United States
Department of
Agriculture
Forest Service

# ELDORADO

# NATIONAL FOREST

# Travel Analysis Process

September 2015

*In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.*

*Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.*

*To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov .*

*USDA is an equal opportunity provider, employer and lender.*

# Table of Contents

# List of Figures



# List of Tables



# Appendices

This page intentionally left blank

# Chapter 1 SETTING UP THE ANALYSIS

## Objectives

The United States Department of Agriculture (USDA) Forest Service's Road System Management Regulations, 36 CFR Chapter 2 §212.5 (a) require each administrative unit of the National Forest System to identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands. In determining the minimum road system, the responsible official must incorporate a science-based roads analysis at the appropriate scale and, to the degree practicable, involve a broad spectrum of interested and affected citizens, other State and Federal agencies, and Tribal governments. The minimum road system is defined as the road system needed to meet resource and other management objectives adopted in the relevant land and resource management plan (36 CFR § 219), to meet applicable statutory and regulatory requirements, to reflect long-term funding expectations, and to ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.

The Travel Analysis Process (TAP) conducted for the Eldorado National Forest (ENF) provides an overview of issues related to the existing system roads. The analysis compiles existing scientific information and provides a strategic framework to manage roads that are safe and meet public and administrative needs. The strategic framework can be efficiently administered, minimizes negative ecological effects on the land and water resources, and is in balance with funding available to operate and maintain the road system.

The TAP is a broad-scale, comprehensive review of the transportation network. The main objectives of the TAP are:

- Balance the need for access while minimizing risks by examining important ecological, social, and economic issues related to roads.
- Describe transportation management opportunities and strategies in narratives, maps, and tables that address environmental concerns and future access needs.
- Identify methods to achieve the minimum necessary road system for the ENF.

## Scale of the Analysis

The travel analysis was conducted for current system roads in the entire area managed by the ENF. The analysis evaluated the relative risk to resources and benefit to multipurpose forest management of the existing road system to produce a list of roads "likely not needed" for future multipurpose use. The analysis makes no decision, only recommendations.

The analysis did not include unauthorized routes or opportunities to add routes to the system because those issues have been addressed in extensive analysis and public involvement that has occurred recently for the Travel Management Environmental Impact Statement (EIS) in 2008 and Supplemental EIS in 2013. Numerous site-specific analyses have also identified needs and addressed resource issues related to roads. These large scale and small scale decisions have modified the road system by adding routes and subtracting routes as determined by needs for public access and resource protection.

## How the Report Will be Used

The TAP results will assist the ENF in addressing issues related to the management of the existing road system to achieve an efficient system of roads. The TAP will inform future analyses, decisions, and specific actions. The TAP can be updated entirely or partially as necessary to inform long-range strategic plans or to provide site specific information for project level analyses. In addition, Geographic Information System (GIS) screening criteria were designed to be available for use in future project level scoping and analysis.

## Roles of Specialists

The Eldorado National Forest Supervisor assigned the Analysis Team. Table 1 lists the Analysis Team members and their primary disciplines.

**Table 1. Interdisciplinary Team Members.**

| Name | Resource Area |
|---|---|
| Eric Nicita | Soils |
| Cindy Oswald | Recreation, Lands, Special Uses |
| Jen House, Susan Yusida, Dawn Lipton | Wildlife |
| Steve Markman | Hydrology |
| Katy Wilkinson, Dan Teater, Dawn Lipton | Aquatics |
| Matt Brown | Botany |
| Katy Parr | Cultural, Minerals |
| Jay Kurth | Fire and Fuels |
| Don Errington | Vegetation Management |
| Tina Garcia | Grazing |
| Tom Goebel, John Sherman | Engineering |
| Deb Tatman | GIS |
| Kristi Schroeder | Public Affairs |
| Craig Kjar | Coordinator |

The team members identified analysis criteria for each resource area and reviewed GIS screening information to determine relative rankings of risks and benefits for each road. Initial rankings were reviewed and adjusted based on the specialists' field knowledge of the resources. Final rankings were tabulated and recommendations were developed. Reviews of two drafts were done by District specialists to assure that current local conditions were considered.

## Identification of Information Sources

Existing resource and access information was available for this study. The EIS analysis for Subpart B Travel Management was useful in developing the ranking systems, but the ranking criteria were updated to reflect current resource standards. The TAP may be revised as more information becomes available.

The following sources of information were identified for use in this analysis:

- GIS database information for the transportation system, land ownership, vegetation management, aquatic and terrestrial wildlife, botanical resources, cultural resources, stream environment zones, wetlands, soils, geology, and topography.
- Infra roads database.
- Road management objectives for each system road.
- Budget information for funding allocated to roads in prior years and costs for maintaining the road system to standards.
- Wildland fire response plans, vegetation management plans, and fuels treatment plans
- Special Use authorizations.
- Land rights-of-way records and cost share agreements.
- Road requirements in FERC licenses.
- Information from Subpart B Travel Management and Roads Analysis Process.
- Information from the Road Analysis Process.
- Watershed Condition Assessment
- Existing publications and research relating to resource issues on the ENF.

## Analysis Plan

The analysis team followed these steps to complete this analysis:

- Identify the existing road system to be studied.
- Identify criteria of each resource area for ranking roads for risk and benefit.
- Use GIS analysis to apply the criteria where possible (no new data were collected).
- Rank the roads for risk and benefit based on the GIS analysis.
- Review the GIS rankings by individual specialists and modify the rank based on knowledge of the field conditions.
- Use records for Land, Recreation, and Special Uses as well as local knowledge of the District staff to rank benefits for Land and Recreation where GIS data were not available.
- Use individual resource rankings to assign risk and benefit rankings to each road.
- Place roads in one of nine road management categories using relative risk and benefit rankings.
- Use the road management categories to classify the roads for consideration in future projects' National Environmental Policy Act (NEPA) analyses.
- Identify roads as "likely needed" and "likely not needed" using the rankings and current use of each road.

# Chapter 2 DESCRIBING THE SITUATION

## Analysis Area

The ENF is located on the western slope of the Sierra Nevada range in Northern California. It has a Mediterranean climate with definite modifications in moisture and temperature regimes with elevation changes. At the lower elevations, precipitation comes mostly from rainfall, while the higher elevations receive precipitation mainly in the form of snow. At the mid-elevations, precipitation varies between rain and snow. At mid- to upper elevations, rain-on-snow events occur, which can cause significant damage both to stream channels and riparian areas as well as cause significant damage to transportation systems. A major rain-on-snow event in 1997 resulted in 78 Emergency Roads Federally Owned sites within the ENF. Hot, dry summers can cause native surface roads to become very dusty, leading to both safety hazards from lack of visibility and excessive dust particulates affecting air quality. The American Recovery and Reinvestment Act of 2009 provided an opportunity to fund many projects for storm-proofing roads.

Large private companies with industrial timberlands within the ENF boundaries depend upon, and cooperate in the use, maintenance, and design of, the Forest road system. Many owners of smaller private landholdings within the ENF also depend on permits to use Forest system roads to access their property. Water and power utilities have permits and agreements to use roads that access facilities, property, and permits within the ENF boundary to accomplish their missions of providing products to the public in the surrounding area.

Well-known attractions include the Crystal Basin Recreation area, Desolation and Mokelumne Wilderness Areas, Kirkwood and Sierra-at-Tahoe ski resorts, several small resorts along both U.S. Highway 50 and California State Highway 88, campgrounds, picnic areas, and numerous dispersed recreation sites scattered throughout the ENF. Recreation uses and opportunities vary from the Jeepers Jamboree on the Rubicon trail to wilderness solitude. While there are no roads present in wilderness areas, most trailhead areas are served by Forest system roads. The area addressed in this analysis is defined by four Ranger Districts: Amador, Georgetown, Pacific, and Placerville.

## Existing Road System and Direction

The ENF is served by about 330 miles of State and county road systems which provide public access within the forest. These public roads provide access within the ENF to many of the private landholdings within the forest as well as some forest recreation sites. In addition, these public roads serve as corridors that connect to the system of roads managed by the ENF for forest access. The ENF works with counties under cooperative agreements to perform minor reconstruction and maintenance of county roads to address wear and tear by heavy logging truck traffic as needed. The ENF also cooperates with the Federal Highway Administration to

secure funding for reconstructing and improving county roads that serve as key transportation routes into the forest using the Federal Lands Access Program established in 2013 as a replacement for the Forest Highway Program. The State of California administers U.S Highways 50 and 88 through the ENF. U.S. Highway 50 is a high-speed route connecting Sacramento and San Francisco to Lake Tahoe. Highway 50 is the highest standard road through the ENF and carries the highest volume of visitors and commercial traffic. Highway 88 is a National Forest Scenic Byway which carries fewer commercial vehicles than Highway 50, but is still a major traffic corridor serving the forest.

There are 2,704 miles of National Forest System roads managed by the ENF according to data from April 2015 (Table 2). These roads are traveled by millions of visitors as well as serving as an integral part of the rural transportation system for the counties. Forest roads provide access for recreation, research, fish and wildlife habitat management, grazing, timber harvest, fire protection, mining, insect and disease control, and private land access.

**Table 2. Miles of Forest System Roads by Maintenance Levels.**

| Maintenance Level | Miles | Percent |
|---|---|---|
| 1 | 759 | 28 |
| 2 | 1,492 | 55 |
| 3 | 302 | 11 |
| 4 | 123 | 5 |
| 5 | 28 | 1 |
| Total | 2,704 | 100 |

National Forest System roads are not public roads in the same sense as roads that are under the jurisdiction of State and county road agencies. National Forest System roads are not intended to meet the same transportation needs of the public at large as does a county road. Instead, the Forest roads are authorized only for the use and administration of National Forest lands. Although generally open and available for public use, that use is at the discretion of the Secretary of Agriculture. Through authorities delegated by the Secretary, the Forest Service may restrict or control traffic to meet specific management direction (USDA Forest Service, Forest Service Manual 7731).

The network of National Forest System roads was primarily constructed in support of the timber program to remove commercial timber from the forest. The higher standard roads were designed to support multiple uses including public access and recreation. Roads were also constructed with funds from the Forest Service budget allocated to improvement projects for purposes other than timber, such as recreation and public access. Though originally driven by timber access needs, the current transportation system effectively serves multiple land management objectives on both public and private land.

Maintenance of the road system is funded from several sources as discussed in Appendix B, Economics. The ENF has funding to maintain only a portion of the existing road system. The Forest Service has authorities that provide for collection of road maintenance costs for use of the road system by commercial users and private landowners. When maintenance funding is not adequate for all necessary maintenance work, the tasks that are not accomplished become deferred maintenance and the road system slowly deteriorates, affecting user comfort and safety. As road conditions become critical to safety or pose a significant threat of resource damage, projects to correct the deficiency are funded. In some instances, roads may be closed temporarily until a repair project can be funded either as a specific project or as part of a larger project. The road system open for use has never been limited by lack of funding to meet all maintenance needs. Roads are not decommissioned if they serve the multipurpose management needs of the ENF.

