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Fremont-Winema National Forest Forest-Wide Travel Analysis Report

Fremont-Winema National Forest
Oregon

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Date

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Introduction

In 2005, the Forest Service created a Travel Management Rule to provide national consistency and clarity on motor vehicle uses on all National Forests within the National Forest System. The rule is subdivided into 3 parts: Subpart A - *Administration of the Forest Transportation System*; Subpart B - *Designation of Roads, Trails and Areas for Motor Vehicle Use*; and Subpart C - *Use by Over-Snow Vehicles*. The general purpose of Subpart A is to help forests identify their future road systems needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands. The general purpose of Subparts B and C is to reduce impacts from cross-country/off route travel on national forests by designating roads, trails, and areas where motorized use is allowed.

On March 29, 2012, the US Forest Service, Washington Office (WO) directed Regional Foresters to complete a science-based analysis of all National Forest System (NFS) roads by the end of FY15. This Travel Analysis must be documented in a travel analysis report, and is an important first step in meeting those sections of Subpart A of the 2005 Travel Management Rule that require each National Forest to:

- Identify the minimum road system needed for safe and efficient travel and for the protection, management, and use of NFS lands
- Identify roads that are no longer needed to meet forest resource management objectives and which therefore should be scheduled for decommissioning or considered for other uses

By completing this work, the Forest Service expects to identify opportunities for making changes toward a more appropriately-sized and environmentally sustainable transportation system that is responsive to ecological, economic, and social concerns. The WO stated that the NFS road system of the future must continue to provide needed access for recreation and resource management, as well as support watershed restoration and resource protection to sustain healthy ecosystems.

Travel analysis is not a decision-making process; it is an assessment of the existing condition of the current road system. It will be used to inform future decisions relating to administration of the forest transportation system and helps to identify proposals for changes to travel management direction (FSM 7712). Specifically, once travel analysis is completed, it will be used to:

- Inform future plan and project level proposed actions, purpose and need statements, and future decisions pertaining to road construction, reconstruction, decommissioning, and maintenance
- Inform road investments at multiple scales
- Inform delivery of restoration programs for multiple resources
- Inform agency strategies to comply with regulatory requirements, including those associated with the Clean Water Act and the Endangered Species Act

In completing this Travel Analysis Process (TAP), Forests were encouraged to build upon road-related analyses they have completed in the past, such as the Roads Analysis of the early 2000s and Access and Travel Management Plans of the 1990s. This initial step helps to determine the appropriate scope and scale of the new TAP so that it could be used to build upon previous work and minimize redundancy.

An interdisciplinary team of resource specialists (IDT) from the forest reviewed past road related analysis documents and plans to determine what could be used as a foundation and starting point for this TAP. Documents that were determined to be valid and useful for this purpose include: the 2005 Fremont Roads Analysis Report, the 2005 Winema Roads Analysis Report, the 2010 Travel Management Decision completed under Subpart B, and all Transportation Analysis Reports that accompanied signed NEPA decisions in the last 10 years. It was decided the appropriate scope to begin with would be to analyze all roads within the Fremont-Winema National Forest not addressed within project areas that resulted in current NEPA decisions for the roads.

Assessment Criteria and Results

The Fremont-Winema National Forest covers 2.3 million acres, and has over 12,500 miles of roads, which is one of the largest transportation systems in the National Forest System. Due to this immense transportation system, when the direction to begin this project was given from the Regional Office, the IDT chose to assess the road system by using risk and benefit rating criteria that could be analyzed over the entire Forest area. Risk criteria and benefit criteria were identified by the working group members with assistance from District specialists. In order to evaluate such a large transportation system, these categories were queued into the Forest's GIS and roads were rated for risk and benefit based on the GIS queries.

Once the transportation system was ranked for risk and benefit, the final rating for each road could be calculated by assigning each criterion an equal weighted number (0-3). The final rating number for risk and benefit would allow for a future project planning team to recommend different opportunities for that particular road. If a road was found to have already been analyzed as part of a signed NEPA decision, it was not a part of this assessment.

It is assumed that the data in this report is as current as the Geographical Information System (GIS) information provided at the time of publication. It is assumed that specialists can use the information in this report as a starting point for future NEPA analysis.

Project Intention

This report will assist decision-making officials in the analysis of future NEPA projects where the laws, regulations, manual, handbook direction governing the transportation system will be followed. This includes completing a site-specific NEPA analysis process prior to making any final decisions related to the Fremont-Winema National Forest's transportation system. The information provided in this report was analyzed using resource-specific criteria, based on the

information when this report was written, in order to generally rate a road for risk and benefit. The final rating in this travel analysis makes a general assumption that all of the site-specific incidences or areas of great concern are found in the Forest Service GIS system. This information should be reviewed by resource specialists in future analyses, decisions, and to assist in achieving a long-term goal of economic and ecological sustainability.

Travel Analysis Steps

This travel analysis report followed the steps outlined in Forest Service Handbook (FSH) 7709.55_20. The report is made up of these different sections:

Step 1: Setting Up the Analysis

Step 2: Describing the Situation

Step 3: Identifying Issues

Step 4: Assessing Benefits, Problems and Risks

Step 5: Describing Opportunities and Setting Priorities

Step 6: Key Findings

Step 1: Setting up the Analysis

Objectives

The intent of this travel analysis is to review the risks and benefits of all Maintenance Level (ML) 1 to 4 roads on the Fremont-Winema National Forest (there are not any ML 5 roads on the Forest), and then, to present opportunities that could improve the ecological, social and economic sustainability of the Forest Transportation System. Using a scientific and geospatial process, the analysis will provide information for managing the current transportation system in a way that:

- Provides a more resilient and sustainable road network that meets basic public safety standards and provides appropriate access for public and agency use;
- Improves watershed, wildlife, and ecosystem health, while making progress towards regulatory requirements for road density and environmental sustainability;
- Follows the Fremont and Winema Forest Plans;
- Is managed efficiently to the best ability of the Forest staff; and
- Ensures our limited and decreasing appropriated road maintenance dollars are being used efficiently.

Project Area

The project area for this assessment encompasses the entire Fremont-Winema National Forest. When this project was initiated, the Fremont-Winema's working group gathered to discuss the most efficient and reliable way to asses this immense road system. This large-scale travel analysis is intended to give a broad scale comprehensive look at the transportation structure and provide opportunities and recommendations for managing the road system into the future.

Interdisciplinary Team of Specialists

The Fremont-Winema National Forest's working group consisted of primary resource specialists, or Forest program managers. These specialists worked with all of the District specialists, and consultation was completed with Staff Officers and District Rangers as well. The primary team member, point of contact, and their associated resource analysis roles are listed in Table 1.

Process

The working group used the following process to assist with this travel analysis project:

- Assist with collecting existing data
- Identify access and resource issues, concerns, and opportunities
- Consult with District specialists
- Review the final rating map and review for accuracy
- Identify opportunities for making changes to current road management practices in response to the recognized resource concerns.

Table 1 - Working Group Member List

Resource Specialty	Primary Point of Contact
Leader	Amanda Warner Thorpe
Fisheries	Phillip Gaines
Fire/ Fuels	Clint Albertson
Geographic Information System (GIS)	Kirsten Tighe
Heritage Resources	John Kaiser
Hydrology	William Goodman
Range and Noxious Weeds	Lucas Phillips
Recreation	Dennis Scott
Sensitive Plants	Lucas Phillips
Special Uses/ Minerals	Catherine Callaghan
Timber	Judd Lehman
Transportation	Sue Morris
Wildlife	Amy Markus
Writer/ Editor	Amanda Warner Thorpe

Information Gathered

The following is a list of essential information gathered prior to initiating the travel analysis process:

- As much accurate and current information and recommendations on the existing transportation system as possible, including existing road use, easements, and maintenance responsibilities of different roads.
- Existing and approved Forest-scale and project scale travel analyses
- 2010 Travel Management Decision and associated travel analyses
- Current Road Management Objectives
- Assessment of resource concerns and resource benefits and how they relate to the current road system
- Fremont and Winema Forest Plans and other current program management direction
- Public access to recreational opportunities
- Private land access needs, including permitted activities (i.e. range, minerals, land uses, etc.)
- Areas of special sensitivity, resource value, etc.
- State and County laws and regulations related to motorized use on public roads
- Applicable Federal, State, and local laws
- Public and user group values, concerns, and requests.

Step 2: Describing the Situation

Existing Road System

The Fremont-Winema National Forest has one of the largest road networks of any forest in the Nation. This extensive system of roads has over 12,500 miles from Maintenance Level (ML) 1 to ML 4. Please see Table 2 on the Fremont-Winema National Forest's road maintenance level summary.

The purpose of a travel analysis is to review the risks, benefits, and costs associated with a road network and identify opportunities for making changes to that road system that are responsive to the issues. In doing so, it is important to understand the existing road system and classifications, as well as any restrictions, prohibitions, and closures. Laws and regulations, Forest Service directives, Forest Plans, Forest Orders, and Transportation Reports with Project specific decisions all give important information on routes open to the public for motorized use.

Road Maintenance Level Definitions

The Forest Service differentiates forest system roads into five different maintenance categories which further describe the level of service provided and the road maintenance required.[1]

Road Maintenance Level 5 (ML 5):

Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated.

Road Maintenance Level 4(ML 4):

Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated.

Road Maintenance Level 3 (ML 3):

Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced.

Road Maintenance Level 2 (ML 2):

Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level.

[1] Operational maintenance levels are defined in FSH 7709.59, Ch. 60.

Road Maintenance Level 1 (ML 1):

Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Roads receiving Level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at Level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses.

Table 2: Forest Road Summary, Fremont-Winema National Forest

Maintenance Level	Forest Road Miles	Percentage
ML 1 – Basic Custodial Care (Closed)	**6,181**	**49%**
ML 2 – High Clearance Vehicles Only	**5,382**	**43%**
ML 3 – Suitable for Passenger Vehicles	**729**	**6%**
ML 4 – Moderate Degree of User Comfort	**254**	**2%**
ML 5 – High Degree of User Comfort	**0**	**0%**
	12,546	

Road Definitions

Below are some key Forest Service road terms and definitions used in this report:

Open Road:

These forest system roads are existing roads where motorized use is allowed by the public. They are typically ML 2 through ML 5 roads.

Closed Road:

These roads are assigned to ML 1 and have been closed to vehicle traffic. They may be necessary in the future for project activity use.

Decommissioned Road:

These roads are no longer part of the transportation system and could have been ML 1 through ML 5 before they were decommissioned. They should have (or are scheduled to have) some type of physical barrier at the entrance of the road. All engineered structures (bridges, culverts, signs, etc.) should be removed from the road prism, and the road may be completely re-contoured or naturally reclaimed.

Unauthorized Road/ User-Created Route:
These roads are located in the National Forest, but they are not considered to be part of the open road network on the Forest's transportation system. These roads are typically established by repeated motorized use over time. These roads are not part of the forest transportation inventory and are not typically included on forest maps or recorded in forest transportation databases.

Motorized Trails:
A route 50 inches or less in width, or a route over 50 inches wide that is identified and managed as a trail, and designated to be used by motorized vehicles.

Motorized Areas:
The Fremont-Winema National Forest does not have any designated motorized areas.

Important Note: When making changes to road maintenance levels that would affect public access, or when adding unauthorized roads, or removing (decommissioning) roads from the Forest transportation system, NEPA analysis with public involvement must completed first.

