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Okanogan-Wenatchee National Forest
Forestwide Travel Analysis Report

Okanogan - Wenatchee National Forest
Washington

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Executive Summary

This report documents the information and analysis procedure used for the Okanogan - Wenatchee National Forest (O-WNF) travel analysis. This analysis is designed to provide decision-makers with information to develop a safe road system responsive to public needs and desires, affordable and efficiently managed, have minimal negative ecological effects on the land, in balance with available funding for needed management actions, and meets Forest Plan objectives. This analysis and report is not a decision document. All road-related decisions must go through the NEPA process with public involvement.

The Travel Management Rule, published in the Federal Register, November 9, 2005, updates the 2001 Road Management Strategy Rule and Policy regulations pertaining to Forest Service management of motor vehicle use.

Transportation analysis is a six-step process, described in Forest Service Handbook 7709.55 Chapter 20, Travel Analysis. The steps are designed to be sequential, with an understanding that the process may require feedback and iteration among steps over time.

1. Setting up the analysis
2. Describing the situation
3. Identifying the issues
4. Assessing benefits, problems and risks
5. Describing opportunities and setting priorities
6. Reporting

The process provides a set of possible issues and analysis questions with answers that can help managers make choices about road system management.

The current revision of agency policies combines the accepted roads analysis process with the analysis of motorized trails and areas as the TAP process. The Travel Management Rule requires each administrative unit (National Forest, National Grassland, Ranger District, etc.) to designate NFS roads, NFS trails, and areas on NFS lands that are open to motor vehicle use by class of vehicle and, if appropriate, by time of year (36 CFR 212.51). Travel analysis is intended to complement and integrate existing laws, policy, guidance, and practice into the analysis and management of roads on the national forests.

This report documents the forest-wide maintenance level (ML) 1-5 roads analysis on the Okanogan - Wenatchee National Forest. The forest elected not to analyze motorized trails and motorized use areas in this TAP. Analysis of unauthorized routes is not a requirement of the travel management rule. The Okanogan - Wenatchee National Forest has not completed an inventory and elected to not include unauthorized roads in this TAP. Unauthorized routes have not been geographically located or mapped sufficiently to allow for analysis at this time. As unauthorized roads are identified, their management objectives will be determined during site specific projects.

Travel Analysis is a tool that provides data for subsequent site specific project environmental analysis. TAP is not a NEPA process, rather it is an integrated ecological, social, and economic approach to transportation planning, addressing both existing and future roads, trails and motorized recreation areas. This TAP is a broad-scale analysis that encompasses the entire administrative unit. TAP is a comprehensive inventory and road/trail-specific disposition recommendation to match the transportation system to the desired future condition, as determined through existing direction, public input, and agency resource specialist guidelines.

This TAP report provides a comprehensive review and identifies opportunities for changes to the existing road system,

TAP is intended to identify opportunities for the national forest transportation system to meet current and future management objectives, and to provide information that allows integration of ecological, social, and economic concerns in future decisions. TAP is tailored to local situations and landscape conditions identified by forest staff members, coupled with past public input.

The outcome of the TAP is a list of opportunities for making changes to the forest transportation system to better reflect desired conditions for the future.

On August 13 and 14, 2013 the working group assigned to this project met to discuss the Travel Analysis Process, Appendix J. After reviewing the existing Roads Analysis Processes for the forest, and considering available resources, it was determined that the appropriate scope of analysis would include all system roads within the Okanogan - Wenatchee National Forest System (USDA 1989, USDA 1990). The analysis period is set at a minimum of ten years for needs, effects, and implications (Appendix J).

Summary of Issues

Issues were identified using internal Forest Service resource specialist input and public involvement results during forest plan revision and travel management planning. Resource issues identified to evaluate road benefits and risks include:

- Road maintenance funding is not adequate to maintain roads and signs to standard
- Access for fire suppression
- Access for public safety, egress
- Access for vegetation management, (timber and fuels) and agency administration
- Access to recreational facilities
- Access to range allotments
- Access to private lands
- Access to tribal lands
- Access for other authorized uses and administration facilities
- Road effects on watershed hydrologic process, geomorphic instability, sediment production
- Road effects on riparian habitat
- Road effects crossing sensitive soils
- Road effects at stream crossings
- Road effects on ungulate habitat
- Road effects on carnivore habitat
- Road effects on species dependent on late-successional habitat
- Road effects related to human caused fire
- Road effects on cultural resources
- Road effects on Threatened or Endangered Species (TES) plants
- Road effects related to noxious, invasive, and non-native plants

Summary of Recommended Actions Responding to Issues

- Reduce road miles that need to be maintained, or reduce maintenance levels to reduce maintenance costs
- Leverage funds to increase maintenance capabilities

- Identify any roads that could be transferred to county jurisdiction
- Maximize cooperation from landowners by proposing reciprocal easement where needed
- Enter into a special use agreement with landowners, where the permittee performs maintenance.
- Identify and retain roads for fire control including prescribed burns and wildfire suppression.
- Maintain access to developed National Forest recreation sites and appropriate undeveloped/dispersed sites for public use.
- Restrict motorized vehicle use to designated roads through travel management.
- Use signs, physical barriers and other traffic control devices to discourage unauthorized road use.
- Transfer jurisdiction and maintenance to permit holders.
- Consider rerouting existing roads that impact important heritage sites.
- Reduce open road miles in key wildlife habitat.
- Place seasonal restrictions on roads in important wildlife areas.
- Reduce road width and maintenance level to minimum needed for safe vehicle travel and to meet the intended need in sensitive wildlife areas and other resource areas.
- Maintain road signs in accordance with handbook direction.
- Install route numbers on system roads to increase users compliance with motor vehicle use regulations.
- Identify, and effectively close or decommission, infrequently used roads, or roads that are no longer needed, to reduce road maintenance costs.
- Apply Best Management Practices treatments to roads that are at high risk for sediment delivery to aquatic environments to reduce sediment delivery.
- Monitor roads after barriers are installed and other mitigation measures are implemented. Take appropriate actions to ensure proper function.

Other possible management actions not directly related to identified issues

- Provide information and education about motor vehicle regulations and responsible use of motorized vehicles on the National Forest.
- Use enforcement to curtail off-road driving.
- Provide information to help public users understand problems created by off road driving.
- Rehabilitate areas damaged by off-route driving.
- Update and maintain the Motor Vehicle Use Map.

Analysis Performed

Road risk and benefit issues were identified by the interdisciplinary team (IDT). The IDT used the risk-benefit assessment to rank roads based on benefits (administration and public use, facilities access, recreational opportunities and developed site access, fire suppression, range allotment management and other authorized uses) and risks (hydrologic, aquatic, wildlife, Threatened or Endangered Species of plants, invasive species and cultural resource impacts). The IDT then developed science based questions applicable to their specialty (Step 4, Assessing benefits, problems and risks - USDA 1999) to build issue statements suitable for GIS analysis and evaluation criteria to determine risk and benefit ratings for each road. Maintenance funding was evaluated to determine existing and future needs, current funding and predicted future maintenance needs.

Key Results and Findings

Through the travel analysis process, the IDT ranked roads based on benefits and risks for each resource.

Five resource benefit areas were identified and evaluated.

Fire management and public safety access
Integrated vegetation management access
Recreation access
Range improvements access
Other authorized uses and administrative facilities access

Nine resource risk criteria (adverse effects) were identified and evaluated.