A forest-level Roads Analysis Process for Maintenance Level 3, 4, and 5 roads was completed in 2003. Most of these roads are wider with paved surfaces to support higher speeds and user comfort. They serve as collector and arterial corridors for traffic from the Maintenance Level 2 roads – typically native surface, slower speed roads serving timber areas or remote recreation areas where traffic volume and speeds are low. The 2003 analysis was used as an initial input for the roads rankings for the Level 3, 4, and 5 roads. Information from that analysis included long-term rights granted to others and user information that justifies the standard of the road and need for future use of the road. That information was reviewed, validated, and updated during this analysis.

Roads that are not needed for a year or more can be closed to all traffic while remaining available for a future use. The most common recurring use of these roads is vegetation management and timber harvest. Roads currently closed to all motorized traffic, including administrative use, are designated Maintenance Level 1. These roads are usually native surfaces with some hardened surfaces where needed to meet Best Management Practices. In the absence of traffic, plants will become established on the road surface. A well designed road is unlikely to cause resource damage while in Maintenance Level 1. When a road is closed, the entrance is gated, obliterated, or otherwise blocked to prevent access until the road is again needed. Maintenance Level 1, also known as “storage,” is the most cost effective way to protect a not currently needed road for anticipated future use. The ENF currently stores fewer than one-third of its roads at Maintenance Level 1.

The ENF has implemented Subpart B of the Travel Management Rule which designates specific motorized routes open to the public and closes all other routes. As the ENF made that decision, all motorized routes were reviewed in much more detail than was possible for this analysis. Public comments received during that process were also useful in informing this analysis. The Subpart B closures allow the ENF to eliminate public traffic on some routes, thus reducing maintenance expenses. The Subpart B closures also exclude public traffic that could cause significant resource damage from roads that are currently required for resource management projects or access permits, but would otherwise be converted to long-term

storage as Maintenance Level 1 roads.

The ENF manages changes required to keep the road system relevant to the needs of the public and private users who rely on the road system. The road system will continue to serve necessary public access to the forest. The future direction of the road system will depend on public access needs, future uses of the forest, existing access rights granted to public and private entities, and to some degree, funding for maintenance.

## Land Ownership Patterns

There are large tracts of privately owned land within the ENF's boundaries which predate establishment of the forest. Some of these lands were granted during construction of the transcontinental railroad. Private land within the ENF ranges from small private parcels to extensive corporate landholdings used in commercial timber production. Land ownership patterns affect the road system because private land access uses forest roads. In many instances, the number of users is insufficient to warrant extension of the county road system to serve these somewhat isolated private holdings. The ENF roads then become essential for private lands access. As subdivision and development occurs, use of the forest roads increases, resulting in greater maintenance requirements and the need for other improvements. This may result in transfer of road jurisdiction to counties, should the need for services increase beyond the Forest Service's authority.

Ultimately, it is much more effective to manage the nation's forests as large blocks of public land. The Forest Service has authority to exchange or purchase land in order to improve the efficiency of management or enhance management such as acquiring unique resource habitats. The ENF has the ability to make adjustments to land ownership. Those decisions affect the road system, but this program is not a major factor in resolving road management issues.

## Physical Environment

The ENF is located in a mountainous area formed by collision of several oceanic plates that were later infused with igneous rock (granitics) and then covered with volcanic lava and mud flows. These three materials have been subjected to chemical and mechanical weathering and gravity. Patterns of erosion, transport by water, and deposition moved sediments to the valley floors. The materials can be unstable, resulting in mass wasting of various types. The many types of soils formed from the granitics, lava, and mud flows are affected by road construction and maintenance. Choosing the right location and designing the road for the specific site conditions is important for a well performing, low maintenance road with minimal effects on soils and foundation materials. Choice of cover vegetation to stabilize disturbed material must be based on soil type and elevation. The physical environment provides a basis for selection of hydrology and soils factors for this analysis.

## Biological Environment

The ENF provides habitat for over 300 species of birds, mammals, amphibians, reptiles and fish (ENF LRMP, Appendix H, Wildlife Species List). Current management direction is guided by the Endangered Species Act (ESA) of 1973, the National Forest Management Act, (NFMA) and implementing regulations (CFR 219.19), the ENF Land and Resources Management Plan (LRMP) (as amended), and local Habitat and Deer Herd Management Plans (Travel Management EIS).

Several species found on the ENF are listed as Endangered or Threatened under the ESA, or have been designated by the Forest Service, Region 5, as sensitive to management activities (sensitive species). Management Indicator Species (MIS) were identified in the ENF LRMP to represent the diversity of vegetation and special habitat components on the ENF. The risk ratings and criteria of the Threatened, Endangered, Protected, or Candidate (TEPC) and Forest Service (FS)-sensitive species are discussed in Chapter 3.

The ENF has aquatic resources that support forest ecosystems and a number of beneficial uses of water such as recreation, water supplies for human and animal consumption, hydroelectric power production, fisheries, and wildlife habitat. Water quality in undisturbed forested watersheds is usually quite pure because healthy soils, plants, and organisms act as an effective natural water purification system. The biological environment provides a basis for selection of wildlife, botany, and vegetation management factors for this analysis.

## Social Environment

The ENF is located in Alpine, Amador, El Dorado, and Placer Counties and is surrounded by several rural communities. A large component of the wildland-urban interface (WUI) is associated with many of these rural communities and private residences along the western border of the ENF. Development inside the ENF boundary is minimal compared to development adjacent to its boundary, which continues to grow at a consistent pace.

Towns such as Georgetown, Pioneer, Placerville, and Markleeville benefit from recreation on the ENF. Recreational visitors to the forest sleep, eat, buy gas, shop, and have their vehicles repaired in those towns. Dispersed and developed camping, especially with a motor vehicle, are also important recreation activities on the ENF and provide revenue to local economies. The ENF is an hour’s drive from Sacramento, California, two and a half hours from San Francisco, California, and an hour from Reno, Nevada. The eastern border of the Forest is about 25 miles from the vacation resort town of South Lake Tahoe, which attracts visitors from around the world. In addition to the few million visitors who vacation there every year, the forest is the backyard playground for the myriad of subdivisions located within and adjacent to its borders.

Since the late prehistoric times, three Native American ethnographic groups (Northern Sierra

Miwok, Nisenan, and Washoe) have used the resources of the lands that became the ENF. Forests often serve as a source of traditional medicines, food, firewood, and basket-making materials. Native people use roads to access historical and spiritual areas valued for their importance in sustaining cultural traditions and beliefs.

Social factors provide the basis for selecting factors for land, recreation, range, fire, cultural and vegetation management.

# Budget

The ENF receives funding for the National Forest System Roads from three major sources. The first is appropriated funds from the Federal budget process. These monies are used for general road maintenance, decommissioning, and capital improvement projects. This source of funding varies annually, but has been generally declining over the past 10 years. Purposes funded from this source include administration, operation and maintenance, and capital improvement. Additional appropriated funds may be available for large capital improvement projects or rehabilitation treatments for areas that have experience wildland fires.

The second source of funding is from purchasers of Federal timber who either deposit funds or perform road maintenance or a combination of those two. Engineering for design of road reconstruction work is required to be reimbursed by timber purchasers. Maintenance of roads used in the timber sale is either performed by the timber purchaser or funds are collected for the ENF to perform the maintenance. In addition, funds are collected for replacement of surface materials on improved roads. This can be collections for replacing aggregate on gravel roads or repairing or replacing pavement. This category includes three Stewardship Service Contracts with requirements for road improvement and maintenance during the past five years. Not all Stewardship Service Contracts will have these requirements.

The third source of funding is from commensurate use. Collections are received or maintenance is performed from users based on maintenance needs due their use of the roads under Commercial Road Use permits. These are commercial users such as a private timber company or water bottling company or a company extracting minerals who use the roads to transport products from either private or public lands. Similarly, Sierra Pacific Industries (SPI) is a co-owner of part of the road system through the Road Right-of-Way Construction and Use Agreement (also known as the Cost Share Program). As SPI uses the co-owned roads to haul timber, they perform maintenance commensurate with their use. They also make deposits or perform maintenance on roads they use where they are not co-owners. The Federal Energy Regulatory Commission (FERC) permittees operate hydroelectric facilities inside the ENF. The permits for Eldorado Irrigation District and Sacramento Municipal Utility District require them to meet commensurate use requirements when using the ENF road system to access their facilities. Due to reduced staffing levels, availability of experienced staff to quantify the extent of these agreements was not possible, but it is an important aspect of roads funding because of the long history of commercial use of the ENF road system. The data that

were located were used to estimate a value for road maintenance either funded or accomplished in kind through these agreements. After comparison with previous studies and historical collections, these estimates were accepted as adequate representations for the purposes of this study.

More specific information about funding programs, annual funds, funding estimates, and cost to maintain the ENF road system is included in Appendix B, Economics. This analysis shows the ENF cannot afford to maintain all of the roads currently in service to the standards required in Forest Service Directives. That does not mean that the ENF will have to reduce the road system to the size that can be maintained to standard, but it does mean that users may experience less than optimal conditions on the forest roads. Users may be inconvenienced after storms or other events that cause severe damage to the road system.

# Chapter 3 IDENTIFYING ISSUES

## Purpose

This section of the report identifies resource concerns and key issues related to managing the road system.

## Resource Concerns – Risks

Seven categories of risks to resource values were identified for analysis of the road system: Terrestrial Wildlife, Botany, Aquatic Wildlife, Soils, Hydrology, Cultural, and Road Density. They are introduced in this section and the criteria to determine risk rank are developed in Chapter 4.

### Terrestrial Wildlife

The ENF provides significant habitat for wildlife. Roads can impact wildlife by affecting migration routes, fragmenting habitat, increasing mortality, creating barriers, introducing noise and pollution, and enabling human access into wildlife habitats. Roads can facilitate access for unauthorized use of vehicles to travel off road, resulting in direct impacts to wildlife and habitat. Roads also provide access to private land within the ENF boundary and facilitate development and recreational activities which intensify disruption of wildlife. The ENF road system was analyzed using information for several wildlife species with existing GIS data and local information.

### Botany

Key issues for botanical resources from roads on the ENF include impacts such as crushing, altering habitat (e g., erosion and altered hydrologic condition), invasive species introduction, and fugitive dust. Roads can also disrupt hydrologic flow and hydrologic characteristics, thereby impacting aquatic and wetland species that are sometimes a substantial distance downstream of the road impact. For some species of concern, roads can increase the risk of unauthorized collection of native plants. Impacts from roads can often extend beyond the road prism, for example, during roadside management activities such as road brushing and hazard tree removal. GIS layers for research natural areas, threatened and endangered species, meadows, lava caps, fen, watch-list plant occurrence, aquatic plants, whitebark pine, serpentine soils, springs, and botanical special interest areas were used to determine road locations affecting threatened and endangered species, sensitive species, and biodiversity areas.