Current NEPA Decisions Referenced

This travel analysis is intended to be completed on roads outside of project areas where current NEPA decisions were already made regarding the road systems. The amount of mileage that has been covered under existing NEPA decisions in the last 10 years is nearly 2,270 miles, whereas this report analyzed virtually 10,280 miles. The list of project areas where current NEPA decisions have been made for the roads are listed below:

- **Jakabe Vegetation Restoration Project (February 2007)**
- **Burnt-Willow Project (Sept 2006)**
- **Abe Project (Sept 2007)**
- **West Drews Watershed Restoration and Vegetation Management (February 2009)**
- **Barry Point Project (July 2013)**
- **Deuce Fuels Reduction and Vegetation Management (July 2014)**
- **Red Knight Restoration Project (September 2013)**
- **Bluejay Vegetation Restoration Project (May 2015)**
- **Oatman Restoration Project (September 2014)**
- **Black Hills Vegetation Management (January 2012)**
- **Coyote Fuels Reduction and Restoration Project (September 2011)**
- **Fort Fuels Reduction Project (March 2013)**
- **Modoc Restoration Project (September 2011)**

Step 3: Identifying Issues

Key Issues

The working group identified issues related to the road system by using previous and ongoing public engagement, past analyses, and internal Forest Service input. Issues were identified using extensive public involvement and comments received during the planning for the 2010 Fremont-Winema Travel Management Plan that was completed under Subpart B of the TM rule, other recent project scale NEPA analysis involving road decisions, as well as input from Forest Service personnel. The following list of key issues identified by the working group is in random order, and does not represent a hierarchy of importance:

- **Existing road system cannot be maintained adequately under current and expected budgets**
- **Increased risk for human caused fire**
- **Needed access to the Forest for all administrative purposes (fire, timber, etc.)**
- **Needed access to recreational areas**
- **Needed access to the Forest for all permitted activities (range, mining, etc.)**
- **Needed access to private land inholdings and communities**
- **Road activities pose threats to watershed conditions and fish habitat**
- **Impacts/damage to sensitive plant population and spread of invasive plants**
- **Protection of cultural resources**
- **Maintenance of an appropriate road density in wildlife habitat**
- **Unauthorized routes and non-system roads**

Resource Concerns

The Fremont-Winema National Forest has had an increase in motorized use, and recently has been working with local entities and interested visiting entities to provide additional OHV recreational access. Increased use on the Forest routes causes an increase in road maintenance needs. When road funding allocations are limited, it becomes impossible to maintain the entire road system, and so the funding gets shifted to the most used roads in the transportation system. The heavily used roads on the Fremont-Winema are typically the ML3-4 roads, including some heavily used ML2 roads. The roads that are heavily used may be left to deteriorate without adequate funding. This results in ruined road surfacing, water quality issues, overgrown vegetation problems, and affected wildlife and plant habitat conditions. User-created routes create a concern for public safety because they are not regulated by the Forest.

Human-caused fires are a large concern when opening up Forest lands for public use. The National Interagency Fire Center states that "humans cause an average of 62,631 fires each year." This results in "more than 2.5 million acres (that) are burned each year by people who start wildfires." [2] In 2015, the Fremont-Winema had 5 human-caused fires (burning 99 acres),

[2] Quotes provided from www.nifc.gov/fireInfo/fireInfo_stats_human.html.

and South Central Oregon Fire Management Partnership (SCOFMP) reported 35 human-caused fires (that burned 200 acres). In 2014, the Fremont-Winema reported 31 fires (burning 156 acres), while SCOFMP reported 73 fires (that burned 363 acres).

Is it necessary to preserve the transportation system for roads that permittees need to access for administrative purposes for burning, for timber harvesting and administration, for mineral extraction purposes, for access to recreational sites, for private land access and egress, and for all other general administrative purposes. Motorized uses on roads that are administered under these short-term special use authorizations were not taken into consideration in this TAP due to the fluidity of the process. Short term special use authorizations are better analyzed at the site-specific project scale.

It's also important to understand, and take into account, the effects that a road system has on vulnerable resources. The mere existence of a road can pose a threat to a nearby stream due to potential sediment runoff and stream-restricting culverts. In addition, roads that run parallel to hillside slopes and have disrupted natural contours can intercept shallow groundwater into ditches leading to increases in stream temperature and sediment delivery to streams and decreases in the storage of water in headwater areas critical to the integrity of the Forest watershed health. All aquatic organisms and fish habitat are sensitive to these effects, and analyzing the transportation system for a reduction of the Forest's road density could benefit the watershed. Invasive plants have a higher chance of spreading on or near a motorized route due to their inherent population ecology characteristics. Sensitive plants have a greater potential of being adversely impacted by roads when compared to invasive species. As well, considerations of the benefits to sensitive plant species by spreading of propagules were discussed, but this is not highly recognized or widely accepted yet. Cultural sites are located throughout the Forest, and the chances of the public unearthing and damaging these sensitive items are greater with a high open road density.

Unauthorized routes were not included in this travel analysis. Regional guidance suggested including any unauthorized routes that are known to be needed for future resource management or public uses into the analysis to examine risks/benefits of them. All other un-authorized roads did not need to be part of this TAP analysis. The working group did not identify any un-authorized roads that needed to be considered in the TAP at this time.

Additional Concerns

The reality of climate change is a major consideration for managing our forested landscape for resiliency. Average annual air temperature is predicted to continue to increase through the 21st Century (OCCRI 2010). Accompanying the increase in temperature will be changes to the type, timing, magnitude, and frequency of precipitation events throughout the Region. For example, the multi-model average decrease in summer precipitation of 14% by the 2080's will be coupled with warmer summers, increasing the likelihood of large-scale fire episodes. An increase in annual air temperatures in the Pacific Northwest over the last 50 years have already led to more

winter precipitation falling as rain (rather than snow), earlier snowmelt[3], and reduced spring snowpack[4]. Such changes could have substantial impacts on soil moisture and water quantities available to various Forest receptors. This change in climate is expected to greatly alter vegetation structure and composition, terrestrial and aquatic ecosystem processes, and the delivery of important ecosystem services over the next century. Building resiliency into the landscape in aquatic and terrestrial ecosystems is paramount to the long-term health of Forest resources and the services they provide. Decreasing road density is, therefore, a major component to the revitalization of a resilient forested landscape. Additionally, increases in winter peak flows will have large impacts on Forest road infrastructure due to improperly sized culverts and roads located next to streams. This, coupled with decreases in snowpack, will change the types and patterns of recreation on the Forest as well. Road material historically frozen and snow-covered in winter will be subject to more and more impacts to heavy winter rains. These factors could potentially cause additional road damage to the system because the users will be utilizing the road system year round, rather than just in the spring, summer, and fall months.[5]

More than half of the Winema National Forest and a portion of the Fremont National Forest are made up of lands that lie within what is referred to as the 1954 Klamath Tribes Reservation Boundary. Not only are any and all places in and around the Forest, but virtually all of the lands in the west, are subject to cultural finds. Heritage resources are a large concern due to past excavations and destruction of burial sites and vision quest sites, and the scouring and stealing of known artifacts. The Tribes have a large stake in specific project planning efforts due to these valid concerns. The Forest's tribal relations specialist puts importance on consulting with the Director of the Culture and Heritage Department on all projects. The Forest remains committed to maintaining a productive and respectful relationship with the Tribe, and it seeks out ways to use the working relationship to improve resource protection measures. Most of the Tribal Codes are used as important conservation tools that may be sufficient to regulate Tribal motorized impacts. The Forest expects that enforcement of Tribal Codes and regulations will be adequate for successful travel management.

[3] Hamlet A.F.; Lettenmaier, D.P. 2007. Effects of 20th century warming and climate variability on flood risk in the western U.S. Water Resources Research. 43: W06427.
Stewart, I.T.; Cayan, D.R.; Dettinger, M.D. 2005. Changes toward earlier streamflow timing across western North America. Journal of Climatology. 18: 1136–1155.
[4] Barnett, T.P.; Pierce, D.W.; Hidalgo, H.G. [et al.]. 2008. Human-induced changes in the hydrology of the western United States. Science. 19: 1080–1083.
Hamlet, A.F.; Mote, P.W.; Clark, M.P.; Lettenmaier, D.P. 2005. Effects of temperature and precipitation variability on snowpack trends in the western U.S. Journal of Climate 18: 4545-4561.
[5] Oregon Climate Change Research Institute. 2010. Oregon Climate Assessment Report, K.D. Dello and P.W. Mote (eds). College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, OR

The right to hunt, fish, trap, and gather within the boundaries of the former reservation lands of the Klamath Tribes was reserved for the Klamath and Modoc Tribes, and the Yahooskin Band of Snake Indians in the Treaty of October 14, 1864. Klamath Tribes members may also gather firewood and other dead material anywhere within the 1954 reservation boundary.

Step 4: Assessing Benefits, Problems, and Risks

Resource Assessment

Working group members independently developed classifications for the different ways that roads affect their resource. They each assessed how their resource specialty could be affected positively or negatively by the location of a road. Each resource specialist further described how the road would rate for risk and/or benefit in detail, and then came up with a measurement for the different ratings. Each road was then assessed using a GIS analysis and the identified risk and benefit categories.

The risks and benefits for tribal access were considered during the analysis, but were left out of the overall analysis. The agreement between the Fremont-Winema National Forest and the Klamath Tribes (spelled out in the 2010 Travel Management Decision) that describes the Klamath Tribes' commitment to self-government of resource and travel management within the Klamath Tribes 1954 Boundary. Cross-country travel is discouraged, and tribal members are expected to follow Tribal Code and regulations to manage travel management activities. The Tribes have shouldered their own transportation management responsibility and resource management objectives, therefore, the final rating did not include a specific rating component for tribal access. During each individual project planning NEPA effort, the Tribes are consulted to provide information regarding each specific area in order to assist with final recommendations of roads that are of tribal interest.

Analysis Process

Resource specialists within the working group presented risk and benefit categories that correlated with their specific resource key issues discussed earlier. Some specialists could state a risk *and* a benefit, while others were only able to rate a road as a risk *or* a benefit. There are many categories that present risks associated with the presence or conditions of roads associated with the resource concern. There are also many benefits and opportunities that roads provide for forest management and public uses.

Benefit Categories

- Fire and Fuels Management – Vegetation and Agency Management Access And Public Safety - Egress/Escape Routes for the Public
- Timber Management – Harvesting Access
- Access to Recreation Sites
- Access for Range Permit Administration
- Community/Public Road: Connects to and Accesses Communities
- Private Land Access

Risk Categories

- Water Quality, Road Related Sediment
- Water Quality, Non-Sediment Pollution
- Water Quality, Disruption of ground water flow and negative hydrologic surface connectivity
- Water Quality, Flow Effects
- Water Quality, Wetlands and Wet Meadows
- Hydrological Processes, Floodplain Function, Off-Channel Habitat and Riparian Reserves (Non-Sediment Pollution)
- Fish Habitat, "At Risk" Fish Populations & Watershed Function
- Fire and Fuels Management - Human Caused Fire
- Invasive Plant Species & Impacts to Sensitive Plant Species or Habitat
- Known Cultural Resources
- Open Road Densities within Big Game Habitat
- Direct Impacts to TES or MIS Nesting Habitat
- Impacts to Important Wildlife Habitats

Criteria and Statements in Risk/Benefit Analysis Process

The resource specialists and program managers worked with District specialists to provide additional, more concise information on their resource and the process they would recommend in order to rate a road on the transportation system for risk and/or for benefit. Each working group member provided detailed ranking statements or questions in order to evaluate a road. Criteria were also detailed in order to be used in this travel analysis and rating process. Roads could be scored with values of high, medium, or low (and in some cases, a road could be scored with no benefit or risk). The following tables reveal the benefit and risk statements and criteria used in this travel analysis:

Benefit Statements and Criteria

Benefit: Fire and Fuels Management - Vegetation Management and Agency Access, and Public Safety - Egress/Escape Routes for the Public	
Transportation system roads are used to access areas for vegetation management activities, for both currently planned and future projects, and access for fire management personnel to manage fires (wildfire and prescribed fire). Escape routes are needed in the event of an emergency (wildfire, medical and law enforcement incidents). Private landowners, public groups and other forest users need adequate egress to evacuate from homes, seasonal cabins, youth camps and campgrounds.	**HIGH BENEFIT**– High benefit roads will be used repeatedly over the planning horizon. They include all roads which are the primary access to multiple planned treatment units. High benefit roads provide access to improvements that benefit fire management activities. This includes access to heli-spots, water sources, staging areas. High benefit roads can also serve as a control feature for fire operations (fire control line or burnout line) High benefit roads provide a primary escape route for the public. Provides egress to a county road.
	MEDIUM BENEFIT – Medium benefit roads access single planned treatment units and provide access to isolated areas and may serve as a control feature for fire activities. Medium benefit roads provide a secondary escape route for the public.
	LOW BENEFIT – Low benefit roads do not access planned treatment units. Low benefit roads are dead-ends or do not meet any of the above criteria. Low benefit roads provide no egress (a dead-end road).
	NO BENEFIT – These roads have already been determined to have zero benefit and have been recommended for decommissioning in an approved NEPA Decision document.

