rediscovered in 1992, initiating surveys for this species on the PNF. To date, 45 occurrences have been documented within the lower elevations of the PNF, while 14 occurrences have been reported from outside of the Forest boundary.

Clarkia mosquinii is probably a fire-follower and wildfire suppression has likely restricted the amount of suitable habitat for this species. This species often occurs in road cuts and on decomposing granite. Threats from management activities include road construction and maintenance and timber harvest. This species is considered highly vulnerable because of the high risk to occurrences outside of NFS lands.

PNF management prescription: Protect occurrences from ground disturbance before seed set. Evaluate ground disturbance outside of the growing season; however, in general, disturbance (without major habitat alteration) after plants have set seed can occur. Canopy removal in and adjacent to occurrences is encouraged to open the habitat. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

One occurrence of *Clarkia mosquinii* occurs within 100 feet of a trail proposed under Alternative 2 (Table 132). No occurrences of this species are impacted under any of the other action alternatives.

Like many of the species in this guild, *Clarkia mosquinii* is often found in exposed, disturbed habitats such as roadsides. Motor vehicle trails may create some suitable edge habitat for this species (i.e. increased light availability and low levels of competition); however, these effects could easily be overcome by the negative direct effect of repeated trampling or death of individuals. Indirect effects, such as increased erosion and noxious weed invasion, may negatively impact occurrence 13B.

Table 132. *Clarkia mosquinii* location within 100' of the trails proposed under the Action Alternatives.

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
13B	5M06		0.04	0.04	X		

Cumulative Effects

It is difficult to determine how *Clarkia mosquinii* has responded to past management activities because this species was thought to be extinct until its re-discovery in 1992. The presence of *Clarkia mosquinii* on exposed, disturbed habitats such as roadsides suggests that this species may benefit from management activities that create open conditions and increase light reception to the understory. Past wildfire suppression activities have likely restricted the amount of suitable habitat for this species.

Implementation of the action alternatives would reduce direct impacts to this species by banning cross-country travel; however, Alternative 2 would not eliminate the potential for direct impacts to all occurrences. One occurrence of *Clarkia mosquinii* (12C) occurs along an existing system trail; use of this trail and any associated impacts to this occurrence would continue under all of the action alternatives. The one location of *Clarkia mosquinii* that may be impacted by use of the trail proposed under Alternative 2 represents approximately two percent of all known occurrences on the PNF (Figure 6) and the known occurrences in California (CNDDB 2008).

Adding this trail to the NFTS under Alternative 2 may have some negative indirect impacts to this species; however, these would likely not reduce the overall viability of *Clarkia mosquinii* due to its presence in areas of disturbance (i.e. road cuts) and the relatively small scale of potential impact. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

3.8.9.6.5 *Lupinus dalesiae* (Quincy lupine)

This perennial lupine species is known to occur in Plumas County and in isolated occurrences in Sierra and Yuba counties in California. Within this limited range, *Lupinus dalesiae* is locally abundant. There are currently 260 occurrences documented on the PNF. Outside of the PNF, there are 22 occurrences, all of which occur on lands adjacent to the National Forest.

Lupinus dalesiae is found in a variety of habitats that include undisturbed and disturbed sites (such as old skid trails and road cut banks), openings in chaparral, cismontane woodlands and mixed conifer forests. Recent visits to old project areas have shown that this species tolerates and even thrives on disturbance; however, the intensity, extent or frequency of the disturbance associated with these occurrences has not been quantified in a manner that facilitates the development of prescriptions that consistently mimic historical disturbance regimes.

The trend for this plant is stable. Threats include road construction and maintenance; timber harvest, release and site preparation activities; mining; off-highway vehicle use; and development on private lands. The California Native Plant Society recently lowered the listing status of *Lupinus dalesiae* (from List 1B to List 4) based on the number of mapped occurrences in the California Fish and Game's California Native Diversity Data Base (CNDDB).

PNF management prescription: Protect 30 percent of known occurrences within a project area from ground disturbance. Favor protection of locations that have open tree and shrub canopies (less than 50 percent cover) over those with closed tree and shrub canopies. Favor allowing ground disturbance and prescribed fire in areas of dense shrub or tree cover. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

There are 21 locations of *Lupinus dalesiae* within 100 feet of the proposed trails, as shown in the following table.

Lupinus dalesiae is a perennial herb that is found in disturbed sites, such as old skid trails and road cut banks and undisturbed sites. Past management has demonstrated that this species tolerates and even thrives on disturbance. For example, a survey of Occurrence 35 found *Lupinus dalesiae* occupying all of the areas that had been previously disturbed by mechanical timber harvest and disturbance and road building were thought to have been one cause for this population's increase (Rotta 1983). Surveys conducted during the summer of 2007 also noted individual plants growing in the center of and along the edge of the proposed trails (Vollmar 2007).

All of the *Lupinus dalesiae* occurrences that are within 30 feet of the trail may be directly affected by the proposed trails. Some individuals are likely to have their vigor and productivity reduced or to be killed by motor vehicles. The five locations (23J, 160, 165, 166A and 166B) that have 100 percent of their individuals within 0-30 feet of the trail have the highest risk of negative effects. The death of individuals within these locations could result in the elimination of the entire occurrence.

The remaining sites have a portion of their occurrence between 30-100 feet from the edge of the trail, where direct effects are less likely to occur. Individuals that are greater than 30 feet from the trail may benefit from the indirect effects (i.e. increased light or low levels of competition) of the trail.

There would be no direct or indirect effects to *Lupinus dalesiae* from implementation of Alternative 3.

Table 133. Locations of *Lupinus dalesiae* within 100' of the trails proposed under the Action Alternatives

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30'	Within 30-100'		2	4	5
0	9M54	0.01	0.001	0.01	X	X	X
2E	8M19	0.005	0.23	0.35	X		
10A	8M13		0.006	0.02	X		
10B	8M13		0.02	0.02	X		
23F	8M18	0.8	1.5	2.79	X		
23J	8M17	0.1		0.1	X		
35	7M16	2.9	5.6	29.6	X	X	X
41D	8M42	0.71	1.72	19	X		X
	8M43	0.27	0.88		X	X	X
44A	9M37	0.2	0.50	111	X		X
66	9M37	0.02	0.003	0.02	X		X
	9M37A		0.003		X		
79	8M28	2.49	5.64	23	X	X	X
	8M28A	0.79	2.10		X		
88	9M35	0.8	1.2	5.10	X		X
89A	9M35		0.02	0.02	X		X
89B	9M33	0.03	0.1	0.1	X		
140A1	10M12		0.01	0.01	X	X	X
140A2	10M12		0.006	0.02	X	X	X
141A	10M12		0.03	5.14	X	X	X
160	11M09	0.07		0.07	X		
161	9M39A		0.01	0.01	X	X	X
165	7M15	0.01		0.01	X	X	X
166A	7M15	0.01		0.01	X	X	X
166B	7M15	0.002		0.002	X	X	X

Cumulative Effects

The ability of *Lupinus dalesiae* to colonize both previously disturbed and undisturbed sites and tolerate and even thrive on disturbance, suggests that this species may have benefited from past management activities that created open conditions and increased light reception to the understory.

Implementation of the action alternatives would reduce direct impacts to this species by banning cross-country travel; however, Alternatives 2, 4 and 5 would not eliminate the potential for direct impacts to all occurrences. The close proximity of this species to the proposed trails would increase the probability of direct effects; however, these effects will likely not be severe enough to negatively impact this species due to its high tolerance to disturbance.

The 22 locations of *Lupinus dalesiae* that may be impacted by use of the proposed trails represent approximately eight percent of all known occurrences on the PNF (Figure 6) and seven percent of the known occurrences in California (CNDDB 2008). Adding these trails to the NFTS under the action alternatives may have some negative direct impacts to individuals; however, these would likely not reduce the overall viability of *Lupinus dalesiae* due to its ability to tolerate and even thrive, in disturbed sites and the low percentage of sites impacted. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

There are no direct or indirect effects to *Lupinus dalesiae* from implementation of Alternative 3; therefore, the cumulative effects from this alternative would be negligible.

3.8.9.6.6 *Penstemon personatus* (closed-throated beardtongue)

This rhizomatous species is limited to 31 occurrences in Butte, Nevada, Plumas and Sierra counties. On the PNF, this species occurs in 23 large but localized populations and population size varies from thousands of stems to less than 10.

Penstemon personatus occurs in west side mixed conifer and red fir forests. It appears to tolerate limited disturbance, as long as it does not change the microhabitat or result in soil compaction. Observations have shown that plants that grow in complete canopy cover typically have a shorter stature and do not flower, whereas plants in partial sun are reproductive. A report on the biology of *Penstemon personatus* in 2001 found that the species is typically less abundant and less tolerant of disturbance on south-facing slopes.

Although there may be local fluctuations in population size, the overall trend for this species appears stable. General threats to this species include road construction and maintenance, timber site preparation and release, landing construction, high intensity pile burns, grazing, mining activity and off-highway vehicle use. A species management guide was written for this species in 1987.

PNF management prescription: Use guidance in the Preferred Alternative of the approved *Penstemon personatus* Species Management Guide of 1987 to develop a set of key *Penstemon personatus* Areas (occurrences or portions of occurrences) within each metapopulation, which will be protected from management disturbances. These key areas would be established within occupied habitat to maintain the species’ geographic distribution. Priority for the delineation of key areas would be given to those occurrences that currently exhibit a diversity of habitat types. Avoid building landings or temporary roads through known occurrences. Avoid sub-soiling through known occurrences. Evaluate other activities on a site-by-site basis considering species abundance, population size, geographic distribution and known species ecology.

Direct and Indirect Effects

Two locations of *Penstemon personatus* intersect the trails proposed under Alternatives 2 and 5 (Table 134)

Table 134. Locations of *Penstemon personatus* within 100’ of the trails proposed under the Action Alternatives

Occurrence ID	Route ID	Number of acres with potential for impact		Size of Occurrence (acres)	Action Alternatives		
		Within 0-30’	Within 30-100’		2	4	5
7I	8M04	3.2	6.3	148	X		
12	7M11	1.3	2.8	83	X		X

Penstemon personatus is a perennial herb that is found in disturbed and undisturbed sites. For example, surveys of the above occurrences found *Penstemon personatus* along the edges of old skid trails and in other disturbed sites where the soil had not been compacted (Carter 1992). Past management indicates that this species is able to tolerate and even increase in abundance or vigor following ground disturbance. Although this species does tolerate a number of different types of disturbance, it is not required for regeneration or survival.

Within the two occurrences, the distribution and abundance of *Penstemon personatus* in relation to the trail is unknown; therefore, those individuals that are within the trail would likely be negatively impacted by motor vehicle use. Indirect effects, such as increased erosion and noxious weed invasion, may also negatively impact the two occurrences. The large size (over 80 acres) of these occurrences and consequently the relatively low number of individuals with potential to be directly and indirectly affected, would reduce the overall negative impact to this species from adding the trail to the NFTS.

There would be no direct or indirect effects to *Penstemon personatus* from implementation of Alternatives 3 or 4.

Cumulative Effects

Suitable habitat for *Penstemon personatus* has been impacted by past timber management practices, which generally favored removal of larger, more dominant trees (i.e. overstory removal). This management practice, as well as the suppression of wildfire, has resulted in a greater number of dense forests that are dominated by small trees and a reduction in open forest habitat across the landscape. The ability of *Penstemon personatus* to colonize both previously disturbed and undisturbed sites suggests that this species may have benefited from past management activities that created open conditions and increased light reception to the understory.

Implementation of the action alternatives would reduce direct impacts to this species by banning cross-country travel; however, Alternatives 2 and 5 would not eliminate the potential for direct impacts to all occurrences. The close proximity of this species to the proposed trails would increase the probability of direct effects; however, these effects would likely not be severe enough to negatively impact this species due to its high tolerance to disturbance.

The two locations of *Penstemon personatus* that may be impacted by use of the proposed trails represent approximately nine percent of all known occurrences on the PNF and two percent of the known occurrences in California (CNDDB 2008). Adding these trails to the NFTS under the action alternatives may have some negative direct impacts to individuals; however, these would likely not reduce the overall viability of *Penstemon personatus* due to its ability to tolerate and even thrive, in disturbed sites and the low percentage of sites impacted. The effects of present and future projects on this species would likely be minimal or similar to those described in this analysis if existing Management Guidelines (such as field surveys, protection of known rare species locations and noxious weed mitigations) remain in place.

There are no direct or indirect effects *Penstemon personatus* from implementation of Alternatives 3 or 4; therefore, the cumulative effects from these alternatives would be negligible.

3.8.10 Action Alternatives (2 thru 5)—Summary of Environmental Consequences

The following section presents an overview of the effects analysis for each action alternative (Table 135). In general, the greater the number of motor vehicle trails (and miles) proposed, the higher the risk and severity of negative impacts to rare species and their associated habitats. Alternative 2 impacts the largest number of rare species and botanically sensitive resources. Alternative 3, which does not add trails to the NFTS, has the least impact on rare species. In comparison to these alternatives, the impacts from Alternative 5 fall near the middle of the spectrum of potential effects.

3.8.10.1 Alternative 2—Proposed Action.

3.8.10.1.1 Direct/Indirect Effects

Table 135. Summary of rare species indicator measures for Alternative 2.

Indicator Measure	Value
Miles of proposed system trail open for public motorized vehicle use within or adjacent to Sensitive rare species sites	5.2 miles
Number of trails open for public motorized vehicle use within or adjacent to Sensitive rare species sites	54 trails
Acres of rare plant sites within 100 feet of a proposed system trail	133 acres
Total number of rare plant sites within 100 feet of a proposed system trail	79 locations

Alternative 2 prohibits cross-country travel, adds approximately 364 miles of proposed trails to the trail system and makes no changes to the existing system trails. In comparison to the other action alternatives, Alternative 2 has the highest impact on rare species and their habitats. It has the highest number of proposed trails (54 trails) and trail miles (5.2 miles) that intersect rare species occurrences or associated habitat. This alternative also has the potential to impact 18 rare species (79 locations) both directly and indirectly.

The following species have been documented within 100 feet of a trail proposed under Alternative 2: *Botrychium* sp., *Ivesia aperta* var. *aperta, Ivesia sericolueca* and *Pyrrocoma lucida* (Meadow and Seep species); *Hydrothyria venosa* (Riparian Area species); *Allium jepsonii, Arabis constancei, Calycadenia oppositifolia, Eriogonum umbellatum* var. *ahartii and Monardella follettii* (Serpentine species); *Lewisia kelloggii* ssp. *huchinsonii* (Barren and Open Habitat species); *Cypripedium fasciculatum* (Interior Forest species); and *Astragalus lentiformis, Astragalus pulsiferae* var. *pulsiferae, Clarkia mildrediae* ssp. *mildrediae, Clarkia mosquinii, Lupinus dalesiae and Penstemon personatus* (Open Habitat species). Six of these species are only impacted by this alternative and none of the other action alternatives; these are: *Astragalus pulsiferae* var. *pulsiferae, Botrychium sp., Clarkia mosquinii, Eriogonum umbellatum* var. *ahartii, Ivesia sericolueca and*

Lewisia kelloggii ssp. *hutchisonii*. Refer to the analysis in the section above (“Action Alternatives (2 thru 5): Summary of Environmental Consequences for Individual Species”) for a detailed discussion of effects to individual species. Overall, Alternative 2 has the potential to negatively affect all of these species.

In general, occurrences with individuals that are in or within 30 feet of the trail are at a high risk of direct effects from motorized vehicle use. These effects could include death, altered growth or reduced seed set from physically breaking, crushing or uprooting plants (Wilshire, Shipley and Nakata 1978, Cole and Bayfield 1993).

Indirect effects to species are dependent upon a number of species-specific factors that include habitat type, tolerance to disturbance, distance from trail, amount of occurrence impacted and intensity and timing of disturbance. All of the rare species listed above (i.e. those within 100 feet of a proposed trail) have a high risk of indirect effects from noxious weed introduction and spread. Species that are intolerant of disturbance, such as *Cypripedium fasciculatum*, may be indirectly impacted by increased light levels and duff or litter disturbance along the edges of motorized trails. In contrast, for those species that tolerate some degree of disturbance, such as *Astragalus lentiformis* or *Lupinus dalesiae*, adding motorized trails to the NFTS may have fewer detrimental indirect effects.

The largest improvement over Alternative 1 is the prohibition of cross-country travel. This reduces vehicle access and impacts to rare plants and their habitats, lowers the risk of noxious weed introduction and spread throughout the forest and concentrates use on maintained trails that would be managed and improved to reduce resource damage.

Special Interest Areas

Alternative 2 has highest number of proposed trails (4.4 miles) within PNF Special Interest Areas (Table 7). Implementation of this alternative proposes adding trails to NFTS in Brady’s Camp (2.8 miles), Butterfly Valley (0.2 miles) and Fowler Lake (0.1 miles) SIAs. An additional 1.2 miles of unauthorized routes would also be added to the existing 5.6 miles of NFS trail in the proposed McRae Meadow SIA. Some of the unique botanical features for which these Special Interest areas were designated (or proposed for designation) include large meadow and stream complexes, aquatic plant communities, red fir and lodgepole forests and sub-alpine plant communities (Meyer 1991). While some of these proposed trails are relatively well-established, motor vehicle use within these areas still has the potential to significantly degrade or disturb these special features if trail design features are not in place.

3.8.10.1.2 Cumulative Effects

All of the rare species locations (78 sites) located within 100 feet of a proposed trail have the potential to be directly or indirectly affected by adding the trail to the NFTS; therefore, these species are also at risk of being cumulatively impacted.

In comparison to the other action alternatives, Alternative 2 has the greatest number of miles in riparian areas, wet meadows, serpentine areas, barren habitats, interior forest and open forest (Table 113); therefore, implementation of this alternative also has the potential to affect suitable habitat for a number of rare species on the PNF.

Of the eighteen species with the potential to be directly and indirectly impacted by Alternative 2, fourteen have 25 percent or less of their known PNF locations impacted by the proposed trails (Figure 6). Four species have greater than 25 percent of their known locations affected; these are: *Eriogonum umbellatum* var. *ahartii* (64 percent), *Clarkia mildrediae* ssp. *mildrediae* (57 percent), *Calycadenia oppositifolia* (29 percent) and *Astragalus pulsiferae* var. *pulsiferae* (25 percent). Because of this large percentage of occurrences impacted, direct and indirect effects to locations along the proposed trails could have a significant cumulative effect to these species.

Overall, cumulative effects to rare species under this alternative are far less than those under Alternative 1. This is primarily due to the ban on cross-country travel. Of the action alternatives, this alternative has the largest cumulative impact on Sensitive rare species due to the large number of miles proposed, the amount of suitable habitat impacted and the number of species directly and indirectly affected by the proposed trails.

3.8.10.2 Alternative 3

3.8.10.2.1 Direct/Indirect Effects

Table 136. Summary of rare species indicator measures for Alternative 3.

Indicator Measure	Value
Miles of proposed system trail open for public motorized vehicle use within or adjacent to Sensitive rare species sites	0 miles
Number of trails open for public motorized vehicle use within or adjacent to Sensitive rare species sites	0 trails
Acres of rare plant sites within 100 feet of a proposed system trail	0 acres
Total number of rare plant sites within 100 feet of a proposed system trail	0 locations

Alternative 3 prohibits cross-country travel, adds no proposed trails to the trail system and makes no changes to the existing trail system. In comparison to the other action alternatives, Alternative 3 has the lowest impact on rare species and their associated habitats. It proposes no trails that intersect rare species occurrences or associated habitat.

Of those species that have been documented along a trail proposed under Alternatives 2, 4 or 5, the following five are known to occur along existing system trails: *Monardella follettii* in Serpentine Areas; *Lewisia kelloggii* ssp. *huchinsonii* in Barren and Open Habitats; *Cypripedium fasciculatum* in Interior Forest habitats; and *Clarkia mildrediae* ssp. *mildrediae* and *Clarkia mosquinii* in Open Habitats. Use of the existing system trails may have some negative effects to these five species, but they would not contribute to a trend toward federal listing. This is due to the low number of sites that are potentially impacted, as well as the fact that many of the existing system trails are already well-established and frequently utilized roads and trails where species have either adapted to the existing condition or been extirpated by past motorized vehicle use. Impacts to species along the existing system trails would continue under all of the action alternatives; no additional impacts would occur to PNF Sensitive species under Alternative 3 because no trails are proposed.

Special Interest Areas

Alternative 3 proposes no new trails within PNF Special Interest Areas or Research Natural Areas; therefore, it places no additional adverse impact on these unique botanical resources. There are approximately 9.6 miles of existing system trail in the Butterfly Valley SIA and the proposed McRae Meadow and Mount Fillmore SIAs (Table 112). Use of these existing trails would continue under all of the action alternatives.

3.8.10.2.2 Cumulative Effects

Overall, cumulative effects to rare species under this alternative are far less than those under Alternative 1 or the action alternatives. This is primarily due to the ban on cross-country travel and eliminating the use of all unauthorized routes. No proposed trails are added to the NFTS under this alternative; therefore, none of the PNF rare species are at risk of being cumulatively impacted by Alternative 3.

3.8.10.3 Alternative 4

3.8.10.3.1 Direct/Indirect Effects

Table 137. Summary of rare species indicator measures for Alternative 4

Indicator Measure	Value
Miles of proposed system trail open for public motorized vehicle use within or adjacent to Sensitive rare species sites	1.3 miles
Number of trails open for public motorized vehicle use within or adjacent to Sensitive rare species sites	14 trails
Acres of rare plant sites within 100 feet of a proposed system trail	33 acres
Total number of rare plant sites within 100 feet of a proposed system trail	23 locations

Alternative 4 prohibits cross-country travel, adds approximately 141 miles of trails to the NFTS and makes no changes to the existing trail system. In comparison to the other action alternatives, Alternative 4 has second lowest impact on rare species and their associated habitats. It has the second lowest number of trails (14 trails) and trail miles (1.3 miles) that intersect rare species occurrences or associated habitat. This alternative has the potential to impact 6 rare species (23 locations) both directly and indirectly.

The following species have been documented within 100 feet of a trail proposed under Alternative 4: *Arabis constancei* and *Monardella follettii* (Serpentine Area species); *Cypripedium fasciculatum* (Interior Forest species); and *Astragalus lentiformis, Clarkia mildrediae* ssp. *mildrediae and Lupinus dalesiae* (Open Habitat species). A detailed discussion of direct, indirect and cumulative effects to these species from motorized vehicle use is provided under “Action Alternatives (2 thru 5): Summary of Environmental Consequences for Individual Species”. While Alternative 4 may negatively affect some of these species, it would not contribute to a trend toward federal listing.

In comparison to Alternative 2, this alternative provides a greater level of protection for the following seven rare species: *Astragalus pulsiferae* var. *pulsiferae, Astragalus lentiformis, Botrychium sp., Clarkia mosquinii, Eriogonum umbellatum* var. *ahartii, Ivesia sericolueca and Lewisia kelloggii* ssp. *hutchisonii*. This is because a number of the routes that were in violation of the

PNF management prescriptions for individual species (i.e. those that had the potential to directly impact individuals or small occurrences) were excluded from the proposed trail system. In addition, this alternative avoids impacts to *Ivesia aperta* var. *aperta* and *Pyrrocoma lucida* (Meadow and Seep species); *Hydrothyria venosa* (Riparian Area species); *Allium jepsonii* and *Calycadenia oppositifolia* (Serpentine Area species); and *Penstemon personatus* (Open Habitat species).

In general, occurrences with individuals that are in or within 30 feet of the trail are at a high risk of direct effects from motor vehicle use. These effects could include death, altered growth or reduced seed set from physically breaking, crushing or uprooting plants (Wilshire, Shipley and Nakata 1978, Cole and Bayfield 1993).

Indirect effects to species are dependent upon a number of species-specific factors that include habitat type, tolerance to disturbance, distance from trail, amount of occurrence impacted and intensity and timing of disturbance. All of the rare species listed above (i.e. those within 100 feet of a proposed trail) have a high risk of indirect effects from noxious weed introduction and spread. Species that are intolerant of disturbance, such as *Cypripedium fasciculatum*, may be indirectly impacted by increased light levels and duff or litter disturbance along the edges of motorized trails. In contrast, for those species that tolerate some degree of disturbance, such as *Astragalus lentiformis* or *Lupinus dalesiae*, adding motorized trails to the NFTS may have fewer detrimental indirect effects.

The largest improvement over Alternative 1 is the prohibition of cross-country travel. This reduces vehicle access and impacts to rare plants and their habitats, lowers the risk of noxious weed introduction and spread throughout the forest and concentrates use on maintained trails that would be managed and improved to reduce resource damage.

Special Interest Areas

Alternative 4 has the lowest number of motorized trails (1.2 miles) within PNF Special Interest Areas (Table 113). Under this alternative, 1.2 miles are proposed in the McRae Meadow SIA, which currently contains 5.6 miles of existing system trail. Some of the unique botanical features for which this SIA has been proposed for designation include large meadow complexes, a state-designated Wild Trout stream, unique old-growth forests and unusual geologic features (Meyer 1991). While some of these proposed trails are relatively well-established, motor vehicle use within these areas still has the potential to significantly degrade or disturb these special features if trail design features are not in place. None of the remaining Plumas SIAs or RNAs are impacted by the routes proposed under Alternative 4 (Table 4).

3.8.10.3.2 Cumulative Effects

All of the rare species locations (23 sites) located within 100 feet of a proposed trail have the potential to be directly or indirectly affected by adding the trail to the NFTS; therefore, these species are also at risk of being cumulatively impacted.

In comparison to the other action alternatives, Alternative 4 has the second lowest number of proposed trail miles in riparian areas, wet meadows, serpentine areas, barren habitats, interior forest and open forest (Table 113). Because this alternative does propose routes within these sensitive habitat types, implementation of this alternative has the potential to affect suitable habitat for a number of rare species on the PNF. Of the six species with the potential to be directly and indirectly impacted by Alternative 4, all have 13 percent or less of their known PNF locations impacted by the proposed trails (Figure 6).

Overall, cumulative effects to rare species under this alternative are far less than those under Alternative 1. This is primarily due to the ban on cross-country travel. Of the action alternatives, this alternative has the second lowest cumulative impact on Sensitive rare species due to the low number of miles proposed, amount of suitable habitat impacted and the lower number of species directly and indirectly affected.

3.8.10.4 Alternative 5

3.8.10.4.1 Direct/Indirect Effects

Table 138. Summary of rare species indicator measures for Alternative 5

Indicator Measure	Value
Miles of proposed system trail open for public motorized vehicle use within or adjacent to Sensitive rare species sites	2.6 miles
Number of trails open for public motorized vehicle use within or adjacent to Sensitive rare species sites	30 trails
Acres of rare plant sites within 100 feet of a proposed system trail	67.8 acres
Total number of rare plant sites within 100 feet of a proposed system trail	44 locations

Alternative 5 prohibits cross-country travel, adds approximately 251 miles of proposed trails to the trail system and makes no changes to the existing trail system. Of the action alternatives, implementation of Alternative 5 has the second greatest impact to rare species and their associated habitats. It has the second highest number of trails (30 trails) and trail miles (2.6 miles) that intersect rare species occurrences or associated habitat. This alternative also has the potential to impact 12 rare species (44 locations) both directly and indirectly.

The following species have been documented within 100 feet of a trail proposed under Alternative 5: *Ivesia aperta* var. *aperta* and *Pyrrocoma lucida* (Meadow and Seep species); *Hydrothyria venosa* (Riparian Area species); *Allium jepsonii, Arabis constancei, Calycadenia oppositifolia and Monardella follettii* (Serpentine species); *Cypripedium fasciculatum* (Interior Forest species); and *Astragalus lentiformis, Clarkia mildrediae* ssp. *mildrediae, Lupinus dalesiae and Penstemon personatus* (Open Habitat species). A detailed discussion of direct, indirect and cumulative effects to these species from motorized vehicle use is provided under “Action Alternatives (2 thru 5): Summary of Environmental Consequences for Individual Species”. While Alternative 5 may negatively affect some of these species, it would not contribute to a trend toward federal listing.

In comparison to Alternative 2, this alternative provides a greater level of protection for the following seven rare species: *Astragalus pulsiferae* var. *pulsiferae, Astragalus lentiformis, Botrychium sp., Clarkia mosquinii, Eriogonum umbellatum* var. *ahartii, Ivesia sericolueca and Lewisia kelloggii* ssp. *hutchisonii*. This is because a number of the routes that were in violation of the PNF management prescriptions for individual species (i.e. those that had the potential to directly impact individuals or small occurrences) were excluded from the proposed trail system.

In general, occurrences with individuals that are in or within 30 feet of the trail are at a high risk of direct effects from motorized vehicle use. These effects could include death, altered growth or reduced seed set from physically breaking, crushing or uprooting plants (Wilshire, Shipley and Nakata 1978, Cole and Bayfield 1993).

Indirect effects to species are dependent upon a number of species-specific factors that include habitat type, tolerance to disturbance, distance from trail, amount of occurrence impacted and intensity and timing of disturbance. All of the rare species listed above (i.e. those within 100 feet of a proposed trail) have a high risk of indirect effects from noxious weed introduction and spread. Species that are intolerant of disturbance, such as *Cypripedium fasciculatum*, may be indirectly impacted by increased light levels and duff or litter disturbance along the edges of motorized trails. In contrast, for those species that tolerate some degree of disturbance, such as *Astragalus lentiformis* or *Lupinus dalesiae*, adding motorized trails to the NFTS may have fewer detrimental indirect effects.

The largest improvement over Alternative 1 is the prohibition of cross-country travel. This reduces vehicle access and impacts to rare plants and their habitats, lowers the risk of noxious weed introduction and spread throughout the forest and concentrates use on maintained trails that would be managed and improved to reduce resource damage.

Special Interest Areas

Of the action alternatives, Alternative 5 has second highest number of motorized trails (3 miles) within PNF Special Interest Areas (Table 113). Implementation of this alternative proposes trails in Brady’s Camp (1.5 miles), Butterfly Valley (0.2 miles) and McRae Meadow (1.2 miles) SIA. Two of these SIAs, Butterfly Valley and McRae Meadow, already have existing NFS trails within their boundary (Table 112). Some of the unique botanical features for which these Special Interest areas were designated (or proposed for designation) include large meadow and stream complexes, aquatic plant communities, red fir and lodgepole forests and sub-alpine plant communities (Meyer 1991). While some of these proposed trails are, relatively well-established, motorized vehicle use within these areas still has the potential to significantly degrade or disturb these special features if trail design features are not in place. None of the remaining Plumas SIAs or RNAs are impacted by the routes proposed under Alternative 5 (Table 113).