Hydrology and Soils (1-6: Geomorphic instability and sediment production potential)
Riparian roads - location
Riparian road - sensitive soils crossing
Riparian road - stream crossing (risk to aquatic organisms)
Ungulate winter and summer habitat
Late-successional habitat species and primary cavity excavators
TES plant species
Undesirable, invasive, plant species
Known cultural resources

A complete list of each resource rating and combined, total, risk and benefit rating for each road is included in Appendix A. Appendix D contains maps displaying the IDT road management opportunities.

The IDT reviewed the combined risks and benefits and identified the following opportunities based on the matrix rule set:

- There are 7,948 miles of system roads on the O-W NF included in INFRA record.
- 3,170 miles, 40 percent of road miles were rated high benefit, 2,239 miles, 28 percent were rated medium benefit and 2,539 miles, 32 percent, were rated low benefit
- 3,933 miles, 49 percent of road miles were rated high risk, 3,345 miles, 42 percent were rated medium risk and 670 miles, 8 percent, were rated low risk
- The IDT reviewed road miles by maintenance level in these categories and developed a GIS analysis strategy to identify management opportunities for each road group; low risk/low benefit (LL), medium risk/low benefit (ML), high risk/low benefit (HL), low risk/medium benefit (LM), medium risk/medium benefit (MM), high risk/medium benefit (HM), low risk/ high benefit (LH), medium risk/medium benefit (MH), and high risk/high benefit (HH). Roads in high and medium risk categories with low and medium benefits should be considered first for mitigation to reduce resource risks, closure or decommissioning. Management opportunities for each road are included in Appendix A.
- 1,706 miles of ML-1 and 171 miles of ML-2 roads (1,877 total miles, 24 percent), of current system roads were assessed by the IDT to have low benefit and are likely not needed for future resource management purposes. These roads should be considered for decommissioning through a site-specific NEPA process.
- 262 miles of ML-2 roads, 3 percent, should be closed, or changed to ML-1
- 487 miles of ML-3 should be changed to ML-2
- 1 mile of ML-4 changed to ML-3 to reduce maintenance costs

- 5,321 remaining road miles (67 percent of total road miles) should be mitigated to reduce risks where needed and maintained at existing ML
- 6,071 miles of system roads (INFRA data base) should be retained as likely needed for the future, this is a 24 % reduction in system road miles

Total road miles, percent of miles, and miles for each maintenance level with management recommendations for each matrix cell category are shown in Table 9.

There are 190.88 miles of existing roads that have tabular data in the Forest's corporate database, but lack geospatial data (2% of system road miles). These roads were identified after the specialists evaluated and scored all roads included in the database for benefits and risks (Appendix A, PivotTable_ML_OW_RoadCore_NullRecords_03-12-2015.xlsx). Missed roads are generally short, often providing access to old log landings, trail heads, campground loops, structures or corrals etc. Since GIS spatial data was not available, resource specialists' criteria and rule sets could not be applied in the geospatial environment, and thus score the roads for benefit and risk. As a proxy method of evaluating and rating these roads, forest staff applied scores to these roads based on scores of the geographically nearest roads, with consideration of the road's attributes. Missed roads attribute data (road number, road name, miles, operator maintenance level, recommended maintenance level, etc.) and benefit/risk evaluation is included in Appendix H as a separate spreadsheet (PivotTable_ML_OW_RoadCore_NullRecords_03-12-2015.xlsx). Missed road miles are not included in Table 8. (Roads risk and benefit matrix and recommendations for existing National Forest System roads) matrix road miles and are not included in Table 9, (Road management recommendations by risk/benefit categories, all system roads, miles and percent of total 7,948 road miles) management recommendations. Each road lacking geospatial data was located on a hard copy map (Forest map, old timber sale maps and other special use maps), evaluated, and assigned a risk and benefit score maintenance level and management recommendation. Missed road miles by maintenance level and management recommendation are displayed in Step 6, Table 11, below. Missed road miles are not included in the benefit/risk evaluation results noted above. Missed roads benefit and risk evaluation by maintenance level are shown in Table 11 details and included in Appendix A and H.

How the Report Will Be Used

Travel analysis results will assist the Okanogan-Wenatchee National Forest managers address issues related to road management. Travel analysis results will be used for planning future site-specific actions, project analyses and decisions. TAP is not a decision process; final road management decisions will be made through site-specific, project level, resource analysis, ground truthing, and public scoping under the NEPA process.

Travel analysis products include proposals for long-range strategic planning adjustments to forest travel management direction and to the physical forest transportation system. These adjustments may be evaluated through subsequent environmental analysis and decision making. Travel analysis is a tool that provides data for project level environmental analysis, with the intent that individual projects are site specific focused and address direct, indirect and cumulative activity effects. A forthcoming environmental impact statement, now in the planning stage, will address which roads, trails, and areas to designate for motor vehicle use. Results of that planning will be used to publish the Motor Vehicle Use Map.

Project Introduction

Areas included for analysis under the Forest Level Travel Analysis Process include the entire Okanogan - Wenatchee National Forest (Chelan, Cle Elum, Entiat, Methow Valley, Naches and Tonasket Ranger Districts). Total area is about 3.87 million acre (USDA 1989, USDA 1990).

The Okanogan - Wenatchee National Forest Line Officers will use this Forest Level Travel Analysis Process's results as a starting point when planning future NEPA projects where laws, regulations, manual and handbook direction require that a Travel Analysis Process be completed prior to a NEPA project inception. This TAP will analyze all 7,948 miles (6,266 system roads) on the Okanogan - Wenatchee National Forest. The forest leadership team elected not to include motorized trails or motorized use areas in this analysis (08-13 and 14-14 IDT meeting notes, Appendix J).

This Forest travel analysis examined 7,948 existing NFS road miles as they exist on the landscape, identified as the following NFS Maintenance Level:

- Maintenance Level 5 passenger car roads – 50 miles
- Maintenance Level 4 passenger car roads – 226 miles
- Maintenance Level 3 passenger car roads – 1,248 miles
- Maintenance Level 2 high clearance roads – 3,839 miles
- Maintenance Level 1 long term storage roads (closed) – 2,585 miles

In evaluating and identifying management opportunities for roads, the IDT elected (at 05-07-14 IDT meeting) not to determine if any roads should be converted to trails in this TAP assessment. Road conversion to trails would be decided at project level analysis (Appendix J).
Road management decisions would be done under future NEPA project analysis.

This TAP evaluated the following road benefits and risks.

Benefits (access)

- Fire management and public safety
- Integrated vegetation management
- Recreation
- Range improvements
- Other authorized uses and administrative facilities

Risks (adverse effects)

- Geomorphic instability and sediment production potential
- Aquatic or riparian area road location
- Aquatic area roads crossing sensitive soil (risk to aquatic organisms)
- Aquatic road-stream crossing
- Ungulate winter and summer habitat
- Late-successional habitat and primary cavity excavators
- Cultural resources
- TES plant species (including S&M taxa)
- Undesirable (invasive) plant species

Step 1: Setting up the Analysis

Purpose

The purpose of this section is to:

- Identify the project area and state objectives
- Develop a process and analysis plan
- Address information needs
- Clarify technical specialists roles

This travel analysis process was developed to inventory, analyze, evaluate benefits and risks identified by Forest resource specialists and identify opportunities for improved management of system roads.