Benefit: Timber Management - Harvesting Access	
Access for timber management activities, for currently planned and future projects. The data was gathered using the Forests 5-year Stewardship Plan.	**HIGH BENEFIT** – High benefit roads are located within the 5-year Planning Areas.
	MEDIUM BENEFIT – Medium benefit roads provide access to and are located within the "Forested" areas, but may not necessarily be located within the 5-year Planning Areas.
	LOW BENEFIT – Low benefit roads are not located within the Planning Areas, or in the "Forested" areas.
	NO BENEFIT - These roads have already been determined to have zero benefit and have been recommended for decommissioning in an approved NEPA Decision document.

Benefit: Access for Recreation Sites	
Roads provide access to developed recreation sites (i.e., trails, campgrounds, picnic areas, recreation residential homes, and camps). Roads can also provide access to the general forest area where other recreational uses can present themselves, such as remote ATV recreational experiences, dispersed camping opportunities, and other recreational driving and opportunities.	**HIGH BENEFIT** - A high benefit road is part of a road network that provides the most direct access to developed recreation sites such as trails, campgrounds, picnic areas, cabin/lookout rentals and recreation residential homes or provides access to a high number of dispersed sites with high use. Road provides direct access to one or more high use developed sites (>25% weekday use, more than 50% of capacity on weekends), or dispersed campsites with high use (some week-day use, occupied >50% of summer/fall weekends)
	MEDIUM BENEFIT - A medium benefit road is part of a road network that provides indirect or alternative access to developed recreation sites such as trails, campgrounds, picnic areas, cabin/lookout rentals and recreation residential homes or provides access to a moderate number of dispersed sites with moderate use. Medium benefit roads may provide direct access to undeveloped areas or features that are named or serve to complete a circuitous loop within the road network for recreational driving. Road provides indirect or alternative access to one or more developed sites (10-25% weekday use, less than 50% of capacity on all but holiday weekends) or provides access to moderate number of dispersed sites with moderate use (some weekday use, occupied 25%-50% of summer/fall weekends)
	LOW BENEFIT - A low benefit road is not part of a road network and dead-ends in the general forest area where there is no apparent point of interest or named location. Road leads to one or more low use developed sites (low weekday use, less than 25% of capacity on all but holiday weekends) or provides access to low number of dispersed sites with low usage (little or no weekday use, occupied less than 25% of summer/fall weekends)
	NO BENEFIT - These roads have already been determined to have zero benefit and have been recommended for decommissioning in an approved NEPA Decision document.

Benefit: Need for Range Permit Administration	
Roads provide authorized users (permittees) and administrative access to active grazing allotments, as well as range structural improvements. Access to grazing allotments is needed for effective livestock management and administrative use such as monitoring annual use key areas and long term trend sites. Structural range improvements include: fences, corrals, water haul sites, salting grounds, spring developments, water lines and troughs and stock ponds. These facilities are key in managing livestock use and movements in order to meet management objectives.	**HIGH BENEFIT**- High benefit roads access multiple structural range improvements, special management interest areas, key administrative monitoring sites, and are frequently used by authorized users (permittees) and for administrative purposes. The road segment provides primary access to multiple allotments/pastures.
	MEDIUM BENEFIT- Medium benefit roads access limited structural range improvements, special management interest areas, key administrative monitoring sites and are only occasionally used by authorized users (permittee) and for administrative purposes. The road segment provides secondary access to three or fewer allotments.
	LOW BENEFIT - Low benefit roads only access one or two structural range improvements or key management areas within a given allotment/pasture. The road segment provides only secondary access for one allotment/pasture.
	NO BENEFIT - No benefit roads do not access structural range improvements or do not access key management areas within a given allotment/pasture.

NOTE: All roads have potential risk associated with them by allowing public access to or near structural range improvements that may result in damage to the improvement. However, damage to structural range improvements can be just as likely to occur even if there is no immediate access to the improvement, therefore a separate "risk assessment" is not required for range permit administration.

Benefit: Community/Public Road: Connects to and Accesses Communities	
Roads are an important access into and around the communities that exist around the Forest boundary.	**HIGH BENEFIT -** Road segment is primary access route and receives high use (more than 50% of total ingress/egress) access to communities and/or is a "portal" (provides primary access to the Forest).
	MEDIUM BENEFIT - Road segment is secondary and moderate use (more than 25%, less than 50% of total ingress/egress) access to communities and/or provides secondary access to the Forest).
	LOW BENEFIT – Road segment is secondary and low use (less than 25% of total ingress/egress) access to communities and/or provides only cursory access to the Forest).
	NO BENEFIT – Does not provide any access to or between communities and no connection to public roads.

Benefit: Private Land Access	
This factor includes access needs for private or other legal obligations such as providing access to private land ownership through right-of-way easements or permits, cost-share easements, road use permits, reserved rights, etc. How does the road system connect large blocks of land in other ownership to public roads? How does the road system affect managing roads with shared ownership or with limited jurisdiction?	**HIGH BENEFIT -** Road segment provides long-term, primary access (alternative routes are not available) to private land. Reasonable access is required, perhaps even by law.
	MEDIUM BENEFIT - Road segment provides long-term access to private land. Alternative routes are available to provide reasonable access to the land owner.
	LOW BENEFIT – Road segment has short-term commitments through road use or other special use authorizations.
	NO BENEFIT – Road segment does not include any private use, right-of-way, cost-share, or other special use authorization access.

Benefit: Lands and Minerals Access	
What is the likely transportation system needed for future needs (withdrawal areas, mining claims, mineral material sources/disposal sites, etc.)? How does the road system affect access to recreational rock collecting areas? Rating System: Will the road segment be needed for access for Lands and Minerals (withdrawal areas; mining claims; common variety sources/disposal sites; recreational minerals' exploration (gold panning; metal detecting; public collection area; etc.)? Primary access is the main route and secondary access has more than one route into the area.	**HIGH BENEFIT -** Road segment provides primary access to one or more areas.
	MEDIUM BENEFIT - Road segment provides secondary access to two or more areas.
	LOW BENEFIT – Road segment provides secondary access to one area.
	NO BENEFIT – Road segment does not provide access needs for Lands and Minerals.

Note: This criterion is not shown on the spreadsheet in Appendix A. These criteria will need further review during a project-specific NEPA process.

Benefit: Special Uses or Reserved/ Outstanding Rights	
How does the road system affect the operations and maintenance of an authorized constructed feature or access to an area of use/occupancy? How does the road system affect managing special use authorizations or reserved/outstanding rights?	**HIGH BENEFIT -** Road segment provides long-term, primary access (alternative routes are not available) to private land or other special use authorization areas. Reasonable access is required by law.
	MEDIUM BENEFIT - Road segment provides long-term access to special use authorization areas. Alternative routes are available to provide reasonable access to the land owner or authorization holder.
	LOW BENEFIT – Road segment has short-term commitments through road use or other special use authorization.
	NO BENEFIT – Road segment does not include any private use, right-of-way, cost-share, or other special use authorization access.

Note: This criterion is not shown on the spreadsheet in Appendix A. These criteria will need further review during a project-specific NEPA process.

Legal constraints are restrictions on changes to the transportation system, which may involve the following:

- Existing Authorizations (Easements, Permits, Letters, etc.) for access to inholdings
- Existing reserved rights (ie. land adjustment deeds)
- Existing Cooperative Agreements

Risk Statements and Criteria

Water Quality Risk Assessment – Preface

One of the objectives of this part of the analysis is to create a Forest-wide approach, or framework, for evaluating water quality risks from individual National Forest System Roads (NFSR) at the project level. This framework was used for this forest-wide TAP and will provide consistency from project to project when performing future roads analyses at the project scale.

Road Segments

Roads will be divided into segments. The segments can be delineated in a manner analogous to a stream reach. When the character of a road changes, the existing road segment will end and a new road segment will begin. Segments should be delineated as long as possible without losing the characteristics of the road. Road segments in the sub-basin analysis will be divided into individual lengths for that sub-basin (i.e. a road segment in a 5th level hydrologic unit code (HUC) will start as the road passes into the HUC and end as it passes out). Road segments on the 6th field HUC level are first defined as valley bottom road, mid-slope road or ridge top road. The segments are then further delineated based upon the risk factors, or changes in a physical characteristic recognized as affecting resources, such as frequency of stream crossings. A road segment would change when the segment changed from a valley bottom to mid-slope, mid-slope to ridge top, or if the definition remains the same (valley bottom, mid-slope, ridge top), a new road segment would be delineated when one of the risk factors changes. For example, a new road segment should be delineated when the road goes from a high risk geologic hazard to a low risk, because the impact on the floodplain functions change, the road goes from a significant subwatershed to a subwatershed that is not determined to be significant, etc. Road maintenance levels may also need to be included.

Development of the Aquatic Impact/Risk Factors

Aquatic factors were developed to capture key processes associated with roads as they link to aquatic environments. The list of factors includes: geologic hazard; road related sediment; floodplain off-channel habitat riparian reserve function; flow effects; at risk fish populations; and wetlands. The term “at risk fish” in this document refers to fish listed as Threatened, Endangered or Sensitive.

<table>
<tr><th colspan="2">Risk: Water Quality, Road Related Sediment</th></tr>
<tr><td rowspan="4">Surface erosion occurs on wildland roads due to erosion of the road surface, cut slopes and fill slopes and accelerated mass failures. Surface erosion of the road is sensitive to road design, road maintenance and geologic hazard. Road surface, design and maintenance of drainage structures can influence the amount of road surface erosion. Insufficient drainage structures, culverts, including ditch-relief culverts can also be sources of sediment. Roads crossing areas of high geologic hazard or with unstable fill slopes may contribute to accelerated mass wasting initiated by the failure of the fill slope. Culverts at stream crossings can be a sediment source if the culvert is under-sized and the hydraulic capacity is exceeded, or the culvert inlet is plugged causing streamflow to overtop the road. Large amounts of sediment or mass wasting can also be generated if the plugged culvert results in failure of the crossing resulting in a debris flow, or if the culvert is overrun resulting in the stream flowing down the road surface eroding the surface and fill. Ditch relief culverts that erode fill material directly into streams are another sediment source. The increase in sediments can cause streams that do not meet water quality standards to be listed as impaired under section 303(d) of the Clean Water Act.</td><td>HIGH RISK - Road segment has high potential impacts to at risk fish habitat. Road surface and/or fill slopes exhibit erosion into streams, visible ditch erosion, or cut slope erosion into ditches. Sediment directly enters fish-bearing stream from ditch. Fill slopes are beginning to fail, and there is evidence of accelerated mass wasting due to the sediment and/or crossings with high potential for failure where failure of the prism will result in a large amount of sediment delivered into at risk fish habitat. If culverts are over-topped it is probable that the stream will travel down the road and deliver sediment to at risk fish habitat. Crossings are altering stream channel type downstream and/or causing downstream bank erosion. The stream is on the 303d list for sediments.

OR

41-100% of a road segment is within 300 feet of a perennial TES fish bearing stream</td></tr>
<tr><td>MEDIUM RISK - Road segment is not meeting “all” of the LOW RISK criteria. Potential impacts to at risk fish habitat appear to be minor due to amount of erosion. Potential for sediment delivery if a crossing failure or fill slope failure were to occur is minor. Change to channel morphology due to a crossing is confined to the site or does not alter the channel type. The stream is on the 303d list for sediments.