3.8.10.4.2 Cumulative Effects

All of the rare species locations (44 sites) located within 100 feet of a proposed trail have the potential to be directly or indirectly affected by adding the trail to the NFTS; therefore, these species are also at risk of being cumulatively impacted.

In comparison to the other action alternatives, Alternative 5 has the second greatest number of miles in riparian areas, wet meadows, serpentine areas, barren habitats, interior forest and open forest (Table 113); therefore, implementation of this alternative also has the potential to affect suitable habitat for a number of rare species on the PNF.

Of the 12 species with the potential to be directly and indirectly impacted by Alternative 5, eleven have 25 percent or less of their known PNF locations impacted by the proposed trails (Figure 6). One species, *Calycadenia oppositifolia*, has 23 percent known locations affected. Because of this large percentage of occurrences impacted, direct and indirect effects to locations along the proposed trails could have a significant cumulative effect to this species.

Overall, cumulative effects to rare species under this alternative are far less than those under Alternative 1. This is primarily due to the ban on cross-country travel. Of the action alternatives, this alternative has the second largest cumulative impact on Sensitive rare species due to large number of miles proposed, the amount suitable habitat impacted and the number of species directly and indirectly affected.

3.8.10.5 Summary of Determinations

Table 139 presents the determinations for all of the PNF rare species. These determinations are based on professional experience and judgment; the existing condition of botanical resources within the analysis area and the potential impacts of the alternatives. An effects determination is also the culmination of potential direct, indirect and cumulative effects. Even if the potential direct effects are low, there is often the potential for the indirect or cumulative effects to affect the viability of the species.

Table 139. Summary of species determinations. Shaded cells indicate a "may affect" determination.

Species	Alternative				
	1	2	3	4	5
Allium jepsonii	MA (T)	MA (NT)	WN	WN	MA (NT)
Arabis constancei	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
Astragalus lemmonii	WN	WN	WN	WN	WN
Astragalus lentiformis	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
Astragalus pulsiferae var. *coronensis*	MA (NT)	WN	WN	WN	WN
Astragalus pulsiferae var. *pulsiferae*	MA (NT)	MA (NT)	WN	WN	WN
Astragalus webberi	MA (T)	WN	WN	WN	WN
Balsamorhiza macrolepis var. *macrolepis*	WN	WN	WN	WN	WN
Botrychium ascendens	MA (NT)	MA (NT)	WN	WN	WN
Botrychium crenulatum	MA (NT)	MA (NT)	WN	WN	WN
Botrychium lineare	MA (T)	MA (NT)	WN	WN	WN
Botrychium lunaria	MA (NT)	MA (NT)	WN	WN	WN
Botrychium minganese	MA (NT)	MA (NT)	WN	WN	WN
Botrychium montanum	MA (NT)	MA (NT)	WN	WN	WN
Botrychium pinnatum	MA (NT)	MA (NT)	WN	WN	WN
Bruchia bolanderi	MA (NT)	WN	WN	WN	WN
Buxbaumia viridis	MA (NT)	WN	WN	WN	WN
Calycadenia oppositifolia	MA (NT)	MA (NT)	WN	WN	MA (NT)
Calystegia atriplicifolia ssp. *buttensis*	MA (NT)	WN	WN	WN	WN
Clarkia biloba ssp. *brandegeae*	MA (NT)	WN	WN	WN	WN
Clarkia gracilis ssp. *albicaulis*	MA (NT)	WN	WN	WN	WN
Clarkia mildrediae ssp. *mildrediae*	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)

Species	Alternative				
	1	2	3	4	5
Clarkia mosquinii	MA (T)	MA (NT)	WN	WN	WN
Cudonia monticola	WN	WN	WN	WN	WN
Cypripedium fasciculatum	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
Cypripedium montanum	MA (NT)	WN	WN	WN	WN
Dendrocollybia racemosa	WN	WN	WN	WN	WN
Eleocharis torticulmis	MA (T)	WN	WN	WN	WN
Eriogonum umbellatum var. *ahartii*	MA (NT)	MA (NT)	WN	WN	WN)
Fissidens aphelotaxifolius	WN	WN	WN	WN	WN
Fissidens pauperculus	MA (NT)	WN	WN	WN	WN
Fritillaria eastwoodiae	MA (NT)	WN	WN	WN	WN
Helodium blandowii	WN	WN	WN	WN	WN
Hydrothyria venosa	MA (NT)	MA (NT)	WN	WN	MA (NT)
Ivesia aperta var. *aperta*	MA (NT)	MA (NT)	WN	WN	MA (NT)
Ivesia sericolueca	MA (NT)	MA (NT)	WN	WN	WN
Ivesia webberi	WN	WN	WN	WN	WN
Lewisia cantelovii	MA (NT)	WN	WN	WN	WN
Lewisia kelloggii ssp. *hutchisonii*	MA (NT)	MA (NT)	WN	WN	WN
Lewisia kelloggii ssp. *kelloggii*	WN	WN	WN	WN	WN
Lomatium roseanum	MA (NT)	WN	WN	WN	WN
Lupinus dalesiae	MA (NT)	MA (NT)	WN	MA (NT)	MA (NT)
Meesia longiseta	WN	WN	WN	WN	WN
Meesia triquetra	MA (NT)	WN	WN	WN	WN
Meesia uliginosa	MA (NT)	WN	WN	WN	WN
Mielichhoferia elongata	WN	WN	WN	WN	WN
Monardella follettii	MA (T)	MA (NT)	WN	MA (NT)	MA (NT)
Monardella stebbinsii	MA (T)	WN	WN	WN	WN
Oreostemma elatum	MA (NT)	WN	WN	WN	WN
Packera eurycephala var. *lewisrosei*	MA (NT)	WN	WN	WN	WN
Packera layneae	MA (FT)	WN (FT)	WN (FT)	WN (FT)	WN (FT)
Penstemon personatus	MA (NT)	MA (NT)	WN	WN	MA (NT)
Penstemon sudans	MA (NT)	WN	WN	WN	WN
Phaecollybia olivacea	WN	WN	WN	WN	WN
Pyrrocoma lucida	MA (NT)	MA (NT)	WN	WN	MA (NT)
Sedum albomarginatum	MA (NT)	WN	WN	WN	WN

For Sensitive Species:

•WN: The routes proposed under this Alternative will not affect this species.

•MA (NT): The routes proposed under this Alternative may affect individuals, but is not likely to result in a trend toward federal listing or loss of viability for the species.

•MA (T): The routes proposed under this Alternative may affect individuals and is likely to result in a trend toward federal listing or loss of viability for the species.

For Federally Listed Species:

•WN (FT):The routes proposed under this Alternative will not affect this species or its designated critical habitat.

•MA (FT): The routes proposed under this Alternative may affect and is likely to jeopardize the continued existence of the species

3.8.10.5.1 Summary of Effects Analysis across All Alternatives

The following presents an overview of the effects analysis for each alternative (Table 140). In general, the greater the number of motorized vehicle trails (and miles) proposed, the higher the risk and severity of negative impacts to rare species and their associated habitats. Alternative 1 has the greatest negative effect on rare species and habitats, primarily due to the allowance for cross-country travel, which has the potential to affect all but the most inaccessible rare species and habitats. Out of the action alternatives, Alternative 2 impacts the largest number of rare species and botanically sensitive resources. Alternative 3, which designates no unauthorized routes, has the least impact on rare species. In comparison to these alternatives, the impacts from Alternative 5 fall closer to the middle of the spectrum of potential effects.

3.8.10.6 Compliance with the Forest Plan and Other Direction

Alternative 1 does not comply with the Forest Plan or other management direction for botanical resources. It does not prohibit cross-country travel and has the highest impact on rare species and botanical resources. Alternative 1 does not protect sensitive species as needed to maintain viability (FSM/H 2670). It also does not protect the resource values within the established Mud Lake RNA from motorized vehicle travel (SNFPA 2004).

The action alternatives are consistent with the Forest Plan and other direction. Under these alternatives, sensitive plant species are protected (albeit to differing degrees) as needed to maintain viability. Motor vehicle travel in the Mud Lake RNA is also prohibited under all action alternatives (SNFPA 2004).

Table 140. Summary of Effects for Botanical Resources

Indicators – Botanical Resources	Rankings of Alternatives for Each Indicator[1]				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Miles of unauthorized or proposed system trails open for public motorized vehicle use within or adjacent to Sensitive rare species sites.	1	2	5	4	3
Number of unauthorized or proposed trails open for public motorized vehicle use within or adjacent to Sensitive rare species sites.	1	2	5	4	3
Acres of rare plant sites or suitable habitat within 100 feet of unauthorized or proposed system trails.	1	2	5	4	3
Total number of rare plant sites within 100 feet of unauthorized or proposed trails.	1	2	5	4	3
Average for Botanical Resources	**1**	**2**	**5**	**4**	**3**

[1] A score of 5 indicates the alternative is the best for botanical resources related to the indicator; A score of 1 indicates the alternative is the worst for botanical resources related to the indicator.

3.9 Noxious Weeds

3.9.1 Introduction

In 2003, the United States Forest Service identified invasive species as one of four critical threats to the nation's ecosystems (Bosworth 2003). Noxious weed species pose a significant threat to biological diversity due to their ability to displace native species, alter nutrient and fire cycles, decrease the availability of forage for wildlife and degrade soil structure (Bossard, Randall and Hoshovsky 2000).

Motor vehicles contribute to the introduction and spread of noxious weed species by creating suitable environmental conditions for establishment and by acting as a major vector for spread (Trombulak and Frissell 2000). The following section provides a discussion of the risk associated with noxious weed introduction and spread as a result of adding trails to the NFTS. A complete assessment of noxious weed risk is provided in the "Plumas National Forest Travel Management: Noxious Weed Risk Assessment", which is located in the project record.

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

Direction relevant to the alternatives that are relevant to the management and prevention of noxious weeds includes:

FSM 2081.03 requires that a weed risk assessment be conducted when any ground disturbing activity is proposed. Determine the risk of introducing or spreading noxious weeds associated with the proposed action. Projects having moderate to high risk of introducing or spreading noxious weeds must identify noxious weed control measures that must be undertaken during project implementation.

Executive Order 13112 of Feb. 3, 1999, directs federal agencies to: prevent the introduction of invasive species; detect and respond rapidly to and control such species, not authorize, fund or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species unless the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and take all feasible and prudent measures to minimize risk of harm in conjunction with the actions.

Sierra Nevada Forest Plan Amendment (SNFPA). The Record of Decision (ROD) for the 2004 Sierra Nevada Forest Plan Amendment identified Standards and Guidelines applicable to motorized travel management and noxious weeds, which will be considered during the analysis process (USDA Forest Service 2004). Appendix A of the SNFPA 2004 Record of Decision (page 36) establishes goals for noxious weed management using an integrated weed management approach according to the priority set forth in Forest Service Manual 2081.2. The three goals/priorities include:

1. Prevent the introduction of new invaders.
2. Conduct early treatment of new infestations.
3. Contain and control established infestations.

3.9.3 Effects Analysis Methodology

3.9.3.1 Geographic Area Evaluated for Impacts on Noxious Weeds

Two geographic areas were chosen to analyze the effects of the proposed trails on noxious weeds:

- Direct and indirect effects from noxious weeds under the four action alternatives were assessed using the area within 100 feet of proposed trails. In general, weed infestations located in close proximity to the proposed trails (i.e. within 100 feet) will have a high risk of spread to areas along the trail and to other parts of the Forest.
- The No-action Alternative (Alt. 1), which allows for cross-country travel, was assessed using the entire PNF.

Those noxious weed species located within these two geographic areas were considered to have the highest potential to be impacted or influenced by the proposed trail designation. Conversely, species outside of the analysis area were not considered to have a high likelihood of being impacted by the proposed project either directly, indirectly or cumulatively.

3.9.3.2 Field Surveys

To date, field surveys have been conducted on approximately 287 miles of proposed trails (Vollmar 2007, USDA Forest Service 2007, USDA Forest Service 2008 a, b and c). An additional 66 miles of proposed trail and 10 miles of existing system trails (USDA Forest Service 2003a) have also been surveyed under past management projects. For those 25 miles of trail that had not been surveyed at the time of this analysis, information from the PNF noxious weed records were used to analyze the potential risk from known noxious weed infestations.

3.9.3.3 Assumptions Specific to Noxious Weed Assessment

In addition to those listed at the beginning of Chapter 3, the following assumptions were used in the analysis of noxious weeds:

1. This project is assumed to be a ground-disturbing activity, which requires a weed risk assessment.
2. Existing weed infestations will continue to spread and the rate of spread will be increased by motor vehicle activity. Infestations located along trails will spread further along the trails. Motor vehicles will bring in weed seeds and propagative parts from home areas and other areas where they have traveled.
3. When completing the risk assessments, the following categories were assigned to determine the risk of noxious weed spread or introduction: high, medium or low. These categories were assigned based on the following factors:
    - **High Risk**: A high risk of spread or introduction was assigned based on the presence of weed infestations along portions of a route or proposed trail that was heavily used, a high level of invasiveness (i.e. the species was considered an A-rated species by the California Department of Agriculture or invasive by the California Invasive Plant Council.) or unauthorized route inventories were lacking or incomplete. A high risk of spread was assumed when there was no information on weed populations.

- **Medium Risk**: The risk of spread was considered medium if noxious weed infestations did not occur directly along a travel route or occurred on a portion of the unauthorized route where travel was prohibited; treatment mitigations were available and feasible; or the species was listed as a B or C-rated species by the California Department of Agriculture or was considered to be less invasive and already fairly well distributed.
- **Low Risk**: The risk of introduction or spread was considered low if existing inventories demonstrated that noxious weed populations were not present along the unauthorized route.

3.9.3.4 Noxious Weeds Methodology by Action

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

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Plumas National Forest.

Indicator(s):

- Miles of unauthorized routes within or adjacent to noxious weed sites.
- Total number of weed sites within 100 feet of an existing unauthorized route.

2. **Direct/Indirect Effects of adding facilities (presently unauthorized roads, trails and /or areas) to the NFTS.**

Short-term timeframe: 1 year.

Long-term timeframe: 20 years.

Spatial boundary: Plumas National Forest.

Indicator(s):

- Number and miles of proposed trail open for public motor vehicle use within or adjacent to noxious weed sites.
- Acres of noxious weed sites within 100 feet of a proposed trail.
- Total number of noxious weed sites within 100 feet of a proposed trail.

3. **Direct/Indirect effects of identifying vehicle class and season of use on the NFTS.**

The timeframe, spatial boundary, indicators and methodology would be the same as those listed under number 2 above.

4. **Cumulative Effects**

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

Long-term timeframe: 20 years.

Spatial boundary: Plumas National Forest.

Indicator(s):

- Number and miles of proposed trails assigned a “high” risk of noxious weed spread.

3.9.4 Affected Environment

Twenty five invasive plant species are considered to be a high management concern for the Plumas National Forest (PNF). Of these, fifteen have been documented on the PNF. These weed species, which are known from about 1,280 locations, occupy a total area of almost 700 acres. Of these known occurrences, 551 (or 43 percent) are within 100 feet of an existing National Forest System road. The weed sites on the PNF range in size from 1 square foot to over 150 acres, with the majority of infestations (over 80 percent) occupying an area less than 0.25 acre.

Table 141 lists all noxious weed species that are known to occur on the Plumas National Forest. Also included in the table are the ratings from the California Department of Food and Agriculture's noxious weed list (CDFA 2007) and the California Invasive Plant Council's invasive plant inventory (Cal-IPC 2006). The CDFA list divides noxious weeds into three categories: A, B and C. A-listed weeds are those for which eradication or containment is required at the State or County level. Eradication or containment of B-listed weeds is at the discretion of the County Agricultural Commissioner and C-listed weeds require eradication or containment only when found in a nursery or at the discretion of the County Agricultural Commissioner. Cal-IPC categorizes invasive plants as high, moderate or limited, based on the species' negative ecological, rather than economic or management, impact in California.

Table 141. Plumas National Forest noxious weed species.

Species	Common Name	CDFA rating	Cal-IPC rating	Number of PNF locations	Total acres on the PNF
Aegilops triuncialis	barb goatgrass	B	High	5	0.8
Cardaria draba	hoary cress	B	Moderate	2	0.1
Carduus nutans	musk thistle	A	Moderate	1	< 0.001
Centaurea maculosa	spotted knapweed	A	High	18	1.8
Centaurea solstitialis	yellow starthistle	C	High	207	269
Chondrilla juncea	rush skeletonweed	A	Moderate	8	1.8
Cirsium arvense	Canada thistle	B	Moderate	597	139
Cytisus scoparius	Scotch broom	C	High	97	131
Genista monspessulana	French broom	C	High	64	20.5
Isatis tinctoria	dyer's woad	B	Moderate	3	0.1
Lepidium latifolium	perennial pepperweed	B	High	128	8.7
Linaria genistifolia* ssp. *dalmatica	Dalmation toadflax	A	Moderate	4	0.1
Rubus armeniacus	Himalaya blackberry	None	High	2	0.05
Spartium junceum	Spanish broom	None	High	5	0.6
Taeniatherum caput-medusae	medusahead	C	High	123	98

3.9.4.1 Habitat Vulnerability

A large portion of the PNF is considered relatively free of noxious weeds, with most infestations concentrated along roads (43 percent) or in areas of past and present disturbance, such as timber harvest units, skid trails, temporary roads, unauthorized routes, mining claims and grazing allotments. The lower elevations on the Forest and the mid-elevation valleys contain many of the high noxious weed concentrations. These areas often provide entry points or "seed sources" for weeds moving into the less-invaded parts of the Forest.

Motor vehicle travel both on and off roads and trails has been a part of Forest recreation for many years. This activity has created disturbed conditions that greatly increase the vulnerability of the landscape to noxious weed invasion and spread. The PNF has been heavily influenced over the last 150 years by activities that include mining, livestock grazing, timber harvest, fire exclusion, large high-severity wildfires and non-motorized recreational activities such as camping, hiking, biking and horseback riding. Undeniably, the additive effects of recent and past actions have shaped the present landscape and correspondingly noxious weed infestations.

Over the past few years, a number of large wildfires have occurred on the Forest. These recent events increase the vulnerability of the landscape to weed establishment and spread by increasing the availability of resources, such as light and nitrogen; and decreasing competition from native plant species. In their comparison of low-severity and high-severity burns, Turner et al. (1997) found that the density of the invasive Canada thistle after severe surface and crown fires was two to four times greater than the density of Canada thistle after a light surface fire.

Beyond these recent events, the effect of specific past management actions on noxious weed species is largely unknown. Targeted noxious weed surveys at the project level first began relatively recently on the Forest. While it is often difficult to draw definitive conclusions regarding the effects of past project activities on noxious weeds, the high level of past activity, combined with the current level of weed infestation, suggest that past activities have had a significant effect on noxious weed introduction and spread across the PNF.

Of the 1,280 noxious weed locations (covering approximately 700 acres) that have been documented to date on the PNF, about 160 locations are treated annually using mechanical, cultural and in some limited cases, chemical methods. In addition, one future project is designed to treat noxious weeds found within 50 feet of existing roads. While these ongoing and future actions would decrease the potential for these occurrences to spread along roads, the actions would not greatly reduce the extent of noxious weed infestations over the Forest landscape.

3.9.4.2 General Types of Impacts

Noxious weed species pose a serious threat to biological diversity because of their ability to displace native species, alter nutrient and fire cycles, decrease the availability of forage for wildlife and degrade soil structure (Bossard, Randall and Hoshovsky 2000). Noxious weed species have the potential to affect native plant species indirectly through allelopathy (i.e. the production and release of plant compounds that inhibit the growth of other plants) (Bais et al. 2003), as well as through direct competition for nutrients, light and water (Bossard, Randall and Hoshovsky 2000). Noxious weed infestations can also reduce the recreational or aesthetic value of native habitats.

Noxious weed species are often classified as “pioneer” species or invaders. Therefore, disturbance, such as that associated with motor vehicle use, often creates ideal conditions for weed introduction and establishment. Natural areas that have experienced minimal levels of human disturbance are generally less invaded by noxious weeds than those areas that have been directly disturbed (Rejmánek 1989 *in* Daehler 2003). Noxious weed colonization into disturbed sites is often due to the removal of natural barriers that frequently keep invasive species in check, such as unsuitable light, soil or moisture conditions (Parendes and Jones 2000).

Motor vehicles greatly increase the amount of disturbance along and in the vicinity of the proposed trails. Indirect effects from motor vehicle use, such as soil compaction, increased erosion and modification of soil properties, can impact the distribution, abundance and vigor of native vegetation (Brooks 1995 *in* Ouren et al. 2007). The removal of native vegetation increases light levels and reduces the amount of competition for water and nutrients, making these edge habitats highly susceptible to noxious weed invasion.

3.9.4.3 Increased Vectors as a Result of Proposed Trail Designation

Motor vehicle routes contribute to dispersal of noxious weed species because they (1) create suitable habitat by altering environmental conditions, (2) make invasion more likely by stressing or removing native species and (3) allow for easier movement by wild or human vectors (Trombulak and Frissell 2000).

High concentrations of noxious weeds have been observed in close proximity to roads and areas of motor vehicle use in many different ecosystems (Gelbard and Harrison 2003, Parendes and Jones 2000 and others). One study in the Mohave Desert determined that non-native, early successional species were more common at sites disturbed by off-highway motorcycles (Davidson and Fox 1974). Another study in the Mohave Desert, found that the biomass of a non-native grass increased in plots disturbed by off-highway vehicle use and grazing when compared to areas excluded from these activities (Brooks 1995).

Roads, whether they are major highways, general Forest roads or motor vehicle trails, are often the primary conduit for weed introduction and establishment. For example, in their study of invasive species along roads and streams in Oregon, Parendes and Jones (2000) found weed species along nearly all of the high and low-use roads that they sampled.

Seeds and propagative plant parts often get lodged in the tires or undercarriages of motor vehicles and can be transported along and between routes into uninvaded portions of the Forest. In one National Park in Australia, weed seed was found to be most often transported into and around the park by visitor’s vehicles that had been driven off road (Lonsdale and Lane 1994). Maintenance (i.e. brush clearing) of routes can also facilitate the spread of noxious weeds by disturbing the soil, removing native vegetation and transporting soil and weed seed to new locations.

At the site-specific level, the risk of noxious weed establishment and the potential for spread is largely dependent upon the type and frequency of disturbance associated with each route or trail . For example, plant communities adjacent to routes that receive high vehicle traffic would be expected to be more invaded than those adjacent to infrequently used areas (Parendes and Jones 2000). Also, the risk of weed introduction would be highly dependent upon if a vehicle had been in an area infested with noxious weeds in the recent past.

3.9.5 Environmental Consequences: Effects of Alternatives on Noxious Weed Species

The following sections provide a discussion of the direct, indirect and cumulative effects of each alternative on noxious weeds. It is important to note that the analysis below represents what is known about motor vehicle impacts along unauthorized routes at this point in time. Designation of a trail is expected to increase and concentrate motor vehicle use; this has the potential to increase the risk of noxious weed introduction and spread. Proposed trails, infestations and mitigations or control measures will need to be re-evaluated on a continual basis to assess and address the risk from noxious weeds.

3.9.5.1 Alternative 1 (No-action)

3.9.5.1.1 Direct/Indirect Effects

Alternative 1 carries the highest risk of noxious weed introduction and spread. The largest impact of this alternative is from cross-country travel, which has the potential to introduce new noxious weeds to areas that are not currently infested and to aid in the expansion of existing infestations.

Under this alternative, it is impossible to quantify when and where noxious weeds would be encountered, spread or introduced by motor vehicles; therefore the 1,073 miles of unauthorized routes were used as a representation of current motor vehicle use on the Forest. There are presently 159 noxious weed locations (68 acres) documented within 100 feet of unauthorized routes and existing system trails (Table 142). This represents 13 percent of the noxious weed locations documented on the PNF.

Table 142. High priority noxious weed species documented within 100 feet of an unauthorized route or existing system trail and their percentage relative to the total percent and acreage on the Plumas National Forest.

Species	Number (and acres) of noxious weed infestations within 100’		% of known PNF infestations	% of total PNF acres
	Unauthorized Routes	Existing System Trail		
Centaurea maculosa (spotted knapweed)	5 infestations (0.2 acres)		28	11
Centaurea solstitialis (yellow starthistle)	41 infestations (26.2 acres)	8 infestations (8 acres)	24	13
Cirsium arvense (Canada thistle)	38 infestations (6.7 acres)	3 infestations (0.9 acres)	7	5
Cytisus scoparius (Scotch broom)	11 infestations (4.8 acres)		11	4
Genista monspessulana (French broom)	2 infestations (11.6 acres)		3	57
Isatis tinctoria (Dyer's woad)	2 infestations (0.04 acre)		67	40
Lepidium latifolium (perennial pepperweed)	1 infestation (0.02 acre)		1	0.2
Linaria dalmatica ssp. dalmatica (Dalmatian toadflax)	3 infestations (0.1 acres)		75	100
Rubus armeniacus (Himalaya blackberry)	1 infestation (0.002 acres)	1 infestation (0.05 acre)	100	100
Taeniatherum caput-medusae (medusahead)	34 infestations (9.4 acres)	9 infestations (0.25 acre)	35	10
TOTAL	**138 infestations (59 acres)**	**21 infestations (9.25 acres)**	**13**	**10**

Under this alternative, motor vehicles traveling on and off unauthorized routes would continue to create areas of disturbance that are highly vulnerable to weed invasion. Noxious weeds would continue to reduce the quality of native plant communities by displacing native species, altering nutrient and fire cycles, degrading soil structure and decreasing the quality and availability of forage for wildlife (Bossard, Randall and Hoshovsky 2000). Under this alternative, all but the most inaccessible habitats would be at risk of noxious weed invasion and spread from cross-country motor vehicle travel.

3.9.5.1.2 Cumulative Effects

As the number of Forest visitors and subsequently the number of unauthorized routes, continues to grow each year, the risk of new invasive species introductions also increases. The high number of past, on-going and planned activities on the Forest also increases the vulnerability of the landscape to noxious weed spread. Existing vectors for spread, which are unrelated to the motor vehicle travel, include mining, livestock grazing, timber harvest, fire exclusion, large high-severity wildfires and non-motorized recreational activities such as camping, hiking, biking and horseback riding. These would continue to aide in the dispersal and spread of noxious weed species across the Forest.

Standard management practices, such as cleaning off-road vehicles and flagging and avoiding weed infestations, are often used to reduce the risk of noxious weed introduction and spread. While these practices can be effective in reducing cumulative impacts in most projects, it is not a practical mitigation for trail designation. Some of the PNF standard management guidelines and mitigation measures (i.e. the requirement to use weed-free materials for erosion control, maintenance and revegetation) would reduce the risk of weed invasion from trail reconstruction and maintenance; however, in general, those alternatives that avoid or mitigate existing weed infestations have a lower risk of weed spread than those alternatives that do not.

3.9.5.2 Action Alternatives (2 through 5): Summary of Environmental Consequences for Individual Species

The following sections provide a discussion of the effects of each action alternative (2 through 5) on those noxious weed species with the highest potential to be directly or indirectly impacted by the proposed project. The general effects, described under the “General Types of Impacts” section, also apply to these weed species. The following table summarizes information about the noxious weed species that are known to occur within 100 feet of a proposed trail.

Table 143. The number of noxious weed infestations within 100’ of a proposed trail displayed by action alternative.

Species	**Action Alternatives**		
	2	**4**	**5**
Centaurea solstitialis	8	1	5
Cirsium arvense	8	2	5
Cytisus scoparius	2	1	1
Rubus armeniacus	1	1	1
Taeniatherum caput-medusae	12	2	2
TOTAL	31	7	14

3.9.5.2.1 *Centaurea solstitialis* (yellow starthistle)

Yellow starthistle is considered a high priority for control and eradication in Plumas County as well as on the Plumas National Forest (Karl Bishop, Plumas-Sierra Counties Agricultural Commissioner, personal communication). In California alone, this invasive species is estimated to cover approximately 12 million acres of rangeland and wildland.

Yellow starthistle reproduces exclusively from seed, with most long-distance dispersal (greater than 16 feet) attributed to wildlife or human-related factors. The control or eradication of this species requires elimination of seed production as well as depletion of the soil seedbank (seeds residing in the soil that have not germinated). The size of the seedbank is dependant upon the age of the infestation; on average it takes 5 to 10 years to deplete the seedbank. This species is actively treated on the PNF where control methods have ranged from hand pulling to limited herbicide control.

Effects from the Proposed trails

There are eight yellow starthistle infestations within 100 feet of the proposed trails under Alternatives 2, 4 and 5 (Table 144).

Table 144. Yellow starthistle occurrences within 100' of the proposed trails.

Site ID	Trail ID	Number of acres with potential for impact		Size of infestation (acres)	Proposed Mitigation¹	Action Alternatives		
		Within 0-30'	Within 30-100'			2	4	5
CESO3_198	10M39	0.02	0.2	1.5		X		
CESO3_201	10M40	0.4	0.3	0.8	FP	X		X
CESO3_292	11M25		0.002	0.002	HP	X	X	X
CESO3_309	5M06		0.1	0.9	HP	X		
CESO3_332	10M36	0.04		0.04	HP	X		X
CESO3_333	10M36		0.002	0.002	HP	X		X
CESO3_339	10M42	0.1	0.3			X		
CESO3_344	6M08	0.1	0.1	0.4	HP (O)	X		X

¹HP: Hand-pull individuals within infestation prior to trail designation; HP (O): Hand-pull individuals within infestation / trail open for designation; FP: Infestation proposed for treatment under future project

The five infestations situated less than 30 feet from the proposed trails will have the highest risk of spread from motorized vehicles. Although seed dispersal in yellow starthistle is generally poor, with most seeds falling within two feet of the mother plant, dispersal distances of over 16 feet have been documented (Roché 1991). Long-distance dispersal events are often attributed to wildlife or human factors, such as dispersed camping, vehicle use or hiking along trails. Experimental results suggest that seeds remain viable in the soil for three to ten years (DiTomaso 2004). These factors, in combination with the close proximity (less than 100 feet) from the trails, place all of the seven trails listed above at high risk due to yellow starthistle.