Project Area and Objectives

The travel analysis process (TAP) was conducted for all maintenance level (ML), 1 to 5 roads on the Okanogan - Wenatchee National Forest. The purpose of the analysis is to provide resource information for managing roads that are safe and responsive to public needs and desires, conform to the Okanogan – Wenatchee Land Resource Management Plan (LRMP), are efficiently administered with minimal negative ecological effects on the land, reflect funding levels available for needed management actions and comply with state and federal regulations and meet statutory regulations.

The TAP is intended to be a broad scale comprehensive look at the transportation network. The main objectives of the TAP are to:

- Identify opportunities for making changes to the forest transportation system that balance the need for access while minimizing risks by examining important ecological, social, and economic issues related to roads
- Develop maps, tables, and narratives that display transportation management opportunities and strategies that address current and future access needs, and environmental concerns.
- Identify needed changes by comparing existing road conditions to desired road conditions
- Identify opportunities for change that will inform travel management decisions in subsequent NEPA documents
- Provide a list of opportunities and background information necessary for the identification of the minimum road system (MRS) needed for safe efficient travel, administration, use and protection of National Forest System (NFS) lands directed in 36 CFR 212.5(b)(1).

The analysis area for this TAP includes the entire Okanogan (1,706,200 acres) (USDA 1989) – Wenatchee (2,164,180 acres) (USDA 1990) National Forest, 3,870,380 total acres (vicinity map, Appendix B).

IDT Specialists

An interdisciplinary team (IDT) of forest specialists and TEAMS Enterprise specialists were assigned to the TAP. Team members and their primary analysis role are listed below (Appendix J).

Resource	Specialist	Phone
Engineer/Leader	David Colbert*	509-826-3282
Wildlife	Andrea Lyons	509-664-9232
Fire/Fuels	Keith Satterfield	509-664-9228
Fire	Brian Maier	541-729-4183
Silviculture/Vegetation	Stuart Wooley	509-664-9332
Range	Stuart Wooley	509-664-9332
Range	Travis Fletcher	509-775-7424
Recreation	Mary Bean	509-664-9319
Recreation	Brenda Yankoviak*	509-664-9367
Archeology/Heritage	Powys Gadd	509-664-9394
Hydrology	Matt Karrer	509-548-2576
Aquatics	Richard Vacirca*	509-664-9361
Aquatics	Emily Johnson	509-664-9217
Botany	Rod Clausnitzer	509-826-3278
Geology	Greg Graham	
GIS (TEAMS)	Craig Comstock	559-920-4677
Report Writer (TEAMS)	Francis (Frank) Yurczyk	559-920-6578
Consultant (TEAMS)	Chris Bielecki	559-920-7708

Travel analysis is intended to be based on science. Team members located, interpreted, and used relevant scientific literature to disclosed assumptions and describe road benefit and risk criteria.

Process Plan

TAP followed the six-step process described in FS-643, Roads Analysis: Informing Decisions About Managing the National Forest Transportation System (USDA 1999, USDA FSH 7709.55).

Travel Analysis requirements are further described in:

- FSM 7700 Travel Management;
- FSM 7710 (Travel Planning);
- FSM 7730 (Road Operations);
- FSM 2350 (Motorized trails);
- FSH 7709.55 (Travel Analysis);
- FSH 7709.59 (Road Operations);
- FSH 2309.18 (Motorized trail Operations);
- 36 CFR 212, 251, 261 Travel Management Final Rule
- Executive Order 11644 - Use of Off-Road Vehicles on Public Land – Feb. 8, 1972;
- Executive Order 11989 - May 24, 1977 Amends EO 11644 setting forth an exclusion from the definition of off-road vehicles for any fire, military,

emergency, or law enforcement vehicle when used for emergency purposes and Sec. 9 Special protection of the public lands.

- National Environmental Policy Act of 1969

Administrative units are to use an authorized science-based analysis process conducted by an interdisciplinary team to inform planners and decision makers of road system opportunities, needs, and priorities that support land and resource management plan objectives. Roads Analysis includes opportunities for public participation and emphasizes interdisciplinary team identification and evaluation of road issues and opportunities. The team was formed to provide the Responsible Official with critical information needed to identify and manage a sustainable transportation system for the future.

The transportation system should be safe and responsive to public needs and desires, affordable and efficient to manage, produce minimal adverse effects on ecological processes, ecosystem health and diversity, does not reduce productivity of the land, reflects available funding for needed management actions, and meets state and federal regulations.

Analysis Plan

The IDT followed these steps for the analysis:

- Review and assemble existing data
- Verify accuracy of system road locations on maps
- Identify and document discrepancies between on-the-ground conditions, the Forest's INFRA database, and current management direction
- Where possible, verify existing road conditions, and associated features including surface type and impacts on other resources
- Identify preliminary access and resource issues, concerns, and opportunities
- Identify road safety issues
- Identify additional issues, concerns, and opportunities through previous public involvement and internal resource specialists
- Identify opportunities for making changes to the road system based on the findings of this analysis in response to the issues identified.

Information Needs

The following information was required to proceed with the analysis:

- Accurate location of all system roads within the analysis area. For each road, the following information is needed:
    1. Existing public, permittee, or agency use
    2. Right-of-way dedication to the FS
    3. Additional right-of-way required
    4. Maintenance responsibility for the road (Forest Service, County, City, volunteer group, or State)
- Assessment of current opportunities, problems, and risks for all roads in the analysis area
- Soil, water resources, invasive species, environmental issues, and biological communities
- Public access and recreational needs and desires in the area, including access for nearby landowners
- Current observed road uses
- Current road management objectives
- Areas of special or sensitivity resource values
- Best management practices for the area
- Current forest plan and other management direction for the area
- Agency objectives and priorities
- Interrelationship with other governmental jurisdictions for roads
- State laws that regulate motor vehicle use on and off public roads
- Applicable federal, state, and local laws
- Public and user group values and concerns
- Forest scale and any project level roads analysis
- Cultural resources

Step 2: Describe the Situation

Purpose

The purpose of this step is to:

- Describe existing road system
- Describe existing management direction
- Summarize Washington State OHV/All-Terrain Vehicle (ATV) Laws (Note, motorized trails and motor use areas are not included in this TAP assessment)
- Describe road maintenance levels

Existing Road System

The Okanogan - Wenatchee National Forest has 7948 miles of maintenance level 1 through 5 system roads in INFRA. This TAP reviewed and analyzed the ML1 through ML5 roads shown on Existing Roads by Maintenance Level Maps (seven maps) in Appendix C. Motorized trails are not addressed in this TAP. Attributes for each system road are included in Appendix A.

Existing Direction for Road Management

A. General

Travel analysis is focused on identifying needed changes to the forest transportation system. Existing National Forest System road direction for restrictions, prohibitions, and closures to motor vehicle use are included in the LRMP and shown in Appendix A attribute table.

Existing laws and regulations, official directives, forest plans, forest orders, and forest-wide or project-specific road decisions determine motorized routes and areas open to public motorized travel. Road and motorized trail management objectives are shown on forest maps, recreation opportunity guides, tabular databases, travel management plan and other sources. Road management attributes are identified and included in the INFRA database. The LRMP describes existing and planned road densities for timber harvest and other resource management needs.