OR

20 to 40% of road segment is within 300 feet of a perennial stream</td></tr>
<tr><td>LOW RISK - Road segment is native surfaced, or graveled but has no visible erosion. Ditch relief culverts are not causing erosion of fill into streams, crossings are perpendicular to the stream and sufficient to pass the 100 year flood, or designed so that if failure occurs, only the prism at the crossing fails. Crossings are not impacting channel morphology downstream or causing downstream bank erosion. There is no evidence of accelerated mass wasting due to the road segment. The stream is on the 303d list for sediments.

OR

Less than 20% of road segment is within 300 feet of a perennial stream</td></tr>
<tr><td>NO RISK - Road segment has a paved surface, crossings are bridged or sufficient to pass the 100 year flood and associated debris. Cut and fill slopes are vegetated and are not eroding. Crossings are not impacting channel morphology downstream.</td></tr>
</table>

<table>
<tr><th colspan="2">Risk: Water Quality, Non-Sediment Pollution</th></tr>
<tr><td rowspan="4">Roads can be a source of elevated temperature, Fecal Coliform, Dissolved Oxygen, pH and other pollutants negatively impacting water quality. These pollutants can originate from human activities such as camping, or cattle livestock grazing.

For this Non-Sediment Pollution Issue, high risk zones are defined within 300 feet of stream reaches with, or potential of, Total Maximum Daily Load (TMDL) concerns, and/or dispersed camping sites and/or associated human activity, and/or cattle access provided at road-stream crossings.

Stream temperature was not taken into consideration in the GIS rating process.</td><td>HIGH RISK – 100% of the road segment is located within high risk rating zones.

OR

The road segment has two or more dispersed camping sites and associated human activity within 300 feet of a perennial or intermittent stream.

OR

The road segment has two or more perennial or intermittent stream crossings where livestock have access.</td></tr>
<tr><td>MEDIUM RISK – 2-5% of the road segment is located within high risk rating zones.

OR

The road segment has one dispersed camping site and associated human activity within 300 feet of a perennial or intermittent stream.

OR

The road has one perennial or intermittent stream crossings where livestock have access.</td></tr>
<tr><td>LOW RISK – the road does not meet all criteria for No Risk.</td></tr>
<tr><td>NO RISK – the road segment is not within an active grazing allotment. Road segment does not access formal or dispersed campgrounds.</td></tr>
</table>

Risk: Water Quality, Disruption of ground water flow and negative hydrologic surface connectivity	
Roads can be a source of disruption to natural hydrologic flows by disrupting ground water flow and increasing surface water connectivity. For Flow Effects Issue, high risk zones are defined as a road located in the riparian area and/or floodplain (300 feet from stream edge). Parallel roads on slopes create a cumulative effect on the disruption of ground and surface water flows.	**HIGH RISK** – 5-100% of the road segment is located within high risk rating zones. OR 5-100% the road segment is within 300 feet of perennial or intermittent stream OR There are more than two parallel road segments (stacked roads) on slopes over 30% between the perennial or intermittent stream and ridge.
	MEDIUM RISK – 0-5% of the road segment is located within a high risk rating zone. OR, 0-5% the road segment is within 300 feet of perennial or intermittent stream. OR, There are one or two parallel road segments (stacked roads) on slopes over 30% between the perennial or intermittent stream and ridge
	LOW RISK– the road does not meet criteria for NO RISK.
	NO RISK – Road segment does not visibly capture or divert ground or surface water flow.

Risk: Water Quality, Flow Effects	
This factor addresses road segments that, 1) intercept surface runoff and near surface ground water along cut slopes and ditchlines, converting subsurface flows to surface flows, and 2) increase delivery efficiency of these flows by diverting them directly to streams. Where these combined flows are continuous between roads and stream systems there is hydrologic connectivity. Hydrologic connectively is defined as any road segment that during runoff has a continuous surface flow between any part of the road prism and a natural stream channel. Water moves from hillslopes to valley bottom via surface and subsurface paths. Roads affect flow when they cut across hillslopes and/or require fill material through depressions that interrupt these natural paths. Road cutslopes or ditches intercept surface runoff and groundwater, accelerating their movement toward stream crossings. This action frequently increases soil erosion risks and routing efficiencies, which deliver road derived sediments and contaminants to streams and can alter peak flows and channel characteristics downstream. Precipitation/runoff mechanisms including rain-on-snow, spring snowmelt and convectional storms should be considered when evaluating a road segment's hydrologic connectivity. Indicators of these effects include water interception on road surfaces and ditchlines, absences of ditchline relief culverts or crossdrains, or interruption and	**HIGH RISK -** Road segment frequently intercepts both surface runoff and/or groundwater (>50% of segment length) in sufficient volumes to influence flow downstream and delivers waters directly to streams. Steep slopes and high drainage densities provide increased delivery efficiency to stream channels (usually less than 150 feet from stream channels). Downstream stream channels are unstable and susceptible to damage from increased peak flows. Road prisms may be interrupting and detaining water preventing it from recharging floodplain aquifers. Road has high hydrologic connectivity to the stream system. Road densities are 6 miles per square mile or greater (only use during 6th field analysis). OR 41-100% Road is within 300 feet of perennial or intermittent stream OR There are more than two parallel roads (stacked roads) on slopes over 30% between the perennial or intermittent stream and ridge
	MEDIUM RISK– Road segment frequently intercepts both surface runoff and/or groundwater (25-50% of the length of the segment) in sufficient volumes to influence flow downstream and moderately delivering waters directly to streams. Landform slopes are moderately steep and drainage densities moderate, providing increased delivery efficiency to stream channels (usually 150-300 feet from the stream channel). Downstream stream channels have occasional unstable reaches and are susceptible to damage from increased peak flows. Road prisms may be interrupting and detaining water preventing it from recharging floodplain aquifers. Road has moderately hydrologic connectivity to the stream system. Road densities are 4-5 miles per square mile (only use during 6th field analysis). OR 20-40% Road is within 300 feet of perennial or intermittent stream OR There are one or two parallel roads (stacked roads) on slopes over 30% between the perennial or intermittent stream and ridge
	LOW RISK– Road segment is occasionally intercepting runoff

detention of flows by road fill.	(<25% of length), esp. during peak events but generally not groundwater. Delivery efficiencies are low due to combination of landform slope and weakly developed stream networks (usually greater than 300 feet from the stream. Some additional ditch relief is necessary for routing surface runoff through vegetative filter. Downstream stream reaches may be susceptible to damage from increase peak flows. Road densities are 2-3 miles per square mile (only use during 6th field analysis).
	NO RISK – Road segment is not intercepting concentrating runoff or groundwater in ditchlines. Runoff is cross-drained through a vegetative filter prior to reaching stream channels. Natural flow paths are maintained uninterrupted.

Risk: Water Quality, Wetlands and Wet Meadows	
This factor addresses whether wetlands are present along road systems and do road segments interfere with their condition and function, ground water movement or wetland vegetation. The wetlands also include seeps, springs and sag ponds related to landslide terrain.	**HIGH RISK** – Road segment is adjacent to, or crosses landscape scale wetlands or wet meadows (greater than 50 acres). The road's location and design have displaced or degraded the wetland's size and function. Runoff is being delivered directly to the wetland, increasing sediment and contaminant loadings. Crossings of surface and near surface water paths have severely limited the volume, timing and distribution of water necessary to saturate the landform and support the wetland's vegetation and soil characteristics. Road segment is providing motorized off-road vehicles access into the area, further contributing to its degradation.
A road segment's influence on the condition and function of adjacent wetlands is a result of either a direct impact, such as a road location relative to the wetland, or indirect impacts related to the road's effect on the wetland's supporting hydrology, vegetative community and soil characteristics. The most notable effects include converting productive wetlands to compacted road surfaces, providing motorized off-road access into these areas, constraining and diverting both surface and subsurface flows that support the water table,	**MEDIUM RISK**– Road segment is adjacent to, or crosses large scale wetlands or wet meadows (6-50 acres in size). The road's location and design have displaced or degraded the wetland's size and function. Runoff is being delivered directly to the wetland during high flow events, increasing sediment and contaminant loadings. Crossings of surface and near surface water paths have somewhat limited the volume, timing and distribution of water necessary to saturate the landform and support the wetland's vegetation and soil characteristics. Road segment could, or is starting to provide motorized off-road vehicles access into the area, further contributing to its degradation.
	LOW RISK– Road segment is adjacent to, or crosses small localized wetlands or wet meadows (<5 acre in size). Road design characteristics, particularly crossings of surface and near surface

intercepting runoff which can accelerate erosion and lower water tables, increasing sediment loading and delivery of toxic pollutants, conversion of plant species composition by introducing noxious weeds, reducing baseflows and increasing peak flow and flood frequencies and degrading water quality. Of these effects, those that affect the areas ability to receive, store and move water will likely have the greatest impact on the wetland's condition and function.	water paths are limiting the available water necessary to inundate and saturate the landform and support the wetland's vegetation and soil characteristics. Initiation of wetland degradation including noxious weed establishment, increased sediment loading, and decreased area of saturation is occurring.
	NO RISK – Road segment is either not within 300 feet or adjacent to wetlands/wet meadows, or road design characteristics are providing for the uninterrupted movement of surface and groundwater necessary to support the wetland's vegetation and soil characteristics.

Risk: Hydrological Processes, Floodplain Function, Off-Channel Habitat and Riparian Reserves	
This factor addresses how the road segment has altered the function of a stream's floodplain and/or off-channel habitat. Floodplains are important regulators of streamflow and water quality. They absorb overbank floodwaters, allowing water to soak through the vegetation/organic mat and into the ground where it is stored and released more slowly into streams. In doing so, functioning floodplains can provide more water in late summer and reduce peak floods in winter and spring. Roads can affect floodplains by limiting the frequency of overbank flows thereby concentrating greater volumes of water within stream banks, and by interfering with the ability of the stream to migrate across its floodplain. In addition, roads can prevent hillslope runoff from recharging floodplain aquifers, intercept runoff and flood waters thereby eroding and degrading water quality, and indirectly degrade floodplain function by encouraging off-road motorized access from roads onto floodplains.	**HIGH RISK** = Road segment is located on unconfined valley bottom which frequently or continuously restricts channel migration and off-channel habitat. Road segment is affecting riparian habitat conditions affecting vegetation, altering movement of water, accelerating erosion processes, and interfering with recruitment of large woody debris. Road segment is providing access for motorized off-road dispersed use within the floodplain or riparian reserve to the point riparian habitat conditions affecting riparian habitat are being degraded or channel changes from a class B to a class C type stream, or there is a greater width to depth ratio. Stream is 303(d) listed for temperature, lack of shade contributes to elevated temperatures.
	MODERATE RISK– Road segment located on moderately confined valley or unconfined bottoms with localized areas of road encroachment on stream channel. Road location may be providing motorized off-road access onto floodplain or within riparian reserve such that floodplain or riparian habitat

Indicators of direct and indirect floodplain or riparian reserve degradation include soil compaction, noxious weed introduction, evidence of soil erosion or mass wasting of road fill during peak runoff, water quality changes, artificial confinement of streams, stream bank erosion, interruption of hillslope delivery of water onto floodplain, and loss of downed or standing woody debris which is both an energy dissipater and a habitat component. Similar impacts occur if roads are within or provide vehicle access to the portion of a riparian reserve which affects aquatic habitat; loss of bank vegetation with associated loss in cover and accelerated bank erosion, reduction in large wood from the channel or potential large wood due to wood cutting or hazard tree removal, soil compaction and accelerated surface erosion. Off-road access, provided by roads onto floodplains or riparian reserves, is influenced by factors which include: proximity of road to floodplain, slope of ground leading from road onto floodplain, and desirability of floodplain determined by its width and demands for dispersed use. With more alteration, the likelihood increases that stream systems will not be functioning properly and those road segments within the floodplain will be at higher risk of damage. Off-channel habitats provide important rearing habitat and refuge habitat during high flows. Roads in the floodplain may isolate these off-channel areas so they are no longer accessible to fish or completely fill them. A road system may not isolate or fill an off-channel area but by providing access to vehicles result in loss of vegetation, bank stability, large wood input, cover and a loss of overall habitat quality.	conditions which affect aquatic habitat showing signs of degrading in localized areas (see indicators below). **LOW RISK–** Road segment located on slightly confined valley or unconfined bottoms with localized areas of road encroachment on stream channel or off channel habitats. Road location may be providing limited motorized off-road access onto floodplain or within riparian reserves such that floodplain or riparian habitat conditions which affect aquatic habitat could start degrading in localized areas within a few years with continued use (see indicators below). **NO RISK** – Road segment is not located in valley bottom or is located on the toe slope in confined valley bottom outside the 100 year floodplain and not interfering with floodplain functions and does not provide for dispersed recreation access.