None of the infestations in Table 144 are currently treated on an annual basis. One infestation, CESO3_201, is proposed for treatment under the Keddie Hazardous Fuels Project. Four additional infestations (CESO3_292, CESO3_309, CESO3_332 and CESO3_333) require mechanical treatment (i.e. hand-pulling) prior to the trail being open for motorized use. One of these infestations, CESO3_292, occurs on an old, disturbed landing, which also appears to be used as a dispersed campsite (Coppoletta, personal observation 2007). This site is the starting point for unauthorized route 11M25 and would likely be utilized for staging off-road vehicles, making the risk of yellow starthistle spread from this infestation along trail 11M25 and the adjacent 11M24 trail high.

Yellow starthistle infestations are also found along some of the National Forest system roads and existing system trails that are adjacent to the proposed trails (e.g. 5M09, 5M32 and 6M08). Restricting motor vehicle access on these trails through the trail designation process would not remove the risk of spread from other licensed vehicles utilizing these existing roads and trails; however, in a few of the higher risk situations, trails have been proposed for designation (i.e. they will be open to the public) with the intent of mechanically treating the noxious weeds along the access routes.

3.9.5.2.2 *Cirsium arvense (*Canada thistle*)*

This perennial thistle spreads rapidly by producing long horizontal underground roots that give rise to aerial shoots (Bossard, Randall and Hoshovsky 2000). Canada thistle has an extensive root system; the species has been shown to produce over 66 feet of new roots over a two-year period, some of which have been shown to grow 15–20 feet deep. This species is considered particularly difficult to eradicate. Several insect species have been identified as possible biocontrol agents, but none of them have been shown to be effective controls (Bayer 2000, Nuzzo 1997, Tu et al. 2001). Mechanical methods, such as hand pulling or mowing, are generally not recommended because they may exacerbate the problem by spreading root fragments to new locations (Bossard, Randall and Hoshovsky 2000). The most effective method is herbicide control, which is often times used in conjunction with revegetation activities (Bossard, Randall and Hoshovsky 2000).

Effects from the Proposed trails

There are ten Canada thistle infestations within 100 feet of the proposed trails under Alternatives 2, 4 and 5 (Table 145).

Seven of the Canada thistle infestations are situated less than 30 feet from a proposed trail, making the risk of spread from motor vehicles very high. Canada thistle poses a large threat to native plant communities on the PNF due to its abundance and distribution, particularly in the northern portion of the Forest. The rates of Canada thistle spread that are documented in scientific literature range from less than 2 feet per year to over 40 feet per year (Donald 1990; USGS 2005; Nuzzo 1997; Bond and Turner 2004).

Table 145. Canada thistle occurrences within 100' of the proposed trails.

Site ID	Trail ID	Number of acres with potential for impact		Size of infestation (acres)	Proposed Mitigation[1]	Action Alternatives		
		Within 0-30'	Within 30-100'			2	4	5
CIAR4_040	13M03	0.1	0.2	2.2		X		
	13M04A		0.002			X		
CIAR4_081	10M40	0.002		0.002	FP	X		X
CIAR4_089	10M43	0.01		0.005		X		
CIAR4_270	11M42	0.02	0.01	0.04		X		
CIAR4_355	12M22	0.005	0.2	0.2	FP	X		
CIAR4_358	12M21		0.05	0.05	FP	X		X
	12M21A		0.04		FP	X		X
CIAR4_372	12M34		0.003	0.003	FP		X	X
CIAR4_390	12M34		0.01	0.01	FP		X	X
CIAR4_495	11M42	0.3	0.05	0.5		X		
CIAR4_546	12M24	0.1	1.4	14.8		X		

[1] FP: Infestation proposed for treatment under future project

Canada thistle is a shade-intolerant species and its growth is shown to be discouraged in areas where there are low levels of disturbance and sufficient competition from native species. For example, in Rocky Mountain National Park, it was found that dry upslope conditions, thick canopies from woody species and well-established grass meadows inhibited Canada thistle invasion and population size over time (Beck 1994). However, it was also noted that only a minor amount of disturbance (i.e. such as from elk grazing) was necessary to promote Canada thistle invasion and establishment.

This species is considered particularly difficult to eradicate and none of the infestations listed above are treated on an annual basis. Mechanical methods, such as hand pulling or mowing, are generally not effective (Bossard, Randall and Hoshovsky 2000). At present, the most successful control method for Canada thistle is herbicide treatment (Bossard, Randall and Hoshovsky 2000). Canada thistle sites that are not actively treated will continue to expand along roadsides, trails and into riparian and other native plant communities.

One infestation, CIAR4_081, is proposed for treatment under the Keddie Hazardous Fuels Project. Four additional infestations (CIAR4_355, CIAR4_358, CIAR4_372 and CIAR4_390) are being considered for treatment under a future weed treatment project. To reduce the high risk of spread along these proposed trails, some of these trails will remain closed until future treatments are complete.

*3.9.5.2.3 Cytisus scoparius (*Scotch broom*)*

Scotch broom is an invasive shrub that currently occupies more than 700,000 acres in the central to northwest coastal and Sierra Nevada foothill regions of California (Bossard 2000). In disturbed areas, this species has been shown to form dense thickets that decrease native plant diversity and have the potential to modify fire frequency and intensity. Scotch broom spreads by producing large quantities of seed; one medium-sized plant can produce over 12,000 seeds (Bossard 2000). Scotch broom is also capable of stump sprouting after cutting, freezing or fire.

Effects from the Proposed trails

There are two scotch broom infestations within 100 feet of the proposed trails under Alternatives 2, 4 and 5 (Table 146).

Table 146. Scotch broom occurrences within 100' of the proposed trails.

Site ID	Trail ID	Number of acres with potential for impact		Size of infestation (acres)	Proposed Mitigation[1]	Action Alternatives		
		Within 0-30'	Within 30-100'			2	4	5
CYSC4_147	9M50 (W)		0.01	0.3		X	X	X
CYSC4_154	9M50 (E)	0.03	0.07	0.1		X		

CYSC4_147 and CYSC4_154 are situated opposite the proposed trails on a paved NFS road. These two sites have been treated annually since 2005. To date, the mechanical methods used to treat Scotch broom on the Forest have been effective. This on-going treatment, as well as the location of these infestations in relation to the proposed trails, lowers the risk of spread along the proposed trails.

3.9.5.2.4 *Rubus armeniacus (*Himalayan blackberry*)*

This robust shrub effectively and rapidly displaces native species by forming impenetrable thickets along disturbed roadsides, right-of-way corridors and riparian areas. It can grow in a wide variety of conditions and on a number of different soil types, including barren and infertile soils (Hoshovsky 2000). Himalayan blackberry has rapid growth rates; canes have been shown to grow up to twenty-three feet in a single growing season (Hoshovsky 2000). It spreads both vegetatively and through the production of large quantities of seed, which are readily dispersed by mammals, birds and via rivers and streams. The most effective treatment methods for Himalayan blackberry are mechanical removal, burning and in some cases herbicide application (Hoshovsky 2000).

Effects from the Proposed Trails

There is one Himalayan blackberry infestation within 100 feet of a proposed trail under Alternatives 2, 4 and 5 (Table 147).

Table 147. Himalayan blackberry occurrences within 100' of the proposed trails.

Site ID	Trail ID	Number of acres with potential for impact		Size of infestation (acres)	Proposed Mitigation[1]	Action Alternatives		
		Within 0-30'	Within 30-100'			2	4	5
RUAR_002	8M36	0.002		0.002		X	X	X

This small infestation is situated less than 30 feet from the proposed trail and poses a high risk of spread from motorized vehicles. Himalayan blackberry has rapid growth rates and spreads both vegetatively and by seed. At present, this species is not actively treated on the Plumas National Forest and efforts to document infestations are in the early stages.

3.9.5.2.5 *Taeniatherum caput-medusae* (medusahead)

Over the past 10 years, managers of public lands in the western United States have witnessed an explosive spread of this invasive grass species (Bisson 1999). This species spreads primarily by seed, which is dispersed by wind and water, although it can be dispersed to more distant sites by grazing animals, machinery, vehicles and clothing (Bossard, Randall and Hoshovsky 2000). Medusahead is able to grow in a wide range of climatic conditions and has been documented in plant communities up to 7,000 feet in elevation.

Traditional methods of control (such as mowing and hand pulling) are not considered practical for medusahead because they are nonselective, often times fail to remove the active portion of the plant where new growth originates and are not recommended along roadsides after seed set because of increased potential for seed dispersal (CDFA 2004). Other management options, such as biological, cultural and chemical control methods, have also shown variable effectiveness (CDFA 2004).

Effects from the Proposed trails

There are twelve medusahead infestations within 100 feet of the proposed trails under Alternatives 2, 4 and 5 (Table 148).

Table 148. Medusahead occurrences within 100' of the proposed trails.

Site ID	Trail ID	Number of acres with potential for impact		Size of infestation (acres)	Proposed Mitigation	Action Alternatives		
		Within 0-30'	Within 30-100'			2	4	5
TACA8_031	10M22		0.05	0.2		X		
TACA8_051	10M20		0.01	0.02		X	X	X
	10M21		0.02			X		X
TACA8_085	10M39	0.02	0.2	1.5		X		
TACA8_087	10M39		0.001	0.005		X		
TACA8_088	10M39		0.02	0.03		X		
TACA8_094	10M38		0.01	0.02		X		
TACA8_097	10M38	0.03		0.03		X		
TACA8_098	10M38	0.01		0.009		X		
TACA8_172	10M14	0.03	0.2	1.5		X	X	X
TACA8_186	10M42	0.002		0.002		X		
TACA8_187	10M42	0.07		0.07		X		
TACA8_188	10M42	0.01		0.01		X		

Under these alternatives, the seven medusahead infestations that are situated less than 30 feet from the proposed trails have a very high risk of spread from motor vehicles. This invasive grass is primarily dispersed by wind and water, although it can be dispersed to more distant sites by machinery, vehicles and clothing (Bossard, Randall and Hoshovsky 2000). Medusahead is of significant concern on the PNF because it occurs in areas of high visitor use where there is increased potential for spread and traditional treatment methods (i.e. mechanical, chemical, biological, etc) are not practical or effective for large-scale control. These factors, in combination with the close proximity (less than 100 feet) from the trails, place all of the seven trails listed above at high risk due to medusahead.

TACA8_051 and TACA8_172 are situated directly off County Roads; therefore restricting motor vehicle access on trails through the trail designation process may not remove the entire risk of spread from other licensed vehicles utilizing the road. Many of these trails (10M20, 10M21 and 10M22) occur in an area that is heavily infested with medusahead. There are currently no feasible or effective mitigation measures to control the spread of this invasive species; therefore the risk of spread is high in these areas.

3.9.5.3 Action Alternatives (2 through 5): Summary of Environmental Consequences

The following section presents an overview of the effects analysis for each action alternative. In general, the greater the number of motorized vehicle trails (and miles) and the less mitigation proposed, the higher the risk of noxious weed spread. Of the action alternatives, Alternative 2 carries the highest risk from noxious weeds, whereas Alternative 3, which does not add any trails to the NFTS, has the lowest risk of weed introduction and spread. In comparison to these alternatives, the risk of noxious weed spread and introduction from the proposed trails under Alternative 5 is closer to the middle.

3.9.5.3.1 Alternative 2 (Proposed Action)

Direct/Indirect Effects

Table 149. Summary of noxious weed indicator measures for Alternative 2.

Indicator Measure	Value
Miles of proposed trail open for public motorized vehicle use within or adjacent to noxious weed sites	1.2 miles
Number of trails open for public motorized vehicle use within or adjacent to noxious weed sites	21 trails
Acres of noxious weed sites within 100 feet of a proposed trail	5 acres
Total number of noxious weed sites within 100 feet of a proposed trail	31 locations

Alternative 2 prohibits cross-country travel, adds approximately 364 miles of unauthorized routes to the NFS trail system and makes no changes to the existing system trails. In comparison to the other action alternatives, Alternative 2 poses the greatest risk of noxious weed introduction and spread due the high number of trails within or adjacent to noxious weed infestations (21 trails), the total number (31 sites) and acreage (5 acres) of weed infestations within 100 feet of a proposed trail and the lack of feasible treatment and control options for some of these infestations (Table 149).

The following noxious weeds have been documented within 100 feet of a proposed trail under Alternative 2: yellow starthistle (8 locations), Canada thistle (8 locations), Scotch broom (2 locations), Himalayan blackberry (1 location) and medusahead (12 locations). A detailed discussion of the risk associated with these individual species is provided in the section above ("Action Alternatives (2 through 5): Summary of Environmental Consequences for Individual Species").

Of the 31 noxious weed sites that are located within 100 feet of a trail proposed under Alternative 2, twelve are proposed for treatment either prior to or concurrent with the trail being open to the public. Of those 19 infestations that are not proposed for treatment, three (CYSC4_147, TACA8_051 and TACA8_172) are situated on a paved NFS road on the side opposite of the proposed trail; the risk of spread from these infestations onto the proposed trails is considered moderate. Five of the remaining untreated sites are Canada thistle and nine are medusahead; these two weed species do not have mitigation options available that fall within the scope of this project. Under this alternative, those locations that are left untreated will greatly increase the risk of spread along the proposed trails and into adjacent unoccupied habitat.

Cumulative Effects

In comparison to Alternative 1, the risk of noxious weed spread under this alternative is far less, primarily due to the ban on cross-country travel; however, in comparison to the other action alternatives, Alternative 2 carries one of the highest cumulative risks from noxious weed introduction and spread. This is largely due to the number (20 proposed trails) and mileage (12.8 miles) of “high risk” proposed trails. Under this alternative, the 31 noxious weed sites that are located within 100 feet of a proposed trail and are not actively treated will have a high risk of spread from motorized vehicle use. These noxious weed infestations would continue to expand along trails and into uninvaded native plant communities and would act as sources of seed for new weed introductions to nearby trails.

As the number of forest users continues to grow each year, the risk of new invasive species introductions also increases. The high number of past, ongoing and planned activities on the Forest also increases the vulnerability of the landscape to noxious weed spread. Existing vectors for spread, unrelated to motorized vehicle use, would continue to aide in the dispersal and spread of noxious weed species across the Forest.

3.9.5.3.2 Alternative 3

Direct/Indirect Effects

Table 150. Summary of noxious weed indicator measures for Alternative 3.

Indicator Measure	Value
Miles of proposed trail open for public motor vehicle use within or adjacent to noxious weed sites	0 miles
Number of trails open for public motor vehicle use within or adjacent to noxious weed sites	0 trails
Acres of noxious weed sites within 100 feet of a proposed trail	0 acres
Total number of noxious weed sites within 100 feet of a proposed trail	0 locations

Alternative 3 prohibits cross-country travel, adds no proposed trails to the trail system and makes no changes to the existing trail system. In comparison to the other action alternatives, Alternative 3 has the lowest risk of noxious weed introduction and spread due to the fact that it proposes no new system trails that intersect noxious weed occurrences (Table 150).

Of those species that have been documented along a proposed trail under Alternatives 2, 4 or 5, the following four are known to occur along existing system trails: yellow star-thistle (8 locations), Canada thistle (3 locations), Himalayan blackberry (1 location) and medusahead (9 locations). Use of the existing system trails will increase the risk of noxious weed introduction and spread onto PNF lands; however, motorized use of existing system trails would continue under all of the action alternatives. No additional risk of noxious weed spread and introduction would occur under Alternative 3 because there are no proposed trails to the trail system.

Cumulative Effects

Overall, cumulative effects to noxious weeds under this alternative are far less than those under Alternative 1 or the action alternatives. This is primarily due to the ban on cross-country travel and elimination of all proposed trails. No trails are proposed under this alternative; therefore none of the noxious weed infestations that have been documented along unauthorized trails pose a risk under Alternative 3.

3.9.5.3.3 Alternative 4

Direct and Indirect Effects

Alternative 4 prohibits cross-country travel, adds approximately 141 miles of unauthorized routes to the NFS trail system and makes no changes to the existing trail system. In comparison to the other action alternatives, Alternative 4 has the second lowest risk of noxious weed introduction and spread due to the lower number of trails within or adjacent to noxious weed infestations (5 trails) and the reduced number (7 sites) and acreage (0.3 acres) of weed infestations within 100 feet of a proposed trail (Table 151).

Table 151. Summary of noxious weed indicator measures for Alternative 4.

Indicator Measure	Value
Miles of proposed trail open for public motor vehicle use within or adjacent to noxious weed sites	0.14 miles
Number of trails open for public motor vehicle use within or adjacent to noxious weed sites	5 trails
Acres of noxious weed sites within 100 feet of a proposed trail	0.3 acres
Total number of noxious weed sites within 100 feet of a proposed trail	7 locations

The following noxious weeds have been documented within 100 feet of a trail proposed under Alternative 4: yellow starthistle (1 location), Canada thistle (2 locations), Scotch broom (1 location), Himalayan blackberry (1 location) and medusahead (2 locations). Refer to the analysis in the section above (“Action Alternatives (2 through 5): Summary of Environmental Consequences for Individual Species”) for a detailed discussion of effects to these individual species.

Of the seven noxious weed sites that are located within 100 feet of a trail proposed under Alternative 2, three are proposed for treatment either prior to or concurrent with the trail being open to the public. Of those four infestations that are not proposed for treatment, three (CYSC4_147, TACA8_051 and TACA8_172) are situated on a paved NFS road on the side opposite of the proposed trail; the risk of spread from these infestations onto the proposed trail is considered moderate. The remaining infestation is Himalayan blackberry, which is not currently treated on the PNF.

In comparison to Alternatives 2 and 5, the exclusion of a number of “high risk” unauthorized routes and the proposed weed treatment mitigations greatly reduce the risk of noxious weed spread along and among the Alternative 4 proposed trails.

Cumulative Effects:

In comparison to Alternative 1, the risk of noxious weed spread is far less under this alternative, primarily due to the ban on cross-country travel. In comparison to the other action alternatives, Alternative 4 carries the second lowest cumulative risk of noxious weed introduction. This is largely due to the lower number (2 trails) and mileage (0.7 miles) of “high risk” trails.

Under this alternative, the seven noxious weed sites that are located within 100 feet of a proposed trail and are not actively treated have a high to moderate risk of spread from motorized vehicle use. These noxious weed infestations could continue to expand along trails and into uninvaded native plant communities and may act as sources of seed for new weed introductions to nearby trails.

As the number of Forest visitors continues to grow each year, the risk of new invasive species introductions also increases. The high number of past, on-going and planned activities on the Forest also increases the vulnerability of the landscape to noxious weed spread. Existing vectors for spread, unrelated to motorized vehicle use, would continue to aide in the dispersal and spread of noxious weed species across the Forest.

3.9.5.3.4 Alternative 5

Direct/Indirect Effects:

Table 152. Summary of noxious weed indicator measures for Alternative 5.

Indicator Measure	Value
Miles of proposed trail open for public motorized vehicle use within or adjacent to noxious weed sites	0.6 miles
Number of trails open for public motorized vehicle use within or adjacent to noxious weed sites	14 trails
Acres of noxious weed sites within 100 feet of a proposed trail	1.6 acres
Total number of noxious weed sites within 100 feet of a proposed trail	14 locations

Alternative 5 prohibits cross-country travel, adds approximately 251 miles of proposed trails to the trail system and makes no changes to the existing trail system. In comparison to the other action alternatives, Alternative 5 has the second highest risk of noxious weed introduction and spread due the high number of proposed trails within or adjacent to noxious weed infestations (14 proposed trails) and the high number (14 sites) and acreage (1.6 acres) of weed infestations within 100 feet of a proposed trail (Table 152).

The following noxious weeds have been documented within 100 feet of a trail proposed under Alternative 5: yellow star-thistle (5 locations), Canada thistle (5 locations), Scotch broom (1 location), Himalayan blackberry (1 location) and medusahead (2 locations). Refer to the analysis in the section above (“Action Alternatives (2 through 5): Summary of Environmental Consequences for Individual Species”) for a detailed discussion of effects to individual species.

Of the 14 noxious weed sites that are located within 100 feet of a trail proposed under Alternative 5, ten are proposed for treatment either prior to or concurrent with the trail being open to the public (Appendix A). Of those four infestations that are not proposed for treatment, three (CYSC4_147, TACA8_051 and TACA8_172) are situated on a paved NFS road on the side opposite of the proposed trail; the risk of spread from these infestations onto the proposed trail is considered moderate. The remaining infestation is Himalayan blackberry, which is not currently treated on the PNF.

In comparison to Alternative 2, the exclusion of a number of “high risk” unauthorized routes and the proposed weed treatment mitigations greatly reduce the risk of noxious weed spread along and among the Alternative 5 proposed trails.

Cumulative Effects

In comparison to Alternative 1, the risk of noxious weed spread under this alternative is far less, primarily due to the ban on cross-country travel; however, in comparison to the other action alternatives, Alternative 5 carries the second highest cumulative risk from noxious weed introduction and spread. This is largely due to the number (10 proposed trails) and mileage (5.2 miles) of “high risk” proposed trails.

Under this alternative, the 14 noxious weed sites that are located within 100 feet of a proposed trail and are not actively treated will have a high to moderate risk of spread from motor vehicle use. These noxious weed infestations could continue to expand along proposed trails and into uninvaded native plant communities and may act as sources of seed for new weed introductions to nearby trails.

As the number of Forest users continues to grow each year, the risk of new invasive species introductions also increases. The high number of past, ongoing and planned activities on the Forest also increases the vulnerability of the landscape to noxious weed spread. Existing vectors for spread, unrelated to motor vehicle use, would continue to aide in the dispersal and spread of noxious weed species across the Forest.

3.9.6 Summary of Effects Analysis Across All Alternatives

The proposed trails would greatly increase the risk of noxious weed introduction and spread by creating disturbed conditions that favor noxious weed establishment and spread. Implementation of standard management prevention practices is not practical for this project and the limited number of noxious weed control mitigation measures that are available do not completely eliminate the risk of noxious weed spread along and among proposed trails.

The risk of noxious weed introduction and spread varies among the proposed alternatives due to the number and mileage of open unauthorized routes or proposed trails within or adjacent to noxious weed infestations and the total number and acreage of weed infestations within 100 feet of a proposed trail. Alternative 1 has the highest risk of noxious weed introduction and spread, primarily due to the allowance for cross-country travel, which provides potential access to all but the most inaccessible weed infestations and native plant habitats (Table 153). Out of the action alternatives, Alternative 2 poses the highest risk from noxious weeds, while Alternative 3, which designates proposed trails, has the lowest risk of weed introduction and spread. In comparison to these alternatives, the impacts from Alternative 5 fall closer to the middle of the spectrum of potential effects.

Table 153. Summary of Noxious Weed risk under each Alternative

Indicators–Noxious Weeds	Rankings of Alternatives for Each Indicator1				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Miles of unauthorized routes or proposed trails open for public motorized vehicle use within or adjacent to noxious weed sites.	1	2	5	4	3
Acres of noxious weed infestations within 100 feet of unauthorized or proposed trails.	1	2	5	4	3
Total number of noxious weed sites within 100 feet of unauthorized or proposed trails.	1	2	5	4	3
Overall Risk of Noxious Weed Spread	1	2	5	4	3

1 A score of 5 indicates the alternative has the lowest risk of noxious weed spread (in relation to the indicator measure); A score of 1 indicates the alternative is the worst for noxious weeds (highest risk).

3.9.7 Compliance with the Forest Plan and Other Direction

Alternative 1 does not prohibit cross-country travel and carries a high risk of noxious weed spread and introduction. This alternative is not consistent with Forest Service Manual direction (FSM 2081.03), which requires the identification of noxious weed control measures in areas of high risk.

The action alternatives are consistent with the Forest Plan and other direction. A noxious weed risk assessment has been completed for each alternative (FSM 2081.03 and USDA Forest Service 2004); the public has been informed of the risk and effects from motor vehicle travel and noxious weeds (USDA Forest Service 2004); and under some of the alternatives, noxious weed control measures (i.e. route closure or restricted access) have been identified in areas of high risk (FSM 2081.03).

3.9.8 Mitigation and Control Measures

Standard weed prevention practices, such as cleaning off-road vehicles and flagging and avoiding weed infestations, are not practical mitigations for trails designation. Weed prevention practices that are practical include: education, outreach and continued cooperation with federal, state and private entities; requirements for use of weed-free materials for erosion control, trails maintenance and revegetation; cleaning of equipment used in trails maintenance; and monitoring. Educational materials that emphasize weed prevention measures should be incorporated into the final MVUM maps or associated materials. In addition, the weed mitigations (i.e. hand-pulling) listed in Appendix A and in Table 144 and 145 have been designed to reduce the risk of noxious weed spread along the proposed trails.

3.10 Cultural Resources

3.10.1 Introduction

The Plumas National Forest is responsible for stewardship of a large share of the region's cultural resources including a wide variety of archaeological sites, buildings, structures, objects and cultural landscapes. The Forest also manages natural resources, which are critical to the continuation of the lifeways of indigenous peoples (referred to as traditional cultural properties). Preserving the important cultural, educational and scientific values of these nonrenewable resources for future generations is a Forest Service priority. The proposed project was designed to ensure compliance with federal historic preservation laws, and management strategies were developed to balance resource protection, cultural values and recreation opportunities. The following provides a summary of the effects of the proposed project to cultural resources, as well as proposed mitigation measures, where needed. Although the analysis is presented from the perspective of each alternative as a whole, all individual routes have been analyzed. Site-specific analysis is provided in the following reports, which are part of the project record and incorporated by reference: Archaeological Reconnaissance Report, OHV Route Designation Survey, Feather River Ranger District, Plumas National Forest, Butte and Plumas, California (Moore 2008); Archaeological Reconnaissance Report, OHV Route Designation Survey, Mt Hough Ranger District, Plumas National Forest, Plumas County California (Weinberg 2008); Archaeological Reconnaissance Report, OHV Route Designation Survey, Beckwourth Ranger District, Plumas National Forest, Plumas and Sierra Counties, California. (Kliejunas 2008); Heritage Resource Survey for the Plumas National Forest Off-Highway Vehicle Route Designation Project (McCombs 2008).

The Congress in 1966 declared it to be our National policy that the Federal government "administer federally owned, administered, or controlled prehistoric and historic resources in a spirit of stewardship for the inspiration and benefit of present and future generations" (National Historic Preservation Act (NHPA) (16 U.S.C. 470-1(3)). This need was made more explicit when the National Historic Preservation Act was amended in 1980 and Section 110 was added to expand and underscore Federal agency responsibility for identifying and protecting historic properties and avoiding unnecessary damage to them. Many historic properties are fragile and once damaged or destroyed they cannot be repaired or replaced.

Section 106 of the NHPA compels federal agencies to take into account the effect of its undertakings on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (36 CFR 60) (Historic Properties). The Travel Management Rule requires that the effects on cultural resources be considered, with the objective of minimizing damage, when designating roads, trails, and areas for motor vehicle use on National Forest System lands (36 CFR 212.55(a), 212.55(b)(1)).

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

Direction relevant and specific to the alternatives as they affect cultural resources includes:

The Forest Service is directed to identify, evaluate, treat, protect, and manage historic properties by several laws. However, the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 et seq.) (NHPA), provides comprehensive direction to federal agencies about their historic preservation responsibilities. Executive Order 11593, entitled *Protection and Enhancement of the Cultural Environment*, also includes direction about the identification and consideration of historic properties in Federal land management decisions.

The **National Historic Preservation Act of 1966** extends the policy in the Historic Sites Act of 1935 (49 Stat. 666; 16 U.S.C. 461-467) to include resources that are of State and local significance, expands the National Register of Historic Places (NRHP), and establishes the Advisory Council on Historic Preservation and State Historic Preservation Officers (SHPO). NHPA Section 106 directs all Federal agencies to take into account effects of their undertakings (actions, financial support, and authorizations) on properties included in or eligible for the National Register. The Advisory Council on Historic Preservation's (ACHP) regulations (36 CFR 800) implements NHPA Section 106. NHPA Section 110 sets inventory, nomination, protection, and preservation responsibilities for Federally-owned historic properties.

The Forest Service's policy for compliance with Section 106 of the NHPA in travel management with respect to route designation for motor vehicle use was issued in 2005: *USDA Forest Service Policy for Section 106 of the NHPA Compliance in Travel Management: Designated Routes for Motor Vehicle Use* (2005). This policy was developed in consultation with the Advisory Council on Historic Preservation. It outlines minimal requirements for considering possible effects to historic properties that may be associated with designating routes and areas as part of a National Forest's Transportation System (NFTS). This policy statement recognizes that Forests with programmatic agreements for compliance with Section 106 of the NHPA will follow the terms of those agreements.

Section 106 of the NHPA and the ACHPs implementing regulations, *Protection of Historic Properties* (36 CFR Part 800), require that federal agencies take into account the effect of their undertakings on historic properties, and that agencies provide the ACHP with an opportunity to comment on those undertakings. Programmatic agreements (36 CFR 800.14(b)) provide alternative procedures for complying with 36 CFR 800. Region 5 has such an agreement: *Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, U.S.D.A. Forest Service, Intermountain Region's Humboldt-Toiyabe National Forest, California State Historic Preservation Officer, and Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for Designating Motor Vehicle Routes and Managing Motorized Recreation on the National Forests in California* (2006) (**Motorized Recreation PA**). This agreement defines the Area of Potential Effects (APE) (36 CFR 800.4(a)(1)) and includes a strategy outlining the requirements for cultural resource inventory, evaluation of historic properties, and effect determinations; it also includes protection and resource management measures that may be used where effects may occur.

Executive Order 11593: *Protection and Enhancement of the Cultural Environment*, issued May 13, 1971, directs Federal agencies to inventory cultural resources under their jurisdiction, to nominate to the National Register of Historic Places all Federally owned properties that meet the criteria, to use due caution until the inventory and nomination processes are completed, and to assure that Federal plans and programs contribute to preservation and enhancement of non-Federally owned properties.

3.10.3 Effects Analysis Methodology

3.10.3.1 Geographic Scope of Analysis

The geographic analysis area for cultural resources includes all routes identified under Alternatives 2 (Proposed Action), 4 and 5. These alternatives include all unauthorized or user-created routes proposed for designation under the action alternatives. The location of historic properties is the unit of spatial analysis used to consider effects with one exception: a Native American Traditional Cultural Property (TCP) in the vicinity of a route on the Feather River Ranger District required analysis of the setting beyond the historic property's location in order to address potential auditory and visual effects from OHV use in the area.