The potential for vehicle travel and road maintenance activities to spread infestations along established road corridors is the primary issue for invasive species. The higher the traffic volume, the more likely the invasive species are being transported, including species from

outside the ENF. In addition, the surrounding landscape outside of the road prism is susceptible to invasive species spread along designated roads. Roads that intersect recent fires, transmission corridors, hydroelectric facilities, and grazing allotments are considered highly susceptible to potential invasive species spread from Forest system roads.

In addition to risks of damage to desired species or spreading invasive species, the road system has benefits for: 1) monitoring of botanical condition, 2) allowing restoration of native vegetation to improve conditions for desired species, 3) accessing seed collection sites, and 4) providing access to treat invasive species.

### Aquatic Wildlife

The proximity of roads to aquatic habitat may directly or indirectly impact aquatic species. Direct impacts occur where the road crosses occupied or suitable habitat. At these locations, individuals may be disturbed, injured, or killed by motorized vehicles entering their habitats. Where cross-drainage systems are in place, aquatic organism passage may be inhibited. Aquatic species may also be impacted by habitat fragmentation or disruption of migration due to the presence of roads. Habitat alterations; stream channelization, and increased erosion and sediment loading may be a result of hydrologically connected road segments or poorly designed or maintained roads and stream crossings.

Stream crossing failures are generally related to undersized, poorly placed, plugged, or partially plugged culverts. The potential to deliver sediment to the stream can be eliminated from almost all stream crossings by eliminating inboard ditches, outsloping roads, installing rolling dips, and proper design of culverts and other drainage structures. The reduction of road densities and the reconstruction of roads to reduce the use of inboard ditches, for example, can reduce the amount of water that is delivered directly to watercourses, including any associated sediment load. The two most effective ways to reduce sediment delivery to streams is proper design to improve stream crossing resilience to disturbance and decommissioning roads. Across a broad landscape, reducing road density is the most effective way to reduce road-related sediment and improve water quality for aquatic species resources.

The TEPC and FS-Sensitive Species that may be affected by the presence of roads on the ENF are listed in Table 3 and Table 4.

**Table 3. Threatened, Endangered, Proposed, and Candidate Species.**

| Species / Critical Habitat | Scientific Name | Status |
|---|---|---|
| **Native Fish:** | | |
| Delta Smelt | *Hypomesus transpacifus* | Threatened |
| Lahontan Cutthroat Trout | *Oncorhynchus clarkii henshawi* | Threatened |
| Central Valley Steelhead | *Oncorhynchus mykiss* | Threatened |
| Central Valley Spring-run Chinook Salmon | *Oncorhynchus tshawytscha* | Threatened |
| Winter-run Chinook Salmon, Sacramento River | *Oncorhynchus tshawytscha* | Endangered |
| **Amphibians:** | | |
| California red-legged frog | *Rana draytonii* | Threatened |
| California red-legged frog: Critical habitat | *Rana draytonii* Critical Habitat | Designated |
| Sierra Nevada Yellow-Legged Frog | *Rana sierrae* | Endangered |
| Sierra Nevada yellow-legged frog: Critical Habitat | *Rana sierrae* Critical Habitat | Proposed |
| Yosemite Toad | *Anaxyrus canorus* | Threatened |
| Yosemite Toad: Critical Habitat | *Anaxyrus canorus*: Critical Habitat | Proposed |

**Table 4. Forest Service Sensitive Species**

| Species / Critical Habitat | Scientific Name | Status |
|---|---|---|
| **Native Fish:** | | |
| Hardhead | *Mylopharodon conocephalus* | FS-Sensitive |
| Pacific Lamprey | *Entosphenus tridentatus* | FS-Sensitive |
| **Amphibians:** | | |
| Foothill yellow-legged frog | *Rana boylii* | FS-Sensitive |
| Western Pond Turtle | *Actinemys marmorata* | FS-Sensitive |

## Recreation

A road can pose a risk to quiet, non-motorized recreation and wilderness character.

## Soils

The primary effects of roads to soils on the ENF are impacts to shallow soils, diversion of groundwater, and concentration of surface flows. Shallow soils and the unique plant

communities that stabilize them are irreversibly damaged by mechanical disturbance. High natural surface runoff from these soils concentrates water on a road's downslope, resulting in greater erosional potential and sediment delivery to water bodies. Wet soils provide unique habitat for flora and fauna, water storage, and water temperature control, but the subsurface flows can be altered by compaction from vehicle traffic. Rutting in wet soils and runoff from adjacent roads concentrates flow, causing headcuts and gullies which can reduce the function of the wet soils. Road design can address some of these concerns, but not all. For instance, reducing concentration of overland flow and providing erosion protection at drainage points is possible, but reducing the effects of compaction to subsurface flow is very difficult. Adequate road maintenance is required to assure the design features perform correctly or are modified to correct observed impacts.

## Hydrology

Roads can adversely affect hydrology by disrupting connectivity, increasing sediment delivery to streams and other surface waters, and altering groundwater movement and recharge through soil compaction. The ENF contains aquatic resources that support forest ecosystems and a number of beneficial uses of water such as recreation, water supplies for human and animal consumption, hydroelectric power production, fisheries, and wildlife. Healthy soils, plants, and organisms act as an effective natural water purification system. Protecting water quality and quantity requires the monitoring of disturbed areas and taking actions that reduce the impacts of those disturbed areas. Research has shown that roads with their disturbed areas are frequently the largest anthropogenic source of sediment delivered to aquatic features in forested watersheds. In addition, roads that cross or border aquatic features can have a major detrimental effect on hydrologic connectivity of those features. The location and design of roads, as well as the use of Best Management Practices during their construction and maintenance, are important considerations for protection of aquatic resources and hydrologic connectivity.

## Cultural

Roads on the ENF have the potential to directly and indirectly affect cultural resources. Native Americans resided on the area that became the ENF from 5,000 years ago through the last half of the 19th century. Three Native American ethnographic groups (Northern Sierra Miwok, Nisenan, and Washoe) were using resources within the ENF boundary by late prehistoric times. Archaeological evidence confirms rather widespread use and activities due to a wide array of site types. Prior to the opening of the Trans-Sierra roads by immigrant parties, native people used an extensive transportation system throughout the Sierra.

Historic activities such as mining, logging, homesteading, recreation, and ranching left an imprint on the landscape of the ENF. Explorers and trappers visited the area as early as the 1820s. The discovery of gold in Coloma in 1848 lead to rapid population expansion and permanent settlements as well as development of major transportation routes and services

such as the Pony Express and transcontinental railroad and enterprises such as mining, logging, and grazing. The establishment of the ENF in 1907 introduced recreation into the activities of the area. The ENF has the responsibility to preserve the cultural resources that are evidence of these prehistoric and historic activities. Roads can directly affect cultural resources if they are located within cultural sites. In such cases road maintenance and vehicle operation are likely to disturb artifacts and destroy site context. Roads that do not directly affect cultural resources may have indirect consequences by easing access to cultural sites. While this may benefit cultural resources through facilitating research and conservation activities, it can also provide additional opportunities of inadvertent site disturbance through recreational use or actual site plunder for unauthorized collection of artifacts.

# Resource Concerns – Benefits

Five categories of benefits were identified for analysis of the Forest road system: land and special uses, recreation and special uses, fire, range, and vegetation management. They are introduced in this section and the criteria to determine benefit rank are developed in Chapter 4.

## Land and Special Uses

Road benefits to lands and land special uses are generally legal obligations of the ENF. Legislation such as Federal Land Policy and Management Act of 1976, Alaska National Interest Lands Conservation Act, and Federal Road and Trails Act provide authority to grant rights to others or obtain rights from others. These rights could be for access to adjacent private lands, access for public purposes such as utility corridors, county roads, and other purposes. The Federal government also has authority to acquire rights-of-way (ROW) from private or public owners.

Purposes for occupying National Forest System land

The following items are some of the specific purposes for ROW on the ENF:

- **Utilities (i.e., water, power, communications)** – Roads that provide access for maintenance of utility improvements on National Forest System lands can be part of a special use authorization or Federal Energy Regulatory Commission (FERC) license. There are four FERC licenses on the ENF: FERC #137 (Pacific Gas & Electric Co.), FERC #184 (El Dorado Irrigation District), FERC#2101 (Sacramento Municipal Utility District), and FERC #2079 (Placer County Water Agency). Each utility company has a transportation plan that identifies the minimum road and trail system necessary to operate the hydroelectric-licensed facilities. In addition to the FERC-licensed roads, some roads may be under a special use authorization describing use and maintenance responsibilities.

- **Communication Sites** – The ENF has 10 communication sites (mountain tops)

operated by commercial interests and government agencies. The communications site management plan for each describes the road access permitted and maintenance responsibilities.

- **Private Land Access** – There are numerous private land holdings within the boundaries of the ENF that require access across the National Forest System lands. The ENF manages this access within the authorities of public laws for the various types of use.

- **Highway Right-of-Way** – A Federal Highway Administration easement with the State of California recognizes the development and maintenance of Highways 50 and 88 through the ENF. These highways provide important access to the forest and are a key component of the transportation system serving the public.

- **County Right-of-Way** – There are numerous county roads within easements on the ENF which provide service to private inholdings as well as multipurpose forest access. An easement with El Dorado County for the Rubicon Trail is a key recreational resource for off-highway vehicles.

## Recreation and Special Uses

The ENF is classified as an Urban National Forest. It is located one hour from the metropolitan area of Sacramento, which has a population of over one million people, and two to three hours driving time from the San Francisco Bay area, with a population of over six million. The ENF is an ideal place for people seeking to escape from busy urban lifestyles. Its climate and topography offer a wide range of recreational opportunities including hiking, fishing, boating, camping, cross-country skiing, and downhill skiing. Roadways provide essential access to National Forest developed facilities, trailheads, and general forest areas.

Recreational opportunities within the ENF, whether in the public or private sector, require a reliable and accessible road network. The estimated annual visitation from the most recent National Visitor Use Monitoring for the ENF (2012) is 1,150,000 site visits. Numerous streams, natural lakes, and more than ten reservoirs provide key features for a substantial share of recreation activities. There are 36 recreation residence tracts serving 965 permittees, 57 campgrounds, 24 day-use sites, 5 recreation rentals, 20 trailheads, 7 boat launches, 2 staffed-information stations, 2 downhill ski areas, 3 snow parks, 3 resorts, 6 organization camps, and 2 private camps. In addition, the ENF has two popular wilderness areas: Desolation Wilderness and Mokelumne Wilderness.

The most recent Motor Vehicle Use Map (MVUM-2015) catalogs roads identified in the ENF Travel Management EIS and Supplemental EIS available for public motorized recreation (Table 5). The motorized trail system includes an additional 273 miles with 99 miles open yearlong. The trail system is not part of this analysis.