Note: This criterion is not shown on the spreadsheet in Appendix A. These criteria will need further review during a project-specific NEPA process.

Risk: Fish Habitat, "At Risk" Fish Populations & Watershed Function	
This factor addresses whether fish listed for protection under the Endangered Species Act or on the Regional Foresters Sensitive Species List or Essential Fish Habitat, are present in the watershed and the relative importance to recovery within the subbasin. The term "significant" here is used to denote important spawning and/or rearing habitat that is key to populations persistence. This factor addresses the relative importance of a subwatershed to the conservation and recovery of at risk fish and to help weight the potential for adverse impacts to at risk fish or their habitat. Besides the potential impacts to aquatic habitat, roads can increase the potential for poaching or introduction of exotic species.	**HIGH RISK -** Road segment is in a significant subwatershed for an At Risk species and no road crossings are barriers to any life stage of an at risk species, but poaching due to access from the road segment is a concern though not necessarily documented. The road segment is or has potential, based upon the previous factors, to have serious adverse impacts to at risk fish habitat; and/or there are road crossing barriers to some life stage of an at risk species and/or there is known poaching of at risk fish occurring.
	MEDIUM RISK– Road segment is in a subwatershed with at risk fish but is not a significant subwatershed for an At Risk species. One or more crossings are a barrier to at risk fish at some life stage; or road segment is in a significant subwatershed for an at risk species, no road crossings are barriers to any life stage of an at risk species, poaching is not a major concern.
	LOW RISK – Road segment is in a subwatershed with at risk fish but is not a significant subwatershed for At Risk species. Stream crossings are not barriers to at risk fish but may be to other species. Or at risk fish are not present and some stream crossings are barriers to some life stages of other species
	NO RISK – Road segment with the following set of conditions: road segments located in a watershed with no listed fish species; stream crossings are not migration barriers (any life stage) for other fish species.

Risk: Fire and Fuels Management - Human Caused Fire	
Transportation system roads are used by the public to access public lands. The more public use of an area equates to a higher probability of Human caused fire starts due to increased use of incendiary devices and purposes (campfires, smoking, ATV-use, target shooting, etc.)	**HIGH RISK** – High risk roads typically do not lead to developed recreation sites (campgrounds, boat launches, etc.) Fire hazard/fire risk in these areas is high. The fuel complex may include conifers, ponderosa pine and fir.
	MEDIUM RISK – Medium risk roads lead to developed recreation sites and to dispersed camp sites. Fire hazard/fire risk in these areas is moderate. Fuel complex may include grassy meadows, ponderosa pine and fir.
	LOW RISK– Low risk roads are not used by public. These are closed roads.
	NO RISK - These roads have already been recommended for decommissioning in an environmental assessment.

Risk: Invasive Plant Species & Impacts to Sensitive Plant Species or Habitat	
Roads facilitate the establishment and spread of invasive plants and non-native plant species. The more public use of an area equates to a higher probability of weed infestation occurring. Road maintenance has the ability to increase the establishment and spread of invasive plants by moving the seed and/or propagules along the road prism, introducing infected aggregate or providing a vector for infected vehicles/equipment to transport seed. Invasive plants can reduce ecological values by displacing native vegetation, increasing soil erosion, reducing forage for wildlife and livestock, degrading recreational values, and increasing fire risk. Following Best Management Practices for road maintenance and projects that occur along or near roads can reduce the risk of weed infestation. Sensitive plants can be affected by motorized use through habitat loss and direct mortality. Sensitive species occur in a variety of habitats on the Fremont-Winema National Forest. Thorough surveys have been	**HIGH RISK -** • High risk noxious weed species occur along the road segment. Examples include knapweeds, leafy spurge, toadflax, St. Johnswort, medusahead, etc… • Recreation use is high- Road leads to a developed recreation site. • High traffic flow. The road is a major arterial road that has a higher risk of spreading weeds through high levels of traffic, as well as high levels of maintenance disturbances (i.e. grading, ditch work, gravel additions, etc.). High level of road reconstruction also increase the alteration of habitat conditions that favor invasive plants. • The road segment travels through an area that has a high fire risk in combination with a high risk weed problem. If the area does burn, weeds will spread rapidly along the roads. • Existing populations, public road use, and previous disturbance. • Road segment may not have weeds, but is located relatively close to high infestation areas; therefore it is likely that weeds will spread into this road segment. • The area has not been surveyed and the risk is not known. However, the area has received a high amount of ground disturbance. • Contains private lands which have not been surveyed, but have a high potential for invasive plant occurrences, or it is known that high risk invasive plant species occur and are not being treated. • There is a high potential for invasive plant occurrences in the area, with a high potential for spreading along the road system. • High risk roads are within 300 feet of known sensitive plant locations or intersect riparian.

conducted in some areas but not in others. In most of the forest dispersed camping is allowed within 300 feet of roads and it is assumed most camping related activities will take place within 500 feet of the road.	**MEDIUM RISK -** • Weeds occur along the road segment, but the population is reduced and considered contained due to years of treatment. (However, this road segment could become a high risk if a year of treatment is skipped due to lack of funding and personnel). • Recreation use is moderate- Road leads to a popular recreation sites used seasonally. • Medium traffic flow occurs along the road segment. • Weeds do not occur along the road segment, but high risk species are established on road(s) feeding into this road. • The area has not been surveyed and the risk is not known. However, the area has received a moderate amount of ground disturbance • Contains private lands which have not been surveyed and are assumed to be uncontrolled or it is known that the private land invasive plant populations are not being treated. • There is moderate concern that invasive plants exist in the area and will spread along the road system. • Medium risk roads occur within 300 – 500 feet of known sensitive plant locations
	LOW RISK - • The road segment is relatively far away from large infestation areas • Recreation use and overall traffic is low or limited seasonally (e.g. spring mushroom hunting) such that there is a relatively lower risk of weeds spreading and becoming established. • A relatively small invasive plant infestation occurs along the road and it is fairly stable and contained, and not expected to spread (assuming that yearly treatment continues). • The species along the road segment or closest to the road segment is of relatively low risk (e.g., bull thistle). • Road is used only for administrative uses, there is minimal maintenance and disturbance activities, and use is seasonally limited. • There exists low or limited potential habitat (barrow pits and road shoulders are well vegetated) for the invasive plant species; therefore the population is not expected to expand its size and range along the road segment. • Low risk roads do not intersect riparian areas or are more than 500 feet from known sensitive plant occurrences.

	NONE RISK - All roads in this scale/level of analysis are at risk of being invaded by invasive plants. Therefore, there is never a "no risk" situation.

Invasive Plant Species Assumptions

- All roads have a high risk of facilitating the spread and establishment of invasive plants.
- Due to limited budgets, inventory and mapping of invasive plants is not keeping up with the rapid rate of spread of invasive plants. As a result, existing invasive plant sites maybe missing in the electronic analysis; therefore, the invasive plant analysis will rely heavily upon the knowledge of district botanists and ecologists.
- Invasive Plant Risk can be reduced by:
  - Annual inventory and treatment (i.e., early detection and treatment).
  - Following Best Management Practices for road maintenance and projects that occur along or near roads.

Risk: Known Cultural Resources	
Cultural resource sites/value can be impacted by the transportation system. Use and maintenance of roads which cross or come within close proximity of cultural sites and/or cultural values can impact these resources. In addition, access to areas with cultural sites and/or values increases that likelihood that these resources could be negatively disturbed by the public users of the forest.	**HIGH RISK**: high risk roads that have been surveyed lie within the high cultural site density areas identified. Roads within identified high cultural site density areas that have not been surveyed have a probability of impacting unknown cultural sites/cultural values.
	MEDIUM RISK: roads within the proposed five (5) year vegetation management plan have a medium risk designation for a potential effect to cultural sites/cultural values.
	LOW RISK: low risk roads lie outside designated high cultural site/cultural values density areas and outside the areas identified for the five (5) year vegetation management plan.
	NO RISK: roads already studied in a signed NEPA Decision in which the travel analysis has determined the road is to be decommissioned in the future.

Risk: Open Road Densities within Big Game Habitat	
Route density thresholds for wildlife have been established in the Fremont LRMP, and thresholds for wildlife in the literature can vary by season and by	**HIGH RISK** – Open roads contribute to open road densities at the watershed scale of: 1. $\geq$ 1.0 mi/sq mi within mule deer winter range $\geq$ 2.5 mi/sq mi within mule deer summer range

geographic location. Fremont LRMP standards state that roads open to motorized vehicle traffic will be managed at a level of 1 mile or less of open road per square mile during the critical winter period of December 1 to March 31, and roads open to motorized vehicle traffic will be managed at a level of 2.5 miles or less per square mile in summer range. Winema LRMP state that areas managed as deer winter range shall be managed for reduced vehicular access from November 15 through July 15 to prevent disturbance of wintering and fawning mule deer.	**NO RISK** – Open roads contribute to open road densities at the watershed scale of: 1. < 1.0 mi/sq mi within mule deer winter range 2. < 2.5 mi/sq mi within mule deer summer range

Risk: Direct Impacts to TES or MIS Nesting Habitat	
Motorized use on designated routes has the potential to affect wildlife in a number of ways including habitat alteration, mortality, and disturbance. Disturbance to wildlife is the main concern. Disturbance can result in the displacement of animals from important sites including nesting or rearing habitat.	**HIGH RISK** – 1. Roads within a 1/4 mile buffer of known bald eagle nest sites. 2. Roads within a 1/2 mile buffer of known spotted owl nest sites. 3. Roads within a 1/4 mile buffer of known goshawk nest sites. 4. Roads within a 700 yards (2100 ft) buffer of known peregrine falcon nest sites. 5. Roads within a 1/4 mile of known golden eagle nest sites.
	NO RISK – All roads not located within the above buffer distance to nest sites.

Risk: Impacts to Important Wildlife Habitats	
Wet meadows and scabflats are important habitats for wildlife. Roads within these habitats can cause resource damage due to water retention. * Note: This category may seem a duplicate with a Water Quality wetland category above, but this rating category is important because it takes into consideration that wetlands are important to Wildlife as well.	**HIGH RISK** – Roads located within wet meadows or scabflats.
	NO RISK – All roads not located within wet meadows or scabflats.

Rating and Scoring

The risk and benefit for each road was scored by each resource specialist in the working group based on the criteria listed above, which generated a high, medium, or low rating. This produced a road's score, which were all totaled to find a road's overall risk and benefit rating.

For both the benefit and risk ratings, a high rating results in a score of 3 points, a medium rating results in a score of 2 points, and a low score results in a score of 1 point. There are situations where a road is rated "high to medium", for example, and that score correlated equally to be assigned half-way between 3 and 2 points, or 2.5 points.

There are 12 risk categories and 7 benefit categories for each road analyzed. That means that a road could have the potential for a final risk score of 36 points (3 points for each criteria), and a final benefit score of 21 points (3 points for each category). Refer to the examples in Tables 5 and 6.

The final rating of a single road would add up the total points, and it would fall between equally calculated ranges, which divide the total points into 3 different categories.