3.10.3.2 Assumptions Specific to Cultural Resources Analysis

1. Unauthorized, user-created routes and areas have already affected historic properties within route/area prisms.
2. Under the action alternatives, use will continue at current levels or increase over time on the designated system with the prohibition of cross-country motorized travel.

3.10.3.3 Data Sources

Three types of data were gathered to provide the basis for understanding the nature and extent of cultural resources within project area, and the effects of the proposed additional trails to the NFTS on these resources:

1. Archival and literature sources were reviewed and data from Forest Service cultural resource records, maps and GIS layers compiled to provide a prehistoric and historic overview of the geographic region, identify major historical themes and events, and to provide information on previous archaeological inventories, known site locations, and the likelihood of unidentified resources within the project area. Tribal consultation occurred concurrently with other public involvement activities. The project was discussed at multiple meetings with the Concow Maidu Tribe of Mooretown Rancheria, the Estom Yumeka Tribe of Enterprise Rancheria, Greenville Rancheria, the Mechoopda Indian Tribe of Chico Rancheria, Susanville Indian Rancheria, the Tyme Maidu Tribe of Berry Creek Rancheria, and the Washoe Tribe of California and Nevada.
2. All routes proposed under the action alternatives for which there was no previous survey coverage have been inventoried. Survey coverage includes a 30-meter corridor centered on each route, and complete survey of proposed use areas, including a 30-meter buffer around these use areas.
3. Archaeological site monitoring was completed for all known sites within the project area unless current data on the effects of off-highway vehicle use was available. Data collection focused on characterizing the type, nature and severity of effects.

3.10.3.4 Basis for Analysis/Cultural Resources Indicators

All cultural resources identified within the APE are considered historic properties, as defined by the NHPA (36 CFR 60), for purposes of this undertaking (Motorized Recreation PA) unless they have already been determined not eligible in consultation with the SHPO or through other agreed upon procedures (36 CFR 60.4; 36 CFR 800).

Site characteristics identified in the NHPA and the following NRHP eligibility criteria form the basis for effects analysis. Of the four National Register Criteria, the following are applicable to this project: criterion (c) which includes resources that embody distinctive characteristics of a type, period, or method of construction, that represent the work of a master, and that possess high artistic values, that represent a significant and distinguishable entity whose components may lack individual distinction (e.g. historic structures); and criterion (d) which includes resources that have yielded, or may be likely to yield, information important in prehistory or history (e.g. prehistoric and historic archaeological sites) (36 CFR60.4(a-d)). Integrity measures are based on effects to important site characteristics, including location, design, setting, materials, workmanship, feeling and/or association (36 CFR 800.5(a) (1)).

The following cultural resources indicators will be used to assess effects:

- Degree to which the integrity of historic property values discussed above are diminished.
- Number of historic properties within unauthorized routes at risk from ongoing use.
- Average number of historic properties per acre at risk if additional proposed trails or areas are created.

For purposes of this analysis, cultural resources effects are defined as follows:

1. Direct effect is or will be caused by motor vehicle use or the consequences of such use, including physical damage resulting from erosion, down-cutting or displacement of resources (Table 154).
2. Indirect effects are associated with motor vehicle uses outside unauthorized routes and areas, for example, adjacent camping areas or areas where motorized travel off of unauthorized routes or areas may occur. The proximity of sensitive cultural resources to unauthorized routes is an important factor when determining where resources are at greater risk. Indirect effects could include those listed for direct effects, but may also include other destructive actions like vandalism and looting (see table below).
3. Types of effects: None, Direct, Indirect, Cumulative
4. Nature of effects: Erosion, down-cutting, rutting, displacement, disturbance, damage, deterioration, vandalism, removal/alteration of historic structures, visual/auditory/atmospheric effects to historic setting or cultural landscape.
5. Severity of effects: Low, Moderate, High, Extreme
    a. Low—only minor disturbances confined to unauthorized routes; no obvious displacement of artifacts, features or archaeological deposits other than original unauthorized route placement (i.e. slight disturbance but no apparent effect to integrity of NRHP values).

b. Moderate—Less than 2 cubic meters of disturbance within the unauthorized route zone (i.e. slight affect to artifacts/features, but overall site integrity and NRHP values are retained.

c. High—Estimated 3-5 cubic meters of disturbance within the unauthorized route zone; displaced artifacts (i.e. localized or multiple areas of effects). Overall site integrity and NRHP values are damaged or altered.

d. Extreme—Estimated 5+ cubic meters of disturbance within the unauthorized route zone; displaced artifacts in several locations and or vandalism noted (i.e. severe effects to NRHP values, artifacts and features associated with NRHP values have been damaged or altered.

Table 154. Cultural resources effects category cross-walk between the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA) and severity determination for this Environmental Impact Statement (EIS).

NEPA	NHPA	Severity
None	No Effect	None-Negligible
Direct Effect	No Adverse Effect	Low
	Adverse Effect	Moderate-High-Extreme
Indirect Effect	No Adverse Effect	Low
	Adverse Effect	Moderate-High-Extreme
Cumulative Effect	No Adverse Effect	Low
	Adverse Affect	Low-Moderate-High-Extreme

3.10.3.5 Cultural Resources Methodology by Action

3.10.3.5.1 Direct/indirect effects of the prohibition of cross-country motorized vehicle travel.

The prohibition of motor vehicle use off of existing NFTS and areas would have a beneficial effect on cultural resources throughout the Forest in both the short and long term. It would curtail ongoing effects and reduce the threat to cultural resources and historic properties that would occur should past unauthorized use patterns continue. Prohibiting cross-country travel would eliminate the effects resulting from the creation of additional unauthorized routes. Under this prohibition, most if not all, future permitted or other unauthorized motorized vehicle travel off of the NFTS would be subject to NHPA Section 106 compliance and potential effects to cultural resources and historic properties could be identified at that time.

Short-term timeframe: 1 year

Long-term timeframe: 20 years

Spatial boundary: Forest scale where motor vehicle use is not already prohibited by law (e.g., wilderness).

Indicator(s): (1) Number of historic properties within unauthorized routes at risk from ongoing use; and (2) Average number of historic properties per acre at risk if proposed trails or areas are created.

Methodology: GIS analysis to identify: (1) the number of historic properties at risk within existing unauthorized routes (estimate of on-going direct/indirect effects curtailed); and (2) the average number of historic properties per acre that would be protected from any unauthorized routes created in the future without a prohibition (estimate of indirect effects).

Rationale: Motorized Recreation PA.

3.10.3.5.2 Direct/Indirect Effects of adding facilities (presently unauthorized routes 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: Location of historic property.

Indicator(s): Degree to which the integrity of historic property values are diminished, related to: location, design, setting, materials, workmanship, feeling, or association.

Methodology: Use existing data from cultural resource site atlas, historic archives, maps, site record files, and GIS spatial layers, and information obtained from archaeological inventories of unauthorized routes, to identify cultural resources in the APE that may have direct, indirect, or cumulative effects.

Rationale: Motorized Recreation PA.

3.10.3.5.3 Changes to the existing NFTS [this can include deletions of facilities and changing the vehicle class and season of use].

None of these actions are considered an undertaking subject to NHPA Section 106 compliance (USDA Forest Service Policy for Section 106 of the NHPA Compliance in Travel Management: Designated Routes for Motor Vehicle Use (2005)). Motor vehicles can already use NFTS roads. Allowing or prohibiting non-highway vehicle use will have no direct, indirect, or cumulative effect on cultural resources.

3.10.3.5.4 Cumulative Effects

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

Long-term timeframe: 20 years

Spatial boundary: Forest administrative boundary (outside of designated wilderness).

Indicator(s): Degree to which the integrity of historic property values are diminished, related to: location, design, setting, materials, workmanship, feeling, or association.

Methodology: Use existing data from cultural resource site atlas, historic archives, maps, site record files, and GIS spatial layers, and information obtained from archaeological inventories of unauthorized routes, to identify cultural resources in the APE that may have direct, indirect, or cumulative effects.

Rationale: Motorized Recreation PA.

3.10.4 Affected Environment

Archaeology can provide valuable contextual information for assessing existing conditions on the Forest. Cultural resources provide a record of the dynamic relationship between humans and the natural landscape—a relationship in the project area which has spanned thousands of years. Cultural remains in the analysis area include a wide-array of objects, sites, buildings, and cultural landscapes from both the prehistoric and historic period, and natural/traditional cultural resources, which are used by modern indigenous peoples.

3.10.4.1 Ethnographic Period

The study area encompasses a region described as a ‘contact zone’ between two geomorphic provinces and ethnographic areas—the Sierra Nevadas and the Western Great Basin (PAR 1996, Kroeber 1925). Most of the study area is within the traditional homelands of the Maidu, though the eastern margins of the PNF were occupied and used by the Northern Paiute and Washoe. Because of similar cultural traits, the sharing of ideas, and use of similar natural environments, the identification of historic cultural boundaries between Native American groups in the area is difficult to identify archaeologically (D’Azevdo 1986, Fowler & Liljeblad 1986, Riddell 1978).

The Maidu had three distinctive linguistic and cultural groups, which also coincided with geographical locations (Dixon 1905). These groups included: the Mountain or Northeastern Maidu, the Konkow or Northwestern Maidu, and the Nisenan or Southern Maidu (Riddell 1978). Maidu territory included the drainages of the Feather and Susan Rivers, and was bounded by Lassen Peak to the north, Sierra Buttes to the south, present-day Quincy to the west, and the Great Basin to the east between Honey and Eagle Lakes. One or more permanent villages were established in Big Meadows (now under Lake Almanor), Butt, Genesee, Indian, Mountain Meadows, and Red Clover Valleys (Riddell 1978:370-372).

Ethnographic literature suggests that political organization within Maidu communities was based on a settlement pattern of villages (Kroeber 1925:397-398; Riddel 1978:373). A central village included a circular, semi-subterranean assembly structure, now commonly referred to as a Roundhouse. A community was composed of 3 to 5 villages, and villages were relatively self-sufficient. Kroeber (1925:397) estimated village populations to be less than 200 prior to contact.

The fundamental basis of the Maidu economy was subsistence hunting, fishing, and collection of plant foods. Acorns were a dietary staple, and were typically collected from oak groves at lower elevations (Riddell 1978). Heavily utilized oak varieties included black oak (*Quercus kelloggii*), canyon or golden oak (*Q. chrysolepis*), and interior live oak (*Q. wislizenii*). The Maidu also gathered nuts from the sugar pine and yellow pine. In the northeastern part of their territory, near present day Susanville, nuts from the huckleberry oak (*Q. vaccinifolia*) and chinquapin (*Chrysolepis sempervirens*) were also collected. Other vegetal resources included hazelnuts, buckeye, wild nutmeg, grass seeds, berries, and various underground roots and bulbs. Salmon, eel, birds/waterfowl, grasshoppers and other insects, as well as large and small mammals, were also consumed. Large animals included deer, elk, and bear.

A wide variety of tools and implements were employed to gather and process food resources. Among these the bow and arrow, traps, nets, slings, snares, clubs, and blinds for hunting land mammals and birds; and salmon gigs, traps, and nets for fishing. Woven tools, including seed beaters, burden baskets, and carrying nets, as well as sharpened digging sticks, were used to collect plant resources. Baskets were either coiled or twined. Snowshoes were used for winter travel, and dugout canoes or log rafts were used for navigating or crossing the mountain waterways (Riddell 1978:373-379).

Prior to the discovery of gold in 1848 at Sutter's Mill near Coloma on the American River, Maidu lifeways were little affected by European exploration. Konkow territory was entered occasionally by Spanish explorers and American trappers. With the discovery of gold, tens of thousands of gold seekers came into the region and with them, the mass introduction of diseases into California native populations. A great epidemic swept the Sacramento Valley in 1833 and all but decimated the Konkow Maidu. Even the remote territories of the Mountain Maidu were overrun in the early 1850s with explorers and miners. The spread of disease and direct acts of violence inflicted on Native peoples were devastating, as was the loss of land and territory, including traditional hunting and gathering locales.

Today, the PNF works closely with descendents of the original inhabitants of this region to ensure that tribal cultural resource values are properly considered in land management activities. The Forest consults regularly with seven federally-recognized tribes including Greenville Rancheria, Susanville Rancheria, the Estom Yemeka Tribe of Enterprise Rancheria, the Tyme Maidu Tribe of Berry Creek Rancheria, the Concow Maidu Tribe of Mooretown Rancheria, the Washoe Tribe of California and Nevada, and the Mechoopda Indian Tribe of Chico Rancheria. In addition to managing many important ancestral sites, the Forest Service also manages natural resources critical to the continuation of traditional lifeways.

3.10.4.2 Prehistoric Period

Prehistoric sites represent activity by Native Americans prior to European contact. Intensive archaeological research has generally not occurred with the exception of documentation of resources associated with Forest Service undertakings. For the most part, available data is not sufficient to adequately define prehistoric complexes or to establish reliable cultural chronologies. Cultural themes and interpretations for the area are heavily reliant on extrapolations from studies in surrounding regions, though it is known that there is significant time-depth of human occupation on the Forest, and high potential for archaeological work to reveal critical information about the history of the natural environment and human adaptation in the northern Sierra Nevada.

Based on evidence from the eastern Sierra Nevada, Elston (1986) proposed that human occupation of the region spans from the Early Holocene (approximately 10,000 years before present (BP)) to the present time. Prehistoric cultural complexes which have been documented in the northern Sierra Nevada mountains include: the Tahoe Reach (10,000-8,000 BP), Spooner (7,000-4,000 BP), Martis (4,000 BP to 1,500 BP), Kings Beach (1,500 BP to 1850), and Historic (after 1850) (Kowta 1988, Moratto 1984).

The Tahoe Reach Complex dates to the early Holocene during which the environment was in a warming trend after the last ice age (Wallace 1978). The most notable artifacts from this time period are large Parman-style projectile points (Moratto 1984). Other diagnostic artifacts of this cultural complex include basalt bifaces, crescents, and scrapers. Cultural material from this time period remains sparse, which may demonstrate a small human population (PAR 1996).

The Spooner Complex is thought to mark the initial occupation of the high Sierras (PAR 1996, Moratto 1984). There is thought to have been a general warming and drying of the environment during periods when Lake Tahoe did not overflow. Characteristic artifacts include large basalt projectile points, milling stones, manos, and unshaped pestles. There are not many significant differences between the Spooner and Martis Complexes.

The Martis Complex is further broken down into the Early (4,000-3,500 BP), Middle (3,500-2,500 BP), and Late (2,500-1500 BP) Complexes. It is believed that the Martis Complex is "represented on both sides of the Sierran crest from south of Lake Tahoe northward to the south end of Honey Lake" (Kowta 1988). Projectile points, scraping, and cutting tools, most commonly made of basalt, demonstrate the importance of hunting large and small game. Diagnostic projectile points include contracting stemmed, corner-notched, eared, and large side-notched points. Seed grinding tools, the milling stone and mano, are also present. Mortars and pestles, associated with acorn and larger seed grinding, show up later in the Martis complex. Areas revisited or occupied over a long period of time have a wide variety and quantity of artifacts, which included bedrock milling features and midden (dark colored culturally-affected soil). Population size increases are evident in the size of permanent base camps and winter settlements (PAR 1996). Evidence of circular houses with sunken floors also appears in the archaeological record during this time.

The Kings Beach Complex is also further broken down into Early (1,500-800 BP) and Late (800 BP to historic) complexes (Kowta 1988). Smaller and lighter projectile points are more commonly made of chert, jasper, and obsidian and demonstrate the introduction of the bow and arrow (Moratto 1984). Diagnostic projectile point types include small desert side notched, cottonwood triangular, and rosegate series. Local faunal food sources include deer, mountain sheep, rabbits, and ground squirrels. Hopper and bedrock mortars as well as the continued use of milling stones and manos demonstrate that seeds and other plant resources like piñon nuts and grass seeds are still utilized (PAR 1986). Other artifacts include pine nut beads, olivella shell beads, steatite pipes, bone tubes, cordage, and basketry.

Prehistoric resources documented on the PNF to date include flaked-stone artifacts scatters reflecting resource procurement activities and seasonal campsites, and habitation sites with diverse cultural deposits, and in some instances, house pits.

3.10.4.3 Historic Period

The California Gold Rush was the initial catalyst for early Euro-American settlement in what would become Plumas County. Many early gold seekers undoubtedly passed westward through the area in 1849 but, so far as is recorded, none settled that year (Farriss and Smith 1882). However, strikes along the Middle and North Forks of the Feather River in early 1850 resulted in the first settlements both along the river terraces and within the attractive and temperate locations of American and Indian Valleys. Many land claims and permanent settlement were well established the following year.

Jim Beckwourth, of African-American heritage, first surveyed an overland trail through the northern Sierra Nevada in the summer of 1850 (Young 2004). From modern day Sparks, NV, his trail first extended northwest then east across Beckwourth Pass skirting the northern edge of Sierra Valley then followed Grizzly Creek northwest into Grizzly Valley. The trail continued northwest diagonally through the valley to Emigrant Creek where it made one of the most difficult crossings along its length over Grizzly Ridge. From here the trail continued down into American Valley and then westward to end at Bidwell's Bar. The route saw extensive one-way traffic though Grizzly Valley throughout the 1850s including the movement of great numbers of cattle to the markets of California's northern gold camps (Lawson 2005).

For the first few years of mining (1849–1852), activity focused on working the natural watercourses by pan, rocker, and sluice box. By 1853 areas away from these streambank diggings, as they were initially called, had become important, and a rush for water claims ensued. The hydraulic mining technique began at this time and small-scale drifting ("drifts" or "tunnels" as they were often called) into the gravel banks of the ancient river channels was also underway (Sinnott 1977:11, 314). An important first step towards the successful mining of the gravel deposits was the transport of water to mining sites. The years 1853 and 1854 saw a rush for water claims since water was needed to wash the drift dirt and undertake hydraulic operations (Baker and Shoup 1985: 25). The rush for water in 1853 to 1854 resulted in the creation of a number of major ditch and flume systems throughout the project area (Baker and Shoup 1985: 26). Hydraulic mining was carried out by applying a stream of water under high pressure onto a gravel bank. The water blasted the bank down, and the gravels containing the gold were then directed into a sluice box, which caught the heavier gold. The water and mud went into a stream or river. Using this system, a few men could process hundreds of tons of earth a day, making it economical to mine gravel worth only a small amount per square yard (Baker and Shoup 1985: 26).

Drift mining was used when lava or other hard rock made hydraulic mining impractical, or when the gold in the gravel was mostly on bedrock. Thus, adits or "tunnels," as they were usually called, were more frequently used to penetrate the bank, using rails and ore cars to bring the pay gravel out of the mine. The first real boom in drift mining came in the late 1850s (Baker and Shoup 1985: 26). The founding and early development of drift mines marked another stage in a transition, which was underway during the mid and late 1850s. This transition had a number of aspects, which collectively marked the demise of the Gold Rush and the rise of a much different type of political economy and society. The most important of these aspects included more capital-intensive mining, the rise of reasonably stable small towns, occupational diversification in these towns, improved transportation and communication in these towns, an alteration of the dominant cultural forms, the arrival of women and children, better mining technology, and the development of sawmills and logging (Baker and Shoup 1985: 27).

Agricultural products were soon in high demand due to the rise of the Comstock in Nevada beginning in the late 1860s. During the following decade many small dairies were established in the valleys of the northern Sierra Nevada to tap this lucrative market. Despite significant transportation challenges, many of these small operations found considerable profit until the mining boom ended in the mid-1880s. Facing a shrinking market and a downturn in the national economy beginning in the early 1890s, most of these small dairies did not survive into the new century.

When the Western Pacific Railroad was completed through Plumas County in 1909 many sawmills were developed. Among these was the Feather River Lumber Company (FRLC), formed in 1905 (Vaughan 1989). By 1910 the main sawmill and box factory had been established at Delleker, west of Portola. The FRLC engaged in extensive logging operations in the forested hills in the late 1910s and early 1920s on both private and PNF land. After about 1915 the company began using a narrow gauge railroad to bring logs to its mill.

3.10.5 Environmental Consequences

3.10.5.1 Alternative 1

As described in Chapter 2, under the No-action alternative, current management plans would continue to guide management of the project area. No changes would be made to the current NFTS and no cross-country travel prohibition would be put into place. This No-action alternative has the greatest potential to directly affect historic properties due to the large number of sites located within route corridors (227 known sites), as well as the probability that these and additional sites would be impacted by unrestricted, random impacts from cross-country travel. However, it is difficult to quantify when and where cultural resources would be impacted by motor vehicles over time. In the short term, disturbances on unauthorized routes would not change.

3.10.5.2 Action Alternatives (2, 4, 5)

As described in Chapter 2, the proposed action includes changes to the NFTS and the prohibition of cross-country travel as described in the NOI published January 3, 2008. For Alternative 2, a total of 364 miles of existing, unauthorized routes would be added to the NFTS.

New inventory was completed for 2,371 acres within the project area (acreage is based on linear distance of routes and the 30 meter corridor that was surveyed). New and previous inventories have resulted in identification of 227 sites within the project area, all of which were monitored to assess potential impacts from motor vehicle use. Detailed results of the inventory and monitoring efforts are provided in multiple archaeological reconnaissance reports (McCombs 2007; Moore 2008; Weinberg 2008; Kliejunas 2008). For all routes within the action alternatives that would be added to the NFTS, Appendix A provides a summary of resource impacts by route. All routes which have moderate, high or extreme effects to cultural resource values are listed below in Table 155.

Of the 227 sites identified within the project area, the vast majority have not been affected by motor vehicle use: 85% of the sites that were monitored had negligible effects, if any. Thirty-one (31) sites were identified with indirect and direct effects ranging from minor to major. These sites will be evaluated for eligibility to the NRHP prior to allowing use under this alternative. If determined eligible, the protective measures identified in Table 155 will be implemented.

Under Alternative 2, six (6) proposed trails were identified as having extreme adverse effects on historic properties. Four (4) of these proposed trails are part of the Beckwourth National Historic Trail (FS Site #051151500001). National Historic Trails are designated by Congress because of their far-reaching effects on broad patterns of American culture and history. The National Historic Trail System is managed for its educational and interpretive values, as well as recreation values (generally, non-motorized depending on the historical use of the trail in question). Designating portions of the

Beckwourth Trail for motorized use would adversely affect characteristics of the property which form the basis for its significance as a pioneer trail. Another proposed trail was deemed to have extreme effects to four historic properties, including the Beckwourth Trail and a geologic feature, Frog Rock, which is associated with Maidu creation stories, and is culturally important to modern Native Americans. One other proposed trail dissects the Letterbox Townsite. There is an extensive web of unauthorized routes throughout the site area, and evidence of intensive site vandalism. Alternatives 4 and 5 do not include these six trails.

Table 155 Effects to sites by route.

Route ID	Site Number	Site Type	Type of Effect	Nature of Effect	Severity of Effect	Protection Measures/Mitigation
5M06	5115400840	HIS	Indirect and Direct	Looting (indirect) and site displacement (direct)	High for both	NRHP Evaluation. Restriction Category H* for Heritage. *Route dropped for watershed concerns.*
5M28E	5115400388	HIS	Direct	Site displacement	High	NRHP Evaluation. Restriction Category H for Heritage. *Route dropped for watershed concerns.*
6M05	5115400212	PRE	Direct	Rutting, site displacement	Moderate	NRHP Evaluation. Restriction Category M* for Heritage. Stabilize rutting, signage, regular monitoring
6M08	5115400227	HIS	Direct	Rutting, site displacement	High	NRHP Evaluation and realignment of trail off of site. Restriction Category H for Heritage. Stabilize rutting, signage, regular monitoring
6M14	5115400574	MUL	Direct	Rutting, site displacement, artifact disturbances	Moderate	NRHP Evaluation. Restriction Category M* for Heritage. Stabilize rutting, signage, regular monitoring
6M26	5115400062 5115400063 5115400103 Frog Rock	MUL	Direct and Indirect	Site displacement, artifact/feature disturbances, vandalism (graffiti), audio/visual effects to Tribal Cultural Resource	High to Extreme	Mulitiple eligible properties (Beckwourth National Historic Trail and Swayne Lumber Co. Camp plus Maidu Ethnographic Site/possible TCP). Restriction Category E* for Heritage. *Route dropped due to Heritage Resource concerns.*

Route ID	Site Number	Site Type	Type of Effect	Nature of Effect	Severity of Effect	Protection Measures/Mitigation
6M29	5115400190 5115400192	HIS	Direct	Site displacement, damage to artifacts	Moderate	NRHP Evaluation. Restriction Category M for Heritage. Stabilize site, signage, regular monitoring
6M30 W	5115400595	PRE	Direct	Erosion	Moderate	NRHP Evaluation. Restriction Category M for Heritage. Stabilize erosion, signage, regular monitoring
6M35	5115400162	HIS	Direct and Indirect	Maze of OHV activity through historic townsite, looting, artifact disturbances	High to Extreme	Probable Eligible property (Letterbox Townsite). Restriction Category E for Heritage. *Route dropped due to Heritage Resource concerns.*
6M47	5115400275 5115400480 5115400765	MUL PRE PRE	Direct	Site displacement, artifact/feature disturbances	Moderate for all	NRHP Evaluation. Restriction Category M for Heritage. Stabilize site, signage, regular monitoring
8M17	511500001	HIS	The Beckwourth Trail is part of the National Historic Trail System designated by Congress. Any effects considered extreme.			Site is eligible for the NRHP. Restriction Category E for Heritage. *Route dropped due to Heritage Resource concerns.*
8M18	511500001	HIS	The Beckwourth Trail is part of the National Historic Trail System designated by Congress. Any effects considered extreme.			Site is eligible for the NRHP. Restriction Category E for Heritage. *Route dropped due to Heritage Resource concerns.*
8M19	511500001	HIS	The Beckwourth Trail is part of the National Historic Trail System designated by Congress. Any effects considered extreme.			Site is eligible for the NRHP. Restriction Category E for Heritage. *Route dropped due to Heritage Resource concerns.*
8M25	511560077	HIS	Direct	Site displacement	Moderate	NRHP Evaluation. Restriction Category M for Heritage. Stabilize site, signage, regular monitoring
9M03	5115300296	HIS	Direct	Erosion	Moderate	NRHP Evaluation. Restriction Category M for Heritage. Stabilize site, signage, regular monitoring

Route ID	Site Number	Site Type	Type of Effect	Nature of Effect	Severity of Effect	Protection Measures/Mitigation
9M05 E/W	5115300935 5115300956	HIS	Direct	Site displacement, artifact damage	Moderate	NRHP Evaluation. Restriction Category M for Heritage. Stabilize site, signage, regular monitoring
9M07	511530014	HIS	Direct	Site displacement, artifact damage	Moderate to High	NRHP Evaluation. Restriction Category H for Heritage. *Route* may *be dropped due to private property issues.*
9M12	5115300466	HIS	Direct	Site displacement	Moderate	NRHP Evaluation. Restriction Category M for Heritage. Stabilize site, signage, regular monitoring
9M14	5115300466	HIS	Direct	Site displacement	Moderate	NRHP Evaluation. Restriction Category M for Heritage. *May be system road.*
9M14a	5115300466	HIS	Direct	Site displacement	Moderate	NRHP Evaluation. Restriction Category M for Heritage. Watershed mitigation measures may require additional heritage analysis. Stabilize site, signage, regular monitoring
9M15	5115300730 5115300735	HIS	Direct	Site displacement	Moderate	NRHP Evaluation. Restriction Category M for Heritage. Watershed mitigation measures may require additional heritage analysis. Stabilize site, signage, regular monitoring
9M16	5115300849 5115300364	HIS	Direct	Site displacement	Moderate	NRHP Evaluation. Restriction Category M for Heritage. Watershed mitigation measures may require additional heritage analysis. Stabilize site, signage, regular monitoring
9M16a	5115300822 5115300634	HIS	Direct	Site displacement	Moderate	NRHP Evaluation. Restriction Category M for Heritage. *Route dropped for watershed concerns.*

Route ID	Site Number	Site Type	Type of Effect	Nature of Effect	Severity of Effect	Protection Measures/Mitigation
9M17	5115300025 5115300404	HIS	Indirect and Direct	Site displacement (direct), looting (indirect)	Moderate	NRHP Evaluation. Restriction Category M for Heritage. *Route dropped for watershed concerns.*
9M18	5115300025	HIS	Direct	Site displacement	Moderate	NRHP Evaluation. Restriction Category M for Heritage. *Route dropped for watershed concerns.*
9M20	5115300466	HIS	Direct	Site displacement	Moderate	NRHP Evaluation. Restriction Category M for Heritage. *Route dropped for watershed concerns.*
9M45	5115600258	HIS	Direct	Site displacement	High	NRHP Evaluation. Restriction Category H for Heritage. Stabilize site, signage, regular monitoring
9M46	5115600375	HIS	Direct	Site displacement	High	NRHP Evaluation. Restriction Category H for Heritage. Stabilize site, signage, regular monitoring
9M46A	5115600375	HIS	Direct	Site displacement	High	NRHP Evaluation. Restriction Category H for Heritage. Stabilize site, signage, regular monitoring
9M48	511500001	HIS	The Beckwourth Trail is part of the National Historic Trail System designated by Congress. Any effect considered extreme.			Site is eligible for the NRHP. Restriction Category E for Heritage. *Route dropped due to Heritage Resource concerns.*
9M51	5115600267	HIS	Indirect	Route is situated adjacent to Stiver Cemetery	Moderate	Close portion of trail. Restriction Category M for Heritage.
10M13	5115600105	HIS	Direct	Site displacement, artifact/feature disturbances	Moderate	NRHP Evaluation. Restriction Category M for Heritage. Stabilize site, signage, regular monitoring
13M10	51155000048	PRE	Direct	Site displacement	High	NRHP Evaluation. Restriction Category M for Heritage.

Route ID	Site Number	Site Type	Type of Effect	Nature of Effect	Severity of Effect	Protection Measures/Mitigation
13M32	5115500614	MUL	Direct and Indirect	Site displacement, artifact/feature disturbances	High	NRHP Evaluation. Restriction Category H for Heritage.
13M36	5115100387	PRE	Direct	Site displacement	Moderate	NRHP Evaluation (likely CAREDAP). Restriction Category M for Heritage.
13M38	5115500349	PRE	Direct	Site displacement	Moderate	NRHP Evaluation (likely CAREDAP). Restriction Category M for Heritage.