**Table 5. 2015 Motor Vehicle Use Map Roads.**

| Category | Miles |
|---|---|
| Forest Roads Open to all Vehicles, Yearlong | 37 |
| Forest Roads Open to all Vehicles, Seasonal | 921 |
| Forest Roads Open to Highway Legal Vehicles Only, Yearlong | 603 |
| Forest Roads Open to Highway Legal Vehicles Only, Seasonal | 136 |
| Total Forest Roads | 1,697 |
| State or US Highways | 43 |
| Other Public Roads | 302 |
| Grand Total of Roads Available for Vehicle Use within ENF | 2,042 |

## Fire

Vegetation types on the forest are dominated by fire adapted species. Surface fuels and shade tolerant species have increased throughout the forest, which along with other anthropogenic disturbances, has initiated a transition to a fire regime having greater resistance to suppression efforts, high-intensity fire events, and associated vegetation type changes. The urban areas of the forest must be protected from wildland fire, which requires access for fire suppression. Routes are evaluated to determine those necessary for emergency equipment access and evacuation of residents. Additionally, most wildfires occurring on the ENF have potential to move into or seriously impact urban areas if they escape initial attack efforts. Fire suppression is also a significant concern to protect critical habitats for threatened and endangered species, as well as other resource values across the forest. WUI zones and all roads into areas with structures are high priority areas to access in the event of a wildland fire.

Fuels reduction is an important component of both the Fire Program and the Vegetation Management Program. The Timber and Fire staff work together to manage vegetation to reduce hazardous forest conditions with the goal of reducing wildfire intensities through a combination of mechanical fuel treatments and prescription fires. This coordinated effort to reduce hazardous fuels is intended to reduce risk of wildfire damaging public and private property and improve safety of the visiting public and adjacent landowners.

## Tribal and Forest Products Access

Historic and prehistoric features of the ENF are considered when determining appropriate access to the forest. Protection of and management of access to historic properties and features that are listed or eligible for listing on the National Register of Historic Places is a priority. Properties or areas important to the local tribal communities are a priority for protection and access management. Criteria were developed to quantify the risks and benefits of roads to these interests.

## Range

The ENF LRMP authorizes 24 grazing allotments; however, only 9 of these allotments are currently active (Bear River, Chipmunk, Cody Meadow, Corral Flat, Neilsen [Morrison], Old Pino, Pardoe, Sherman, and Sopiago). The 9 active allotments cover a total of 277,217 acres, with 191,395 of those acres being on the ENF. Livestock numbers vary with annual conditions; however, approximately 10,244 animal unit months (AUMs) are authorized by term grazing permits on the 9 active allotments. The grazing allotments are primarily transitory range with a relatively small portion in permanent range.

The grazing season varies by allotment from May to October, depending primarily on elevation. Livestock are trucked onto the allotments from winter range located on private land when range readiness conditions such as vegetative growth and soil moisture have been met. Livestock move across the landscape in response to forage and water availability and livestock operator management activities such as salting, herding and fencing. Livestock are gathered at the end of season and trucked off the allotment.

## Vegetation Management

Vegetation management on the ENF is used to accomplish objectives of the forest health program and typically includes the salvage of wildfire-killed, insect-infested, or diseased timber as well as commercial thinning harvests designed as fuels treatments. Together, salvage and commercial thinning harvests are intended to achieve desired ecosystem conditions for management of multiple forest resources. Stewardship contracts are commonly used to achieve a wide range of goals such as fuels management, watershed improvement, habitat management, and improved timber growth. Most timber harvest related projects incorporate road maintenance, road reconstruction, road decommissioning, or some combination of the three as ancillary project opportunities. Using these opportunities can improve the road system, reduce impacts to resources, and eliminate unneeded roads. Vegetation management tends to be more efficient with road densities higher than those typically preferred for other resource areas.

Salvage projects are driven by objectives that may include fuels treatment, hazardous tree removal, habitat restoration, and economic value capture. Most commonly, a combination of all four objectives determines the need for and design of a timber salvage project. Timber salvage can best be described as an opportunistic program; it is largely dependent upon circumstances or events that are not necessarily controlled by local management or fully predictable. As a result, the salvage program fluctuates broadly from year to year depending on the response needed as a result of wildland fire, endemic or epidemic insect activity, drought, or wind events.

Commercial thinning operations are mostly targeted at strategic fuels reduction objectives or other forest health benefits. Commercial thinning is currently the key component in achieving the goals of the ENF’s Hazardous Fuels Reduction Program.

Maintenance Level 1 and 2 roads provide the majority of the direct access to areas of timber harvest related activities. The existing road system generally provides adequate access to managed timber land on the ENF. Few new permanent roads are needed or constructed in support of the timber program. Road density, design, and specific location are important considerations in determining the economic efficiency of various logging systems, the feasibility of these systems, and the general timber management opportunities that are associated with a specific parcel of land. In general, higher road densities result in more efficient timber harvests because they permit more rapid turn-around times and higher production rates. Yarding and hauling costs are reduced so stumpage values are increased which translates to a higher economic return to the forest. In the case of stewardship contracts, this economic return provides greater benefits in funding for use in various resource enhancement activities. However, higher road densities also tend to increase the total cost of road maintenance and may increase road impacts on other resource values.

# Key Issues

## Access

Road access to the forest is necessary for private landowners, recreation, vegetation management, fire protection, commercial permittees, commensurate users, FERC permittees, utilities, and administrative use.

## Environmental Impacts of Roads

Roads affect resources including watersheds, wildlife, and plants. Vehicles using the road can introduce or spread invasive plants.

## Habitat Fragmentation and Loss of Solitude

Greater numbers of roads (higher road density) disrupts habitat for wildlife and plants, resulting in declines in wildlife numbers. This same issue of road numbers reduces opportunities for solitude or to watch wildlife.

## Funding Maintenance of System Roads

The ENF road system must be maintained to provide a safe transportation system that minimizes resource damage. Over the past 15 years, the available funding appropriations have decreased. The ENF also uses other sources of funding and cooperative programs to accomplish maintenance. The amount of maintenance that can be accomplished is not sufficient to maintain the existing road system to Forest Service Standards. Appendix B, Economics, discusses the road system and funding in more detail.

In the 1990s, many roads were chip sealed, including native surface roads. The cost of maintaining a chip seal is greater than native surface maintenance. Commensurate Use

partners have commented that they prefer native or gravel surfaces that are less expensive to maintain.

# Chapter 4 ASSESSING BENEFITS, PROBLEMS, AND RISKS

## The Analysis Process

The analysis was designed to use specific criteria to rank each road for risk and benefit according to the resource areas identified in Chapter 3. The risk and benefit rankings were used to filter the roads to determine if there were roads that are likely not needed. The risk and benefit rankings were also used to assign each road to one of nine categories. A road's category may assist in identification of future project level analysis needs and opportunities for making improvements to the road system to reduce risk to resources.

## Criteria Used for Risk and Benefit

The criteria for each resource are described in this section of the report.

### Terrestrial Wildlife

The risk to terrestrial wildlife was modeled using existing GIS information for the northern goshawk, California spotted owl, great gray owl, and deer, plus physical features of meadows and road density (Table 6).

**Table 6. Wildlife Risk Ranking Criteria.**

| Species | Ranking Criteria |
|---|---|
| Northern Goshawk<br>California Spotted Owl<br>Great Gray Owl | High – Road is within ¼ mile of roosts, nest groves or nests |
| Northern Goshawk<br>California Spotted Owl<br>Great Gray Owl | Moderate – Road intersects Protected Activity Center surrounding nest |
| Northern Goshawk<br>California Spotted Owl<br>Great Gray Owl | Low – Road does not meet other criteria. |
| Deer | High – No Ranking<br>Moderate –Road occurs in critical winter habitat<br>Low – No Ranking |
| Meadows | High – Road intersects a meadow<br>Moderate – No Ranking<br>Low – No Ranking |
| Road Density | High – Road density greater than 4 miles per square mile |

| Species | Ranking Criteria |
|---|---|
| Road Density | Moderate – Road Density is 2 to 4 miles per square mile |
| Road Density | Low – Road density is less than 2 miles per square mile |

The road density factor analyzed the National Forest System Roads and did not include the ENF motorized trail system (273 miles). The road density analysis did include State, county, and private roads within the forest in the analysis because all of the roads cause resource effects. The density calculation used a circular area of one mile to determine road miles within the one mile. Road density overpowered the species ranks in many cases and became a primary factor in ranking roads as the high risk for this resource.

### Botany

Existing botanical datasets were intersected with the road system to identify the risk from roads. The risk ranking is a composite of two criteria: 1) risk to existing species and 2) risk of invasive plant species to existing species. A biologist with local knowledge reviewed each ranking to increase consistency and accuracy.

The risk to existing species assessment used datasets for:

- TES (threatened, endangered, or sensitive species) plant occurrences.
- Watch-list plant occurrences.
- Channels/aquatic features with TES occurrences bisected by a road (likely indicator of potential habitat at road/feature intersection).
- Meadows.
- Lava caps: use existing layer and supplement with local knowledge of lava cap areas.
- Whitebark pine: all roads above 7,000 feet.
- Springs.
- Serpentine soils.
- Roads intersecting springs (potential habitat).
- Fens.

- Research Natural Areas.
- Botanical Special Interest.

Roads were intersected with these datasets and ranked as follows:

- High – Roads with documented impacts or with sites within 150 feet of the road with potential impacts
- Moderate – Sites within 150 to 300 feet of the road with potential impacts
- Low – Roads with no sites within 300 feet and no documented impacts

The risk of roads to the movement of invasive plant species was determined by volume of traffic and location as well as known infestations. High priority invasive species that the ENF actively manages were the only species included in the analysis (Table 7).

**Table 7. High Priority Invasive Plant Species for the ENF included in analysis.**

| Species | Species |
|---|---|
| *Acroptilon repens* Russian knapweed | *Chondrilla juncea* rush skeleton weed |
| *Aegilops triuncialis* barbed goatgrass | *Cirsium arvense* Canada thistle |
| *Ailanthus altissima* Chinese tree of heaven | *Elymus caput-medusae* medusahead |
| *Arundo donax* Arundo | *Euphorbia oblongata* oblong spurge |
| *Centaurea calcitrapa* purple starthistle | *Genista monspessulana* French broom |
| *Centaurea diffusa* diffuse (white) knapweed | *Lepidium latifolium* tall whitetop |
| *Centaurea melitensis* tocalote | *Lythrum salicaria* purple loosestrife |
| *Centaurea solstitialis* yellow starthistle | *Spartium junceum* Spanish broom |

Rankings were assigned as follows:

- High – Paved, asphalt, Portland cement, bituminous roads, and 150-foot buffers around infestations.
- Moderate –Roads below 4,000 feet; 300-foot buffers around infestations; roads intersecting a corridor of a transmission line, flume, penstock, canal, or other linear feature that could transport invasive species introduced by the road; roads accessing known grazing features; or roads within recent fire perimeters.