Risk:

High Risk: 25-36 points
Medium Risk: 13-24 points
Low Risk: 1-12 points
No Risk: 0 points

Benefit:

High Benefit: 14-21 points
Medium Benefit: 8-14 points
Low Benefit: 1-7 points
No Benefit: 0 points

It is important to note that these categories were developed for this travel analysis at the forest-wide scale and thus are general in nature. A project level analysis could potentially bring up additional, or more specific, resource concerns that could further establish more site-specific recommendations, mitigations, or actions for a road's future management objectives.

Also, there were roads within the transportation system that the Forest determined would likely be needed in the future, despite the final analysis rating. These roads were considered to overrule the travel analysis rating system because of their importance to the Forest's administrative duties and/or recreational obligations. For example, these particular roads could lead to fire lookout towers, established recreational sites, or existing administrative facilities.

Table 3 - Example of Risk Scoring System for a Single Road

	Risk Categories	H, M, and L Rating	Points for each Rating
1	Water Quality, Road Related Sediment	M	2
2	Water Quality, Non-Sediment Pollution	M	2
3	Water Quality, Disruption of ground water flow and negative hydrologic surface connectivity	M	2
4	Water Quality, Flow Effects	L	1
5	Water Quality, Wetlands and Wet Meadows	M	2
6	Hydrological Processes, Floodplain Function, Off-Channel Habitat and Riparian Reserves	L	1
7	Fish Habitat, "At Risk" Fish Populations & Watershed Function	H	3
8	Fire and Fuels Management - Human Caused Fire	L	1
9	Invasive Plant Species	N	0
10	Known Cultural Resources	L	1
11	Open Road Densities within Big Game Habitat	M	2
12	Direct Impacts to TES or MIS Nesting Habitat	L	1
13	Impacts to Important Wildlife Habitats (Wetlands)	M	2
		Total Points:	**20 out of 36 possible MEDIUM RISK**

Table 4 - Example of Benefit Scoring System for a Single Road

	Benefit Categories	H, M, and L Rating	Points for each Rating
1	Fire and Fuels Management – Vegetation and Agency Management Access	L	1
2	Fire and Fuels Management – Egress/Escape Routes for the Public	M	2
3	Timber Management – Harvesting Access	M	2
4	Access for Recreation Sites	L	1
5	Need for Range Permit Administration	N	0
6	Community/Public Road: Connects to and Accesses Communities	H	3
7	Private Land Access	L	1
		Total Points:	**10 out of 21 possible MEDIUM BENEFIT**

Based on this example, the overall score would be "medium" for risk and "medium" for benefit. See Appendix A – Existing Road System's Risk & Benefit Assessment for the overall risk and benefit results for each road in the Fremont-Winema National Forest's existing transportation system.

Table 5 displays the score (point) range for high, medium and low benefit, road miles and percent of miles in each score group.

Table 5 - Benefit Score Summary

	Point Range	Overall Score	Roads Miles	Percent of Total Miles
BENEFIT	0	No Benefit	0	0%
	1-7	Low Benefit	4,720	46%
	8-14	Medium Benefit	4,663	45%
	14-21	High Benefit	897	9%
	Total		10,280	100%

Table 6 displays the risk score range for high, medium and low, road miles and percent of miles in each score group. As noted above, low, medium and high numeric point range is not evenly distributed between cells.

Table 6 - Risk Score Summary

	Point Range	Overall Score	Roads Miles	Percent of Total Miles
RISK	0	No Risk	0	0%
	1-12	Low Risk	2,828	28%
	13-24	Medium Risk	6,931	67%
	25-36	High Risk	521	5%
	Total		10,280	100%

Road Maintenance Costs

Forest Service road budgets have been steadily declining for the past 20 plus years. Region-wide, the amount of funding for road work including both appropriated funding and work contributed by commercial users is less than 20 percent of what it was 20 years ago.

Appropriated road funds to the Pacific Northwest Region (Region 6) have been reduced 40% in the past 5 years alone. Current levels of funding for road work on the Fremont-Winema National Forest are shown in Table 7 below.

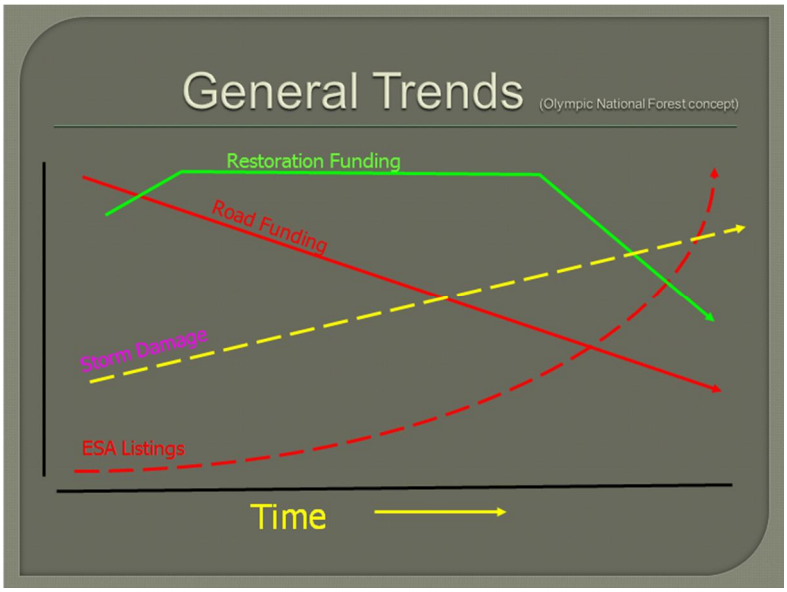

Figure 1- Regional Funding Trends (RO MRS Overview PPT Presentation, 2012)

The Fremont-Winema's road maintenance budget has been closely associated with the Regional Office's declining budget numbers. The Fremont-Winema National Forest's 5-Year average road funding numbers are listed below.

Table 7 - 5-Year Average Road Funding

Fremont-Winema NF - 5 Year Average Budget								
BLI	**Forest Operational Budget (x1000)**					**5 Year Average**	**2014 % to Rd Maintenance**	**Average Mtc Budget**
	2010	**2011**	**2012**	**2013**	**2014**			
CMRD	1183	1046	763	631	652	855	40%	$342
CMLG	590	95	347	286	189	301	25%	$75
CWF2	230	230	183	164	58	173	20%	$35
Purchaser Mtc	114	94	60	50	48	73	100%	$73
CFLRP	0	0	0	200	200	80	100%	$80
							Total	$605

5YR Ave Mtc Budget	Range	
	-20%	+20%
$605	**$484**	**$726**

Amount from appropriated funds:	$532
Amount from commercial Users:	$73

Unfortunately, there is not enough road maintenance funding to perform road work on the entire road system. Typically, the budget for road maintenance falls short of the actual needs of the

system, which results in an unsuccessful maintenance road treatment schedule. Many roads on the Fremont-Winema NF are falling into a severe state of disrepair.

> Deferred Maintenance is defined as "maintenance that was not performed when it should have been or when it was scheduled and which, therefore, was put off or delayed for a future period. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and decrease in asset value", (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998).
>
> Annual Maintenance is defined as "work performed to maintain serviceability, or repair failures during the year in which they occur. Includes preventive and/or cyclic maintenance performed in the year in which it is scheduled to occur", (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998).

Since 1999, the Forest Service has been tracking the amount of the deferred maintenance backlog. Based on national estimates (from 2013), the Fremont-Winema NF, would need approximately $134 million to bring their entire road system back up to standard, and about $13.6 million per year to keep it that way. (Please note that the unit costs used to arrive at the figures above are made up of national averages to restore and maintain the road system in a like new condition. They also include the cyclical items necessary to replace gravel surfacing, pavement overlays, bridges/structures, and major culverts on schedule, and include a 40% overhead rate.)

Our local estimate, (using regional unit rates and not including the national burden rate) indicates that the Fremont-Winema NF would still require about $8 million per year to keep the current road system fully maintained to standard. Table 7 above, shows that on average, the Fremont-Winema N.F. only receives about $600,000 dollars per year, (including maintenance performed by commercial users), that can be applied toward road maintenance work, that is only about 8% of the funding necessary to address the estimated annual maintenance needs to fully maintain the road system.

Financial Analysis Process

The goal of the financial analysis step in the overall Travel Analysis Process is to identify opportunities to help move the road system to a more affordable state.

Based on the figures in the previous section, if the Fremont-Winema National Forest were to focus their available road maintenance funds on a given set of roads to fully maintain to standard, they would only be able to maintain about 65 miles of roads if they were all paved, or about 125 miles of roads if they were all gravel surfaced. That size of road system would not meet the needs of the forest or the public, and does not meet the requirements of the 2005 Travel

Management Rule as it would not allow the forest to meet resource management objectives in the Forest Plan and would not allow the forest to meet statutory and regulatory requirements.

Given the enormous gap between available appropriated funding for road work and the cost to maintain the road system fully to standard, the Region recognized that it would not be possible to balance the size of the road system with the cost of maintaining all roads fully to standard and still be able to meet resource management needs or the needs of the public. Since the requirement in the Travel Management Rule to "reflect long-term funding expectations" was not defined in regulation or policy, Region 6 defined it in the *R6 Guidance for Preparing a Travel Analysis Report* document to mean that "average annual funding" is reasonably in balance with the "average annual cost of routine road maintenance", where:

> Average annual funding is defined as the average amount of funding available for each NFS unit for routine annual maintenance from appropriations, collection accounts, commercial users, cooperators, and other partners during the 2011-2015 timeframe, plus or minus 20%. It does not include funding from the American Recovery and Reinvestment Act (ARRA) or the Capital Improvement Program (CIP). Only the modest amounts specified for "routine maintenance" in Legacy Roads and Trails funding allocations are included.
>
> Average annual cost of routine road maintenance is defined as the average yearly need for basic road maintenance. This includes log out, drainage maintenance, erosion control, blading, brushing, traffic signs, etc. It does not include cyclical replacement costs (such as bridge replacement every 50 years, asphalt overlays, etc.), which are covered by funding beyond the individual NFS unit budgets (e.g., Regional Capital Investment Program).

The Fremont-Winema National Forest utilized the *Region 6 Financial Analysis Template*, which is based on the definitions above, to perform the financial analysis. A full discussion of the Financial Analysis Process is provided in Appendix E. In summary, the first steps of the financial analysis process lead to a determination of the current road maintenance costs for routine annual maintenance items, (which does not include things like replacing gravel surfacing, replacing pavements, or replacing bridges and structures), the current cost of keeping up the existing road system to this standard for the Fremont-Winema NF would be about $1.6 million dollars per year, or roughly three times the amount of currently available funding for this type of work. Table 8 below shows the current breakdown of average annual road maintenance for the current road system by operational maintenance level.