3.10.5.3 Alternative 3

As previously discussed, the prohibition of motor vehicle use off of NFTS and areas under Alternative 3 would have a beneficial effect on cultural resources throughout the Forest in both the short and long term. It would curtail ongoing effects and reduce the threat to cultural resources and historic properties that would occur, should past unauthorized use patterns continue. It would also help eliminate effects resulting from the creation of any additional unauthorized routes if cross-country use was allowed. Under this prohibition, most if not all, future permitted or other unauthorized motor vehicle travel off of the NFTS would be subject to NHPA Section 106 compliance and potential effects to cultural resources and historic properties could be identified at that time.

3.10.5.4 Cumulative Effects

None of the action alternatives are expected to result in significant cumulative effects to cultural resources. Each alternative, with the exception of the No-action alternative, will actually reduce potential effects to historic properties through prohibition of cross-country travel, and the reduction in the number of unauthorized routes on the Forest. Unregulated cross-country travel has the greatest potential for creating adverse impacts to cultural resources making the route designation process an important part of preventing long-term impacts to resources.

3.10.5.5 Summary of Effects

Table 156. Summary Rankings of Alternatives by Indicator and Overall Average

Indicators – Cultural Resources	Rankings of Alternatives for Each Indicator[1]				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Degree to which the integrity of historic property values are diminished	1	3	5	3	3
Number of historic properties within unauthorized routes at risk from ongoing use	1	2	5	4	3
Average number of historic properties per acre protected from creation of new routes	1	2	5	4	2
Average for Cultural Resources	**1**	**2**	**5**	**4**	**3**

[1] A score of 5 indicates the alternative is the best for cultural resources related to the indicator; a score of 1 indicates the alternative is the worst for cultural resources related to the indicator

Chapter 4 Consultation and Coordination

4.1 Distribution of the Environmental Impact Statement

This EIS is being distributed primarily online at the Plumas National Forest website on the internet: http://www.fs.fed.us/r5/plumas/projects_and_plans/ohv_route_designation/
Letters announcing the web site posting are being sent to numerous individuals, Federal agencies, State and local governments, and organizations representing a wide range of views.

Hard copies are being distributed to individuals who specifically requested a copy of the document. In addition, this EIS is being sent to:

- USDA National Agricultural Library, Acquisitions and Serials Branch
- US Environmental Protection Agency, Office of Federal Activities
- Environmental Protection Agency, Region 9
- US Department of Interior, Office of Environmental Policy and Compliance
- Concow Maidu Tribe of Mooretown Rancheria
- Estom Yumeka Tribe of Enterprise Rancheria
- Greenville Rancheria
- Mechoopda Indian Tribe of Chico Rancheria
- Susanville Indian Rancheria
- Tyme Maidu Tribe of Berry Creek Rancheria
- Washoe Tribe of California and Nevada

4.2 List of Preparers

The following is a list of primary contributors to this EIS. Numerous other people have also contributed in many ways to this document. Their help is greatly appreciated.

- **Mark Beaulieu**: Public Service Staff/Forest Engineer, 20 years, BS Forest Engineering, MF Forest Engineering
- **Jane Beaulieu**: Forest Environmental Coordinator, 19 years, BA Technical Journalism, minor in Forestry
- **Julie Burcell**: Forest Heritage Program Manager 14 years, BS Cultural Resources
- **Michelle Coppoletta**: Mount Hough Ranger District Assistant District Botanist, 9 years, BS Plant Biology, MS Ecology
- **George C Garcia**: Forest Wildlife Program Manager, 20 years, BS in Natural Resource Management, emphasis in Fish and Wildlife
- **Pete Hochrein**,: Forest Transportation Planner, 30 years, BS Forestry, MF Forest Engineering
- **Joseph A Hoffman** Forest Hydrology Program Manager, 10 years, MS Environmental Engineering
- **Tina Hopkins**: Forest Fisheries Biologist, 23 years, BS Wildlife/Fishers

- **Maurice Huynh**: Beckwourth Ranger District Assistant District NEPA Planner, 3 years, BS Forestry, MS Forestry
- **Michael Kobelt**: INFRA, 36 years, BS Civil Engineering
- **Joel Schultz**: Beckwourth RangerDistrict Biologist, 11 years, BS Wildlife Biology
- **Sabrina Stadler**: Beckwourth Ranger District Senior NEPA Planner, 4 years, MS Natural Resources Planning and Interpretation
- **Kelly Whitsett:** Feather River Ranger District Hydrologist, 9 years, BS Geology, MS Geology/Geophysics

Index

Appendices

Appendix A: List of Routes and Resource Impacts

The route assessments are summarized in the table below. It contains a comprehensive list of every route proposed to be added to the NFTS as trails under one or more of the action alternatives. For these proposed trails, the route assessment in the table below identifies the number of miles, effects determinations by resource and any mitigation measures (including the season when the trail would be open and any mitigation measures that would be implemented on the trail prior to publication on a MVUM and allowing public use). Trails with an asterisk (*) after the trail number would need mitigation completed prior to being added to the MVUM and used by the public.

Table 157. Proposed Trails

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
4M01*	1.55	Drainage and crossing	L	L	L	L	H
4M02	0.76	Trail causing sediment to channel	L	L	L	L	E
5M01	2.16	Drainage and crossing, use June 1st -Dec. 1st for deer and watershed.	M-Deer	L	L	L	M
5M02	2.74	Drainage and crossing, use May 1st-Dec. 1st.	L	L	L	L	M
5M04	1.92	Drainage and crossing, use May 1st-Dec. 1st.	L	L	L	L	M
5M05	0.88	Drainage and crossing, use May 1st-Dec. 1st.	L	L	L	L	M
5M06	0.47	Trail. Causing sediment to channel Treat weeds.	E-CRLF	L	H	H	E
5M07*	0.29	Drainage and crossing, use May 1st -Dec. 1 st. Need a bridge for CRLF, Heritage evaluation.	H-CRLF	L	L	L	H
5M08*	0.45	Drainage, use May 1st-Dec. 1st.	L	L	L	L	H
5M08A	0.12	Redundant trail.					
5M09	0.65	Drainage, use May 1st-Dec. 1st. Treat weeds.	M-FYLF	L	M	L	M
5M10	0.28	Drainage, use May 1st-Dec. 1st	M-CRLF	L	L	L	M
5M11	0.65	Drainage and crossing, use May 1st-Dec. 1st.	M-CRLF	L	L	L	M
5M12	1.69	Drainage and crossing, use May 1st-Dec. 1st.	L	L	L	L	M
5M13	1.11	Drainage and crossing, use May 1st-Dec. 1st.	L	L	L	L	M
5M14	0.55	Non-existent, obliterated after the 2008 Canyon Complex fire.					
5M15	1.05	Entrenched, irreparable erosion problems.	H-FYLF	L	L	L	E
5M16	0.84	Drainage and crossing, use May 1st-Dec. 1st.	L	L	L	L	M
5M17	0.90	Drainage and crossing, use May 1st-Dec. 1st.	L	L	L	L	M
5M18	1.00	Highly erosive with irreparable erosion.	H-FYLF	L	L	L	E
5M19*	0.60	Drainage, use May 1st-Dec. 1st.	L	L	L	L	H
5M20*	0.80	Drainage, use May 1st-Dec. 1st.	M-FYLF	L	L	L	H
5M21	1.32	Steepness and drainage issues.	M-FYLF	L	L	L	E
5M22	1.60	Entrenched, irreparable erosion problems.	H-FYLF	L	L	L	E
5M23	1.69	Entrenched, irreparable erosion problems	H-FYLF	L	L	L	E
5M24*	1.17	Drainage and crossing, use May 1st-Dec. 1st.	M-FYLF	L	L	L	H

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
5M25*	0.76	Drainage and crossing, use May 1st-Dec. 1st.	M-FYLF	L	L	L	H
5M25A	0.34	No access thru private.					
5M26	0.49	Drainage and crossing, use May 1st-Dec. 1st.	L	L	L	L	L
5M27	1.22	Entrenched, irreparable erosion problems, stream crossing	H-NOGO, FYLF	L	L	L	E
5M28 W	0.43	Use May 1st-Dec. 1st.	M-NOGO	L	L	L	M
5M28 E	1.19	Entrenched, irreparable erosion problems, stream crossing	H-NOGO, FYLF	E-TES	L	H	E
5M29	2.34	Evaluate crossing and drainage. Use May 1st-Dec. 1st. Avoid TES during mitigation.	M-FYLF	M-TES	L	L	L
5M30	1.42	Steep, needs relocation	L	L	L	L	E
6M02*	0.87	Drainage and crossing, use May 1st-Dec. 1st.	M-CRLF	L	L	L	H
6M03*	1.15	Drainage and crossing, use May 1st-Dec. 1st.	H-CRLF	L	L	L	H
6M03A	0.08	Non-existent					
6M04	1.39	Entrenchment and needs relocation	H-CRLF, FYLF	L	L	L	E
6M05	0.41	Use May 1st-Dec. 1st. Heritage evaluation.	M-CRLF	L	L	M	M
6M06	0.88	System road.					
6M08*	0.56	Drainage and crossing, use May 1st-Dec. 1st. Reroute off cultural. Treat weeds.	L	L	M	H	H
6M09	0.37	Drainage, use May 1st-Dec. 1st.	L	L	L	L	M
6M10 N	1.70	Drainage, use May 1st-Dec. 1st.	L	L	L	L	M
6M10 S	1.90	Drainage problems, running along drainage.	H-CRLF	L	L	L	E
6M11*	0.98	Drainage, use May 1st-Dec. 1st.	L	L	L	L	H
6M12	0.43	Dependent on 6M13	L	L	L	L	M
6M13	1.41	Drainage problems, running along drainage.	H-CRLF, FYLF	L	L	L	E
6M14*	2.62	Drainage and crossing, use May 1st-Dec. 1st. Survey for TES botany, Heritage evaluation.	L	H-TES	L	M	H
6M14A	0.17	Non-existent					
6M15	0.40	Use May 1st-Dec. 1st.	L	L	L	L	M
6M16*	2.26	Drainage and crossing, use May 1st-Dec. 1st. Survey for TES botany.	M-CRLF, FYLF	H-TES	L	L	H
6M16A*	0.29	Drainage and crossing, use May 1st-Dec. 1st.	L	L	L	L	H
6M16B*	0.11	Drainage and crossing, use May 1st-Dec. 1st.	L	L	L	L	H
6M19	3.02	Drainage and crossing.	M-CRLF	L	L	L	M
6M20 W	1.27	Drainage	L	L	L	L	M
6M20 E	0.50	Erosion in drainage.	E-MYLF	L	L	L	E
6M21	0.77	Erosion in drainage	L	L	L	L	E
6M22 N*	1.90	Drainage and crossing.	L	L	L	L	H
6M22 S	0.93	Drainage and crossing.	L	L	L	L	M
6M22A	0.65	Drainage and crossing.	M-MYLF	L	L	L	M
6M23*	0.99	Drainage and crossing.	L	L	L	L	H
6M24	0.23	Drainage	L	L	L	L	M
6M25	0.20	Non-existent.					

		Trail	Effects Determinations				
Trail #	**MI**	**Restrictions and Mitigation**	**Wildlife**	**Botany**	**Weeds**	**Cultural**	**Watershed**
6M26	1.36	Heritage resource concerns.	L	L	L	E	M
6M27	0.83	Heritage resource concerns. Drainage and crossing.	L	L	L	E	M
6M28	0.09		L	L	L	L	L
6M29*	3.91	Drainage and crossing. Heritage evaluation.	H-MYLF	L	L	M	H
6M29A*	0.20	Drainage and crossing.	H-MYLF	L	L	L	H
6M29B*	0.47	Spur off 6M29	L	L	L	L	H
6M29C*	0.76	Drainage and crossing.	H-MYLF	L	L	L	H
6M29D*	0.52	Drainage and crossing.	H-MYLF	L	L	L	M
6M30 E*	0.33	Drainage. Heritage evaluation.	H-MYLF	L	L	L	M
6M30 W*	0.17	Drainage. Heritage evaluation.	H-MYLF	L	L	M	H
6M30A	0.30	Drainage	H-MYLF	L	L	L	M
6M31	0.32	Drainage and crossing.	H-MYLF	L	L	L	E
6M31	0.20	Drainage and crossing.	H-MYLF	L	L	L	M
6M31*	0.15	Drainage and crossing.	H-MYLF	L	L	L	H
6M32	0.36	Needs relocation	E-MYLF	L	L	L	E
6M33*	0.65	Drainage.	L	L	L	L	H
6M34	0.52		L	L	L	L	L
6M34A*	0.37	Multiple stream crossings. Drainage.	H-MYLF	L	L	L	H
6M35	0.47	Heritage resource concerns.	L	L	L	E	M
6M36*	0.86	Drainage and crossing.	H-MYLF	L	L	L	H
6M37	1.42	CMP Clean, WB	M-MYLF	L	L	L	M
6M38	0.38	Parallels stream, parallel access exists.	E-MYLF	L	L	L	E
6M39*	0.66	Stream in buffer, needs culvert or crossing.	H-MYLF	L	L	L	H
6M47	0.94	Drainage. Heritage evaluation, use May 1st-Dec. 1st.	L	L	L	M	M
6M48*	0.28	Drainage, use May 1st-Dec. 1^{s}	H-CRLF	L	L	L	L
6M50	0.25	Unmitigatable due to proximity to stream.	H-MYLF	L	L	L	E
6M51	0.77	Drainage	L	L	L	L	M
7M01	0.59	Sediment in creek due to many crossings. Weeds.	E-CRLF	L	M	L	E
7M02	1.12	System road rehabilitated during 2008 Canyon Complex Fire.					
7M03	0.36	Drainage and crossing.	L	L	L	L	M
7M04*	0.85	Drainage and crossing.	H-MYLF	L	L	L	M
7M07*	0.39	Drainage and crossing.	L	L	L	L	H
7M08	0.86	Non-existent					
7M09	0.26	TES.	L	E-TES	L	L	E
7M10	0.54	TES.	L	E-TES	L	L	M
7M11	0.48	Drainage and crossing.	M-MYLF	L	L	L	M
7M12	0.94	System road					
7M13	0.70	Dry crosses stream, needs relocation	H-MYLF	L	L	L	E
7M14	0.25	Drainage	M-MYLF	L	L	L	M
7M15	1.20		L	L	L	L	L

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
7M16	0.94		L	L	L	L	L
7M17	1.73	Very steep, needs drainage	L	L	L	L	M
7M18	0.66		L	L	L	L	L
7M22	0.53	Needs to be defined with the Lassen	L	L	L	L	M
7M28	0.39	Drainage.	L	L	L	L	M
8M01	0.50	Accesses private land, extremely erosive.					E
8M02	0.78	Trail in perennial buffer, Drainage and crossing, No overnight camping.	M-CSO, M-MYLF	L	L	L	M
8M03	1.57	Crosses ephemeral streams, needs stream crossing improvement.	M-CSO, L	L	L	L	M
8M04	0.69	Redundant access	L	L	L	L	E
8M10*	0.67	Trail in perennial buffer, wet meadow. Sign the meadow.	H	L	L	L	L
8M11	1.73	Needs low water-crossing and waterbars.	L	L	L	L	M
8M11A	0.12	Perennial stream in 500 zone, rolling dip.	M-MYLF	L	L	L	M
8M13	0.96	Crossing ephemeral streams, rutted, private	L	L	L	L	E
8M14	0.27	In stream channel.	L	L	L	L	E
8M15*	0.32	Dry crossing, drainage	H-MYLF	L	L	L	H
8M16*	0.77	Crosses intermittent, drainage, crossing.	H-MYLF	L	L	L	H
8M17	1.28	Beckwourth Trail, crossing	H-FYLF	L	L	E	M
8M18	0.41	Beckwourth Trail, drainage	L	L	L	E	M
8M19	1.27	Beckwourth Trail, drainage	L	L	L	E	M
8M20	0.19	Redundant road, goes thru meadow, stream.	H-MYLF	L	L	L	E
8M21	0.72	System road 25N56B					
8M22	0.48	Non-existent					
8M23*	0.49	Entrenched for 1,000'. Drainage. Avoid impacts to TES during mitigation.	H-MYLF	M-TES	L	L	H
8M24	2.71	Crosses perennial stream. Drainage and crossing. Seasonal closure for owls. Open Aug. 15-Mar 1st. (Check nest site location).	M-CSO	L	L	L	M
8M25	1.03	Monitoring for heritage.	L	L	L	M	L
8M26	1.01	Drainage	M-Macros	M-TES	L	L	M
8M27	2.26	Drainage, Power line Access	L	L	L	L	M
8M27(EXT)	0.80	Drop, crosses streams and enters into a CSO PAC.	E-CSO, Macros	L	L	L	E
8M27A*	0.33	Drainage	M-Macros	L	L	L	H
8M28	1.08		L	L	L	L	L
8M28A	0.10	Redundant					
8M29	0.66		L	L	L	L	L
8M30	0.49		L	L	L	L	L
8M31	1.11		L	L	L	L	L
8M32	0.64		L	L	L	L	L
8M33	0.96		L	L	L	L	L
8M34	0.06	Redundant					
8M35	1.57		L	L	L	L	L

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
8M36	0.96	Drainage	M	L	L	L	M
8M37	0.82	Drainage	M	L	L	L	M
8M37A	0.08	Redundant					
8M37B	0.15	Drainage	L	L	L	L	M
8M38*	0.54	Crossings, drainage	M	L	L	L	H
8M39	0.71	Drainage	L	L	L	L	M
8M39A	0.32		L	L	L	L	L
8M40	0.34	Drainage	L	L	L	L	M
8M41*	0.33	Drainage, PGE access	L	L	L	L	H
8M42*	0.98	Crossing, Drainage	L	L	L	L	H
8M43	0.36	Drainage	L	L	L	L	M
8M44	0.30	Drainage	L	L	L	L	M
8M45	0.46	Drainage	L	L	L	L	M
8M46	0.61	Drainage	L	L	L	L	M
8M47	1.46	Crossing, Drainage	L	L	L	L	M
8M47A	0.35	Redundant					
8M48*	0.49	Drainage, use August 15-March 1	M	L	L	L	H
8M49	0.32	Crossing	M	L	L	L	M
8M50	0.83	Drainage	L	L	L	L	M
8M51	0.84	Crossing, Drainage	L	L	L	L	M
8M52	1.39	Crossing, Drainage	L	L	L	L	M
8M53	0.66	Drainage	L	L	L	L	M
8M54	0.82	Crossing, Drainage	L	L	L	L	M
9M01	0.91	Drainage	L	L	L	L	M
9M02	0.39	Drainage and crossing	L	L	L	L	M
9M03	0.56	Relocation and stream crossing. Heritage evaluation.	E-MYLF	L	L	M	E
9M04*	0.18	Drainage and crossing	H-MYLF	L	L	L	H
9M05 E	1.57	Drainage and crossing.	M-MYLF	L	L	M	M
9M05 W	.09	Drainage and crossing.	M-MYLF	L	L	M	E
9M06	0.39	Private access issues.					
9M07	0.08	Private access issues.					
9M08	2.11	Drainage	L	L	L	L	M
9M08A	0.13		L	L	L	L	L
9M09	0.84	Drainage and crossing.	M-MYLF	L	L	L	M
9M10	1.65	Drainage	L	L	L	L	M
9M11	0.65		L	L	L	L	L
9M12*	0.38	Drainage and crossing. Heritage evaluation. Eval after MYLF study complete.	H-MYLF	L	L	M	M
9M13*	0.48	Drainage. Eval after MYLF study complete.	H-MYLF	L	L	L	H
9M14*	0.94	System road	H-MYLF	L	L	M	H
9M14A*	0.58	Drainage and crossing. Heritage evaluation. Eval after MYLF study complete.	H-MYLF	L	L	M	H

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
9M15	0.81	Drainage and crossing. Eval after MYLF study complete. Heritage evaluation.	M-MYLF	L	L	M	M
9M16	1.22	Drainage and crossing. Eval after MYLF study complete. Heritage evaluation.	H-MYLF	L	L	M	M
9M16A	0.57	Irreparable erosion issues. Eval after MYLF study complete. Heritage evaluation.	H-MYLF	L	L	M	E
9M17	1.38	Irreparable erosion issues. Eval after MYLF study complete. Heritage evaluation.	H-MYLF	L	L	M	E
9M18	0.05	Irreparable erosion issues. Heritage evaluation.	L	L	L	M	E
9M19	0.67	Irreparable erosion issues. Heritage evaluation.	L	L	L	M	E
9M20	1.39	Irreparable erosion issues. Eval after MYLF study complete. Heritage evaluation.	H-MYLF	L	L	M	E
9M21	1.63	Drainage and crossing.	M-MYLF	L	L	L	M
9M22 W	0.38	Trail ends where 9M23 intersects.	E-CSO, NOGO	L	L	L	M
9M22 E	0.37	Drainage and crossing.	M-CSO, NOGO	L	L	L	M
9M23	0.69	Combine with 9M22, Drainage and crossing	M-CSO, NOGO	L	L	L	M
9M24	0.85	Sensitive Plants	L	E-TES, SIA	L	L	M
9M25	1.72	Non-existent					
9M25A	0.14	Non-existent					
9M26	0.90	Non-existent					
9M27	0.24	Riling and overgrown, unusable.	L	L	L	L	E
9M32	0.43	Drainage and crossing.	M-MYLF	L	L	L	E
9M32	0.53	Drainage and crossing.	M-MYLF	L	L	L	M
9M33	2.66	Needs heavy drainage and relocation.	H-CSO	L	L	L	E
9M34	0.55	Drainage	M-MYLF	L	L	L	M
9M35*	0.69	Drainage, March 1-August 15	H-CSO	L	L	L	M
9M36	1.33	Non-existent					
9M37*	1.68	Needs to be rerouted for heritage also needs new crossing and drainage.	H-CSO, M-Macros, tree frogs	L	L	L	H
9M37A	0.43	Redundant					
9M37B	0.25	Redundant					
9M38	1.61	Drainage	M-MYLF	L	L	L	M
9M39	1.13	Drainage	L	L	L	L	M
9M39A	0.69	Drainage	L	L	L	L	M
9M40	1.01	Heritage	L	L	L	L	M
9M41	0.67	Heritage	L	L	L	L	M
9M41A	0.19	Heritage	L	L	L	L	L
9M42	0.49	Drainage	L	L	L	L	M
9M42A*	0.17	Drainage	L	L	L	L	H

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
9M42B*	0.52	Drainage	L	L	L	L	H
9M43	0.26	Drainage	L	L	L	L	M
9M44	0.49	Drainage	L	L	L	L	M
9M45*	0.61	Drainage, Documentation for Heritage, use August 15-March 1	H-CSO	L	L	H	M
9M46*	0.95	Drainage, Documentation for Heritage	L	L	L	H	L
9M46A*	0.49	Drainage, Documentation for Heritage	L	L	L	H	M
9M47A	0.47	Drainage	L	L	L	L	M
9M48	0.96	Drainage	L	L	L	L	M
9M49	1.76	Drainage	L	L	L	L	M
9M50	0.33	Drainage and crossing.	L	L	L	L	M
9M50	0.14	Drainage and crossing	L	L	L	L	E
9M51	1.27	Drainage and crossing.	L	L	L	M	M
9M52	0.63	Drainage	L	L	L	L	M
9M53	0.59	Spotted Owl PAC	E-CSO	L	L	L	M
9M53A	0.46	Dead ends onto private. Drainage.	E-CSO	L	L	L	H
9M54	1.00	Drainage	L	L	L	L	M
9M55	0.53	Drainage and crossing	L	L	L	L	M
9M56*	0.73	Drainage and crossing	L	L	L	L	H
9M56A*	0.38	Drainage and crossing	L	L	L	L	H
9M57	0.82	Drainage and crossing	L	L	L	L	M
9M57A	0.17	Crossing	L	L	L	L	M
9M58	1.11	Drainage and crossing	L	L	L	L	M
9M58A	0.63	Drainage and crossing	L	L	L	L	M
9M58B	0.55	Drainage and crossing	L	L	L	L	M
9M59A	0.47	Drainage and crossing	E-deer, M-macros	L	L	L	E
9M59C	0.18	Drainage and crossing	E-deer, M-macros	L	L	L	M
9M59D	0.18	Drainage and crossing	E-deer, M-macros	L	L	L	E
9M59E	0.43	Drop, Drainage and crossing	E-deer, M-macros	L	L	L	M
9M60	0.42	Drainage and crossing	L	L	L	L	M
9M62	0.48	Drainage	L	L	L	L	M
9M65	0.63	Drainage	L	L	L	L	M
10M01	0.45	Non-existent					
10M02*	1.25	Drainage and crossing	H-MYLF, FYLF	L	L	L	H
10M03	0.97	IRA					
10M04	1.70	IRA					
10M04A	0.27	IRA					
10M07	2.64	Overgrown					
10M09	0.84	Non-existent					

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
10M11	1.36	Drainage	L	L	L	L	M
10M12	0.95	Drainage	L	L	L	L	M
10M13	0.20	Evaluate Heritage. Drainage.	L	L	L	M	M
10M14	0.12		L	L	L	L	L
10M15	0.54	Drainage	L	L	L	L	M
10M16	1.09	Redundant access. Use August 15-March 1	M-CSO	L	L	L	E
10M19	1.26	Culverts need cleaning.	L	L	L	L	M
10M20	1.31	Drainage and crossing	L	L	L	L	M
10M20A	0.48	Drainage and crossing	L	L	L	L	M
10M20B	0.13	Redundant access.	E-Deer	L	L	L	L
10M21*	1.24	Drainage	L	L	L	L	H
10M21A	0.11		L	L	L	L	L
10M21B	0.91		L	L	L	L	L
10M21C	0.13		E-Deer	L	L	L	L
10M22	0.50	Unmitigatable weed issue	L	L	E	L	L
10M23*	2.59	Drainage and crossing	L	L	L	L	H
10M24*	1.28	Drainage	L	L	L	L	H
10M25	1.14	Drainage and crossing	L	L	L	L	M
10M27*	0.96	Drainage	H-Macros	L	L	L	H
10M28	1.38	Non-motorized, single track					
10M28A	1.01	Non-motorized, single track					
10M29*	1.56	Drainage	L	L	L	L	H
10M30	0.83		L	L	L	L	L
10M30A	0.24		L	L	L	L	L
10M30B	0.27	Redundant	H	L	L	L	E
10M30C	0.09	Redundant	L	L	L	L	L
10M30D	0.18	Redundant	L	L	L	L	L
10M31	0.24		L	L	L	L	M
10M32*	1.26	Drainage	L	L	L	L	H
10M33	0.70	Drainage	E-Deer	L	L	L	M
10M34	1.83	Drainage	L	L	L	L	M
10M35	0.51	Drainage and crossing	E-Deer	L	L	L	M
10M36*	1.01	Remove weeds. Drainage and crossing.	L	L	H	L	H
10M36A	0.17	Channel in the road.	E-Deer	L	L	L	E
10M38	2.47	Unmitigatable weed issue	L	L	E	L	H
10M39	0.17	Unmitigatable weed issue	L	L	E	L	H
10M40*	1.35	Remove weeds. Drainage.	L	L	H	L	M
10M42	1.44	Unmitigatable weed issue.	L	L	E	L	M
10M43	1.15	Unmitigatable weed issue and wet meadow.	E-WTM	L	E	L	M
10M44	0.45		L	L	L	L	L
10M45	0.67		L	L	L	L	L
10M46	0.71	Drainage and crossing	L	L	L	L	M

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
10M47	1.50	Drainage and crossing	L	L	L	L	M
10M54	0.83	Drainage	L	L	L	L	M
10M55*	0.25	Crossing.	H-MYLF	L	L	L	M
11M02*	1.72	Drainage and crossing	M-MYLF	L	L	L	H
11M03*	0.52	Drainage	L	L	L	L	H
11M04	0.76	Drainage	L	L	L	L	M
11M05	0.96		L	L	L	L	L
11M06	0.42	Drainage, protect spring	M	L	L	L	M
11M07	0.16	Drainage	L	L	L	L	M
11M08	1.16	Head cut stabilization and drainage. In and out of wild and scenic.	E-CSO, H-FYLF, Macros	L	L	L	H
11M08A*	0.27	In and out of wild and scenic.	E-CSO, H-FYLF, Macros	L	L	L	H
11M08B*	0.09	In and out of wild and scenic.	E-CSO, H-FYLF, Macros	L	L	L	H
11M09*	1.07	In and out of wild and scenic.	E-CSO, H-FYLF, Macros	L	L	L	H
11M10	1.97	Non-existent					
11M11	1.03	Non-existent					
11M13	1.03	Drainage.	L	M-SIA	L	L	M
11M13A	0.35	Drainage.	L	M-SIA	L	L	M
11M13B	0.53	Proposed SIA.	L	E-SIA	L	L	M
11M13C	0.06	Proposed SIA and redundant.	L	E-SIA	L	L	L
11M13D	0.08	Proposed SIA and redundant.	L	E-SIA	L	L	L
11M14	0.42	Proposed SIA	L	E-SIA	L	L	L
11M15	0.38		L	M-SIA	L	L	L
11M15A	0.25	Proposed SIA and redundant.	L	E-SIA	L	L	L
11M16*	0.65	Non-existent upper section	H-WTM, TRFR	L	L	L	M
11M17	0.96	Drainage	L	L	L	L	M
11M18	0.23	Drainage	L	L	L	L	M
11M18A	0.54	Drainage	L	L	L	L	L
11M19	0.66	System road, update INFRA.	L	L	L	L	L
11M20	3.33	Drainage	L	L	L	L	M
11M22	0.40		L	L	L	L	L
11M23*	0.67	Drainage	L	L	L	L	H
11M24*	0.47	Pull noxious weeds.	L	L	H	L	L
11M25*	0.43	Pull noxious weeds.	L	L	H	L	L
11M30	0.58	Crossing	L	L	L	L	M
11M34	0.73		L	L	L	L	L
11M35*	0.71	Drainage.	L	L	L	L	H