B. Road Attribute Descriptions

Open Road

Existing forest system roads open for public motorized use are included in the Forest INFRA database (an Oracle Database containing information on all roads and improvements on National Forest lands). Data tables include the following attributes:

- System - National Forest System Road
- Jurisdiction - Forest Service
- Route Status - Existing
- Operational Maintenance Level - 2 through 5

Closed Road

Closed roads have been closed to motor vehicle traffic for at least a year but are necessary for future activities. They appear in the Forest's INFRA database under the following categories:

- System - National Forest System Road

- Jurisdiction - Forest Service
- Route Status - Existing
- Operational Maintenance Level – 1

Decommissioned Road

Decommissioned roads have some type of physical closure at their entrance (berm, etc.), or may be completely obliterated or recontoured. They appear in the Forest INFRA database under the following categories:

- System - National Forest System Road
- Jurisdiction - Forest Service
- Route Status - Decommissioned
- Operational Maintenance Level - 1-5

To return a decommissioned road to service as a system road (or as a temporary use road) the NEPA process must be followed to allow motorized travel on the road.

Unauthorized Road

An unauthorized road is an existing road not included in the forest transportation atlas or database as part of the road system. These roads were usually established by various users or developed for product removal. Unauthorized roads were not inventoried, the forest leadership team decided to not analyze or include unauthorized roads in this TAP (08-13/14-14 IDT meeting notes - Appendix J).

C. Motorized Trails

Designated motorized trails on the Okanogan - Wenatchee National Forest are shown on the Okanogan - Wenatchee National Forest Motor Vehicle Use Map. The Forest is now updating Part B travel management plan. The forest leadership team decided to not analyze or include motorized trails in this TAP (Appendix J).

D. Areas

The forest leadership team decided to not analyze or include motorized use areas in this TAP (08-13/14-14 IDT meeting notes, Appendix J).

E. Previous Travel Management Decisions

This is a stand-alone road evaluation TAP, all system roads in the INFRA database were evaluated and rated by resource specialists for benefits and risks. Roads were grouped by benefit risk categories and maintenance level for management opportunities.

State OHV and ATV Laws

In July 2013, Washington State passed a bill to allow access for Wheeled ATVs on some public and county roads. These vehicles, as well as other OHVs, can be designated for use on USFS roads following the route designation process and motorized mixed use analysis. The Okanogan Wenatchee National Forest INFRA data base shows 147 miles of system roads are currently open to ATV and/or motorcycle use.

Motorized trails were not analyzed in this TAP. Washington state laws govern OHV use on roads in Washington. The following regulations apply to all off-highway vehicles operated in Washington:

- All OHVs must have a current ORV registration
- OHVs must have a USFS (or other) approved spark arrestor and muffling device (muffler) which meets noise standards when the machine is operated.
- OHV must be equipped with working headlights and taillights when the OHV is operated between the hours of dusk and dawn, or when otherwise required for safety of others.
- Vehicle must have adequate brakes.
- It is prohibited to operate an OHV with a suspended or revoked state driver's license.
- It is prohibited to operate an OHV while under the influence of intoxicating drugs or alcohol.
- It is prohibited to operate an OHV in a reckless manner that endangers persons or property.
- OHV operations cannot unreasonably disturb or damage vegetation, soil/water, or wildlife.

Applicable sections of the Washington State laws can be found at:

http://apps.leg.wa.gov/rcw/dispo.aspx?cite=46.09.115

Further information may be obtained from:

http://www.wsp.wa.gov/traveler/docs/equipmt/offroad_atv.pdf

Road Maintenance Levels

The Forest Service categorizes forest roads into five maintenance levels, that define the level of service, and maintenance required. Refer to Appendix L, Glossary, for a description of maintenance levels and recommendations. Maintenance level and management recommendations for each road are included in the Appendix A.

Road Maintenance Level 5 (ML5) – roads are managed and maintained for a high degree of user comfort. These roads are generally paved and are suitable for passenger vehicles.

Road Maintenance Level (ML 4) – roads are managed and maintained for a moderate degree of user comfort. These roads are generally low standard paved roads or double lane gravel surfaced roads and are suitable for passenger vehicles.

Road Maintenance Level (ML3) – roads are managed and maintained for a moderate degree of user comfort. These are generally gravel surfaced roads and are suitable for passenger vehicles.

Road Maintenance Level 2 (ML2) – roads are managed and maintained for high-clearance vehicle use; passenger car traffic is not recommended.

Road Maintenance Level 1 (ML1) – roads that are closed to vehicular traffic intermittently for periods that exceed 1 year.

Table 1. Existing road miles by maintenance level within analysis area (May 2014)

Maintenance Level	Number of Roads	Miles of Road
1 – Basic Custodial Care (Closed)	3608	2585
2 – High Clearance Vehicles	2872	3839
3 – Suitable For Passenger Vehicles	481	1248
4 – Moderate Degree of User Comfort	142	226
5 – High Degree of User Comfort	14	50
Totals	7117	7948

Number of roads in Table 1 (7,117) is from INFRA data. Multiple maintenance levels on roads were dissolved for evaluation of benefit and risk rating in this TAP. A total of 6,266 roads were evaluated in TAP, maintenance level segments were identified for management opportunities (Step 5).

Step 3: Identify Issues

Purpose

The purpose of this step is to:

- Identify resource concerns
- Identify key issues related to the existing road system

Resource Concerns

Maintenance needs and costs on the Okanogan - Wenatchee National Forest have increased while allocated maintenance funds have remained static or reduced. This has caused a disproportionate shift of maintenance funds to ML 3-5 roads. Increased use coupled with decreased maintenance has resulted in degraded soil, water, vegetation, and wildlife habitat conditions in some areas.

The 2003 Interagency Committee for Outdoor Recreation, *Estimate of Future Participation in Outdoor Recreation in Washington State* predicted future participation in 13 of 14 major outdoor recreation categories would increase 10 to 37% in the next 20 years.

Maintenance Level 3-5 roads are generally used by local and out of area visitors in passenger cars. Maintenance Level 2 roads are primarily used by high clearance vehicles and ORVs where permitted. Maintenance Level 1 roads are closed to all motor vehicle use.

Roads and road use effects were identified and evaluated for geomorphic instability, sediment production, riparian and aquatic habitat, wildlife disturbance or displacement, habitat fragmentation, habitat loss and reduced habitat productivity, heritage sites, invasive and TES plants.

Public Involvement (Issues)

Public involvement is directed by - 36 CFR 212.5 (B) (1), "In determining the minimum road system, the responsible official must incorporate a science-based roads analysis at the appropriate scale and, to the degree practicable, involve a broad spectrum of interested and affected citizens, other state and federal agencies, and tribal governments."

Public issues identified in the forest plan revision process, travel management subpart B and project level panning were used to address road management concerns and opportunities. Public scoping related to road and travel management on site specific project areas preceded this analysis. Public input on specific roads for Forest Plan revision and Forest Plan amendments were considered in defining issues and opportunities.

The Okanogan - Wenatchee ongoing Forest Plan revision web site includes issues identified during public scoping (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5369047.pdf). Travel Management Subpart B process, posted on the O-W NF web site December 2014, describes Subpart B planning motorized travel management history and process. Through these announcements the public, tribal government, state and federal agencies are aware of current Forest Service transportation system planning. Past NEPA project based travel analysis scoping has also identified road related issues. Social and resource issues identified during these planning efforts

were reviewed to develop road benefit and risk analysis and rating criteria. Rather than solicit additional involvement in this Subpart A process from these entities, the Forest leadership team determined it would be sufficient to inform the public through press releases or other means that roads analysis is taking place, what the process mechanics are, and how the results of the analysis would be used.