Table 8 - Average Annual Road Maintenance Costs - Existing Road System

OPML	Current		
	Miles	% of System	Cost
5	0	0%	$0
4	254	2%	$453,559
3	729	6%	$711,947
2	5,382	43%	$427,528
1	6,181	49%	$15,514
	12,546	**100%**	**$1,608,549**

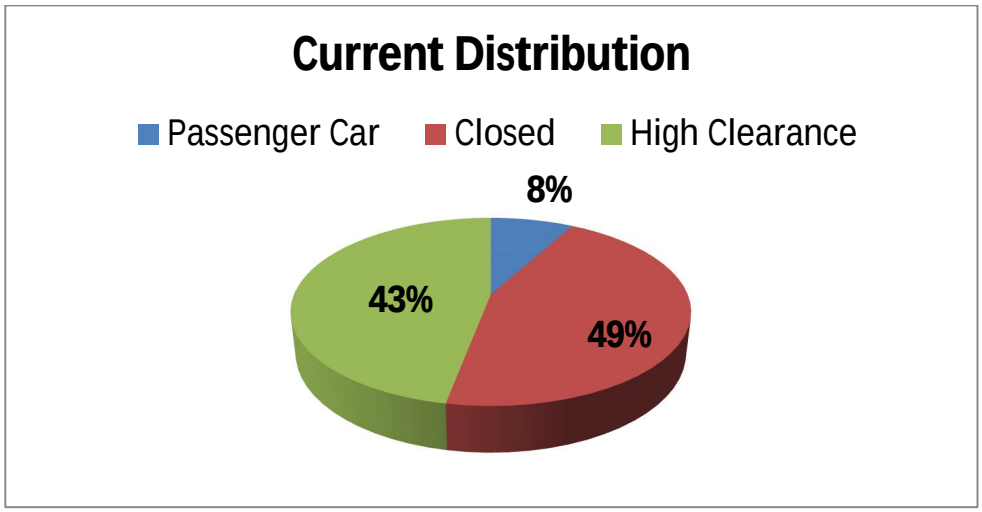

Figure 2 - Fremont-Winema's Existing Road Maintenance Levels Distribution

The second part of the financial analysis process helps identify what types of changes to the size and composition (pavement vs gravel surfacing, maintain for passenger car vs only maintain for high clearance vehicles, etc.) of the road system would be needed to bring the average annual costs in balance with the average annual funding expectations. The results of the financial analysis show that the forest would need to make some significant (and probably unpopular) changes to reduce the number of miles of open roads, (by decommissioning any that are no longer needed, and by closing those that are only needed for intermittent project uses), and by lowering the maintenance standards of the roads that remain open year around. Further discussion of available options is provided in the next section of this report: Describing Opportunities and Setting Priorities.

Step 5: Describing Opportunities and Setting Priorities

Potential Opportunities for the Transportation System

Once the roads have been analyzed, rated, scored, and labeled for risk or benefit, it is then possible to start understanding the opportunities that may correlate with how the roads were rated. The results of this travel analysis, including a list of roads and their corresponding overall rankings are located in Appendix A.

After calculating the final Benefit and Risk rankings, a recommendation matrix (Table 5) can assist in the next step of the travel analysis process. The matrix in Table 5 can be used as a starting point to discuss the different opportunities that can exist for the future planning of the Fremont-Winema National Forest's transportation system.

Table 9 - Risk and Benefit Opportunity Matrix for Existing Roads

ROADS					
	BENEFITS				
RISKS	**Scores**	**None**	**Low**	**Medium**	**High**
	High	(HN) Decommission, Close, or Mitigate (Highest Priority) **0 miles**	(HL) Decommission, Close, or Mitigate (Highest Priority) **13 miles**	(HM) Mitigate or Admin Use Only **269 miles**	(HH) Mitigate and Maintain (Highest Priority) **238 miles**
	Medium	(MN) Decommission, Close, or Admin Access Only **0 miles**	(ML) Decommission, Close, or Admin Access Only **2,561 miles**	(MM) Mitigate and Maintain (2nd Priority) **3,741 miles**	(MH) Mitigate and Maintain (2nd Priority) **629 miles**
	Low	(LN) Decommission, Close, or Convert to Trail **0 miles**	(LL) Decommission, Close, or Convert to Trail **2,145 miles**	(LM) Maintain (2nd Priority) **653 miles**	(LH) Maintain (3rd Priority) **30 miles**
	None	(NN) Decommission, Close, or Convert to Trail **0 miles**	(NL) Decommission, Close, or Convert to Trail **0 miles**	(NM) Maintain (3rd Priority) **0 miles**	(NH) Maintain (3rd Priority) **0 miles**

In order to have a better understanding of what opportunities may be available for the roads within the Fremont-Winema National Forest's transportation system, it is important to understand the details on where a road may fall within the matrix above. This may be a good starting point for future analyses of site-specific projects following the NEPA process. Please refer to Table 11 for the mileage of road system that fell into each opportunistic category.

No Benefit & Low Benefit:

High Risk (Decommission, Close, or Mitigate - Highest Priority) -
Due to the associated risk of these roads and the little to no benefit, these roads are likely not needed for future use and should be further analyzed for decommissioning or conversion to other uses. If a specific road does need to be retained for a specific purpose, it could be reduced in maintenance level to a ML1 (put in storage). The majority of these roads are probably not needed for administrative use in their current location or condition. If for any reason the road is needed for administrative use, the road could be left closed until needed, or left open for administrative use only (depending on the frequency of needed access).

If the road is essential for facility access, then a high priority should be set in order to evaluate and mitigate the associated risks. If the road is needed for public access, the Forest could coordinate with other government agencies (City, County, Towns, etc.) or private landowners to possibly transfer road operational jurisdiction and/or road maintenance responsibility. Permits could be issued for private land owner access or special use permit activities.

If the road is not open to the public, is not under any written authorization, and is not needed for future administrative use, the road should be decommissioned and taken off the transportation system

Medium Risk (Decommission, Close, or Administrative Access Only) -
These roads have been categorized to have little to no benefit, and because of the risk associated with these roads, general public motorized access is not suggested. However, if the road is important for public access or agency resource management, then the Forest could coordinate adequate road maintenance with cooperating permittees or agencies.

The roads in this category could be closed or restricted to administrative access only depending on the agency's future needs. If there is not a compelling administrative or public need for the road in the future, it should be scheduled for decommissioning.

Low Risk & No Risk (Decommission, Close, or Convert to Trail) -
If administrative or public access is not needed in the future, then the road should be decommissioned or considered for other uses such as trails. Conversion to a trail would depend on the nature of the route and whether there is a connection to an existing motorized trail.

If the road is determined to be needed for use in the future, it could be closed (or put into storage for future use) and will remain on the transportation system as a ML1 road. If the road warrants use for motorized recreation, it may be considered as a motorized trail.

If the risk is low, the priority for utilizing funding to mitigate risks would also be low. However, it should be noted that drainage features and erosion control measures should be inspected before any closure to prevent resource damage.

Medium Benefit:

High Risk (Mitigate or Administrative Access Only – Highest Priority)

Routes within this category that do not have a public benefit could be restricted to administrative access only. The risks associated with the roads may require some mitigation, especially if the road is chosen to be open for public access. Some road mitigation measures that could be considered include additional maintenance, invasive weed control, reconstruction, relocation, seasonal maintenance restriction, and season road closures. The risk severity and availability of funds will help determine the scale and frequency of mitigation measures.

Medium Risk (Mitigate and Maintain – 2nd Priority)

The roads within these categories probably need to remain open for administrative use, or even open to the general public, depending on what type of access is appropriate to meet resource management and/or recreation objectives. The risks associated with the roads may require some mitigation, especially if the road is chosen to be open for public access. Some road mitigation measures that could be considered include additional maintenance, invasive weed control, reconstruction, relocation, seasonal maintenance restriction, and season road closures. The risk severity and availability of funds will help determine the scale and frequency of mitigation measures. Roads ranked in this category take a high priority in the allocation of mitigation and maintenance funding.

Low Risk (Maintain – 2nd Priority) -

Depending on the objective the road access warrants, these roads could remain open for administrative use and/or public access. It's important to refer to resource management objectives in order to make the final recommendation. If the road needs to remain open for public access, adequate road maintenance could be coordinated with cooperating permittees or agencies, or other interested user groups.

The low risk associated with these routes indicates that they have low priority for the investment and maintenance time to mitigate risk factors. As well, drainage features and erosion control could be a good investment for the roads in this category.

No Risk (Maintain – 3rd Priority) -

These roads could be open for public access or just for administrative access, depending on the resource objectives of the Forest.

Because these roads fall within a low risk category, the priority of funding associated with time and money to mitigate risk is also low. If these roads are important for public access, the Forest could coordinate adequate road maintenance with cooperating permittees or agencies.

High Benefit:

High Risk (Mitigate and Maintain – Highest Priority) -

Most of these roads are appropriate for general public access; however, some routes may need to be open for administrative use only in order to control access to sensitive cultural or biological resources. The high risks associate with these roads may require some mitigation activities, and if they are open to the public, high priority should be given to schedule these activities. Mitigation depends on the specific risks and may include additional maintenance effort, invasive weed control, reconstruction, relocation, seasonal maintenance restriction, seasonal road closure, etc. The risk severity and availability of funds will help determine the scale and frequency of mitigation measures.

Medium Risk (Mitigate and Maintain – 2nd Priority) -

The roads that fall within these categories generally need to remain open for administrative and public uses, depending on what type of access is appropriate to meet resource management and/or recreation objectives. The risks associated with the roads may require mitigation work. Some road mitigation measures that could be considered include additional maintenance, invasive weed control, reconstruction, relocation, seasonal maintenance restriction, and season road closures. The risk severity and availability of funds will help determine the scale and frequency of mitigation measures. Roads ranked in this category take a high priority in the allocation of mitigation and maintenance funding.

Low Risk & No Risk (Maintain – 3rd Priority) -

These roads are generally open for administrative and public uses, depending on the resource objectives of the Forest.

Because these roads fall within a low risk category, the priority of funding associated with time and money to mitigate risk is also low. If these roads are important for public access, the Forest could coordinate adequate road maintenance with cooperating permittees or agencies.

Potential Actions for Key Issues

This step in the travel analysis provides general guidelines on different approaches the Forest may take for roads to address the Key Issues identified in Step 3 of this report. The scale of the implementation of these opportunities, or activities, will be site-specific and depend on the resource concerns and the compatibility of the proposed course of action. The information

below is intended to begin the discussion process on possible options that decision makers can consider when proposing changes to the transportation system. Final decisions will be made through the NEPA process.

Previously Stated Key Issues:

- **Existing road system cannot be maintained adequately under current and expected budgets**
- **Increased risk for human caused fire**
- **Needed access to the Forest for all administrative purposes (fire, timber, etc.)**
- **Needed access to recreational areas**
- **Needed access to the Forest for all permitted activities (range, mining, etc.)**
- **Needed access to private land inholdings and communities**
- **Road activities pose threats to watershed conditions and fish habitat**
- **Impacts/damage to sensitive plant population and spread of invasive plants**
- **Protection of cultural resources**
- **Maintenance of an appropriate road density in wildlife habitat**
- **Unauthorized routes and non-system roads**

Existing road system cannot be maintained adequately with declining budget

- The number of miles of maintained roads could be reduced. It's also possible to convert higher maintenance level roads to either a lower maintenance level (which reduces the amount of maintenance applied to the road), or convert to a motorized or non-motorized trail.

- Funding could be supplemented by soliciting maintenance opportunities with jurisdictions and/or entities in and around Forest land, including Counties, Towns, Cities, other Forests, interested clubs, and private individuals.

- If a road is a secondary access to a community through the Forest, it may be possible to transfer jurisdiction of those roads to surrounding Counties, Towns, or Cities. They may have a high stake in keeping that road open in a state of emergency and could look at the change in ownership as an opportunity.

Increased risk for human caused fire

- Road density may be reduced by decommissioning routes in an attempt to decrease the probability of a human-caused fire event.

- In areas where roads were roads have a higher value for fire suppression activities, emphasize road storage, (ML 1 roads), rather than decommissioning, so that they could still be used administratively in case of a fire.

- Barricading a non-motorized route may discourage traffic in an unauthorized area and could decrease the likelihood of a human-caused fire. Signs, berms, barriers, and even natural material (trees, boulders, dirt mound, etc.) could be used to block an entrance in order to prevent motorized traffic in unsanctioned areas. It's important to note the barricades would need to be inspected frequently in order to make sure travel has been discouraged.

Preserve access to the Forest for all administrative purposes

- It is important to evaluate the long-term administrative needs for the roads, and prioritize road maintenance, based on current and long-term resource management objectives.

- Reducing the maintenance level of roads to a ML1 (and closing the road to motorized traffic) may decrease the amount of maintenance funding needed for that road, while still providing for future administrative use as needed.

Preserve access to recreational areas

- If recreation areas will be maintained for future use, and the recreational area has designated motorized access (located on the Motorized Vehicle Use Map, or MVUM), then access should be maintained in and out of the recreational area.

- Seek out and utilize partnerships with interested parties, including recreational special use permittees or recreational clubs, to help maintain access to recreation areas.