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
11M36*	1.36	Crossing	M-MYLF	L	L	L	H
11M37	2.15	Drainage	L	L	L	L	M
11M38	0.53	Drainage	L	L	L	L	M
11M39	0.55		L	L	L	L	L
11M40	0.64	Drainage and crossing	E-CSO, M-MYLF	L	L		M
11M41	1.29		L	L	L	L	L
11M41A	0.35	Drainage	L	L	L	L	M
11M42	0.16	Meadow and noxious weeds.	L	L	E	L	E-WTM
12M02	1.23	Drainage	L	L	L	L	M
12M03	0.76	Drainage	L	L	L	L	M
12M04	0.41	Drainage, CMP	M-FYLF, Macros	L	L	L	M
12M06	0.85	Redundant					
12M07	0.44	Drainage	L	L	L	L	M
12M08	0.72		L	L	L	L	L
12M09*	3.08	Drainage and crossing.	M-Macros	L	L	L	H
12M09A*	0.84	Drainage and crossing.	M-Macros	L	L	L	H
12M10*	2.96	Drainage and crossing.	M-Macros	L	L	L	H
12M10A*	0.58	Drainage and crossing.	H-Macros	L	L	L	H
12M12*	0.67	Ford needed over Last Chance.	L	L	L	L	H
12M13	0.40	Drainage	L	L	L	L	M
12M14	0.58	Redundant access. Meadow.	L	L	L	L	E-WTM
12M15*	0.23	Drainage, block creek from crossing.	H-MYLF	L	L	L	M
12M16	1.21	Drainage and crossing.	E-CSO, M-FYLF	E-TES	L	L	M
12M17	0.16		L	L	L	L	L
12M18	0.14	Non-existent					
12M19	0.68		L	L	L	L	L
12M20	0.11		L	L	L	L	L
12M21*	0.23	Treat weeds, drainage	M-Macros	L	H	L	M
12M21A*	0.05	Treat weeds	L	L	H	L	L
12M22*	0.15	Treat weeds	L	L	H	L	L
12M23	0.91	Drainage	L	L	L	L	M
12M24	0.28	Parallels, high quantity of noxious weeds.	H-Macros	L	E	L	E
12M25	1.44	Crossing at the system road. Wildlife concerns.	E-NOGO	L	L	L	M
12M26	1.55	Drainage and crossing.	L	L	L	L	E
12M27	0.91	Drainage	M-MYLF	L	L	L	M
12M30	0.04	Redundant					
12M31*	0.99	Drainage	M-Macros	L	L	L	H
12M32	0.16		L	L	L	L	L
12M34	0.25		L	L	M	L	L
12M35	0.11		L	L	L	L	L

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
12M37	0.17		L	L	L	L	L
12M38	0.26	Treat weeds	L	L	M	L	L
13M01	1.07	Drainage and crossing.	L	L	L	L	M
13M03	0.45	Unmitigatable weeds. Crossing perennial creek Sediment entering stream.	L	L	E	L	E
13M04	0.49	Dispersed camping, drainage.	L	L	L	L	M
13M04A	0.16	Unmitigatable weeds.	L	L	E	L	M
13M04B	0.11	Drainage	L	L	L	L	M
13M05	0.58	Non-existent					
13M06*	1.63	Sedimentation in stream channel. Drainage.	M-Macros	L	L	L	H
13M07	1.24	Non-existent					
13M08	1.39	Meadow	H-MIS TRFR	L	L	L	E-Seasonal WTM
13M09	0.46	Drainage. Avoid TES locations during mitigation.	L	M-TES	L	L	M
13M09A	0.06	Redundant					
13M10	12.04	Redundant	E-MIS, Macros	E-TES	L	M	E-Seasonal WTM
13M10A	0.04	Same as above.					
13M10B	0.13	Same as above.					
13M10C	0.04	Same as above.					
13M11	1.97	Non-existent in places					
13M12	1.50	Drainage and crossing	L	L	L	L	M
13M12A	0.25	Drainage	L	L	L	L	M
13M13*	0.67	Drainage and crossing.	L	L	L	L	H
13M14	1.33	Drainage	L	L	L	L	M
13M15	0.81	Drainage	L	L	L	L	M
13M16	0.54	Drainage	L	L	L	L	M
13M17	1.02	Drainage	L	L	L	L	M
13M18	1.5		L	L	L	L	L
13M19	1.19	Goes right down a drainage.	L	L	L	L	E
13M20	0.22	Goes right down a drainage.	L	L	L	L	E
13M21 S	0.60	Drainage	M-TRFR	L	L	L	M
13M21 N	0.71	Drainage	M-TRFR	L	L	L	E
13M21A	0.22	Redundant					
13M22	1.12	Wet Meadow	H-TRFR	L	L	L	E
13M23	0.60	Road right next to creek.	H-TRFR	L	L	L	E
13M24	0.64	Road runs through the stream channel.	L	L	L	L	E
13M25*	0.70	Willow habitat. Swale needs rocking.	H-MYLF, CAR	L	L	L	M
13M26	0.59	Drainage	L	L	L	L	M
13M27	0.93	Non-existent.					
13M28	0.45	Drainage	M- TRFR	L	L	L	M
13M29	2.24	Drainage	L	L	L	L	M

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
13M30*	0.43	Drainage	L	L	L	L	H
13M31	2.33	Drainage	L	L	L	L	M
13M31A	1.56	Drainage	L	L	L	L	M
13M32*	0.21	Heritage evaluation.	L	L	L	H	L
13M34	0.54	Drainage	L	L	L	L	M
13M36	0.13	Heritage evaluation.	L	L	L	M	L
13M37	0.58	Drainage	L	L	L	L	M
13M38	0.47	Drainage. Heritage evaluation.	L	L	L	M	M
13M40	1.02	Drainage	M-FYLF, TRFR	L	L	L	M
13M41*	0.82	Drainage and crossing	L	L	L	L	H
13M42*	0.08	Drainage and crossing	H-Macros	L	L	L	H
14M01	1.76	Drainage and crossing	L	L	L	L	M
14M01A	0.22	Redundant.					
14M01B	0.17	Redundant.					
14M01C	0.24	Redundant.					
14M02 W	0.45	Drainage	L	L	L	L	M
14M02 E	0.81	Non-existent					
14M04	0.70	Close off around the spring.	M- TRFR	L	L	L	M
14M05*	0.72	Drainage and crossing. Avoid TES during mitigation.	L	M-TES	L	L	H
14M06*	0.37	Drainage and crossing. Avoid TES during mitigation.	L	M-TES	L	L	H
14M07	0.49	No access without 13M10					
14M08	0.48	No access without 13M10					
14M09	1.41	No access without 13M10					
14M10	0.57		L	L	L	L	M
14M11	2.07	Drainage and crossing. Need to reroute north portion away from drainage and decommission the existing route.	M-WIFL, M- TRFR, Macro	L	L	L	M
14M12	1.52	Drainage	L	L	L	L	M
14M16	0.29		L	L	L	L	L
15M01	1.46		L	E-TES	L	L	L
15M01A	0.16		L	E-TES	L	L	L
15M02	1.46	Proximity to stream channel.	L	L	L	L	E
15M02A	0.09	Proximity to stream channel	L	L	L	L	E
15M02B	0.86	Drainage.	L	L	L	L	L
15M03	0.29	Trail goes right along creek, contributes sediment directly into the creek.	E-Macros, CAR	L	L	L	H
15M04	0.32	Drainage, reroute away from stream. Channels. Avoid impacts to TES during mitigation activities.	M-Macros, CAR	M-TES	L	L	M
15M05 Ext	0.65	BLM	L	L	L	L	L
15M05	2.18	Drainage	L	L	L	L	M
15M07	0.76	Drainage	L	L	L	L	M

Trail #	MI	Trail Restrictions and Mitigation	Effects Determinations Wildlife	Botany	Weeds	Cultural	Watershed
15M08	0.40	Drainage	L	L	L	L	M
15M10	0.34	Drainage	L	L	L	L	M
16M01	1.78	Non-existent					
16M03	0.77	Drainage	L	L	L	L	M
16M03A	0.12	Redundant					
16M03B	0.27	Redundant					
16M04*	2.08	Crossing in drainage.	M-Macros	L	L	L	H
16M04A*	0.54	Drainage.	M-Macros	L	L	L	H
17M01	0.28	Drainage	L	L	L	L	M
17M02	0.66	System road	L	L	L	L	L
17M03	0.51	Drainage	L	L	L	L	M
17M04	1.22	Drainage	L	L	L	L	M
17M05	3.87	Drainage, Sensitive Plant	L	E-TES	L	L	H
17M06	0.72	No right of way.					
17M06A	0.69	No right of way.					
Total Miles	**396**						

Botanical Resource Codes:
TES: Threatened Endangered and Sensitive
SIA: Special Interest Area

Wildlife Resource Codes:
CAR: Critical Aquatic Refuge
CRLF: California red-legged frog
MYLF: Mountain yellow-legged frog
FYLF: Foothill yellow-legged frog
NWPT: Northwestern pond turtle
TRFR: Tree Frog
Macros: Stream Invertebrates
NOGO: Northern Goshawk
CSO: California spotted owl
WIFL: Willow Flycatcher
HRCA: Home Range Core Area
WTM: Wet Meadow

L: Low resource effects with routine maintenance of the trail.
M: Moderate resource effects that require site-specific mitigation to reduce effects.
- Wildlife: Limited Use Period
- Botany: Avoid sensitive plants
- Weeds: Pull noxious weeds
- Cultural: Evaluate sites
- Watershed: Site-specific mitigations may include addition or modification of route drainage features (out-sloping, rolling dips, waterbars, or ditch relief culverts): addition or modification of existing route stream crossing structures; relocation of short segments of the existing route; and designation of acceptable seasons of use and vehicle class.

H: High resource effects that require site-specific mitigation to reduce effects.
- Wildlife: Limited Use Period
- Botany: Avoid sensitive plants
- Weeds: Pull noxious weeds

Cultural: Evaluate sites

Watershed: Site-specific mitigations may include addition or modification of route drainage features (out-sloping, rolling dips, waterbars, or ditch relief culverts): addition or modification of existing route stream crossing structures; relocation of short segments of the existing route; and designation of acceptable seasons of use and vehicle class.

E: Extreme resource effects that are outside normal mitigation requiring additional environmental analysis.

Appendix B: Forest Plan Standards and Guidelines

The following table includes the Forest Plan standards and guidelines that apply to this project. The standards and guidelines are from the 1988 Plumas National Forest Plan and the 2004 Sierra Nevada Framework Record of Decision, which amended the Plumas Forest Plan.

Table 158. Forest Plan Standards and Guidelines

No.	Source	Area	Standard/Guideline Text
36	SN04 ROD	Forestwide	Inform forest users, local agencies, special use permittees, groups, and organizations in communities near national forests about noxious weed prevention and management.
38	SN04 ROD	Forestwide	As part of project planning, conduct a noxious weed risk assessment to determine risks for weed spread (high, moderate, or low) associated with different types of proposed management activities. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy to develop mitigation measures for high and moderate risk activities.
40	SN04 ROD	Forestwide	Minimize weed spread by incorporating weed prevention and control measures into ongoing management or maintenance activities that involve ground disturbance or the possibility of spreading weeds. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy.
62	SN04 ROD	Forestwide	As part of the project planning process, survey emphasis habitat within 5 miles of occupied willow flycatcher sites to determine willow flycatcher occupancy. Emphasis habitat is defined as meadows larger than 15 acres that have standing water on June 1 and a deciduous shrub component. Use established protocols to conduct these surveys. If these surveys determine willow flycatcher occupancy, add these to the database of occupied willow flycatcher sites and include them in the 4-year survey cycle of willow flycatcher sites described above.
69	SN04 ROD	Forestwide	Prohibit wheeled vehicle travel off of designated routes, trails, and limited off highway vehicle (OHV) use areas. Unless otherwise restricted by current forest plans or other specific area standards and guidelines, cross-country travel by over-snow vehicles would continue. (Does not apply to Alt. 1, applies to other alternatives.
71	SN04 ROD	Forestwide	Mitigate impacts where there is documented evidence of disturbance to the nest site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb nest sites.
85	SN04 ROD	Forestwide	Mitigate impacts where there is documented evidence of disturbance to the fisher den site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites.

No.	Source	Area	Standard/Guideline Text
87	SN04 ROD	Forestwide	Mitigate impacts where there is documented evidence of disturbance to the marten den site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites.
88	SN04 ROD	Forestwide	Designate riparian conservation area (RCA) widths as described in Part B of this appendix. 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.
89	SN04 ROD	Forestwide	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 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.
97	SN04 ROD	Forestwide	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.
98	SN04 ROD	Forestwide	Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic-dependent species. Locate water drafting sites to avoid adverse effects to in stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features.
99	SN04 ROD	Forestwide	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.
110	SN04 ROD	Forestwide	As appropriate, assess and document aquatic conditions following the Regional Stream Condition Inventory protocol prior to implementing ground disturbing activities within suitable habitat for California red-legged frog, Cascades frog, Yosemite toad, foothill and mountain yellow-legged frogs, and northern leopard frog.
112	SN04 ROD	Forestwide	Identify roads, trails, OHV trails and staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits, and day use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic and riparian-dependent species. At the project level, evaluate and consider actions to ensure consistency with standards and guidelines or desired conditions.

No.	Source	Area	Standard/Guideline Text
114	SN04 ROD	Forestwide	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.
118	SN04 ROD	Forestwide	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, that may be contributing to the observed degradation.
150	PFP 88	Forestwide	Manage all Forest lands according to Recreation Opportunity Spectrum ROS designations as shown on the Recreation Opportunity Spectrum Map. Primitive ROS Class - an essentially unmodified natural environment of 5,000 acres or more that is at least three miles from all motorized use, and that provides significant opportunity for isolation from the sights and sounds of man and a feeling of vastness of scale. Visitors have an opportunity to be part of the natural environment, encounter a high degree of challenge and risk, and use a maximum of outdoor skills. Primitive (P) - Applies only t o the Bucks Lake Wilderness.
151	PFP 88	Forestwide	Manage all Forest lands according to Recreation Opportunity Spectrum ROS designations as shown on the Recreation Opportunity Spectrum Map. Roaded Natural ROS Class - a predominately natural environment where resource modifications and utilization practices are evident. Evidence of the sights and sounds of man is moderate and in harmony with the natural environment. Opportunities exist for both social interaction and moderate isolation from sights and sounds of man. RN is defined as those original Roaded Natural areas that are also coded as Foregrund and Sensitivity Level I. These lands lie along the major travel ways and viewsheds. Nearly all developed sites are in this class. Paved roads and hardened sites are common. User interaction is moderate to high at developed sites. Roaded Natural (RN): Meet applicable RN objectives. Design and maintain a all facilities for

No.	Source	Area	Standard/Guideline Text
			conventional motorized use. Allow Development Scale (see Appendix I) 2, 3,or 4 facilities (little site modification to site heavily modified) with 2-5 sites per acre. Keep use below capacity. Manage for a visitor capacity of 1.57 PAOT/usable acre outside of developed sites t o maintain the quality of RN experience.
152	PFP 88	Forestwide	Manage all Forest lands according to Recreation Opportunity Spectrum ROS designations as shown on the Recreation Opportunity Spectrum Map. Roaded Natural ROS Class - a predominately natural environment where resource modifications and utilization practices are evident. Evidence of the sights and sounds of man is moderate and in harmony with the natural environment. Opportunities exist for both social interaction and moderate isolation from sights and sounds of man. Roaded Modified (RM) is defined as those Roaded Natural areas that are also coded as Middleground. Background or Unsee, and Sensitivity Level II or III. This is the general resource management area of the Forest, typified by pick-up trucks and many miles of dirt and gravel roads. Other than trails or trailheads, virtually no improvements are present. Users experience low interaction. Roaded Modified (RM): Meet applicable RM objectives. Allow Development Scale 2 or 3 (little to moderate site development) facilities .Manage for a visitor capacity of 0.2 PAOT/usable acre to maintain the quality.
153	PFP 88	Forestwide	Manage all Forest lands according to Recreation Opportunity Spectrum ROS designations as shown on the Recreation Opportunity Spectrum Map. Rural ROS Class a substantially modified natural environment. Sights and sounds of man are evident. Modification and utilization practices enhance specific recreation activities or provide the protection of vegetative soil cover. Renewable resource Rural: Meet applicable R objectives. Design facilities according to FSM 2330. Allow Development scale 3 or 4 (moderate to heavily modified facilities) with 3-10 sites per acre to maintain the quality of the RM experience. Manage for a visitor capacity of 4.7 PAOT/usable acre outside of developed sites to maintain the quality of the R experience.
154	PFP 88	Forestwide	Apply Prescriptions Rx-5 (Recreation Area Prescription) and Rx-6 (Developed Recreation Site Prescription) at mapped locations.

No.	Source	Area	Standard/Guideline Text
157	PFP 88	Forestwide	Construct new trails according to management area direction.
159	PFP 88	Forestwide	Open trails for public, outfitter/guide, and administrative uses. If planned and publicized, allow temporary closures of less than one year.
160	PFP 88	Forestwide	Provide sanitation facilities at trailheads where needed to protect water quality.
167	PFP 88	Forestwide	Pacific Crest Trail: Prohibit ORV use.
168	PFP 88	Forestwide	Allow ORV use except where: 1. use is prohibited by law or regulation 2. use is incompatible with the management of other resources, 3. resource damage is likely, 4. rights-of-way are insufficient, 5. lands are designated administrative or developed recreation sites. (Superceded by #69, applies to Alt. 1 only)
169	PFP 88	Forestwide	Restrictioned acreages are summarized in Table 4-5 and shown on the accompanying Off Road Vehicle Closure map. (Superceded by #69, applies to Alt. 1 only)
170	PFP 88	Forestwide	Cooperate with the State, other agencies, and user groups to identify, and where compatible with Forest Plan management objectives, develop segments of trail that supports the concept of a statewide trail system connecting use areas and providing the opportunity for long distance trail touring
171	PFP 88	Forestwide	Manage all Forest land in accordance with the adopted Visual Quality Objectives (VQOs) as mapped in detail in the Planning Records and depicted on the accompanying Visual Quality Objectives map and as defined below. Meet VQOs by applying techniques described in publications listed in Appendix K. Preservation (P) Allow for ecological changes only. Preclude management activity except use for recreation facilities, with very low visual impact. Appendix K: Preservation (P): Only ecological change is allowed.
172	PFP 88	Forestwide	Manage all Forest land in accordance with the adopted Visual Quality Objectives (VQOs) as mapped in detail in the Planning Records and depicted on the accompanying Visual Quality Objectives map and as defined below. Meet VQOs by applying techniques described in publications listed in Appendix K. Retention (R) Provide a natural-appearing landscape where management activities are not visually

No.	Source	Area	Standard/Guideline Text
			evident. Appendix K: Retention (R): People's activities are not to be evident to the casual forest visitor.
173	PFP 88	Forestwide	Manage all Forest land in accordance with the adopted Visual Quality Objectives (VQOs) as mapped in detail in the Planning Records and depicted on the accompanying Visual Quality Objectives map and as defined below. Meet VQOs by applying techniques described in publications listed in Appendix K. Partial Retention (PR) Provide a natural-appearing landscape where management activities remain visually subordinate. Appendix K: Partial Retention (PR): People's activities may be evident but must remain subordinate to the characteristic landscape.
174	PFP 88	Forestwide	Manage all Forest land in accordance with the adopted Visual Quality Objectives (VQOs) as mapped in detail in the Planning Records and depicted on the accompanying Visual Quality Objectives map and as defined below. Meet VQOs by applying techniques described in publications listed in Appendix K. Modification (M) Allow management activities to dominate the landscape: however, keep visual elements comparable to those of natural occurrences. Appendix K: Modification (M): Activities may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. Activities should appear as a natural occurrence when viewed in the foreground or middleground.
175	PFP 88	Forestwide	Manage all Forest land in accordance with the adopted Visual Quality Objectives (VQOs) as mapped in detail in the Planning Records and depicted on the accompanying Visual Quality Objectives map and as defined below. Meet VQOs by applying techniques described in publications listed in Appendix K. Maximum Modification (MM) Allow management activities to dominate the landscape; however, keep background visual elements comparable to those of natural occurrences. Appendix K: Maximum Modification (MM): Activities may dominate the characteristic

No.	Source	Area	Standard/Guideline Text
			landscape but should appear as a natural occurrence when viewed as background.
176	PFP 88	Forestwide	When future resource use activity or wildfire degrades visual quality below the adopted VQOs restore visual quality by planting trees and/or other vegetation where regeneration is feasible.
177	PFP 88	Forestwide	Employ a VQO of "Partial Retention" in those areas viewed as foreground from the Pacific Crest Trail, and allow a VQO of "Modification" in the middle and background.
178	PFP 88	Forestwide	Identify potential locations of non-inventoried cultural resources (cultural, historic, and prehistoric) via documents, literature, and oral interviews, and inventory through archaeological survey or reconnaissance prior to potentially-disturbing project activities on non-inventoried lands. Consult with Native Americans and interested parties regarding cultural resources within these areas.
179	PFP 88	Forestwide	Apply National Register (NR) criteria to determine whether a cultural resource is a Class I, II or III property.
180	PFP 88	Forestwide	Determine probable project effects on Class I and II properties.
181	PFP 88	Forestwide	Apply a test of archaeological interest to Class III cultural resources (according to ARPA criteria). Release properties of non archaeological interest. Determine if each cultural resource is eligible for listing on a local, State, or Federal register of significant properties.
182	PFP 88	Forestwide	Consult with Native American and other interested parties regarding eligible cultural properties.
183	PFP 88	Forestwide	Protect and preserve NR and NR eligible cultural resources and those on State or local listings of significant properties, or recover the values that result in their eligibility (in accordance with NRHP or MOU with SHPO) and in consultation with local Native Americans and interested parties.
184	PFP 88	Forestwide	Protect or recover those materials of archaeological interest.
185	PFP 88	Forestwide	Allow scientific study of cultural resources for public education and enjoyment.
186	PFP 88	Forestwide	Develop and implement agreements with the Advisory Council on historic Preservation for the management of identified Class I and II resources.
187	PFP 88	Forestwide	Identify and determine contemporary value of areas and resources used for traditional cultural or religious practices by Native Americans or other ethnic groups. Do not restrict or deter continued use of important areas.
194	PFP 88	Forestwide	Maintain suitability of occupied prairie falcon, osprey, and golden eagle nesting territories.
195	PFP 88	Forestwide	Maintain and enhance the suitability of currently-occupied nesting territories, and provide sufficient potential nesting, foraging, and winter habitat to meet recovery goals of the Pacific States Bald Eagle Recovery Plan. Apply Rx-11 Bald Eagle Habitat Prescription
197	PFP 88	Forestwide	Protect sensitive and special interest plant species as needed to maintain viability. Inventory

No.	Source	Area	Standard/Guideline Text
			and monitor sensitive plant populations on a project-by-project basis.
201	PFP 88	Forestwide	Provide for fish passage on any drainage or stream where spawning activity occurs, except with concurrence by DFG.
225	PFP 88	Forestwide	Implement FS Best Management Practices (BMP's) to meet water quality objectives and maintain and improve the quality of surface water on the Forest. Identify methods and techniques for applying the BMP's during project level planning and incorporate them into the associated project plan and implementation documents (see Plan Appendix Q).
227	PFP 88	Forestwide	Through the use of BMP's, keep water quality at a level that will allow a safe and satisfactory supply when given reasonable treatment by the purveyor.
243	PFP 88	Forestwide	Develop specific soil evaluation and mitigation measures for each project site as needed.
246	PFP 88	Forestwide	Develop and apply erosion control plans to road construction, mining, recreation development, and other site disturbance projects. Develop specific mitigation measures for each project site as needed.
248	PFP 88	Forestwide	Document observations of slope failures, significant erosion of and from road surfaces, erosion of mine spoils, and any other sources of sediment that are affecting water quality or channel stability. Use for future erosion control planning.
264	PFP 88	Forestwide	Avoid or provide special treatment of unstable areas to avoid triggering mass movement.
265	PFP 88	Forestwide	Use the PNF Land Stability Risk Classification data for preliminary assessment of instability problems on all projects which disturb the land surface. Provide geotechnical evaluation of projects with a moderate or higher potential to initiate or accelerate landslides.
266	PFP 88	Forestwide	Allow no land-disturbing activities on extremely unstable land unless a geotechnical investigation determines certain activities are appropriate.
267	PFP 88	Forestwide	Avoid earthquake fault zones whenever possible when designing roads and other facilities.
325	PFP 88	Forestwide	Prevent violations of the law by making NF restrictions clear and reasonable, informing the public, and pursuing aggressive enforcement.
329	PFP 88	Forestwide	Consider additional areas for RNA status as need and opportunity arise. Protect established, recommended, and candidate RNA's to preserve their research values.
334	PFP 88	Rx-1 Wilderness Prescription	Allow no motor vehicle use. Post boundaries and establish physical controls to prevent motorized entry.
368	PFP 88	Rx 2 - Wild and Scenic River Prescription	Scenic zone: Construct campgrounds and other developments which enhance recreation use. To the extent possible, design and manage recreation developments (including access) to avoid areas of high fire hazard and to prevent ignition and spread of wildfire.
372	PFP 88	Rx 2 - Wild and Scenic River Prescription	Construct or improve trails, or mark travel routes as needed, to properly disperse recreation use and promote safe travel in the zone

No.	Source	Area	Standard/Guideline Text
373	PFP 88	Rx 2 - Wild and Scenic River Prescription	Permit no additional motorized access routes to the river and no motorized transportation along the river. Permit motorized access on the Cleghorn Bar, Stag Point, Deadman Springs, and Little California Mine roads and close all others at their junctions with system roads.
387	SN04 ROD errata	Rx 2 - Wild and Scenic River Prescription	Conduct field surveys for TEPS plant species early enough in project planning process that the project can be designed to conserve or enhance TEPS plants and their habitat. Conduct surveys according to procedures outlined in the Forest Service Handbook (FSH 2609.25.11). If additional field surveys are to be conducted as part of project implementation, survey results must be documented in the project file.
403	PFP 88	Rx-3 Feather Falls Scenic Area	Close all trails to motorized use.
420	PFP 88	Rx-4 Challenge Experimental Forest	Prohibit ORV use.
444	PFP 88	RX-6 Developed Recreation Site	Confine vehicle use to interior roads and spurs. Allow ORV use of trails which lead to adjacent off-road vehicle routes or acceptable cross-country areas. (Superceded by #69, applies to Alt. 1 only)
463	PFP 88	Rx-8 Semi-Primitive	Allow no motorized travel except over-the-snow and management access.
498	PFP 88	Rx-11 Bald Eagle Habitat	Close the areas to ORV use.
540	PFP 88	Rx-17 Research Natural Areas	Manage recreational use according to the ROS class of SPNM. Prohibit recreational uses that would contribute to modification of the area.
541	PFP 88	Rx-17 Research Natural Areas	Maintain existing trails, but do not expand the trail system.
609	PFP 88	MA 4 Galen	Restrict ORV use at Big Bald Rock.
646	PFP 88	MA 8 Kellogg	Allow motorized use in the Wild Zone only on the Little California Mine 4WD trail.
670	PFP 88	MA 10 Feather Falls	Prohibit ORVs below the MFFR canyon rim, on the Feather Falls NRT, and the South Branch Falls Trail.
701	PFP 88	MA 12 Pinchard	Manage the Wild Zone [Middle Fork Feather River] consistent with the Wild and Scenic Rivers Act; employ Rx-2. Allow ORVs on the Stag Point 4WD trail.
727	PFP 88	MA 14 Sawmill	Prohibit ORVs below the MFFR Canyon Rim except on Cleghorn Bar Road.
740	PFP 88	MA 14 Sawmill	Preserve and enhance the Fowler Lake area: employ Rx-7. Close existing road access to Fowler Lake and study the area for ORV closure. Provide directional signing from the PCT. Maintain a forage fish base for wildlife.
757	PFP 88	MA 16 Beartrap	Maintain the Poker Flat and Mt. Fillmore 4WD roads.

No.	Source	Area	Standard/Guideline Text
788	PFP 88	MA 19 North Fork	Coordinate trail management with the Lassen NF for shared routes with uses conforming to Appendix 0.
789	PFP 88	MA 19 North Fork	Close the existing 4WD road extending northerly along the PCT from Three Lakes.
827	PFP 88	MA 21 Silver	Maintain the Gold Lake and Rock Lake trails.
831	PFP 88	MA 21 Silver	Areas closed to ORV use include Butterfly Valley, Snake Lake, and the Bucks Lake Wilderness.
889	PFP 88	MA 25 Bear	Prohibit motorized use except on the Deadman Springs and Lost Cabin Springs 4WD roads. Provide for 4WD parking at the junction of the Deadman Springs 4WD road and the PCT.
923	PFP 88	MA 27 Indian Valley	Preserve and enhance the scenic values of the Crystal Lake-Mt. Hough area: employ Rx-7. Provide minimal access and facilities. Allow low impact timber harvest activities. Limit road access to the saddle above the lake.
937	PFP 88	MA 29 Antelope	Restrict wheeled vehicles to existing roads and trails in the Antelope Lake Recreation Area and the Diamond Mountain ORV Closure Areas as shown on the Off Road Vehicle Closure Plan for the Preferred Alternative map.
965	PFP 88	MA 30 Ward	Designate the remainder of the as "open" to ORV's. (Superceded by #69, applies to Alt. 1 only)
990	PFP 88	MA 33 Nelson Creek	Exclude 4WD's along the East Branch of Nelson Creek in the vicinity of McRae Meadows.
1024	PFP 88	MA 35 Lakes Basin	Confine wheeled ORVs to designated routes. Allow motorized over-the-snow travel, but consider restricting to designated areas if conflicts develop with other users or resources.

Appendix C: Present and Reasonably Foreseeable Future Actions

The following projects were considered as present and reasonably foreseeable future actions for cumulative effects analysis.