- Low – Roads with no infestations and roads above 4,000 feet.

## Aquatic Wildlife

Aquatic wildlife risk rankings were developed in two categories: 1) all native fish and 2) amphibians in five species categories. Aquatic risk rankings do not account for existing condition of the road or stream crossings because adequate data are not available on all conditions. The risk rating assigned for aquatic species is the highest risk rank for any of the six categories. This method provides a conservative approach to identifying risks.

The native fish category screens based on distance from perennial and intermittent streams as shown:

- High – Roads within 50 feet of perennial or intermittent streams.
- Moderate – Roads within 50 to 100 feet from perennial or intermittent streams.
- Low – Roads greater than 100 feet from perennial or intermittent streams.

The amphibian categories are screened based on specific criteria for each species as shown in Table 8. These subcategories take into account the elevation range of the species and are representative of each species' suitable habitat. Suitable habitat layers exist for each of these species so a GIS exercise was conducted for each of these subcategories to determine the risk ranking for each road.

**Table 8. Amphibian Criteria.**

| Species | Ranking | Criteria |
|---|---|---|
| Sierra Nevada Yellow-Legged Frog (SNYLF)[1] | High | Roads within 25 feet of SNYLF suitable habitat |
| Sierra Nevada Yellow-Legged Frog (SNYLF) | Moderate | Roads 25 – 82 feet of SNYLF suitable habitat |
| Sierra Nevada Yellow-Legged Frog (SNYLF) | Low | Roads greater than 82 feet of suitable habitat |
| California Red-Legged Frog[2] | High | Roads within ½-mile of a potential breeding habitat |
| California Red-Legged Frog | Moderate | Roads within ½ to 1 mile of potential breeding habitat |
| California Red-Legged Frog | Low | Roads greater than 1 mile from potential breeding habitat |
| Yosemite Toad[3] | High | Roads within 3,900 feet of a wet meadow |
| Yosemite Toad | Moderate | N/A |
| Yosemite Toad | Low | Roads greater than 3,900 feet from a wet meadow |
| Foothill Yellow-Legged Frog (FYLF)[4] | High | Roads within 50 feet of suitable FYLF habitat |
| Foothill Yellow-Legged Frog (FYLF) | Moderate | Roads within 50 – 100 feet of suitable FYLF habitat |
| Foothill Yellow-Legged Frog (FYLF) | Low | Roads greater than 100 feet from suitable FYLF habitats |
| Western Pond Turtle (WPT)[5] | High | Roads within 150 feet of WPT aquatic habitats |
| Western Pond Turtle (WPT) | Moderate | Roads within 150-300 feet of WPT aquatic habitats |
| Western Pond Turtle (WPT) | Low | Roads greater than 300 feet from suitable WPT aquatic habitats |

## Soils

Three factors were used for the soils portion of the analysis: 1) shallow soils, 2) wet soils, and 3) granitic soils.

- Shallow soils: soils with depths to a water restrictive layer of generally less than 10 inches. These soils produce high runoff because they have limited pore space to store water and high rock content and higher clay content that slows infiltration. The water

[1] Perennial and intermittent streams, meadows, lakes above 4,500 feet
[2] Perennial and intermittent streams, lakes or ponds below 4,500 feet
[3] Wet meadows above 6,500 feet
[4] Perennial and intermittent streams below 6,000 feet
[5] Perennial and intermittent streams, lakes or ponds below 5,000 feet

storage capacity of the soil is exceeded when the soils absorb 3 inches of precipitation. When the soils become saturated, overland flow occurs at rates equal to precipitation rates. Roads that either intersect a shallow soil or are found downslope and near shallow soils concentrate overland flow. Such concentrated overland flows commonly scour hillslope soils from the top of the watershed to intersecting drainages hundreds of feet downslope concentrating with increasing elevation drop.

- Wet soils: soils that are saturated at least part of the year and moist throughout the year. Soils with high moisture content are at high risk for deformation, leading to rutting in wet soils and deep compaction in moist soil. The ruts that form in seasonally saturated soils intercept both surface and shallow subsurface water movement. This interrupts the distribution of moisture in wet soils and can result in isolated drying of wet soils. Also, as concentrated water flows down these ruts, there is a high risk of head-cutting through the soils, resulting in much deeper gullies and increased extent of soil drying. Deep compaction in seasonally saturated and wet soils has the potential of changing subsurface hydrology and affecting plant community composition.

Ideally, a certified soil survey would be used to quickly identify the soil indicators used in this analysis; however, the ENF soil survey has accuracy and resolution limitations that preclude its use as an analysis tool for this project.

Analysis was accomplished using remotely sensed products derived from 30-meter resolution LANDSAT satellite data. The primary data sets include the Region 5 National Forest Remote Sensing Labs (RSL) developed 2005 ENF corporate vegetation data and the Washington Office Remote Sensing Application Center (RSAC) provided DOQ-TM merge data developed as part of the Terrestrial Ecological Unit Inventory data set.

The vegetation datasets subdivide the landscape into vegetation communities. The subdivisions allow for the automated identification of plant communities dependent on moist or wet soils using GIS. The DOQ-TM merge (Digital Orthoquad Imagery merged with LANDSAT data) allows visual identification of wet soil areas and shallow soils. Automated identification was the primary tool for delineating roads through soil indicator sites once visual identification was well correlated with the automatic process. Road maintenance level and transportation infrastructure may mitigate the effects of some road segments passing through soil indicator sites. These will be reviewed during project level analysis. The ranking criteria for soils are:

- High – Roads intersect indicator soils.

- Moderate – Roads do not intersect indicator soil, but may be within a 1/4-mile and at risk of intercepting surface runoff or contributing concentrated flow to an indicator soil.

- Low – No roads are located within 1/4-mile of indicator soils and there is little to no

risk of indirect affect to downslope resources.

## Hydrology

The primary hydrologic risk of roads is the contribution of sediment to aquatic features and the resulting detrimental effects on water quality and aquatic habitat. A secondary hydrologic risk is the disruption of the hydrologic connectivity of aquatic features. The three major risk criteria for hydrology are 1) geologic hazards, 2) stream crossing density, and 3) road -stream proximity. These three hydrologic criteria, which complement the analysis for soils and aquatic wildlife, were evaluated using the existing information in GIS. The hydrologic risk factor assigned to the road was the highest rank in any of the three areas.

- **Geologic Hazard**: The Geologic Hazard risk factor is the risk of geologic hazards causing damage to roads that in turn results in one of more of the following: a) degradation of water quality, b) disruption of hydrologic connectivity of aquatic features, c) degradation of aquatic habitat and aquatic species. For the geologic hazard risk factor, the area of consideration is the intersection of roads and Riparian Conservation Areas (RCAs). RCAs span 300 feet on each side of perennial streams and surrounding special aquatic features (springs, meadows, lakes, etc.) and 150 feet on each side of seasonally flowing streams. The geologic hazards within RCAs that are considered are mass wasting complexes, debris flows, debris slides, eroding hillslopes, inner gorges, rock slides/falls, and rotational slides.

    - High – 30 percent or greater of the road segment within RCA is located within areas identified as a geologic hazard.

    - Moderate – 10 to 29 percent of the road segment within RCAs is within areas identified as a geologic hazard.

    - Low – Less than 10 percent of the road segment within RCAs is within areas identified as a geologic hazard.

- **Stream Crossing Density**: The Stream Crossing Density risk factor is the relative risk of road/stream crossings causing one or more of the following: a) degradation of water quality, b) disruption of hydrologic connectivity of aquatic features, c) degradation of aquatic habitat and aquatic species.

    - High – Road segment has more than 4 stream crossings per road mile.

    - Moderate – Road segment has 3 or 4 stream crossings per road mile.

    - Low – Road segment has 0 to 2 stream crossings per road mile.

- **Road-Stream Proximity**: The Road Stream Proximity risk factor is the relative risk

of roads causing one or more of the following: a) degradation of water quality, b) disruption of hydrologic connectivity of aquatic features, c) degradation of aquatic habitat and aquatic species. For the road –stream proximity risk factor, the area of consideration is where roads are within RCAs.

- High – Greater than 10 percent of the road segment is within the RCA.
- Moderate – 6 to 10 percent of the road segment is within the RCA.
- Low – 0 to 5 percent of the road segment is within the RCA.

The Watershed Condition Assessment for the ENF did not have road-specific information that was necessary for this analysis. The criteria in this section were developed specifically to evaluate the risk of roads to aquatic features and aquatic habitat.

### Cultural

Risk to cultural resources was modeled by intersecting the road system with GIS databased of cultural site occurrences. Risk to cultural resources is defined by impacts to specific cultural resource class types either directly or indirectly associated with travel routes.

Direct at-risk historic properties all share common characteristics. These sites are prehistoric archaeological sites that include buried deposits (e.g., lithic scatters and middens) and are bisected by, or immediately adjacent to, roads. Values associated with buried deposits can cause these sites to be susceptible to ground disturbance such as erosion, rutting, and down cutting of the soil on these routes. In addition, site boundaries of these sites are ill-defined as they have been based solely on surface observations. Subsurface testing of these sites is only method of determining their true extent. Direct risk to historic properties is limited to the route corridor and includes erosion, downcutting, and rutting within site boundaries.

Indirect at-risk properties include resource classes and include impacts from increased exposure or access associated with travel routes. These cultural resource sites include those sites that are high value or are fragile in nature and that are susceptible to increased vandalism and looting, as well as accidental damage from activities.

Ranking included both direct and indirect risks. Direct risk includes the likelihood that use of the road will damage cultural resources. Maintenance or reconstruction of a road on the ENF always includes elimination or mitigation of damage to cultural resources and are thus not risk factors. The risk from a paved road is always low as there is no surface disturbance during use. Risk from gravel roads and native surface roads is ranked low if there are no surveyed cultural resources within the road prism and high if there are surveyed cultural resources within the road prism. Ranking also includes a measure of the risk due to indirect effects such as increased exposure or access associated with travel routes.

## Land and Special Uses

Road benefits to the lands and land special uses are generally legal obligations of the ENF. Legislation such as Federal Land Policy and Management Act of 1976 and Alaska National Interest Lands Conservation Act provide for use of public lands to provide access to adjacent private lands and access for public purposes such as utility corridors and public agencies. The Federal government also has authority to acquire ROW over private lands. Many of the primary lands special uses purposes (i.e., water systems, water tanks, power lines, phone lines, communication sites, hydroelectric facilities) have roads associated with their purpose.

Three criteria were identified for land and special uses:

- High – access for public utilities; critical ROW through private land for access to National Forest System lands, Forest Roads and Trails Act permits to timber companies.

- Moderate – primary or sole access to private land, commercial special uses, communications.