This report will be posted on the Okanogan-Wenatchee National Forest website. Travel analysis is considered a living document and will continue to be revised as needed. It is a part of the O-W NF public road atlas. This travel analysis is not a NEPA analysis with an action proposal resulting in a decision. Future project level road actions with road-specific decisions will require additional public scoping and involvement.

The National Forest road system connects to or has jurisdictional overlap with other governments and agencies roads. This report will be available to tribal governments, local county governments including the County Commissioners and County Road and Bridge Superintendents, the Park Service, Bureau of Land Management, and the US Fish and Wildlife Service (O-W NF web site, noted above). Many of these governments and agencies have mutual shared opportunities and issues.

Key Issues

Key issues were identified by Forest resource specialists using past public involvement and comments on the forest plan revision, Travel Management Subpart B process and on resource specific issues related to activities proposed in NEPA projects. The following road issues were selected and used to evaluate (GIS) and rank road benefits and risks.

1) Insufficient funding for existing system road maintenance could affect user access and resources

Road maintenance funding is not adequate to maintain and monitor existing system roads. Inadequate maintenance reduces access for National Forest users and managers. Inadequate maintenance could have adverse effects on resources. Appendix G contains financial analysis with road maintenance costs details.

2) Road access is needed for forest administration and fire suppression

Access to the forest is needed by the agency for vegetation and other resource management including fire suppression and monitoring.

3) Road access benefits for recreation users

Forest roads provide access to developed recreation sites, and access for other recreational uses including hunting and fishing.

4) Road access benefits integrated vegetation management

Forest roads provide access for vegetation management, fuel reduction and product removal.

5) Roads provide access to private land and to authorized use areas

Forest roads provide access to private land and authorized special uses.

6) Roads provide access for range allotment management

Forest roads provide access to maintain range improvements, administer grazing and manage forage.

7) Roads provide access to firewood and other forest products gathering areas

Firewood, traditional materials, and other plant gathering are important activities. Decommissioning or closing roads may affect access for these activities.

8) Roads and road use affect wildlife habitat

Ungulates respond to recreational activities by avoiding areas near roads, recreation trails, and other areas with human activities. Human activities particularly affect ungulates when activities occur on winter range or where young are reared. Reduced maintenance, new construction, improper user rerouting of eroded road portions and non-compliance with road closures could reduce habitat productivity.

9) Roads and road use affect watershed conditions

Land type associations, soil composition and soil erodibility, combined with road attributes such as the proximity of roads to streams, the number of road-stream crossings and gradient of those crossings, influence the stability of a road on the landscape and the amount of sediment produced.

Roads within 300 feet of streams, rivers or lakes can reduce stream shade, increase water temperature, increase sediment delivery, simplify channel form (cut off side channels, straighten streams through confinement), and create impediments to aquatic species movement. Riparian area roads, that parallel streams with occupied threatened, endangered or sensitive (TES) species and/or their designated critical habitat, could impact TES species.

Roads located on sensitive soils can disrupt hillslope and watershed processes. These roads when in close proximity to streams and rivers, can impact water quality and aquatic habitat.

Road-stream crossings (culverts, fords, etc.) are a source of fine sediment to streams. As the number of road-stream crossings increase, the potential to transport sediment from the road prism to the stream network also increases. Roads that cross streams and rivers with TES fish species and/or designated critical habitat, can impact water quality and aquatic habitat. Erosion and sediment from improperly maintained roads reduce water quality and could add sediment to productive streams.

10) Roads and road use affect TES plants

Rare plant sites can be affected by motorized use through habitat loss or direct mortality of plants from vehicle travel and human-caused disturbance.

11) Roads and road use affect invasive plants spread

Road use could introduce undesirable invasive plant seeds that could establish new populations. Vehicles can carry and spread plant parts or seeds along motorized travel ways.

Step 4: Assess Benefits, Problems and Risks

Purposes

The purpose of Step 4 is to:

- Describe the analysis process
- Describe the criteria used in the risk and benefit analysis process
- Describe scoring and rating
- Summarize the risks and benefits of existing motorized routes
- Discuss the statistical distribution of the risk and benefit assessment
- Describe the costs of maintaining the current road system

The Analysis Process

Issues were described and assessed in Step 3 by the Interdisciplinary Team (IDT). Risk and benefit criteria categories (Step 4, Table 7) were developed by considering issues from Step 3 and suggested resource questions for roads analysis described in FS-643 Roads Analysis: Informing Decisions about Managing the National Forest Transportation System (RAP) (USDA 1999). The IDT reviewed these resource questions to develop criteria for ranking risks and benefits of each road. Resource risks and benefits were then totaled and summarized for each road (Appendix A spreadsheet).

Criteria Used for Benefit and Risk Analysis

Roads provide access for management, administration and use of national forest lands. However, their presence has potential negative effects on natural and cultural resources. Resource benefits and risks categories were identified by the IDT to evaluate and identify transportation system management options.

Evaluation Criteria

Road risks and benefits were identified by the team specialists for each resource area. Specialists were tasked to produce a succinct statement describing each issue, and to describe the criteria used to rank the impact or benefit of each road for that issue.

The assigned interdisciplinary team identified the following benefits and risks by resource area standards and guidelines for each road. Table 2 displays issue benefit and risk criteria used to evaluate and rate roads.

Table 2. Resource categories for roads

Benefit **Roads (motorized use) provide these forest management and use benefits:**	Risk **Roads and motorized use present risks associated with these resource categories:**
Access to authorized uses and administrative facilities, and research sites.	Hydrology and soils
Fire management, public safety, egress routes	Riparian - Road location in riparian areas
Integrated vegetation management access	Riparian - Road crossing sensitive soils
Recreation access	Riparian – Road - stream crossing
Range - allotments, improvements access	Ungulate winter and summer habitat
	Late-successional habitat species and primary cavity excavators
	Known cultural resources
	TES plant species (Including S&M taxa)
	Undesirable, invasive plant species

Each resource specialist developed criteria for rating roads as high, medium, or low benefit or high, medium, or low risk.

Table 3 displays issue descriptions and evaluation criteria used.

Table 3. Benefit and risk statements and rating criteria

Benefit: Fire Management— Public and Agency Access	
Provide agency access for fire management personnel to contain unplanned ignitions. Provide for firefighter safety and protect public and private infrastructure by retaining roads in strategic locations which reduce firefighter and public exposure. Criteria used: Public and Firefighter Safety-Containment of Unplanned Ignitions-Agency Access (based on roads topological position and operational maintenance level) 1. A 30 meter DEM was assigned fuzzy TPI values using a 200 meter search radius where 100 is a perfect topological ridge and -100 is a perfect topological valley. 2. Roads were overlaid and TPI values were summed for each road ID resulting in a sum value where the highest value is the most ridge-y and the lowest is the most valley-y. 3. The top 2000 (~1/3) ranking ridge and valley roads were selected and assigned a benefit rating of 3 (highest desirability for retention) 4. The lowest 2000 ranking ridge and valley roads were selected and assigned a 1 (lowest desirability for retention) 5. The remaining roads were assigned a 2 6. Maintenance level 1 roads that were also	HIGH – High benefit roads are maintenance level 3, 4, or 5 located in valleys or on ridge tops. MEDIUM - A medium benefit road does not fit into high or low rated roads based on topographical position. LOW - Low benefit roads are not located in valleys or on ridge tops.