Table 159. Present and Reasonably Foreseeable Future Actions

District	Project Name	Project Description	Location
Forest-wide	Temporary OHV Forest Order Project CE 31.b(1)	Implement interim OHV forest orders that prohibit wheeled vehicle travel off of existing inventoried roads, areas, and trails for an interim period, until site specific designation can occur utilizing appropriate levels of NEPA.	Forest-wide
Forest-wide	Backcountry Discovery Trail	Designation of Backcountry Discovery Trail (BCDT) on existing roads within the Plumas National Forest to tie together statewide motorized trail	Forest-wide
Forest-wide	Integrated Noxious Weed Control Program	Mechanical, prescribed fire and chemical control to manage invasive plants.	Forest-wide
Beckwourth	Mabie DFPZ	Approximately 7181 acres of DFPZ including underburning, hand thinning, and mechanical treatment. May include road relocation/obliteration.	South of Highway 70 and west of highway 89 near the communities of Graeagle, Portola, Clio, and Blairsden.
Beckwourth	Freeman Project	Reduce Hazardous Fuels, Improve Forest Health, Improve Bald Eagle Habitat, Support Local Communities, Improve Aspen Stands, Transportation Improvements	West of Lake Davis up to Grizzly Ridge.
Beckwourth	Plumas-Sierra Rural Electric Co-op	Construction of 69kv powerline (3-6 miles) and access road construction (3 miles).	S. Hwy 16, south of Honey Lake.
Beckwourth	Camp 14 Salvage and Reforestation Project	Approximately 249 acre salvage of dead and dying trees that resulted from the Antelope Complex Fire that occurred in July 2007.	The project is located approximately 12 miles northeast of Taylorsville, CA, about 2 miles east of Antelope Lake
Beckwourth	Horizon Wind Energy Site Testing	Issue a 3 year Special Use Permit to Horizon Wind Energy to install meterological test towers on several locations.	Several locations on the Beckwourth Ranger District.
Beckwourth	Lake Davis Trails	Build an interpretive trail from Catfish Cove to the lake. Build a trail around the lake using the old railroad grade and connecting inbetween these sections with new trail. The first section is between the 24N10 intersection and lightning tree CG	Lake Davis southeast side
Beckwourth	Sulphur - Barry Stream	Restore approximately 0.5 mile of Sulpher Creek (0.28	Middle Middle Fork Feather River HUC 5

District	Project Name	Project Description	Location
	Restoration Project	mile) and Barry-Creek (0.24 mile) using pond-and-plug technique. Project also includes a Timber Sale for the removal of encroaching conifers on cottonwood stands within the project area.	Watershed
Beckwourth	Clark's Creek Aspen Restoration and Ecosystem Enhancement Project	Thin conifers from three meadows, plant willows and aspent. Desired result: Re-establish naturally occuring riparian vegetation in meadows to improve habitat for deer fawning, willow flycatchers, and other riparian species.	Situated in Clark's Creek, a 10,000 acre tributary watershed to Last Chance Creek, which flows to the North Fork of the Feather River.
Beckwourth	Mills Peak Trail	Construct a seven (7) mile non motorized trail on Beckwourth Ranger District. Starting at Forest Service (FS) Road 22N98 and ending on FS road 822 at Mills Peak. The trail would be 24 to 36 inches wide.	Lakes Basin Recreation Area Beckwourth Ranger District Plumas National Forest
Beckwourth	Smith Lake & Mt Elwell trails reroutes	The Smith Lake Trail reroute will move the trail to the north side of the lake and out of the wet reparian area. The Elwell Trail reroute would install sweeping switchbacks to eliminate the steep grade. A bridge installed at the creek crossings.	Lakes Basin Recreation Area
Beckwourth	Nelson Creek Historic Trail	Reopen the historic Nelson Creek Trail from Zumwalt Flat to the La Porte Rd. A few sections of new trail to connect existing trail or correct over grade problems is also being planned.	Nelson Creek area
Beckwourth	Grizz Project	Defensible Fuel Profile Zone (DFPZ), Group Selections (GS) and Individual Tree Selection (ITS). In th past, these types of projects have also involved the treatment of noxious weeds, road decommissioning and upgrades.	Along Grizzly Ridge, approximately 5 miles from Spring Garden and 3.5 miles from Cromberg
Beckwourth	Jackson Project (old name Happy Jack Project)	Defensible Fuel Profile Zone (DFPZ), Group Selection (GS) and Individual Tree Selection (ITS) in addition to, Wildland Urban Interface fuels reduction. Road reconstruction, decommissioning and construction.	Approximately 4-11 miles northwest of Portola and 1-7 miles north of Graeagle.
Beckwourth	Ingalls DFPZ	Defensible Fuel Profile Zone	Approximately 3 miles

District	Project Name	Project Description	Location
		(DFPZ), Group Selection (GS) and Individual Tree Selection (ITS) in addition to, Wildland Urban Interface fuels reduction. Road reconstruction, decommissioning and construction.	north of Lake Davis
Beckwourth	Big Hill DFPZ	Defensible Fuel Profile Zone (DFPZ), Group Selection (GS) and Individual Tree Selection (ITS) in addition to, Wildland Urban Interface fuels reduction. Road reconstruction, decommissioning and construction.	Approximately 3 miles north of the town of Old Sloat, California
Beckwourth	Dixie Valley and Little Dixie Sheep Allotments	Change the 12,880-acre Dixie Valley Allotment and the 9,170-acre Little Dixie Allotment from vacant cattle allotments to sheep allotments.	10 to 14 miles north-northeast of the city of Portola, California
Beckwourth	Last Chance Water Quality Improvement Projects	Stream channel stabilization and road improvements	Last Chance watershed, Roads 25N66, 25N72, 25N78, 25N08, 25N65, 25N65A, 25N03
Beckwourth	Red Clover Water Quality Improvement Projects	Stream channel stabilization and road improvements	Red Clover watershed, Roads 24N03Y, 22N22Y, 25N05
Beckwourth	Frenchman Water Quality Improvement Projects	Stream channel stabilization and road improvements	Frenchman watershed
Beckwourth	Lake Davis Water Quality Improvement Projects	Stream channel stabilization and road improvements	Lake Davis watershed
Beckwourth	Nelson-Onion Water Quality Improvement Projects	Stream channel stabilization and road improvements	Nelson-Onion watershed
Beckwourth	Last Chance Meadow Restoration	Pond and plug to raise level of creek and reconnect the floodplain	Last Chance watershed from Doyle crossing to Road 26N20
Beckwourth	Sulphur Creek and Barry Creek Meadow Restoration	Pond and plug to raise level of creeks and reconnect the floodplain	Sulphur and Barry Creek at their confluence
Beckwourth	Red Clover and Poco Creeks Meadow Restoration	Pond and plug to raise level of creeks and reconnect the floodplain	Red Clover and Poco Creeks
Beckwourth	Dotta Canyon Meadow Restoration	Pond and plug to raise level of creeks and reconnect the floodplain	Dotta Canyon
Beckwourth	Last Chance (Meadowview) and Little Last Chance (Rowland Creek)	Pond and plug to raise level of creeks and reconnect the floodplain	Meadowview and Rowland Creeks
Beckwourth	Middle Fork Whitetop	Eradicate tall whitetop along the Middle Fork Feather River	Middle Fork Feather River

District	Project Name	Project Description	Location
	Project	using both mechanical and chemical means to control and eradicate this invasive plant species.	
Feather River	Basin Group Selection	Timber harvest of approximately 1215 acres of group selection and 80 acres of individual tree selection harvest under the Herger-Feinstein Quincy Library Group Forest Recovery Act pilot project.	Approximately 10 miles southwest of Quincy, CA
Feather River	Slapjack Project	Construct Defensible Fuel Profile Zones and harvest trees using group selection and individual tree selection under the Herger-Feinstein Quincy Library Group Forest Recovery Act of 1998.	Southwest of Quincy, CA in the vicinity of Challenge, Clipper Mills, Feather Falls, Forbestwon, and Dobbins, CA
Feather River	Yuba Feather K-8 School Expansion DM	Amend an existing special use authorization to allow construction & maintenance of restroom, relocate propane tank, install an emergency power generator, upgrade septic system, renovate play field, & install a track w/in boundaries of play field.	Feather River Ranger District
Feather River	Watdog	Defensible Fuel Profile Zone and Group Selection Harvest as part of the HFQLG Pilot Project	Southwest of Quincy, CA in the Fall River and South Branch Middle Fork Feather River watersheds
Feather River	Hard Quartz Abandoned Mine Hazard Abatement	Includes removal of six buildings and misc. improvements, i.e. water lines, abandoned personal property; removal of exterior structure associated with mine shaft; closure of vertical mine shaft and interior mine roads	T22N, R7E, Section 4, approximately 17 air miles southwest of Quincy, Ca
Feather River	Phat Chance Mining Claim	Mining Plan of Operation approval for exploratory mining activities	Near Haskins Valley
Feather River	Winkeye Mining Claims	Minerals Plan of Operation - Continuation/Development	Six miles northeast of LaPorte, CA in the Howland Flat area.
Feather River	Sugarberry Project	Construction of fuel breaks (defensible fuel profile zones or DFPZs) on approx. 2,100 acres; group selection timber harvest on approx. 1,000 ac; and individual tree selection on approx. 155 ac. enahance approx 100 ac. of black oak stands, 20 ac aspen	South and east of Little Grass Valley Reservoir, from Gibsonville Ridge in the north to the North Yuba River in the south
Feather River	Pike County Peak Microwave Relay	South Feather Water & Power Agency propose to construct and maintain a microwave	Feather River Ranger District

District	Project Name	Project Description	Location
		system to include new equipment at Pike County Peak.	
Feather River	Flea Hazardous Fuels Reduction Project	Construction of approx. 2,500 ac of fuel breaks known as Defensible Fuel Profile Zones, approx. 350 ac of group selection timber harvest, and approx. 300 ac of individual tree selection in Wildlife Urban Interface near Paradise, Pulga, and Concow, CA	The Flea Project Area is bounded by the North Fork of the Feather River on the east and Little Butte Creek on the west, in the Wildland Urban Interface near Paradise, Magalia, Pulga, and Concow, CA.
Feather River	Lower Middle Fork Feather River Water Quality Improvement Projects	Meadow improvement, stream stabilization, and road improvments	Cleghorn Bar Road, Boulder Creek
Feather River	South Fork Feather River Water Quality Improvement Projects	Meadow improvement, road improvements	South Fork Feather River
Mount Hough	Empire Vegetation Management Project	Construction of a Defensible Fuel Profile Zone, Group Selections, and Individual Tree Selection. May involve temporary road construction, road reconstruction, and road closure/decommissioning.	North of Quincy, California
Mount Hough	Meadow Valley Defensible Fuel Profile Zone and Group Selection	Construction of a Defensible Fuel Profile Zone and Group Selections. May include temporary road construction and road decommissioning	Surrounding the community of Meadow Valley, CA
Mount Hough	Canyon Dam Fuel Treatment Project	Mechanical/Hand Thinning and underburning to treat fuels	
Mount Hough	Copper Penny & Two Penny mining Plan of Operation	Mining Plan of Operation for placer mining and mining related activities along Lights Creek, on the Mt. Hough Ranger District	On or near Lights Creek, on the Mt. Hough Ranger District; the nearest town is Greenville
Mount Hough	UC Berkeley Forestry Camp Permit Amendment	Amendment to realign 200 feet of road and widening of the existing road within permit boundary to provide better access. Road project activities will require felling of 25 trees from 4-25 inches in diameter	UC Berkeley Forestry Camp, Meadow Valley, CA
Mount Hough	Moonlight Road Relocation Project	The proposal is to relocate Forest Service Road 28N03 to a stable location. A landslide blocked access and indicates that the existing road location is on an unstable slope. To prevent further erosion, the existing road will be decommissioned.	The project is located about 10 miles north of Taylorsville, California on Forest Service Road 28N03
Mount Hough	Moonlight Project Amendment	Amendment to current mining Plan of Operation for the Moonlight Project. American	Proposed operations are in the area of Moonlight Valley

District	Project Name	Project Description	Location
		Sheffield Inc.has proposed to conduct approximately 6,000 feet of additional exploratory drilling.	
Mount Hough	Plan of Operation - Dredger's Delight and High Grade Placer Claims	Approval of a plan of operation for placer mining activities which include suction redging, sluicing, and panning on Thompson Creek. Trail improvement and minor construction are required for access to mining operations.	near Quincy on La Porte - Quincy Highway, on Thompson Creek
Mount Hough	Corridor Wildland Urban Interface (WUI) Fuels Reduction Project	Reduce fuels within Quincy Wildland Urban Interface on approximately 550 acres through mechanical removal of biomass and merchantable material, under burning, mastication of brush, hand thinning, piling, and pile burning.	The project is located adjacent to the community of Quincy within the ¼ mile WUI of Chandler Road and Highway 89.
Mount Hough	Keddie Hazardous Fuels Reduction Project	Construction of fuelbreaks known as Defensible Fuel Profile Zones, thinning and group selection harvests, road improvements, and noxious weed treatments	Keddie Project is within the vicinity of Keddie Ridge, Round Valley Reservoir, and Mt. Jura. Communities within include Greenville, Crescent Mills, and Taylorsville, California.
Mount Hough	Moonlight and Wheeler Fires Recovery and Restoration Project	Harvest dead trees utilizing ground-based, skyline, and helicopter logging systems. Construct about 25 miles of temporary roads to access the treatment units. Include reforestation on approximately 17,000 acres.	The project area is located northeast of Greenville and north of Taylorsville in the Lights Creek and surrounding drainages.
Mount Hough	Upper Indian Creek Water Quality Improvement Projects	Stream channel stabilization and road improvements	Upper Indian Creek watershed, Roads 27N25Y, 27N19Y, 27N20Y, 27N22Y, 29N43

Appendix D: Watershed Best Management Practices

7. **Water Quality Monitoring of Off-Highway Vehicle (OHV) Use According To a Developed Plan (PRACTICE: 4-7)**
   g. **Objective**: To provide a systematic process to determine when and to what extent OHV use will cause, or is causing adverse effects on water quality.
   h. **Explanation**: Each Forest's OHV plan will:
      a. Identify areas, or routes where OHV use could cause degradation of water quality.
      b. Establish baseline water quality data for normal conditions as a basis from which to measure change.
      c. Identify water quality standards and the amount of change acceptable.
      d. Establish monitoring methods and frequency.
      e. Identify controls and mitigation appropriate in management of OHVs.
      f. Restrict OHV use to designated routes.
   i. **Implementation**: Monitoring results are evaluated against the OHV plan objectives for water quality and the Forest Plan objectives for the area. These results are documented, along with the actions necessary to correct identified problems.

      If considerable adverse effects are occurring, or are likely to occur, immediate corrective action will be taken. Corrective actions may include, but are not limited to, reduction in the amount of ORV use, signing, or barriers to redistribute use, partial closure of areas, rotation of use on areas, closure to causative vehicle type(s), or total closure, and structural solutions, such as culverts and bridges.

      Closure is accomplished through authority of the Forest Supervisor.

12.2 Synopsis for Road and Building Site Construction

National Forest System road planning, construction, reconstruction, maintenance and/or removal is a complex process. The process involves roads analysis, Access and Travel Management Planning as well as NEPA procedures. Though complex, it assures roads are located, designed and maintained to meet Forest management objectives. General objectives are set by legislation, policy, directives, and Forest and District plans.

Project-specific resource objectives and alternatives will be formulated by an IDT selected and convened by the line officer responsible for the road or building activity. Team members represent as needed; timber, engineering, geology, archaeology, land right-of-way or easements, hydrology, soil science, botany, landscape architecture, recreation, fisheries, wildlife, range, fire, fuels and minerals.

Most of the NFS roads in California were built under the timber harvest program as a requirement of the Timber Sale Contract. Other roads were constructed under Public Works Contracts for range, recreation, fire, or silvicultural purposes, or under special use purpose they serve.

Transportation planning is normally conducted on a Forest-wide basis with the objective of locating roads both to service the individual timber sale areas and to meet a Forest's other long-range transportation needs. Road reconnaissance personnel flag proposed road corridors on the ground using road management objectives, the Forest Transportation Plan, topographic maps, aerial photographs, and any preliminary soils, logging, engineering, or geology data.

These corridors are reviewed by an interdisciplinary team. Modifications in design and/or alignment, or new alternative corridors are proposed based on multiple resource management objectives, and recommendations are made for road design criteria. Existing roads that are to be improved or removed go through the same interdisciplinary review. Inadequate roads that are retained as part of the transportation system are upgraded to current Forest Plan Standards and Guidelines to reduce adverse environmental effects and improve user safety.

Interdisciplinary team roads analysis information and recommendations, along with an economic analysis of alternatives, are used to generate a transportation study report. The report is used to help assess the environmental effects and costs of roads for each alternative in the resource project environmental documentation.

Once an alternative has been chosen through the NEPA process, work begins on the road survey. The transportation study report is used to establish design criteria from which a transportation engineer selects road design standards. The road design standards selected depend on the type and amount of traffic, topography, geology, soils, requirements of the environmental document and the Access Travel Management Plan. Most new roads today, however, are only short segments constructed for local access needs.

Engineers design the road according to the selected design standards, which may include, but are not limited to, road widths, road drainage, maximum road grades, radii, and road surfacing. Members of the IDT are usually involved in the road design phase, to assist in meeting the selected resource objectives. Road planning and implementation includes road design, construction staking and construction inspection. Road design includes selection of construction specifications, which help protect environmental concerns addressed in the environmental document and preparation of the construction contract. Road design and construction use Forest Service Standard Specifications for Roads and Bridges, Special Project Specifications, Timber Sale B and C provisions, General Provisions and applicable American association of State Highway and Transportation Officials (AASHTO) and American Society for Testing and Materials (ASTM) specifications.

While road construction is in progress, the Engineering Representative (ER), Contracting Officers Representatives (COR), SA, FSR and Construction Inspector (CI), are frequently on the project site. These inspectors, along with a purchaser's or contractor's field representative, assure that the project is carried out according to the specifications in the contract. Various interdisciplinary team members will be called upon to review proposed design modifications during construction.

As part of the project plan, a road management objectives are developed which detail the level of maintenance for each road. There are five levels of maintenance for permanent roads varying from Level 1 (custodial care of the road and assuring functional road drainage) to Level 5 (the maintenance of two-laned, paved roads). Maintenance generally consists of, but is not limited to, cleaning, ditches and culverts, road surface grading, pothole patching and surface replacement.

Closed system roads (Level 1) are barricaded to preclude use for a year or longer. Water bars are installed where necessary. All open permanent roads will be inspected periodically and maintained as needed. Temporary roads are built for short-term use, principally under a Timber Sale Contract or for emergency wildfire access. When the temporary road is no longer needed, temporary drainage structures are removed, and the roads are decommissioned as required by the provisions of the applicable contract.

Environmental documents based on the work of the interdisciplinary team are also prepared for proposed building sites. Facilities normally encountered on National Forests are administrative sites, such as fire stations, work centers, ranger stations, campgrounds or visitor centers. Other proposals come from the private sector to build such facilities as: ski areas, marinas, concession buildings, waste disposal areas or access to private land inholdings.

Facility locations will be evaluated in much the same way as timber sale areas. An interdisciplinary team is formed to develop resource objectives, formulate alternatives, and analyze the various sites for environmental effects. The interdisciplinary team prepares environmental analysis, recommends alternatives, design criteria, and mitigation measures to meet Forest resource objectives at each site.

12.21 Index for Road and Building Site Construction Practices

	Practice	Number	Page
24.	Traffic Control During Wet Periods	2-24	78
25.	Snow Removal Controls to Avoid Resource Damage	2-25	79
26.	Obliteration or Decommissioning of Roads	2-26	80
27.	Restoration of Borrow Pits and Quarries	2-27	82
28.	Surface Erosion Control at Facility Sites	2-28	83

12.22 Road and Building Site Construction Best Management Practices

The following are the Best Management Practices (BMPs) for the control of non-point source pollution associated with road and building site construction activities. Each BMP was formulated based on the administrative directives that guide and direct the Forest Services' construction and maintenance of roads, buildings, and administrative facilities on National Forest System lands.

The line officer on each administrative subunit is responsible for fully implementing the directives that require water quality protection and improvement during road and facilities construction and maintenance. The directives referenced in Section 13, provide details on methods to incorporate water quality controls into each phase of the road and facility construction and maintenance program. The BMPs synthesize the direction into a "process" to be followed.

Trained and qualified earth scientists, and other professional employees, are available to provide the engineering work force with technical assistance to identify beneficial uses and the most recent state-of-the-art water quality control methods and techniques; and to evaluate results. Publications and training sessions provide road construction and maintenance engineers with knowledge of the latest proven water quality protection methods.

8. **General Guidelines for the Location and Design of Roads (PRACTICE: 2-1)**
    a. **Objective**: To locate and design roads with minimal resource damage.
    b. **Explanation**: The following are some general considerations, which must be incorporated into the planning process of road location and design. These measures are preventive, apply to all transportation activities, and indirectly protect water quality.
        a. A basic requirement for transportation facility development and operation is the formulation and evaluation of alternatives that will best meet the resource management objectives with the least adverse effect on environmental values.
        b. The location, design, and construction of roads include the use of interdisciplinary teams (IDTs). These teams include professional personnel with skills in road, resources and water quality management. The team evaluates the effects of road system development or modification proposals on the environment, and formulates alternative.
        c. All resource-coordinating instructions for the protection and prevention of damage to National Forest System lands, resources, and ecological systems, including wetlands and floodplains will apply to the planning, development, and operation of transportation facilities. The following instructions apply to permanent roads:

i. Locate roads to complete the area transportation system, to fit the terrain, and to minimize damage to improvements and resources. Avoid sensitive areas such as wetlands, inner gorges and unstable ground to the extent practical.

ii. Base road design standards on design criteria such as traffic requirements of a timber sale, or the overall transportation plan, road management objectives or resource objectives, and minimize the effects on Forest resources including water quality.

iii. Design stream crossing structures to provide the most cost efficient drainage facility consistent with resource protection, facility needs, and legal obligations. The design involves a hydrologic analysis to determine runoff volumes, flood conditions, velocities, scour, and open channel shapes. An economic comparison of various flood frequencies versus structure sizes and types is also done to meet resource and legal requirements and cost/benefit comparisons. All crossings will be designed to provide for unobstructed flows and fish passage, and to minimize diversion potential and alteration of stream channels.

c. **Implementation**: The IDT is selected by the line officer to assist in locating the road to best fit resource objectives, and to develop detailed mitigation measures. For force account projects, Forest engineers will be responsible for developing and meeting design specifications.

For some timber sales awarded to small businesses, the purchaser may request that the Forest Service construct the roads. Under present guidelines, such work is normally done by contracting with a road construction contractor.

The COR, ER or FSR ensures compliance with project plan requirements and the operating plan.

9. Erosion Control Plan (PRACTICE: 2-2)

a. **Objective**: To limit and mitigate erosion and sedimentation through effective planning prior to initiation of construction activities and through effective contract administration during construction.

b. **Explanation**: Land disturbing activities can result in short term erosion. By effectively planning for erosion control, sedimentation can be controlled or prevented. Within a specified period after award of a contract (presently 60 days prior to the first operating season in Timber Sale Contracts, per C6.3) the purchaser will submit a general plan which, among other things, sets forth erosion control measures. Operations cannot begin until the Forest Service has given written approval of the plan. The plan recognizes the mitigation required in the contract. A similar plan is required of miners and special use permittees.

c. **Implementation**: Design engineers develop detailed mitigation using an IDT. The detailed mitigations are reflected in the contract specifications and provisions. The intent of mitigation is to prevent construction-generated erosion, as well as that generated from the completed road, from entering watercourses. Contracted projects are implemented by the contractor or operator. Compliance with contract specifications and operating plans is ensured by the COR, ER, or FSR through inspection.

This practice is commonly applied to all road construction through contract clauses and specifications and will apply to road construction for timber sales, mining, recreation, special uses and other roadwork on NFS lands.

10. **Timing of Construction Activities (PRACTICE: 2-3)**

   a. **Objective**: To minimize erosion by conducting operations during minimal runoff periods.

   b. **Explanation**: The amount of erosion and sedimentation from road construction are affected by the magnitude of water runoff. An essential element of effective erosion control is to schedule operations during the dry season or when rain and runoff are unlikely. Purchasers will be required to schedule and conduct operations during the dry season or when rain and runoff are unlikely. Purchasers will be required to schedule and conduct operations to minimize erosion and sedimentation. Equipment will not be allowed to operate when ground conditions are such that excessive rutting and soil compaction could result. Such conditions will be identified by the COR or ER with the assistance of an earth scientist or other specialists as needed.

   Erosion control work will be kept as current as practicable on active road construction projects. Construction of drainage facilities and performance of other contract work to control erosion and sedimentation will be required in conjunction with earthwork projects. The operator should limit the amount of area being graded at a site at any one time, and should minimize the time that an area is laid bare. Erosion control work must be kept current when road construction occurs outside of the normal operating season.

   c. **Implementation**: Detailed mitigations developed by design engineers and an IDT will be included in the environmental analysis and in subsequent project plans and contracts.

   Project crew leaders and supervisors will be responsible for implementing force account projects to construction specifications and as specified in the project plan. Contracted projects are implemented by the contractor, or operator. Compliance with plans, specifications, and the operating plan will be achieved by the COR or ER through inspection.

11. **Stabilization of Road Slope Surfaces and Spoil Disposal Areas (PRACTICE: 2-4)**

   a. **Objective**: To minimize erosion from exposed cut slopes, fill slopes, and spoil disposal areas.

   b. **Explanation**: This is a preventive practice using bioengineering and other techniques to prevent or minimize erosion. Depending on site factors such as slope angle, soil type, climate, and proximity to waterways, many fill slopes, some cut slopes, and some spoil disposal areas will require vegetative and/or mechanical measures to provide surface soil stability. The level of stabilization effort needed is determined on a case-by-case basis by trained and qualified employees.

Revegetation includes the seeding of plant species grass, legumes, or browse species--or the planting of brush, or trees. Revegetation may also include fertilizer, soil amendments, and mulching or even watering to ensure success. A combination of plant types with both woody root systems and fibrous root systems usually produce better results than a single plant type such as grass. Native species are preferred and used wherever feasible. Where local native seed is not available, not economically feasible or native plants would be ineffective in controlling erosion sterilized grass or cereal grain seed is applied.

Mechanical measures may include, but are not limited to: wattles, erosion nets, terraces, side drains, blankets, mats, riprapping, mulch, tackifiers, pavement, soil seals, and windrowing construction slash at the toe of fill slopes.

c. **Implementation**: Vegetative measures are generally a supplementary device, used to improve the effectiveness of mechanical measures, but can be effective and complete by themselves. They may not take effect for several seasons, depending on the timing of project completion in relation to the growing season.

Mechanical and vegetative surface stabilization measures will be periodically inspected to determine effectiveness. In some cases, additional work will be needed to ensure that the vegetative and/or mechanical surface stabilization measures continue to function as intended.

Initial project location, mitigation measures and management requirements are developed during the environmental analysis process. These are translated into project plans, contract provisions and specifications.

Project road inspectors, and their supervisors monitor work accomplishment and effectiveness, to ensure that design standards, project plan management requirements, and mitigation measures are met.

12. Road Slope Stabilization Construction Practices (PRACTICE: 2-5)

a. **Objective**: To reduce sedimentation by minimizing erosion from road slopes and slope failure along roads.

b. **Explanation**: This is an administrative and construction practice. It is prohibitively expensive to immediately and completely prevent erosion from road cut and fill slopes. However, plan all road construction considering adequate stabilization needs. The first planning requirement is an adequate soils and geologic investigation, to provide data necessary for proper cut and fill design such as:

   a. The correct cut and fill slope steepness according to the stable angle of repose for the type of material.
   b. Methods to handle surface and subsurface runoff.
   c. Necessary compaction standards and surfacing needs.

A prerequisite for stabilization is to provide basic mechanical stability of the soils, using data from soils and geologic investigations to develop requirements for proper slope angles, compaction, and adequate drainage.

c. **Implementation**: Include erosion prevention considerations in planning for all road construction contracts. Application is commonly in conjunction with practice 2-4.

Complete most, if not all, of the stabilization measures prior to the first winter rains. At especially critical locations, with a high erosion and/or sedimentation potential, extensive and reliable remedies will be necessary. Determine a project location and detailed mitigation measures during the environmental analysis and included them in the project plan.

Project crew leaders and supervisors will be responsible for ensuring that force account projects meet design standards and project criteria. Contracted projects are implemented by the contractor or operator. Compliance with project plan requirements and the operating plan is ensured by the COR, or ER through inspection.

13. Dispersion of Subsurface Drainage From Cut and Fill slopes (PRACTICE: 2-6)

a. **Objective**: To minimize the possibilities of cut or fill slope failure and the subsequent production of sediment.

b. **Explanation**: This is a preventive practice. Roadways may change the sub-surface drainage characteristics of a slope. Since the angle and height of cut and fill slopes can increase the risk of instability, it is often necessary to provide subsurface drainage to avoid moisture saturation and subsequent slope failure. Where ground water dispersion is necessary because of slopes, soil, aspect, precipitation amounts, inherent instability, or other related characteristics, dispersion methods would include:

   a. Underdrains or subdrains (e.g. pipes, geotextiles)
   b. Horizontal drains or chimney drains

Dispersal of collected water will be accomplished in an area capable of withstanding increased flows. On erosive soils, energy dissipaters or other slope stabilization treatments or conveyance devices need to be placed below pipes carrying large volumes of water. Road surface may be designed to dissipate the intercepted water in a uniform manner along the road.

c. **Implementation**: Project location and detailed mitigation will be determined by design engineers and the IDT, documented and incorporated into subsequent project plans and contracts.

Project crew leaders and supervisors will be responsible for implementing force account projects to construction specifications as specified in the environmental analysis. Contracted projects are implemented by the contractor or timber sale operator. Compliance with project plan requirements and operating plans is ensured by the COR, FSR, or ER.

14. **Control of Road Drainage (PRACTICE: 2-7)**
    a. **Objective**: Is to minimize the erosive effects of water concentrated by road drainage features; to disperse runoff from disturbances within the road clearing limits; to lessen the sediment yield from roaded areas; to minimize erosion of the road prism by runoff from road surfaces and from uphill areas.
    b. **Explanation**: This is a preventive practice. A number of treatments can be used, alone, or in combination, to control unacceptable effects of road drainage. Methods used to reduce erosion include but are not limited to such controls as construction of properly spaced cross drains, water bars or rolling dips; installing energy dissipaters, apron, downspouts, gabions, flumes, overside drains and debris racks; armoring of ditches, drain inlets and outlets and removing or adding berms to control runoff. Accomplish dispersal of runoff on the road surface by such means as rolling the grade, outsloping or crowning. Installing water spreading ditches or contour trenching can disperse road water after the water leaves the road surface.

       Dispersal of runoff reduces downstream peak flows and associated scouring of the channels and sediment transport.

       Reduce sediment loads from road surfaces by adding aggregate or paving surfaces or by installing such controls as: sediment filters, settling ponds, and contour trenches. Soil stabilization can reduce sedimentation by lessening erosion on borrow and waste areas, on cut and fill slopes, and on road shoulders.
    c. **Implementation**: Project location, design criteria and detailed mitigation are determined and documented during the environmental analysis process. These are then incorporated into the project plan.