- Low – ancillary access to primary permitted infrastructure, no Federal access needed.

## Recreation and Special Uses

Roads can be both beneficial and pose risks to recreation. For this analysis, the risks to quiet, non-motorized recreation on National Trails were analyzed on a road-by-road basis. There are two National Trails designated by Congress on the Eldorado National Forest - the Pacific Crest National Scenic Trail and the Pony Express National Historic Trail. The Pony Express National Historic Trail and the historically significant Carson Pass-Mormon Emigrant Trail are in many cases are located on existing roads or motorized trails and quiet recreation is not necessarily an expectation of users of these trails on their entire route through the ENF.

The Pacific Crest National Scenic Trail in the ENF is relatively isolated with only a few roads crossing it. In most cases, these roads provide necessary access to the trail and were considered under recreation benefits. All the roads crossing the Pacific Crest National Scenic Trail were reviewed by a multi-disciplined group to rank risks vs. benefits and confirm the status of likely/not likely needed.

Developed recreation sites have been established to accommodate a concentrated amount of visitation. The sites are hardened and improved to allow public access to popular Forest destinations with minimal impact on the resources or the natural setting. More than half of the developed recreation sites located on National Forest lands are operated under a special use permit by designated permittees or concessionaires, who conduct daily operations and maintenance on the facility, with varying responsibilities for the interior roadways. The need for access to Forest recreation areas, campgrounds, trailheads, picnic grounds, boat ramps,

and water systems was considered in developing the criteria. Roads were ranked on a three-level scale as follows:

- High – access to developed recreation sites and water systems and permitted public recreation facilities where there are constructed investments to protect (most are on the most recent MVUM, unless gated year-round). See the recreation facility list in Table 9.

- Moderate – access to regularly-used dispersed recreation sites and areas as catalogued on the most recent MVUM.

- Low – no access to developed facilities or dispersed recreation areas.

**Table 9. Recreation Facilities List.**

| Facility | Facility |
|---|---|
| BEAR RIVER PARDOES POINT CG | LOON LAKE CG |
| BEAR RIVER SUGAR PINE POINT CG | LOON LAKE EQUESTRIAN GCG |
| BEAR RIVER GROUP CG | LOON LAKE CHALET RR |
| TRADGEDY SPRINGS PG | RED FIR GCG |
| CAPLES LAKE CG | VAN VLECK BUNKHOUSE RR |
| CAPLES LAKE RESORT | ROBBS PEAK LOOKOUT/HUT RR |
| KIRKWOOD LAKE | GERLE CREEK PICNIC ALSO 13n26B-B |
| SILVER LAKE CG | GERLE CREEK CG |
| KIT CARSON RESORT | WENCH CREEK CG |
| PIPI CG | WENCH CREEK GCG |
| WOODS LAKE CG | JONES FORK CG |
| MARTIN MEADOWS CG | BIG SILVER GCG |
| MIDDLE FORK COSUMNES CG | CLEVELAND CORRAL |
| MOKELUMNE CG | ANGEL CREEK PG |
| MOORE CG | ICEHOUSE CG |
| WHITE AZALEA CG | ICEHOUSE BOAT RAMP |
| STUMPY MEADOWS CG | AZALEA COVE CG |
| STUMPY MEADOWS BOAT RAMP | CAMINO COVE CG |
| LAKE EDSON PIC VISTA PT | LONE ROCK CG |
| MIDDLE MEADOW GCG | NORTH SHORE CG (Loon Lake) |
| BIG MEADOW CG | PLEASANT CG (Loon Lake) |
| BLACK OAK GCG | SOUTH FORK GCG |
| PONDEROSA COVE CG | STRAWBERRY POINT CG |
| BALDERSON CORRAL TH | WENTWORTH SPRINGS CG |
| DRU BARNER CG | WEST POINT BOAT CG |
| HELL HOLE CG | WEST POINT BOAT RAMP |
| UPPER HOLE CG | SCHLEIN STATION |
| DONALDSON | ALDER RIDGE LOOKOUT |
| ICEHOUSE BIKE TRAIL | SLY PARK ENVIRONMENTAL EC |
| UNION VALLEY BIKE TRAIL | SLY GUARD RR/CEDAR PARK TH |
| TWIN LAKES TH | ASPEN CREEK (S-A-TAHOE) |
| LYONS CREEK TH | SIERRA-AT-TAHOE RESORT |
| NORTHWIND CG | ECHO SUMMIT RESORT |
| BIG HILL LOOKOUT | 41 MILESTONE SUMMER HOME |

| Facility | Facility |
|---|---|
| WRIGHTS LAKE CG | 39 MILESTONE SUMMER HOME |
| WRIGHTS LAKE EQUESTRIAN CG | CHINA FLAT CG |
| CRYSTAL BASIN TRAILER | HARVEY WEST RR |
| YELLOW JACKET CG | SILVER FORK CG |
| SUNSET CG UNION PENNINSULA | 29 MILESTONE TH |
| SUNSET BOAT RAMP | BRIDAL VEIL PG |
| FASHODA CG | FLEMING MEADOW TH |
| FASHODA PG | SAND FLAT CG |
| FASHODA BOAT RAMP | ECHO LAKES SNOPARK |
| WOLF CREEK CG | CAPPS CROSSING GCG |
| WOLF CREEK GCG | LOVERS LEAP CG |
| AIRPORT FLAT CG | PYRAMID CREEK TH |
| LOON LAKE BOAT RAMP | PLUMMER RIDGE GUARD STATION |

## Fire

Criteria to rate roads for wildland fire were developed to recognize critical needs for WUI areas in conjunction with Community Wildfire Protection Plans. Structures to support infrastructure needs across the forest as well as roads that provide the only access to remote areas also have significant value. Maintenance Level 3 and 4 roads are recognized to provide safe, efficient access when compared to Maintenance Level 1 and 2 roads. In general, spur roads less than 1/5 mile long are not as valuable for fire access. Parallel roads into an area were ranked based on maintenance level for safety and efficiency. A three-level ranking was completed as follows:

- High – Access to WUI areas, including access to all structures.
    - Treat and defense zones (the same data layer)
    - Structure data includes
    - Recreation Residence Tracts
        - Developed Recreation Sites
        - “Building” points from quad data
- Moderate – Remaining roads greater than 1/5 mile in length.
- Low – roads less than 1/5 mile in length, parallel routes to unpopulated areas.

Criteria for benefits associated with fuels treatments are included in the Vegetation Management category.

## Range

Range permittees rely on the Forest road system to transport livestock on and off of the allotments and to manage livestock throughout the season. Roads are used to access fences, corrals and water developments for annual maintenance, to distribute salt and to locate and herd livestock. Forest range managers also rely on the road system to access monitoring sites across the allotments and administer the range resource. Access on arterial and collector roads was not analyzed for this factor because there is sufficient need for those roads by other resource areas. This analysis is limited to Maintenance Level 1 and 2 roads within the range allotments. The Maintenance Level 1 roads are closed to all use, but when they are moved to Maintenance Level 2, they become available for use by the range permittees. Road benefits are ranked as follows:

- High – All Maintenance Level 1 and Maintenance Level 2 roads providing access to or lying within the nine active range allotments.
- Moderate – None.
- Low – None.

## Vegetation Management

### *Vegetation and Fuels Management*

Roads provide access for vegetation management essential for forest health and enhancement of habitat. Roads also pose a risk to resources. This risk can typically be ameliorated by incorporating appropriate consideration of road location, design, construction techniques and maintenance, all of which include adherence to Best Management Practices.

Currently, the highest vegetation management priority is to treat fuels (commercial thinning) near population centers (WUI zones) and in strategic areas identified through relevant fuels analysis where benefits to wildland fire suppression are recognized. Performing appropriate fuels treatment within the WUI has been demonstrated to clearly protect lives and property. In addition, fuel treatments that are designed to increase the fire resilience of the general forested landscape with particular emphasis upon the ridgetop areas and other strategically placed area treatments are an inherent aspect of the current timber/fuels program of work.

### *Vegetation Management Access*

Efficient access to productive timber land for personnel and equipment was chosen as a value parameter for vegetation management for forest health and fuels reduction. The rating factor

chosen is the number of acres of timbered land within 1/4 miles of a system road. The Maintenance Level 1 and 2 roads are of value to timber harvest operations because they are the proximate infrastructure directly associated with a harvest unit. Typically logs are skidded along and loaded onto log trucks at landings located on the Maintenance Level 2 roads. Many of the landings are on spur roads which are constructed to provide access a short distance ranging from a few hundred feet to a mile or more from the collector road system to provide safe working areas away from other traffic and minimize skidding operations. Between treatment cycles, spur roads are stored at Maintenance Level 1.

This analysis used 1/4 mile as an appropriate average maximum distance for access to timber without constructing additional roads. In many cases the actual distance could be somewhat longer or shorter depending upon topography. The number of acres assigned to each ranking is based on the following distribution:

- High – Access to conifer patches on slopes of 35 percent or less and greater than or equal to 50 acres in size.
- Moderate – Access to conifer patches on slopes of 35 percent or less and between 11 and 49 acres in size.
- Low – Access to conifer patches on slopes of 35 percent or less and between1 and 10 acres in size.

The relative rankings indicated above were selected on the simple concept that the value of a road increases in direct proportion with the acreage being accessed. At the project analysis level, this increase in value would be tempered by the difficulty of access, the volume and value of the timber associated with a given land area, and other site specific considerations.

### Tribal Access

Native people use motorized roads and trails to access materials for traditional medicines, food, firewood, and basket-making and to reach historical, spiritual, and sacred areas of cultural significance. Benefits to tribal access were assigned based on access needs such as traditional gathering areas and specific locations of cultural value.

## Composite Ranking

After the individual resource rankings were completed, a composite score for each road was calculated by adding the individual resource rankings. The composite rankings for risk and benefit were used to assigned categories of low, moderate, and high to each road. The roads were assigned to a ranking matrix based on their scores.

# Ranking Matrix

The risk and benefit rankings placed each road into one of nine categories that describe the final ranking status for each road. Table 10 displays the data for each of the nine categories. Figure 1 displays the ranking category by percent of miles. A summary of the rankings for each road is in Appendix A. Table 11 describes the information available in Appendix A.