ranked a 3 were dropped to a 1 7. Maintenance level 2 roads that were also ranked a 3 were dropped to a 2 8. All Maintenance level 4/5 roads were selected and ranked a 3 Additional description of the GIS filter process is included in Appendix K. (Updated 05-08-14)	
Benefit: Integrated Vegetation Management Access	
Integrated Vegetation Management Access (04-14-14) Priority treatment areas were identified to evaluate vegetation management access including timber and fuels benefit rating criteria. A previously run analytical hierarchy process (AHP) ArcGIS model was used. This process used a weighted fire regime, fuel model, aspect, and elevation matrix. The ArcGIS AHP extension used each factor's spatial information in grid form, weighted by the value of each factor at each grid cell, then summed the products of all input grids and created a new grid. The sum became the cell value. These numerical values were then broken into three categories. Highest value categories were rated as high treatment priority, middle categories moderate treatment priority, and the lowest third as low treatment priority. Vegetation treatment feasibility was then applied to the AHP categories. Slopes less than 35% were given a "high" feasibility rating, suitable for ground-based mechanical operations, slopes greater than 35% and less than 65% were given a moderate feasibility rating (line skidding operations), while slopes greater than 65% were given a low feasibility rating.	HIGH – Roads that access and/or are within areas with a high treatment priority (in the AHP ArcGIS model used) and a high or moderate feasibility (based on slope). MEDIUM – Roads that are contained within and/or access areas with a moderate treatment priority and a high or moderate feasibility. LOW - Low benefit roads are contained within, and/or access areas with a low treatment priority and a high or moderate feasibility.

Benefit: Range Improvements Access	
Motorized access is needed to manage grazing allotments and administer grazing permits. Roads benefit grazing permittees by providing access to herder camps and sheep bed grounds and to maintain range improvements (corrals, water developments, fencing, etc.).	HIGH – High benefit roads lead directly to or are within ¼ mile of rangeland structural improvements –OR- Roads that provide the only means for motorized access into an allotment. MEDIUM – Medium benefit roads are located between ¼ mile and ½ mile of rangeland structural improvements LOW – Low benefit roads are located more than ½ mile from rangeland structural improvements.
Benefit: Recreation Access	
Roads provide access to developed recreation sites (trailheads, campgrounds, picnic areas), and to the general forest area for traditional, dispersed recreation, recreational driving, and harvesting non-commercial forest products, etc.	HIGH - A high benefit road is part of a road network that provides the most *direct access to developed recreation sites* such as trails, campgrounds, and picnic areas. MEDIUM - *Medium benefit roads provide direct access to undeveloped areas which receive public use for dispersed recreation or other traditional uses such as forest product gathering or hunting, or serve to complete a loop. A medium benefit road may also provide indirect or alternative access to developed recreation sites.*

	LOW - Low benefit roads provide access to the general forest area where there is no apparent point of interest or provide indirect or alternative access to undeveloped areas that receive public use.
Benefit: Authorized Uses and Administrative Facilities Access	
Roads provide access to special use permit sites (including utility corridors, organization camps, recreation residences, mining operations, communication sites, and other authorized uses), private inholdings, and administrative facilities including lookout towers, work centers, and guard stations. Right of Way easements are not included in Authorized Uses and Administrative Facilities evaluation criteria, this data is not available on GIS (file, OkaWenSpecialUsesTRS.xlsx). Included in the evaluation is access to rental cabins, communication towers, lookouts, guard stations, private lands, power lines, active mines.	HIGH- High benefit roads directly access administrative facilities, special use areas, private inholdings, other authorized use areas or are used for administrative purposes. High benefit roads also include roads under private and FS road access permits. Direct Access is defined as roads that are within 100 feet of the data. MEDIUM- Medium benefit roads indirectly access those types of sites listed above or are only occasionally used by authorized users or are occasionally used for administrative purposes. Indirect access roads are roads that more than 100 feet and less than 500 feet from the data. LOW - Low benefit roads *do not provide access* to the sites listed above.

Hydrology and Soils	
Risk: (1-6): Geomorphic Instability and Sediment Production Potential[3]	
Desired Condition of the Road System: Road interaction with surface and sub-surface water is such that drainage density is not increased. Roads do not accelerate hill slope failure. Roads function in a hydraulic and geomorphic manner that provides watershed and sub-basin scale aquatic habitat connectivity, stream and floodplain connectivity and contribute to attainment of state water quality standards with emphasis on sediment and stream temperature. Landtype associations, soil composition and soil erodibility, combined with road attributes such as the proximity of roads to streams, the number of road-stream crossings and the gradients of those crossings, influence the stability of a road on the landscape and the amount of sediment produced. Landtype associations include and are defined by: General topography, geomorphic process, surficial geology, soil, potential natural vegetation, and local climate. Collectively, these features become diagnostic factors that control or strongly influence biotic distribution, hydrologic function, and ecological functions including natural disturbance regimes. As part of the LTA survey conducted by the USFS (2004), the following processes were mapped across the landscape and were used to determine soil sensitivity to disturbance; Deep Seated Slope stability and Shallow Rapid Landslides.. These attributes were given ratings of high, medium and low based on criteria developed during the LTA Evaluation. Numerical values were assigned to the LTA rankings in these two attributes (Low = 1, Medium = 2 and High = 3). The roads GIS layer was overlaid to determine ranking based on the percent of the road lying in each category. If < 10% of the road prism is within Medium or High LTA rating for either of the attributes = 1pt.; 10-25% of the road prism is within Medium or High LTA rating for either of the attributes = 2 pts.; > 25% of the road prism is within Medium or High LTA rating for either of the attributes = 3 pts.	HIGH – Cumulative numerical rating greater than (≥) 11. MEDIUM– Cumulative numerical rating of 7-10. LOW – Cumulative numerical ratings less than (<) 7.

These values were used to rate roads high medium or low:

1. Soil surveys conducted by the NRCS are used to determine properties of soils on the landscape and are designed to identify possible soil-related risks. Hydrologic soil groups are divided into 4 categories: A- low runoff potential; B – moderately low runoff potential; C – moderately high runoff potential; and D – high runoff potential

2. Determine which roads cross the 4 different soil groups. If road crosses soils groups: A or B = 1 pt.; C = 2 pts.; D = 3 pts. All roads with a paved or impervious surface should be categorized as "D"

Note. For a comprehensive overview and description of hydrologic soil groups;
http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba

3. K factor is an index which qualifies a relative susceptibility of the soil to sheet and rill erosion. K factors range from 0.02 to 0.64 (use attribute kwfact to account for soil rock fragments). Soils high in clay have low K values because they are resistant to detachment. Soils having high silt content are most erodible and have a high K value.

Determine roads that cross High and Low K factor areas and assign numerical values to these. Roads that cross K factor of < 0.24 = Low potential for erosion = 1 pt.; K factor of > 0.24 = High potential for erosion = 3 pts. All roads with paved or impervious surfaces should be categorized as low.

4. Detrimental impacts of stream within close proximity to roads include slope failure, interception of ground water, and road sediment production.

Determine proximity of roads to streams. Roads where all or a portion of the road falls within 300 ft of a stream channel (perennial or intermittent), lake, pond or wetland will be assigned the following rankings: < 10% of the road prism is within 300 ft. = 1pt.; 10-25% of the road prism is within 300 ft. = 2 pts.; > 25% of the road prism is within 300 ft. = 3 pts.