Preserve access to the Forest for all permitted activities

- It is important to recognize the road system needed through studying historic permit applications. These roads should be studied to determine if they should remain open for continued permitted purposes.

Provide access to private land inholdings and communities

- Funding could be supplemented by utilizing maintenance opportunities with jurisdictions and/or entities in and around Forest land, including Counties, Towns, Cities, other Forests, interested clubs, and private individuals.

- Recognize routes that the public may need to take in an emergency and try to provide multiple paths of egress when possible. Coordination should be made with the communities, the jurisdictional fire districts, and the Forest's fire management team.

- If the road is a secondary access to a community through the Forest, this could present an opportunity to transfer jurisdiction of the road to the County, Cities, or Towns nearby.

- If the road is does not need to remain open for Forest Service or general public uses, consider issuing special use agreements with landowners that transfer road maintenance responsibility to them.

- When considering decommissioning multiple roads into the same private land, consider the need for emergency evacuation routes for the landowners.

Road activities posing threats to watershed conditions and fish habitat

- Prioritize mitigation of watershed risks on roads open to the public, including providing erosion control and improving the drainage system.

- When decommissioning roads, remove any drainage structures and rehabilitate the drainage to a natural condition.

- Traffic should be eliminated from decommissioned roads. Signs, berms, barriers, and even natural material (trees, boulders, dirt mound, etc.) could be used to block an entrance in order to prevent motorized traffic in areas of watershed concern. The barricades may need to be inspected frequently in order to insure that travel has been eliminated.

Spread of sensitive plant or invasive weeds

- Consult appropriate Forest Resource Specialists when performing road maintenance activities in areas of plant or weed concern.

- In order to reduce the probability of the spread of noxious and invasive species, try to limit traffic on the transportation system in known areas of invasive weeds by either closing or decommissioning roads.

Protect cultural resources

- Consultation with the Tribes is a high priority when roads are being considered for new construction, opened for public use, closures, and/or decommissioning. If a site-specific cultural issue is discovered, the appropriate road opportunity will be decided upon, which could include gating the road, rerouting the road, closing the road, or decommissioning the road.

- Maintenance agreements can be used to assist the Tribes in managing Forest Service roads that are associated with the Tribal transportation program in the best interest of the Tribes.

Maintain appropriate road density in wildlife habitat

- Encourage reduction in the amount of road miles within habitat of concern during site-specific NEPA analysis. Considered decommissioning parallel roads that provide duplicate access.

- Utilize seasonal restrictions to reduce impact from motorized access to wildlife during seasons when species are sensitive to disturbance.

Unauthorized routes and non-system roads

- Unauthorized routes and non-system roads were not evaluated in this forest-wide TAP. These routes may be considered to be added to the transportation system only after evaluation of risks and benefits in a project scale TAP and subsequent NEPA decision, including public involvement.

- If an unauthorized road is necessary for private land access, a special use agreement may be issued stipulating that it is for private use and all road maintenance responsibility falls on the permittee.

Step 6: Key Findings

Desired Condition of the Future Road System

The 2005 Travel Management Rule (36 CRF 212.5(b)) states:

"(b) Road system—(1) Identification of road system. For each national forest, national grassland, experimental forest, and any other units of the National Forest System (Sec. 212.1), the responsible Official must identify the minimum road system (MRS) 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 travel 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 system is the road system determined to be needed to meet resource and other management objectives adopted in the relevant land and resource management plan (36 CFR part 219), to meet applicatory statutory and regulatory requirements, to reflect long-term funding expectations, to ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance."

This report documents the science-based travel analysis which is a key first step towards identifying a minimum road system. The results of this Travel Analysis will be used by the responsible official for identification of the forest's minimum road system following appropriate NEPA analysis. The ID team has identified a variety of opportunities for making changes to current road management practices that would meet the direction in 36 CFR 212.5 (b).

The entire Fremont-Winema National Forest's transportation system (excluding any roads included in an approved NEPA decision) was analyzed using the criteria set by the working group, a final rating spreadsheet was created. This entire road list and criteria ratings for risk and benefit can be found in Appendix A. Once a road has a final rating and a correlating score for both risk and benefit, it will fit somewhere in the Risk and Benefit Matrix (*Table 5 - Risk and Benefit Matrix Opportunities for Existing Roads* in Step 5).

Roads Likely Not Needed for the Future

From the risk/benefit analysis in Step 4 and the opportunities described in Step 5, approximately 2,574 road miles, or 20% of the road system, were determined to not likely be needed for future resource management purposes and should be further analyzed in NEPA for decommissioning or conversion to other uses.

While it makes the most sense that the roads not likely needed in the future would be the list of roads that truly had no benefit, or that fell under the "None" Benefit column, after the Forest's travel analysis rating and scoring was completed, there were no roads that had a benefit rating of

zero (or that fell in the "None" Benefit column). The next list of roads that may not be needed in the future have been pulled from the "Low Benefit" column, and are rated "High" and "Medium" in Risk. The table below shows the mileage of roads in those two boxes in the Matrix table.

Table 10 - Matrix for Road Miles Not Likely Needed in the Future

ROAD MILES					
RISKS	BENEFITS				
	Scores	None	Low	Medium	High
	High	0	13		
	Medium	0	2,561		
	Low	0			
	None	0			

The mileage of transportation system identified in the Table 11 matrix could be considered not needed in the future. As stated in this report, there are roads that, even if they rated "Low" in Benefit, will still remain on the system due to their important value of recreational access, administrative purposes, private land access, fire lookout access, etc. That said, having roads not likely needed in the future creates an opportunity to decrease the total mileage and the density of the transportation system.

Maps

Road segments that rated Low for Benefit, and both "High" and "Medium" in Risk were mapped as "Roads Not Likely Needed in the Future", which can be found in Appendix C. The roads that have been previously studied in a NEPA Decision were not included in this map.

Transportation System Opportunities

In performing the travel analysis and comparing the results from rating the roads for risk and benefit, there were many opportunities presented from that final rating. It is anticipated that the Forest would preserve the roads considered of high benefit. Any roads of low benefit and high risk should be considered for decommissioning or conversion to other uses and further analyzed in project scale NEPA to make that determination. Using the risk/benefit opportunity matrix in Step 5 of this report, the following opportunities were identified:

Table 11 - Transportation System Management Opportunities

Operational Maintenance Level	Existing Road System (Miles)	Changes from Previous NEPA Decisions[6] (Mileage Difference)	Additional Opportunities from this TAP Analysis (Mileage Difference)	Road System Likely Needed for Future Uses (Miles)	Percent Difference
4	254	0	0	254	0%
3	729	0	0	729	0%
2	5,382	-143	0	5,239	-2.7%
1	6,181	-547	-2,574	3,060	-50.5%
TOTAL	12,546			9,282	-26.0%

The opportunities for change summarized in this table are the IDT's recommendations based on the risk/benefit analysis in this report. Prior to any travel management decisions being made, including any roads being added to or deleted from the system, site-specific analysis, including public involvement, would need to be completed through the NEPA process at an appropriate scale.

Financial Analysis Results

The Financial Analysis in Appendix E includes a scenario using the total mileages from the opportunity table listed above to examine the potential reduction in maintenance cost needs if these changes were to be made. The results of that analysis show that total routine annual costs, with these changes implemented, would require approximately $1.4 million per year in annual maintenance funding. See Table 10 below for details:

Table 12 – Average Annual Road Maintenance Costs for Likely Needed Roads

OPML	Likely Needed Road System		
	Miles	% of System	Cost
5	0	0%	$0
4	254	3%	$467,064
3	729	8%	$598,123
2	5,239	56%	$308,629
1	3,060	33%	$4,758
	9,282	**100%**	**$1,378,575**

[6] These numbers are the amount of miles identified for road decommissioning in the NEPA Decisions cited in the Chapter: Step 2, Describing the Situation.

These changes, if implemented, would result in a modest reduction of only about $200,000 per year in routine annual maintenance funding needs, and does not bring the average annual maintenance needs in balance with the average annual maintenance funding expectations. This is due to the fact that most of the potential road changes come from the Maintenance Level 1 roads that are already closed and not requiring much maintenance effort in their current status. In order to further reduce the maintenance needs, the remaining open roads would require some further reductions to maintenance standards and frequency of work. By implementing those types of reductions, the total annual maintenance costs could be reduced to around $600,000 per year, which would reflect long-term funding expectations according to Region 6 guidelines.

The existing road maintenance budget described in Table 7 of this report is significantly lower than the average annual road maintenance costs for the road system likely needed in the future, shown above in Table 12. Additional considerable changes would need to be made to the road system in order come close to the existing Forest road maintenance allocation.

Table 13 – Scenario Road System Closely Matching Existing Average Annual Maintenance funding, Compared to Existing Road System

OPML		Scenario Road System		
	Current Miles	Scenario Miles	% of Existing System	Cost
5	0	0	0%	$0
4	254	75	-30%	$133,925
3	729	325	-45%	$317,397
2	5,382	1,800	-33%	$142,986
1	6,181	4,300	-70%	$10,793
	12,546	**6,500**	**100%**	**$605,101**

The example in Table 13 is just one scenario (using the template described in Appendix E) intended to show the nature and scale of the system changes that would be needed to better align with the existing annual road maintenance budget. In order to achieve a scenario similar to the one in Table 13, the existing road system would need to change dramatically. Road Maintenance Level changes could be lowered, a select amount of paved roads could be changed to gravel, and a large volume of roads may need to be identified for decommissioning. . This scenario is not a suggested solution to the economic shortfall. A significant reduction to the existing transportation system would result in a loss of administration access and protection of the National Forest System lands and would require extensive project level analyses and further look into the comparisons of an efficient road system.

In addition to the costs of maintaining the road system to these minimum standards, there are also costs associated with any proposed road decommissioning, road closures, and road improvements necessary to address risks and environmental concerns that are identified in the TAP report. These costs are not included in the balancing of road maintenance funds because

funding for these activities is not appropriated along with the normal road maintenance funds used in the calculations. Funding for this type of work generally comes though other programs such as capital investment programs, Legacy Roads and Trails funding, Federal Highway programs, partnerships with outside groups and agencies, etc.

Conclusions

In performing the travel analysis and comparing the results from rating the roads for risk and benefit, there are many benefits from adjusting the transportation system, especially in light of waning Federal transportation funding allocations. Properly applying funds toward annual maintenance in order to keep roads open and safe for use, as well as addressing critical resource concerns, are of utmost importance to the Fremont-Winema National Forest. It's becoming increasingly important to maximize the appropriated road funding and utilize commercial users for road maintenance.

The current trend of reduced funding for road maintenance work is continuing, and so there is a vast and growing gap between current funding and need. Due to inflation, a certain amount of money would not equate to the same amount of road maintenance work 50 years ago as it would in the present day. It is very difficult to identify a future road system where the funding of annual maintenance work necessary to maintain the existing road system can stretch as far as the needs of the system. However, it is possible to alter the transportation system slowly through project-specific NEPA opportunities in order to reduce the amount of mileage to a more sustainable and manageable system for the Forest.

Recommendations

In order to prioritize the most important road needs for mitigation and maintenance work, the Fremont-Winema National Forest should utilize the criteria and opportunities in Steps 4 and 5 of this report. This would allow the Forest to stretch scarce funding as far as possible towards the roads that most need maintenance. The Forest should consider the following:

- Focus available maintenance funding and resources on the highest priority roads identified using the risk/benefit criteria and opportunity matrix in this report.
- Prioritize any capital funding towards road reconstruction or improvement work on roads with high benefit and high risk factors.
- Roads should be considered to be closed or decommissioned if they are of low benefit and pose a high/medium risk.
- Work with commercial users and permittees to encourage performance of road maintenance work in lieu of collecting road maintenance fees and deposits.

- Look for opportunities to transfer jurisdiction of Forest Service roads to neighboring communities, like Counties, Cities, Towns, etc.

- Continue to look for ways to reduce the amount of mileage on the transportation system through future site-specific project analysis.