**Table 10. Ranking Category Matrix – Number and Miles of Road by Category.**

| | Low Benefit Number | Low Benefit Miles | Moderate Benefit Number | Moderate Benefit Miles | High Benefit Number | High Benefit Miles |
|---|---|---|---|---|---|---|
| **High Risk** | 30 | 26 | 205 | 342 | 211 | 918 |
| **Moderate Risk** | 206 | 126 | 898 | 663 | 345 | 417 |
| **Low Risk** | 71 | 26 | 343 | 137 | 85 | 49 |

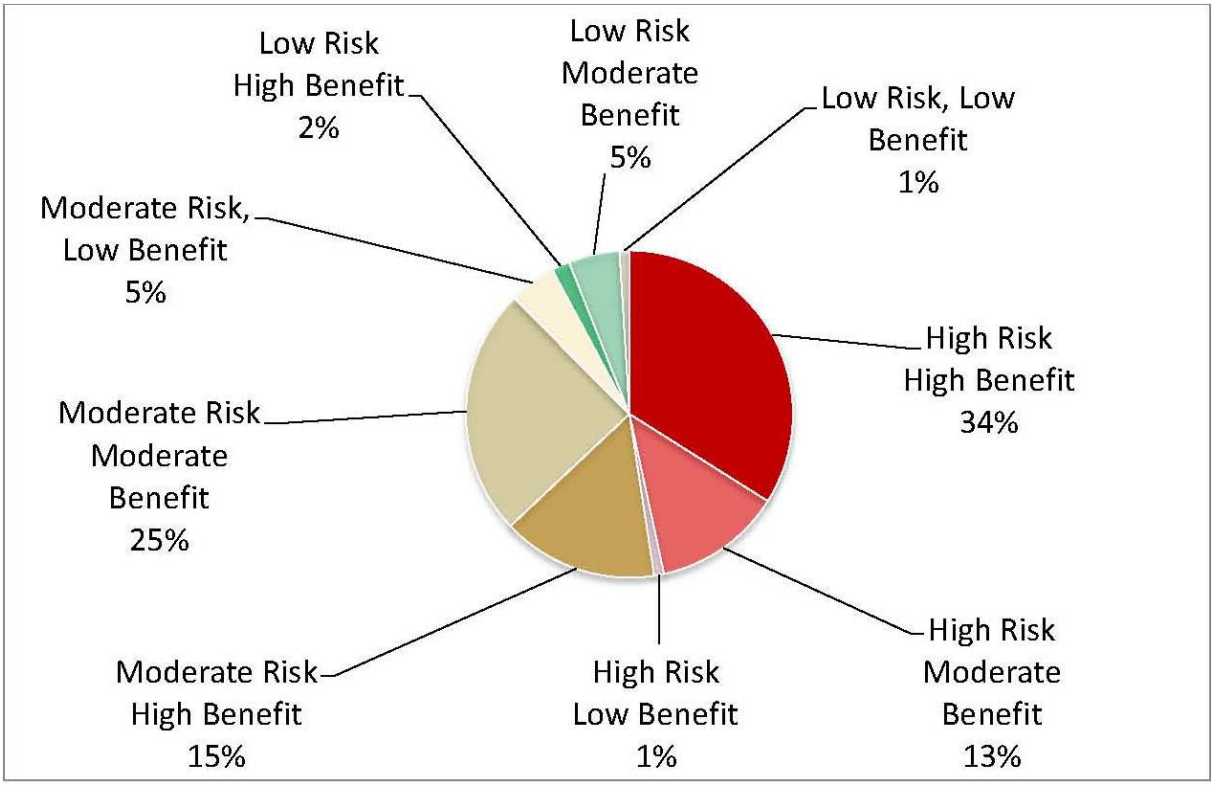


**Figure 1. Percent of Miles in Each Ranking Criteria.**

**Table 11. Description of Summary Tables in Appendix A.**

| Table | Title | Description |
|---|---|---|
| 1 | Risk and Benefit Assessment Summary by Road Number | Lists roads by number with individual resource rankings and management category |
| 2 | Risk and Benefit Assessment Summary by Category | Groups the roads by road management category and displays resource rankings |
| 3 | Risk and Benefit Assessment Summary by District by Road | Groups the roads by District in order of road number with individual resource rankings |
| 4 | Risk and Benefit Assessment Summary by District by Category | Groups the roads by District and then by management category |
| 5 | Roads Likely Not Needed | Lists the roads recommended to be analyzed in more detail as candidates for decommissioning, conversion to motorized trail, or transfer to other jurisdictions |
| 6 | Minimum Road System Recommendation | Lists the recommended minimum road system by road number |

The low risk categories contain a total of 8 percent of the road mileage. This is low because roads received a maximum risk score even though a small length of the road may be all that that indicated a high risk factor was present. Future site specific analysis will determine which segments of road affected the risk rank.

# Chapter 5 OPPORTUNITIES AND PRIORITIES

This chapter focuses on the opportunities to improve the transportation system on the ENF.

## Minimum Road System

The determination of the minimum road system addresses roads likely to be needed and roads likely not to be needed. The road system was designed to meet the multiple resource management needs of the forest and the ENF has managed the system over time by coordinating with timber production, with cost share agreements, and in cooperation with local road authorities. The road system has been adjusted to meet changing needs; coordination and adjustment will continue to meet future needs. Actions that adjusted the road system by both adding and subtracting roads were analyzed in the recent EIS and Supplemental EIS for Subpart B Travel Management.

### Roads Likely Needed

The determination of roads likely to be needed must take into account several factors.

- **Travel management designations** – 1,039 roads totaling 1,697 miles comprise the designated motorized use road system as displayed on the MVUM for the ENF. The roads are all required to provide primary access and motorized recreation opportunities in the forest and are likely to be needed indefinitely. The travel management designations may have small changes annually.

- **Developed Recreation** – Roads that access developed recreation sites and the roads within those sites are all likely to be needed in the future for public use. There are 260 roads totaling 518 miles identified as required for developed recreation sites.

- **Access rights of private landowners** – The ENF honors binding agreements to grant access to private landholdings within the Forest. The roads affected are likely to be needed as long as the private access rights are in effect. The affected roads received a designation of likely needed. In this analysis, 856 roads totaling 1,607 miles were identified as required due to rights granted to others.

- **Fire** – Road systems needed for fire suppression and preventative vegetation management are generally near communities and structures at risk to wildland fire. On the ENF, intermingled private land increases need for roads to provide fire suppression access. There is also a need for roads in the general forest area where firebreaks or ridges provide opportunities to wildland firefighters. A project level analysis may indicate the need to reduce the road system for this purpose, but at this scale, the reduction of roads in WUI areas is not recommended. The number of project activities in these areas will likely be high and provide opportunity to adjust the road system

effectively. There are 1,481 roads totaling 1,880 miles that are ranked high benefit to fire suppression.

- **Range** – The range program has nine management units where all roads were identified as high benefit. Some of these roads may not be necessary for management of the range allotments, but no data regarding which roads are necessary exists. There are 898 roads totaling 1,144 miles identified within the range allotments. Of those roads, 362 are Maintenance Level 1 roads totaling 292 miles that are currently closed to all motorized use.

- **Vegetation management** – The vegetation management program operates over the entire forest and needs an extensive road system to achieve its objectives for forest health. There are 2,056 roads totaling 2,516 miles that are of high benefit for vegetation management, 62 miles of moderate benefit, and 53 miles of low benefit roads. The remaining 85 miles are of no benefit to the vegetation management program.

### Roads Likely Not Needed

The analysis showed that 30 roads totaling 13.73 miles are likely not needed for future use. The roads were selected using the rankings and current use patterns as noted by the District staff. The roads will remain in service for the present. Eventually the roads will be included in detailed analyses subject to public comment and the NEPA process. Those analyses will be used to determine if the roads are needed and will remain or are not needed and will be considered for decommissioning, conversion to motorized trails, or transfer to other jurisdictions. The list of roads is in Appendix A, Table 5.

Roads ranking low benefit are not necessarily prime candidates for "likely not needed" roads because they may have one benefit that has to be honored. For example roads with access permits, FERC permits, cost share agreements, and other legally binding commitments will be kept on the system. Roads that have one primary use such as access for forest health and fuels treatments or a critical tie route for the motorized access routes are likely to remain on the system unless an alternate route or method of meeting the need the road fulfills is found.

## Funding the Road System

Available funding is an important issue in the ability to maintain the road system in the future. The existing funding will support less than half of the existing road system if it is maintained to standard. To maintain the roads to anything less than standard is an option that the ENF has implemented, but safety and resource protection issues limit the acceptability of non-standard maintenance. This dilemma has resulted in nearly one-third of ENF roads being closed to all users at Maintenance Level 1.

The unit costs in Table 1 of Appendix B, Economics show the wide range of annual costs

associated with the various maintenance level designations. Reducing maintenance level is one approach to reducing cost of the road system. Several years ago, the ENF conducted a study of the road system in an attempt to determine which roads could be reduced in maintenance level designation to reduce costs while still maintaining a safe, effective transportation system. Incomplete research notes from that study listed roads and suggested appropriate maintenance levels; however, no narrative was found to explain the principles used and expected risks, impacts, and outcomes if maintenance levels were reduced. The list of roads could provide a starting point for evaluation of appropriate maintenance levels.

Changes in maintenance level need to be carefully considered due to safety concerns. The greater traffic volumes and speeds of the Maintenance Level 4 and 5 roads require a higher standard of road construction and maintenance than the lower volume and speed of a Maintenance Level 3 road. The difference of about $7,000 per mile per year is worth consideration for lowering maintenance levels if traffic studies indicate it is possible. However, modification of the road may be necessary to change driver expectation and behavior. The reduction of Maintenance Level 3 roads to Maintenance Level 2 would yield a smaller savings per mile of about $1,700 per mile, but is still worthy of consideration since road modifications would be less extensive. Without traffic studies, recommendations for maintenance level changes of the Maintenance Level 3, 4, and 5 roads cannot be made. Moving Maintenance Level 2 roads to Maintenance Level 1 would achieve a cost reduction of $500 per year per mile. Converting a portion of the 1,500 miles of Maintenance Level 2 roads to Maintenance Level 1 would to achieve tangible cost reduction, but must be weighed against the current needs for both public travel and forest management that would be lost, should those roads be closed to all vehicles.

# Future Actions

The ENF will have opportunities in future projects to modify the road system. The ENF will use public input and resource analysis to determine which roads will be used and whether the road system can be modified to be more cost effective while serving user needs. Several strategic issues should be considered in those decisions.

### Road Location and Water Interaction

Some ENF roads impact water and aquatic resources due to their locations. For example, roads 9N17A and 9N17B are located on opposite sides of a stream and both have the potential for stream impacts. This situation appears to have resulted from an effort to avoid stream crossings. A well-designed stream crossing could eliminate the need for one of the roads and mitigate stream impacts from both roads. Project-level analysis should determine if there are other opportunities to reduce road miles and stream impacts in similar situations.

## Maintain Partnerships

The ENF and partners such as local road agencies, commercial road users, and individual users work together to track uses of the road system and fund maintenance work. These partnerships benefit all parties, so communications and monitoring is in the best interest of each. The current lack of roads engineering staff on the ENF could have a large impact on these partnerships. Additional support from the Regional Office or other forests may be needed until new staff can be hired and trained.

Partnership with counties may provide opportunities to transfer jurisdiction. Some roads, such as 11N55, 11N99, and 13N22, serve a large area of private land. These roads may be more appropriately operated as county roads with supporting partnership from the ENF.