5. Forest roads represent a significant sediment source in forested watersheds. The main driving processes of road-source fine sedimentation to streams are runoff from: driving surfaces, cut banks, and culverts. Measures of these contributing process include: evaluation of current road condition at crossings (i.e. rutting, ditch depth, ditch cover, road surface effective cover), stream crossing counts, and modeled sediment contributions for crossing approaches. Crossings with approaches over a 3% gradient contribute from 3 to 6 times the amount of sediment that low gradient approaches contribute.

Calculate Stream Crossing Approach Gradients: If <20% of the stream crossings for a unique road have an average approach gradient <3% - Low (score of 1); If >20% of the stream crossings for a unique road have an average approach gradient >3% - High (score of 3)

6. Determine number of road/stream intersections. Assign numerical values based on number of crossings per road. < 1 crossing per road = 1pt., 2 crossings per road = 2 pts., and > 2 crossing per road = 3 pts.

Aquatics	
Risk: (1 of 3): Riparian Road Risk	
Roads can cause erosion, alter water movement on the landscape, and change how streams function when they cross or confine the stream. Roads within 300 ft. of streams, rivers, lakes, etc. can reduce shade which increases water temperatures, increase sediment delivery, simplify channel form (cut off side channels, straighten streams through confinement), and create impediments to aquatic species movement. Roads in riparian areas that parallel streams with occupied threatened, endangered or sensitive (TES) fish species and/or their designated critical habitat present the greatest risks. The road matrix risk rating considered miles of road adjacent to streams, miles of road on sensitive soils, and number of road-stream crossings. Due to the varying length of roads, relative percent of road affected by each factor was considered rather than absolute miles. Roads where all or a portion of the road falls within 300 feet of a stream channel (perennial or intermittent), lake, pond or wetland were assigned high, medium or low risk rating depending % of road length within 300 feet. Hydrology and aquatics also used 300 feet distance for assigning resource risks (this is not a duplication score).	HIGH – > 10% of the road prism is within 300 ft. of a stream or river where TES fish species are present and/or the stream is designated critical habitat. MEDIUM – < 10% of the road prism is within 300 ft. of a stream or river where TES fish species are present and/or the stream is designated critical habitat. LOW - None of the road prism is within 300 ft. of a stream or river where TES species are present and there is no designated critical habitat.
Risk: (2 of 3): Riparian Roads Crossing Sensitive Soil, Risk to Aquatic Organisms	
Roads have been shown as sources of runoff and sediment, with road related sediment generated by both surface erosion and potential road induced landslides. The magnitude and variation of surface erosion and landslide potential due to roads are driven by differences in landtype geology and physiography, as well as road design, location, construction and maintenance. Roads that are constructed on sensitive soils (determined by the following LTA's; shallow rapid landslides and deep seated landslides; soil erosion and surface runoff) can more severely disrupt hillslope and watershed processes. These roads when in close proximity to streams and rivers, can have serious impacts to water quality and aquatic habitat especially for TES fish species.	HIGH – ≥ 10% of the road is within 300 ft. of a stream or river within an LTA that has a ranking of Medium or High and TES fish species are present and/or the stream is designated critical habitat. MEDIUM – < 10% of the road is within 300 ft. of a stream within an LTA that has a ranking of Medium or High and TES fish species are present and/or the stream is designated critical habitat. LOW - Road is within an LTA that has a ranking of Low and there is no TES fish species present and there is no designated critical habitat.
Risk: (3 of 3): Road-Stream Crossing Risk to Aquatic Organisms	
Road-stream crossings (culverts, fords, etc) are a significant source of fine sediment to streams. As the number of road-stream crossings increases, the potential to transport sediment from the road prism to the stream network also increases. Roads that cross streams and rivers with TES fish species and/or designated critical habitat, can have serious impacts to water quality and aquatic habitat for these fish species. (Evaluation rating was rerun 05-07-14, no changes in wording were needed.)	HIGH – Roads that have ≥ 2 stream crossings that intersect streams or rivers with occupied TES fish habitat and/or designated critical habitat. MEDIUM – Roads with 1 stream crossing that intersect streams or rivers with occupied TES fish habitat and/or designated critical habitat. LOW - Roads with no road-stream crossings. Or the road crosses a stream with no occupied or critical TES habitat.

<table>
<tr><th colspan="2">Wildlife</th></tr>
<tr><th colspan="2">Risk: Factor 1: Ungulate Winter and Summer Habitat</th></tr>
<tr><td colspan="2">The focal species selected to represent the effects of roads on ungulates include mule deer, elk, bighorn sheep, and mountain goats. These species were selected because their habitat needs and response to roads is representative of the group, and because habitat effects can be monitored.
In general, ungulates respond to recreational activities by avoiding areas near roads, recreation trails, and other types of human activities. Human activities are of particular concern for ungulates when the activity occurs on their winter range or where young are reared. The direct and indirect effects of recreation on rearing areas may be best evaluated at the site-specific project level owing to the difficulty in identifying effects at the broad scale of this assessment.
The effect of linear routes on ungulates has been well documented and includes displacement, elevated levels of stress hormones, direct mortality from hunting and collisions, and decreases in reproductive success. Previous generations of deer and elk habitat-effectiveness models have used road density as an index for summer ranges. However, Roloff (1998) and Rowland et al. (2000) suggested that a spatially explicit roads variable, based on distance to open roads, may be more appropriate.
As such we suggest following a modification of the methodology in Gaines et al (2003) where an open road has an 800 m influence zone on each side of a plowed road in winter and a 1300 m influence zone on each side of an open road in summer.</td></tr>
<tr><td rowspan="4">Ungulate winter and summer habitat

Summer
A relative ranking of road influences level on deer and elk summer range is then applied as follows:

Buffer all OPEN roads by 1300 meters on each side. That buffered area equals the zone of influence. Calculate the proportion of each HUC10 watershed in/out of the zone of influence, check rankings, if a watershed has X% (% for high, moderate or low rating at right) of summer range outside of the zone of influence, then all of the open roads within that watershed have the corresponding ranking. Do this at the HUC12 scale as well. HUC10 might be too big.

Winter
Buffer all plowed roads by 800 meters on each side. (Use copy of 0617 snow plowed roads.xlsx shapefile that represents ungulate winter range) Then calculate the proportion of the winter range outside of the zone of influence by HUC10 (and HUC12).</td><td>HIGH: Open roads that result in <50 percent of the summer range being outside of the zone of influence of 1300 meters.</td></tr>
<tr><td>MODERATE: Open roads that result in 50 to 70 percent of the summer range being outside of a zone of influence of 1300 meters of an open road.</td></tr>
<tr><td>LOW: Open roads that result in >70 percent of the summer range being outside of a zone of influence of 1300 meters of an open road. – OR – Closed (ML1) roads</td></tr>
<tr><td></td></tr>
<tr><th colspan="2">Risk: Factor 2: Late-Successional Habitat Species and Primary Cavity Excavators</th></tr>
<tr><td rowspan="3">Road-associated factors include negative edge effects of roads on primary cavity excavators (PCE) and late-successional habitat, snag and down log reduction resulting from wood cutting and hazard tree removal along roads. The distances that woodcutters can harvest that contribute to a density of >2.0 mi/mi^2 open roads in a 5th-field watershed. Snag removal from roads differ according to terrain. Effects from roads also include disturbance, especially during nesting, and mortality.
The assessment processes to evaluate the effects of road-associated factors on primary cavity excavators and late-successional species were applied to the 5th-field watershed.</td><td>HIGH: Open roads that contribute to a density of >2.0 mi/mi^2 open roads in a 5th-field watershed</td></tr>
<tr><td>MODERATE: Open roads that contribute to a density of 1.1-2.0 mi/mi^2 open roads in a 5th-field watershed</td></tr>
<tr><td>LOW: Open roads that contribute to a density of 0 -1.0 mi/mi^2 open roads in a 5th-field watershed</td></tr>
</table>