       Project crew leaders and supervisors will be responsible for ensuring that force account projects meet construction specifications, and project criteria. Contracted projects are implemented by the contractor, or operator. Compliance with plans, specifications, and operating plans is ensured by the COR, ER, or FSR.

       This practice is required in contracts when the need is identified in the project planning process.
15. **Constraints Related to Pioneer Road Construction (PRACTICE: 2-8)**
    a. **Objective**: To minimize sediment production and mass wasting from pioneer road construction.
    b. **Explanation**: Pioneer roads are built to allow equipment access for construction of planned roadways. Pioneering is usually done within the roadway construction corridor of the planned road. To meet the objective of minimizing sediment the following constraints will be followed:
       a. Confine construction of pioneer roads to the planned roadway construction limits unless otherwise specified or approved by the ER or COR.

b. Locate and construct pioneering roads to prevent undercutting of the designated final cut slope, avoid deposition of materials outside the designated roadway limits, and accommodate drainage with temporary culverts or log crossings.
c. Complete erosion control work prior to the rainy season and in accordance with contract, or project plan requirements.
d. Dewater sites on live streams crossed by pioneer roads with diversion devices (see Practice 2-15).

c. **Implementation**: Determine and document project location and describe mitigations set forth during the environmental analysis process. Incorporate them into subsequent project plans and/or contracts.

Project crew leaders and supervisors will be responsible for implementing force account projects according to construction specifications and as specified in the project plan.

Contracted projects are implemented by the contractor, or timber sale operator. Compliance with plans, specifications, and operating plans is ensured by the COR, FSR, or ER.

16. **Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects (PRACTICE: 2-9)**

a. **Objective**: To minimize erosion and sedimentation from disturbed ground on incomplete projects.

b. **Explanation**: The best drainage design can be ineffective if erosion control has not been completed by the end of the normal operating season. Affected areas can include roads, road fills, tractor trails, skid trails, landings, stream crossings, bridge excavations, and firelines.

Preventive measures include:

a. Removal of temporary culverts, culvert plugs, diversion dams, or elevated stream crossings.
b. Installation of temporary culverts, side drains, flumes, cross drains, diversion ditches, energy dissipaters, dips, sediment basins, berms, debris racks, or other facilities needed to control erosion.
c. Removal of debris, obstructions and spoil material from channels and floodplains.
d. Planting vegetation, mulching, and/or covering exposed surfaces with jute mats or other protective material.

c. **Implementation**: Apply protective measures to all areas of disturbed, erosion-prone, unprotected ground that is not to be further disturbed in the present year. When conditions permit operations outside of the normal operating season, update the operating plan as necessary and keep erosion control measures sufficiently current with ground disturbance to allow rapid closure when weather conditions deteriorate. Do not leave project areas for the winter with remedial measures incomplete.

Develop project mitigation measures and layout requirements during the environmental analysis process. Incorporate them into subsequent project plans and/or contracts.

Project crew leaders and supervisors are responsible for ensuring that force account projects meet construction specifications and project criteria.

Contracted projects are implemented by the contractor or operator. Compliance with project plan criteria, contract specifications and operating plans is ensured by the COR, ER, or FSR.

17. Construction of Stable Embankments (Fills) (PRACTICE: 2-10)

a. **Objective**: To construct embankments with materials and methods, which minimize the possibility of failure and subsequent water quality degradation.

b. **Explanation**. The failure of road embankments and the subsequent deposition of material into waterways may result from the incorporation of slash, or other organic matter into fills, from a lack of compaction during the construction of the embankment, or use of inappropriate placement methods.

To minimize fill failures, design and construct the roadway as a stable and durable earthwork structure with adequate strength to support the treadway, shoulders, subgrade and the roads traffic loads. Proper slope ratio design will promote stable embankments. Adjacent to SMZs construct and place embankments of inorganic material by methods 2 to 6 below. Construct or place other embankments of inorganic material by one, or more of the following methods:

a. Sidecasting and end dumping
b. Layer placement
c. Layer placement (roller compaction)
d. Controlled compaction
e. Special project controlled compaction
f. In some situations it will be necessary to minimize fill volumes and/or strengthen fills using retaining walls, confinement systems, plantings or a combination of techniques.

On projects, where required densities are specified, some type of moisture compaction control will be necessary. Where outer faces of embankments are not stabilized, due to equipment access difficulty, unfinished slopes subject to erosion and slipping will be stabilized following Practice 2-4.

c. **Implementation**: Project requirements and mitigation measures are developed and documented during the environmental analysis and road design process, by the IDT. The appropriate method of embankment placement is chosen during this process.

Project crew leaders and supervisors will be responsible for implementing force account projects, to construction specifications and project criteria. Contracted projects are implemented by the contractor, or operator. Compliance with project plan specifications, and the operating plan is ensured by the COR, CI and ER through inspection.

18. Control of Sidecast Material During Construction and Maintenance (PRACTICE: 2-11)

a. **Objective**: To minimize sediment production originating from sidecast material during road construction or maintenance.

b. **Explanation**: Unconsolidated materials including rocks and boulders that are cast over the side of the road shoulder can roll directly into streams, damage downslope vegetation and create bare areas that are difficult to stabilize with vegetation. Where spoil does not directly reach a stream, it is still highly susceptible to erosion, dry ravel and mass instability, and subsequently can directly deliver sediment to a nearby stream. Site-specific limits and controls for side casting or end hauling are developed and documented during environmental analysis. Loose, unconsolidated sidecast material must not be permitted to enter SMZs, (see Practice 2-17).

   Sidecasting is an unacceptable construction alternative in areas where it can adversely impact water quality. Prior to the start of construction, or maintenance activities, waste areas must be located where excess material can be deposited and stabilized. During road maintenance operations, potential sidecast and other waste material will be utilized on the road surface or removed to designated disposal sites.

   The roadway will be constructed within reasonable limits of the lines, grades, and dimensions given in the engineering drawings and designated on the ground. Provisions for waste material disposal are included in every road construction and maintenance contract.

c. **Implementation**: Project location, selected disposal areas, and mitigation will be developed and documented during the environmental analysis.

   Project crew leaders and supervisors will be responsible for ensuring that force account projects meet construction specifications and project criteria. Road maintenance plans are developed for each Forest and include slide and slump repairs and disposal site locations for excess material.

   Contracted projects are implemented by the contractor or timber sale operator. Compliance with project criteria, contract specifications, and operating plans will be enforced by the COR, ER, or FSR. Standard maintenance specifications have been prepared which include disposal area operation, disposal methods, and surface treatment.

   Timber sale contracts include clause C5.4 to address temporary road maintenance specifications, which includes slide and slump repair, surface blading, and side casting during road maintenance.

19. Servicing and Refueling of Equipment (PRACTICE: 2-12)

a. **Objective**: To prevent pollutants such as fuels, lubricants, bitumens and other harmful materials from being discharged into or near rivers, streams and impoundments, or into natural or man-made channels.

b. **Explanation**: During servicing and refueling of logging and road construction equipment, any spilled pollutants can be transported by runoff to surface waters. If the volume of fuel exceeds 660 gallons in a single container, or if total storage at a site exceeds 1,320 gallons, project Spill Prevention, Containment and Counter Measures (SPCC) plans are required. Contaminated upland soils can be a long-term threat to surface and ground water quality. This threat must be managed by disposing of waste material properly, selecting service and refueling areas well away from wet areas and surface water; by using berms around such sites and by utilizing impermeable liners or other techniques to contain spills according to the Forest SPCC plan.

c. **Implementation**: The COR, ER, CI, or TSA are authorized to designate the location, size and allowable uses of service and refueling areas. Operators are required to remove service residues, waste oil and other materials from National Forest land. They must also be prepared to take responsive actions in case of a hazardous substance spill, according to the Forest SPCC plan.

20. Control of Construction and Maintenance Activities Adjacent to SMZs (PRACTICE: 2-13)

a. **Objective**: To protect water quality by controlling construction and maintenance actions within and adjacent to any streamside management zone so that the following SMZ functions are not impaired:

    a. Acting as an effective filter for sediment generated by erosion from bare surfaces, road fills, dust drift, and oil traces;

    b. Maintaining shade, riparian habitat (aquatic and terrestrial), and channel stabilizing effects;

    c. Keeping the floodplain surface in a resistant, undisturbed condition to slow water velocities and limit erosion by flood flows.

b. **Explanation**: Construction and maintenance fills, sidecast, and end-hauled materials are kept out of SMZs except at designated sites to minimize effects on the aquatic environment. Factors such as stream class, channel stability, sideslope steepness, ground cover, and sideslope stability are taken into account in developing zone widths. In some situations, SMZ widths are established by records of decision and by EIS standards and guidelines. It is also necessary to stabilize fill slopes to prevent sediment accumulations in the streamside zone.

   The SMZs are determined and documented during the environmental analysis process by the IDT, which includes hydrologists, fishery biologists, and other specialists as required.

c. **Implementation**: Project location alternatives are formulated, and mitigation measures developed by the IDT are included into the contract by design engineers. Project crew leaders and supervisors are responsible for ensuring that force account projects meet maintenance and construction specifications and project criteria.

Contracted projects are implemented by the contractor, or operator. Compliance with mitigation measures, contract specifications, and operating plans is ensured by the COR, FSR, or ER.

21. Controlling In-Channel Excavation (PRACTICE: 2-14)

a. **Objective**: To minimize stream channel disturbances and related sediment production.

b. **Explanation**: During construction, heavy equipment may need to cross, or work in and near streams or lakes. This is permitted only as necessary in the construction, or removal of culverts and bridges and other facilities (e.g. water sources, boat ramp/launching sites, etc.) and only under specific protection requirements. The Engineering Representative (ER) is authorized to designate the location of crossings or work sites and coordinate with the contractor to manage heavy equipment.

   Excavation during the installation of instream structures must follow all of the following minimum water quality protection requirements.

   a. Unless otherwise approved, no excavation will be made outside of caissons, cribs, cofferdams, or sheet piling.
   b. The natural streambed or lake bottom adjacent to the structure will not be disturbed without prior approval of the ER or COR.
   c. If any excavation, or dredging is made at the site of the structure before caissons, cribs, or cofferdams are sunk in place, all such excavations will be restored to the original surface and the streambed or lake bottom must be protected with suitable stable material.
   d. Material deposited within the stream or lake area from foundation, or other excavation will not be discharged directly into live streams or lakes, but will be put into settling areas as shown on the engineering drawings or as approved by the ER, or COR. (See Practice 2-15)
   e. If the channel or lake bottom is disturbed during construction, it must be restored to its original configuration while minimizing any additional disturbance.
   f. Disturbances of stream or lake banks are kept to a minimum. Disturbed banks are stabilized.

c. **Implementation**. Mitigation measures developed by the IDT are set forth in the environmental documentation and incorporated into the contract by design engineers. Project crew leaders and supervisors will be responsible for ensuring that force account projects meet construction specifications and project criteria.

   Contracted projects are implemented by the contractor or operator. Compliance with mitigation measures, contract specifications, and operating plans is enforced by the CI, COR, FSR or ER.

22. Diversion of Flows Around Construction Sites (PRACTICE: 2-15)

a. **Objective**: To ensure that all stream diversions are carefully planned, to minimize downstream sedimentation, and to restore stream channels to their natural grade, condition, and alignment as soon as possible.

b. **Explanation**: Streamflow must be diverted around construction sites such as bridges, culverts and dams. The streamflow will be diverted for all live streams according to the instructions of the ER. The diverted flows are returned to their natural streamcourse as soon as possible after construction or at least prior to the rainy season. All disturbed areas are stabilized prior to the rainy season or as needed.

c. **Implementation**: This practice is required by contract clauses. The NEPA and design process will identify where diversions are required, and the design will include mitigation necessary to protect instream values and downstream beneficial uses of the water. Planning must include environmental analysis to identify and prevent unacceptable effects to the beneficial uses of the water. The planning process may require project review and/or issuance of permits or certifications by other Federal, State, or local agencies and, where appropriate, private parties. Case by case determinations must be made during project planning as to out-service review and consultation needs. Coordination with California Department of Fish and Game (CDFG) is initiated in most all cases.

   Project location, bypass design, and detailed mitigation will be developed in the design and planning process to meet project criteria. Project crew leaders and supervisors will be responsible for implementing force account projects to construction specifications and to meet project criteria.

   Contracted projects are implemented by the contractor, or operator. Compliance with project criteria, contract specifications and operating plans is enforced by the CI, COR, ER, or SA.

23. Stream Crossings on Temporary Roads (PRACTICE: 2-16)

a. **Objective**: To ensure that temporary roads do not unduly damage stream channels and to ensure that fish passage is unimpeded by stream crossing structures.

b. **Explanation**: Stream crossing structures (e.g. culverts, bridges) are required on all temporary roads where it is necessary to cross designated channels. Means of crossing will include but not be limited to, culverts, bridges, coarse rock fills, hardened fords, (using such features as rocked approaches), and low water crossings. Identifying locations to cross streams will be accomplished using an IDT. Such crossings are designed to provide for unobstructed flows and the passage of fish, and to minimize damages to stream channels and water quality.

   The number of crossings is kept to the minimum needed for access. Channel crossings will be as perpendicular to stream courses as possible. Streambank excavation will be kept to the minimum needed for use of the crossings, and entry and exit ramps may need to be rocked. Fords and turnpike crossings hardened with washed rock, concrete planks, slabs or geogrid are sometimes an acceptable alternative, depending on water quality, fishery and hydrological considerations.

Temporary crossing facilities will be removed and the site stabilized prior to the rainy season each year or when the facility is no longer needed, which ever is earliest.

c. **Implementation**: This practice is required when documented in the project plan. In timber sales, stream crossing are located, and mitigation is implemented by the SA, using instructions in the TSA Handbook, supplemental Forest guidelines, and considering IDT recommendations. Mitigation at sensitive stream crossings must be assessed, and controls prescribed during the environmental analysis by the IDT.

   Project crew leaders and supervisors will be responsible for ensuring that force account projects meet construction specifications and project criteria.

   Contracted projects are implemented by the contractor, or operator. Compliance with the requirements in the project plan, contract and/or operating plan is ensured by the CI, COR, FSR, SA, or ER.

24. Bridge and Culvert Installation (PRACTICE: 2-17)

a. **Objective**: To minimize sedimentation and turbidity resulting from excavation for in-channel structures.

b. **Explanation**: Excavation is a common requirement for the installation of bridges, culverts, weirs, check dam, riprapping and other structures. Spoil material generated during construction should neither obstruct the stream course (including natural floodplains) nor impair the efficiency of the associated structures. Preventive measures include:

   a. Keep excavated materials out of channels.
   b. Remove any materials stacked, or stockpiled on floodplains prior to the rainy season.
   c. Divert flowing water around work sites to minimize erosion and sedimentation.
   d. Suitably locate bypass roads and develop plans for their subsequent obliteration and stabilization.
   e. In some cases, fill material may have to be imported for better soil compaction. Original fill may have to be exported to a disposal site.

   Streams identified as important for fisheries or other aquatic resources may require that the channel not be disturbed except during flow periods specified in the project plan. Normally, this work would occur during low flow periods. Work would not be allowed during spawning periods, or other periods critical to aquatic resources. Downstream sediment basins or other sediment reduction facilities or techniques will be necessary to mitigate impacts.

c. **Implementation**: Project location and detailed mitigation measures will be developed during the design process to meet project criteria, using an interdisciplinary process.

Project crew leaders and supervisors will be responsible for ensuring that force account projects meet construction specifications and project criteria.

25. **Regulation of Streamside Gravel Borrow Areas (PRACTICE: 2-18)**
    a. **Objective**: To limit channel disturbances and sediment production associated with gravel source development.
    b. **Explanation**: Materials deposited along channels by storm runoff often provide a source of gravel. With adequate planning gravel can be removed with minimal impact on water resources and channel stability. Gravel removal can alter streamflow characteristics and consequently effect channel stability and create a new sediment source. Borrowing will be limited to material deposited above the bankfull line. Borrow area shaping or other special drainage re-configuration actions are taken to maintain channel function.

       Excavation will not take place below the water table unless sediment basins are built to contain, or catch the resulting sediment. Sediment basins should not be subject to washouts. If excess sediment accumulates in basins, the basin will be cleaned and the sediment deposited and stabilized at approved sites outside the area where it could re-enter the stream.

       Wash water or waste from concrete batching, or aggregate operations will not be allowed to enter streams prior to treatment by filtration, flocculation, settling, and/or other means. (See also Practice 3-3)
    c. **Implementation**: Project location, stability and the limits for disturbance and sediment production will be developed through the environmental analysis and the IDT and in consultation with State Fish and Game or other pertinent agency. Detailed mitigation measures will be developed by the design engineer to meet project criteria.

       Project crew leaders and supervisors will be responsible for implementing force account projects to construction specifications and project criteria.

       Contracted projects are implemented by the contractor or operator. Compliance with project criteria, contract specifications, and operating plans is ensured by the CI, FSR, COR, or ER.

       Special us permits issued for gravel bar excavation will include the above requirements, an operating plan and reclamation plan if warranted. District Rangers or their representatives will be responsible for ensuring compliance.

26. **Disposal of Right-of-Way and Roadside Debris (PRACTICE: 2-19)**
    a. **Objective**:
       a. To ensure that organic debris generated during road construction is kept out of streams so that channels and downstream facilities are not obstructed.
       b. To ensure debris dams are not formed which obstruct fish passage, or which could result in downstream damage from high water flow surges after dam failure.

b. **Explanation**: As a preventive measure, construction debris and other newly generated roadside slash developed along roads in the streamside management zone is disposed of by the following means as applicable: (See also Practice 2-11)
   a. On Site:
      i. Piling and burning
      ii. Burying
      iii. Chipping
      iv. Scattering
      v. Disposal in cutting units
      vi. Windrowing at the base of fill slopes
      vii. Incorporation {only in temporary roads}
   b. Removal to agreed upon locations (especially stumps from the road prism).
   c. A combination of the above.
   d. Large limbs and cull logs are removed to designated sites outside the SMZ or relocated within the zone to meet aquatic resource management objectives.

c. **Implementation**: Criteria for the disposal of right-of-way and roadside debris will be established during onsite evaluation by an IDT. Project location and detailed mitigation measures are also developed and set forth in the environmental analysis and incorporated into project plans and/or contracts.

   Project crew leaders and supervisors will be responsible for ensuring that force account projects meet construction specifications.

   Contracted projects are implemented by the contractor or operator. Compliance with plans, specifications, and operating plans is ensured by the CI, COR, or ER.

27. **Specifying Riprap Composition (PRACTICE: 2-20)**
   a. **Objective**: To minimize sediment production associated with the installation and utilization of riprap material.
   b. **Explanation**: Riprap is commonly used to armor streambanks and drainage ways from the erosive forces of flowing water. Riprap must be sized and installed in such a way that it effectively resists erosive water velocities. On occasion, this may require the use of filter blankets, or other methods to prevent undermining. Stone used for riprap will be free of weakly structured rock, soil, organic material and other material not resistant to streamflow that would only serve as sediment sources. Outlets of drainage facilities on erodible soils commonly require riprapping for energy dissipation. The Corps of Engineers and Federal Highway Administration procedures are commonly used for designing riprap structures.
   c. **Implementation**: Project location and detailed mitigation will be developed through the planning and design process to meet the mitigation measures and requirements of the project plan.

Project crew leaders and supervisors will be responsible for implementing force account projects to construction specifications and project criteria.

Contracted projects are implemented by the contractor or operator. Compliance with project criteria and operating plans is ensured by the COR, or ER.

Appendix E: Watershed Maps

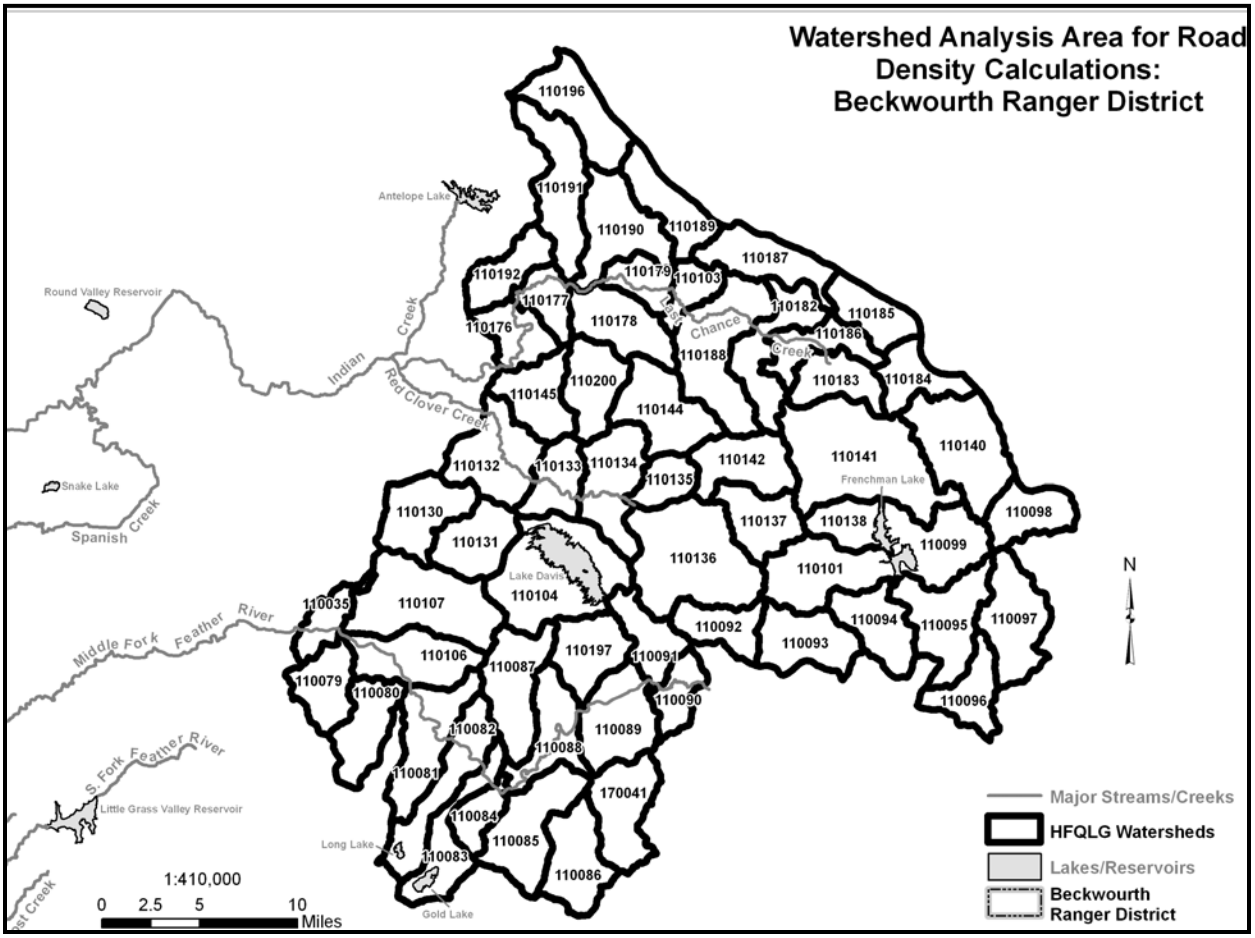
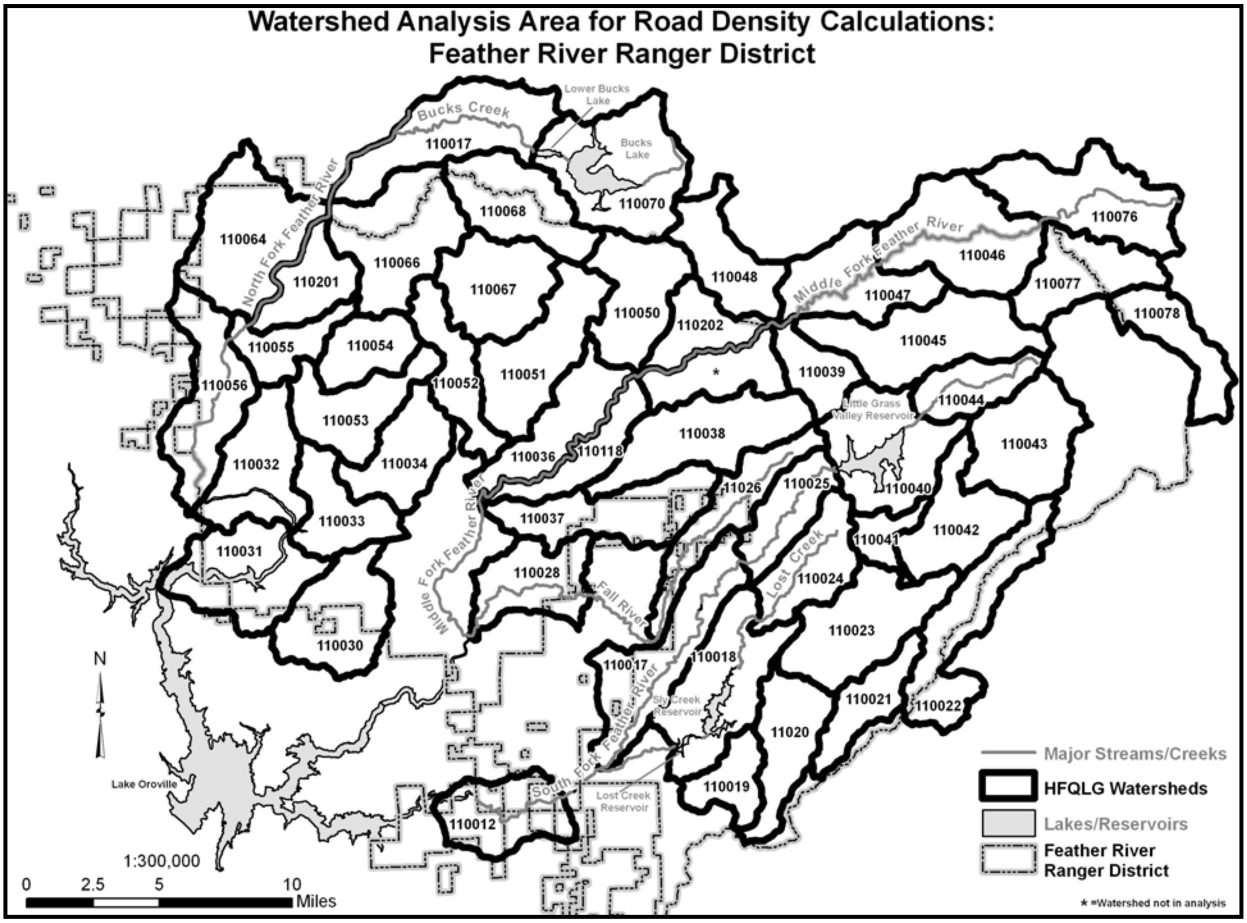


Figure 7. Watershed analysis area for the Beckwourth Ranger District

Figure 8. Watershed analysis area for the Feather River Ranger District



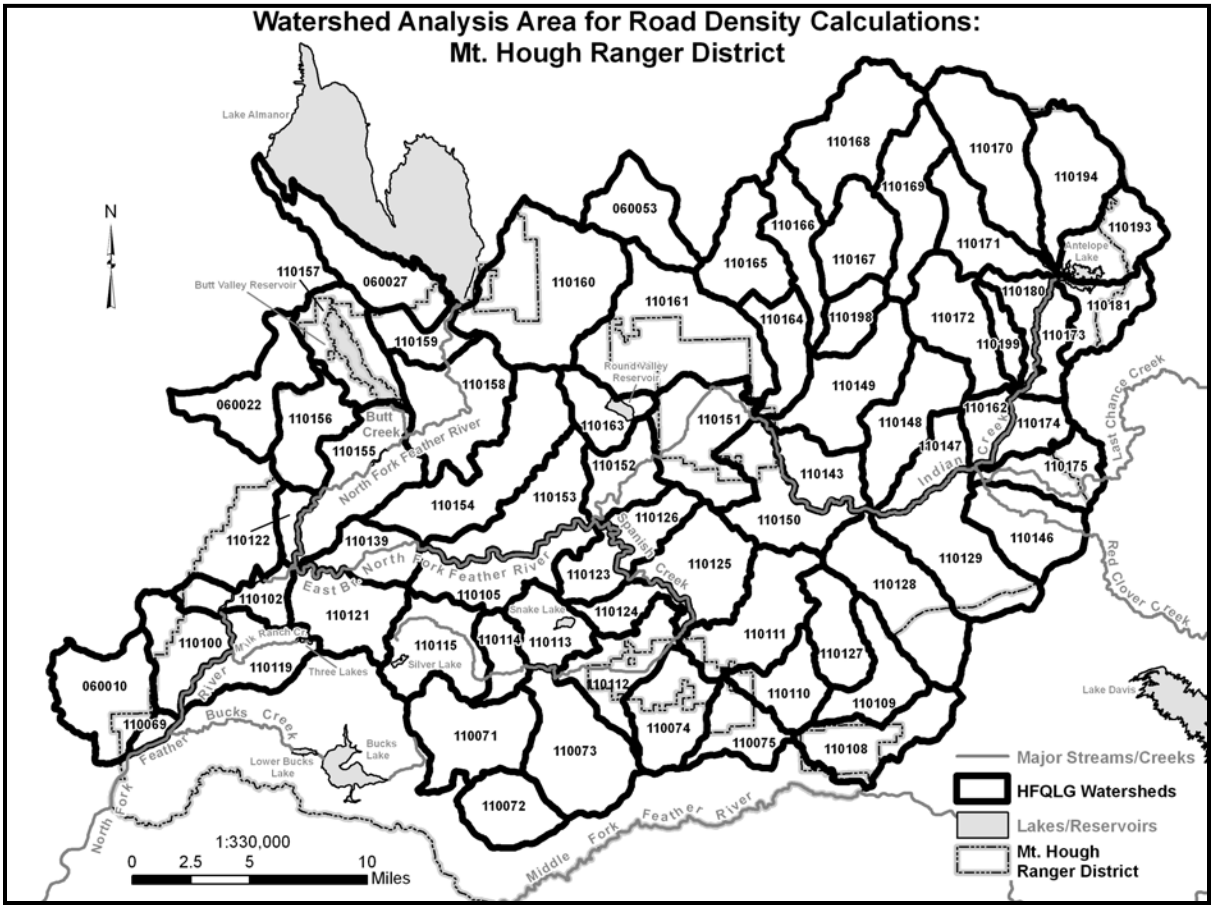


Figure 9. Watershed analysis area for the Mount Hough Ranger District

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