## Use Patterns

Traffic study data on changing use patterns and projections of future use extrapolated from those data will assist in developing proposals for road system changes. The existing road system serves needs that may be changing. Information on the volume of traffic, types of vehicles, speeds, and other factors will assist in determining the road design needs, which affect construction and maintenance cost projections. Rarely used roads should be considered for decommissioning. If there is a possibility that the road may be needed in the future, it should be considered for storage as Maintenance Level 1 to reduce annual maintenance costs. Those cost savings should be compared with the cost to decommission and reconstruct the road to determine which option should be used.

## Convert to Trail

Roads that remain open primarily for users of motorized trails should be reviewed to determine if the road could be converted to a trail and still meet the management needs of the ENF. Consideration for routing vehicle traffic on other roads and impacts to adjacent landowners will affect these decisions.

## Road Density

Road density was a factor in the terrestrial wildlife rankings. In many cases, road density overwhelmed the species factors. Road density as calculated for this analysis included the State, county, and private roads, but did not include motorized trails.

Dense road systems influence resources and non-motorized user experiences, thus road system modification planning should attempt to reduce road density. The maps produced for this report give an indication of areas which should be considered for reduction of road mileage, but at this level of analysis, determining which roads within those areas are the most likely roads to consider was not possible. Much of the road density is due to the topography and may not be resolved unless access is no longer needed.

One factor in road density is short roads (spur roads) that branch off local roads to provide access for specific needs. Most often this need is related to timber harvest, but there are other reasons.

### *Spur Roads*

The ENF has 1,307 spur roads less than 0.60-mile long (Table 12). Together, they total 361 miles in length. These spur roads do not represent a large percent of the miles of roads on the ENF. Most of them access timber landings and separate timber operations from traffic. Less than half of the spur roads are stored as Maintenance Level 1 roads closed to any use. Spur roads are worth considering as a group because they could provide access points for unauthorized use, channel water to the main road system, extend the disturbance areas for plants and wildlife, and provide routes for invasive species to spread.

A few of these roads provide access for recreation, private landowners, and administrative sites as shown by the Maintenance Level 4 and 5 designations. The Maintenance Level 1 roads represent the greatest opportunity for possible decommissioning with the shorter roads being the most likely candidates. The Maintenance Level 2 roads would be candidates for decommissioning or reduction to Maintenance Level 1 to reduce cost and potential for unauthorized use.

**Table 12. Spur Roads.**

| Spur Length Miles | Number of Roads | Number of ML 1 | Number of ML 2 | Number of ML 3 | Number of ML 4 & 5 | Total Miles |
|---|---|---|---|---|---|---|
| 0.0 1 to 0.10 | 243 | 64 | 145 | 32 | 2 | 16 |
| 0.11 to 0.20 | 275 | 108 | 123 | 41 | 3 | 42 |
| 0.21 to 0.30 | 241 | 115 | 100 | 26 | 0 | 60 |
| 0.31 to 0.40 | 218 | 114 | 87 | 16 | 1 | 77 |
| 0.41 to 0.50 | 171 | 86 | 79 | 6 | 0 | 78 |
| 0.51 to 0.60 | 159 | 77 | 75 | 6 | 1 | 88 |
| Totals | 1307 | 564 | 609 | 127 | 7 | 361 |

## Setting Priorities

The roads determined to be likely not needed in this analysis are not the only roads that are priorities for decisions and action. The information in this report can also be used to prioritize the road system when project planning presents opportunities for change.

Table 13 shows a priority matrix of the road management categories and number of roads in each category. This matrix can be used to prioritize road projects. The road matrix also shows general recommendations for future road maintenance and transportation management

decisions. Project level teams would review the roads in site-specific NEPA analysis. The project analysis would include detailed data gathering to support the resource risks and benefits of the road, site specific conditions that require mitigation, and other information that can only be obtained by field investigation and public scoping. Alternative methods to address issues could be developed and the best alternative for access, resource protection, economics, and other factors could be presented to the line officer for decision and subsequent implementation.

**Table 13. Benefit/Risk Analysis Priority Matrix.**

| Scores | High Benefits | Moderate Benefits | Low Benefits | Totals |
|---|---|---|---|---|
| **High Risk** | Category 1<br>Mitigate, Maintain<br>211 Roads<br>918 Miles | Category 2<br>Mitigate, Maintain<br>205 Roads<br>342 Miles | Category 3 Mitigate, Restrict, Close, Decommission<br>30 Roads 26 Miles | 1,286 Miles |
| **Moderate Risk** | Category 4<br>Mitigate, Maintain<br>344 Roadsn<br>417 Miles | Category 5<br>Mitigate, Maintain<br>899 Roads<br>663 Miles | Category 6<br>Mitigate, Restrict<br>206 Roads<br>126 Miles | 1,206 Miles |
| **Low Risk** | Category 7<br>Maintain<br>70 Roads<br>49 Miles | Category 8<br>Maintain<br>344 Roads<br>137 Miles | Category 9<br>Evaluate Need<br>70 Roads<br>6 Miles | 212 Miles |
| **Totals** | 1,384 Miles | 1,142 Miles | 178 Miles | 2,704 Miles |

Roads in the high-risk category represent those roads causing the most resource impacts. The benefit rating of a road indicates the access value to resource managers, the recreating public, private access, administrative use, or other purpose. Even roads with low benefit ratings may be required to remain in use because they provide access for a specific purpose that cannot be terminated.

Within each road management category, several management options are possible. Descriptions of possible actions for four of the nine categories are:

- Category 7 High Benefit, Low Risk – The ideal situation
    - Maintain to standard by focusing road maintenance funds on these roads.
    - Review for potential resource concerns.
    - These roads form an important, lower cost part of the minimum road system.
- Category 1 High Benefit, High Risk – Priorities for investment
    - These roads are a high priority for project analysis to identify opportunities to

reduce the high risk of the road.

  - Investment in the road using capital improvement, deferred maintenance, cooperator cost share, or other funds is likely to be warranted.

  - Increased maintenance expenditures for these roads may be needed to keep resource risks from increasing.

- Category 3 Low Benefit, High Risk- Priorities for risk analysis

  - These roads are high priority for project scale analysis to identify opportunities to reduce risks or eliminate the benefits the road provides.

  - The roads have potential for reduced maintenance level.

  - Decommissioning is a possibility if benefits can be eliminated or realized by alternate means.

- Category 9 Low Benefit, Low Risk

  - These roads are lowest priority for expending annual road maintenance funds.

  - The roads have potential for decommissioning or reducing maintenance level.

  - Consider these for conversion to a trail, fire break, or linear wildlife opening.

  - Carefully review documents (road management objectives, easements, Private access and Utility access) for specific access needs that cannot be terminated

The analysis method selected tends to skew the results to high rankings for both risk and benefit. The longer roads are especially affected because they accumulate ranking factors that could be assigned to several small sections of the road, but the cumulative result places the entire road into a high or moderate category even though the bulk of the road could be a low ranking. The longer roads also tend to be more heavily travelled and warrant more detailed analysis than can be provided here. A more detailed project level analysis is necessary to determine the areas of the road that resulted in the ranking and methods to deal with those areas. There may be sections of roads that can be reconstructed or realigned to eliminate or reduce risk factors and result in the road having a lower risk while retaining its full benefits.

Traffic studies were not available for this analysis. Proposals for changes to the road system should be informed by the use patterns for the road system. Analysis of patterns of use and projections based on changes from each project will assist in making decisions regarding road maintenance level which directly affect the cost of construction and future maintenance. Opportunities to combine routes to reduce parallel routes should be considered to save costs.

Changes in the roads system to be considered include:

- Roads rarely used by the public or Forest Service that are high risk should be considered for decommissioning.

- Roads rarely used by the public or Forest Service that are low resource risk should be considered for either decommissioning or reduced maintenance level.

- Roads which primarily provide access to another jurisdiction (such as county administered lands or a property owners association) with limited benefit to the Forest Service should be considered for transfer of jurisdiction.

- Roads which provide access to a private property inholding or special use permit holder where general public access is not needed or desirable should be considered for transfer of maintenance responsibility to the permit holder if not already done.

- Roads accessing vegetation that will not be accessed for 10 years or more may be evaluated for reduced maintenance level or possibly decommissioning unless there is a fire/fuels access need.

- Roads frequently used by the public or Forest Service with moderate to high resource risk should be evaluated for relocation of portions of the roads away from resource risks or the creation of alternate access routes with fewer resource risks.

- Parallel routes or locations with multiple accesses provide opportunities to decommission the highest risk road.

# Chapter 6 SUMMARY

The ENF has an extensive road system that has been constructed to meet the needs of forest management and public access. Some commercial users of the road system are partners in maintenance and management. The State and county road systems complement the forest road system and allow for efficient transportation of commercial products as well as ease of access for the public.

The Forest road system meets the current needs for management of the forest. Most roads benefit a number of functions. The vegetation management program is the largest user of the road system and most of the roads were constructed to provide access to perform work benefiting forest health. The functions of fire and range require access to many of the same areas as vegetation management and also perform work benefiting forest health. Due to the many private landholdings within the ENF, there is a need for private access across the ENF and public access across private land. Easements and permits allow the sharing of the road system. Recreation is served by the road system both at developed recreation sites and in the general forest area. Concentrated use at the developed sites is served by roads designed to move larger volumes of traffic comfortably. General forest areas are served by roads designed for slower speeds and less traffic. All of the roads complement a motorized trail system which in some places coincides with the roads.

Future management of the forest and recreation needs will determine the needs for roads and the addition or removal or roads from the system. Recent work to designate motorized recreation routes made effective changes to the road system. The current system has very few roads that are likely not needed for future management of the forest. Implementation of any changes will require additional analysis to determine alternatives, seek public input, and choose an action. The resource risk factors in this analysis are available in the GIS database for use as input to future studies.

Results of this study can also be used to prioritize work on roads that must remain open and also have a high risk to resources. The analysis in GIS can be used to determine where the road is impacting a resource. Site visits will determine the type and amount of impact the road is having. The corrective action can be determined and decisions made to take action.

Funding will always be an issue, but the ENF has partnerships, agreements, and contracts with users who help maintain the forest roads. Choices on the level of user comfort and speeds necessary can be made to control some costs. Other funding sources for improvements or major repairs to the roads have been available in the past. The ENF is likely to be prepared to compete for funding from programs and sources that become available in the future. The staff of the ENF is concerned with the successful management and continued good service from the road system.

# APPENDICES

This page intentionally left blank

.

# APPENDIX A

## Existing System Roads Risk and Benefit Analysis

This page intentionally left blank

# APPENDIX B

## Economics

This page intentionally left blank

# APPENDIX C

## Public Involvement and Collaboration

This page intentionally left blank

# APPENDIX D

## Public Comments

This page intentionally left blank

# APPENDIX E

## MAPS