Risk: Known Cultural Resources	
Cultural resources can be affected by the transportation system. Road location is key to determining high, moderate and low risk roads. Use and maintenance of roads that cross or are adjacent to sites can impact cultural resources directly or indirectly. A direct impact would be when a road or trail overlaps a site. An indirect impact might be vandalism to a cabin visible from a road or trail. Access to areas with cultural resources increases the chance that these resources could be disturbed by the public.	HIGH – A road within 100 feet of a surveyed cultural resources listed on the National Register, where eligible or potentially eligible (unevaluated) sites are present or the road has not been surveyed for cultural resources but is located in an area with high site probability per the Forest's site predictive model. (updated wording 05-07-14)
	MEDIUM – A road that has not been surveyed for cultural resources but is located in an area with moderate site probability per the Forest's site predictive model.
	LOW – A road that has been surveyed for cultural resources and no National Register listed, eligible or potentially eligible (unevaluated) sites are present or the road has not been surveyed for cultural resources but the road is located in an area of low site probability per the Forest's site predictive model.
Botany	
Risk: TES Plant Species (Including S&M taxa)	
TES and S&M plant species occur in a wide variety of habitats on the Okanogan-Wenatchee National Forest. Thorough surveys have been conducted in some areas but not in others. Both known and unknown rare plant sites can be impacted by motorized use through either habitat loss or direct mortality of plants from vehicle travel and human-caused disturbance. In addition, on most of the Forest, dispersed roadside camping is allowed and could impact both rare plant populations and habitat. Therefore, for impact analyses, it is assumed most camping and travel related disturbances will take place within 500 feet of the road with a potential high-use area within 100 feet.	HIGH - High risk roads are within 100 feet of known TES and S&M plant occurrences or intersect suitable habitat (within 100 feet) including riparian management areas, wetlands, springs, seeps, ponds, lakes, or alpine/subalpine parklands.
	MEDIUM - Medium risk roads occur within 100 – 500 feet of known TES and S&M plant occurrences or intersect habitat (within 500 feet) including riparian management areas, wetlands, springs, seeps, ponds, lakes, or alpine/subalpine parklands.
	LOW - Low risk roads are more than 500 feet from known TES and S&M plant occurrences and do not intersect habitat (greater than 500 feet) including riparian management areas, wetlands, springs, seeps, ponds, lakes, or alpine/subalpine parklands.
Risk: Undesirable Plant Species	
Roads present a risk for introducing new populations of undesirable invasive plant species because vehicles can carry and spread plant parts or seeds along motorized travel ways. Seed transport vectors include permitted livestock that travel in road corridors as well. The major risk of infestation is from seed transport from infested areas to un-infested areas. Some Forest roadsides are currently infested and are identified in NRIS invasive plant inventories. Additionally, users from outside the local area may introduce new invasive weeds to the Forest from widely occurring taxa on non-FS lands. Non-local users include recreationists and special use permittees, i.e. utility companies who regularly inspect their infrastructure.	HIGH - High risk roads: 1) intersect (within 100 feet) known FS invasive species infestations; 2) occur in active grazing allotments with invasive infestations; or 3) receive a high degree of non-local use. Roads that meet #3 include those that access a developed recreation site or a special area (such as trail heads).
	MEDIUM - Medium risk roads: 1) have invasive infestations within a buffer between 100 and 500 feet from the road; 2) occur in active grazing allotments; or 3) receive infrequent, moderate, or seasonal use by non-local users including special use permittees (roads regularly used to access special use developments such as electric, telephone, or gas lines).
	LOW - Low risk roads: 1) are not infested with invasive plants (>500 feet from road); 2) occur outside active grazing allotments; or 3) are infrequently used by non-local users.

Scoring and Rating

Overall risk and benefit assessment was based on aggregate scores from each resource (IDT member) risk and benefit rating for each road. Each road was rated as high, medium, or low based on criteria stated in the Table 3. Resource scores were totaled for the overall benefit and risk ranking for each road.

There are five benefit criteria and nine resource risk criteria for each road. Scores were based on a point system where a high rating equaled 3 points, a medium rating - 2 points, and a low rating - 1 point. The overall scores for risk range from 9 (1 point for each criteria) to 27 (3 points for each criteria). Overall scores for benefits range from 5 (1 point for each criteria) to 15 (3 points for each criteria).

Combined Benefit numeric rating range, 5 low to 15 high
- Low 5 – 8
- Medium 9 – 11
- High 12 – 15

Combined Risk numeric rating range, 9 low to 27 high
- Low 9 – 15
- Medium 16 – 19
- High 20 – 27

The IDT decided that the range for overall (combined resource score) high, medium, and low benefits and risk would be based on the number of resources affected by the road and the intensity of those effects as described by the specialist's rankings (Table 3). The IDT, preparing the travel analysis process (TAP), set the inclusive numeric rating for each low, medium and high matrix cell (numeric group). Point range is not evenly distributed between high, medium and low cells. The IDT developed the point distribution to more evenly group road miles in matrix cells used to identify road segments with lowest benefit and highest risk ratings for management recommendation groups, displayed in Tables 8 and 9. By adjusting the numeric matrix cell value up or down, road segments with the next higher numeric risk and lower benefit value would be grouped for a specific management opportunity.

Table 4 displays the score (point) range for high, medium and low benefit, road miles and percent of miles in each score group.

Table 4. Benefit score range, miles distribution and percent of road miles by score group

	Point Range	Overall Score	Roads Miles	Percent of Total Miles
BENEFIT	5-8	Low Benefit	2539	32
	9-11	Medium Benefit	2239	28
	12-15	High Benefit	3170	40
	Total		7948	100

Table 5 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 5. Risk score range, miles distribution and percent of road miles by score group

	Point Range	Overall Score	Roads Miles	Percent of Total Miles
RISK	9-15	Low Risk	671	9
	16-19	Medium Risk	3344	42
	20-27	High Risk	3933	49
	Total		7948	100

These category ratings did not consider impact severity beyond the evaluation criteria presented in Table 3.

A benefit rating example is displayed in Table 6.

Table 6. Example of benefit scoring for each road

Criteria	Benefit Categories	H, M, and L Rating	Points for each Rating
1	Fire management, agency and public access	L	1
2	Recreation access	M	2
3	Integrated vegetation management access	L	1
4	Range Improvements access	H	3
5	Authorized uses and administrative facilities access	L	2
Total Points:			**9 out of 15 possible (Medium Benefit)**

The example road in Table 6 scored 9 points and would be rated medium benefit. A risk rating example is displayed in Table 7.

Table 7. Example of risk scoring for each road

Criteria	Risk Categories	H, M, and L Rating	Points for each Rating
1	Geomorphic instability	M	2
2	Riparian road location	H	3
3	Road crossing sensitive soil	L	1
4	Road stream crossing	M	2
5	Ungulate habitat	M	2
6	Late successional habitat	H	3
7	Known cultural resources	M	2
8	Sensitive plant species	L	1
9	Undesirable plant species	M	2
Total Points:			**18 out of 27 possible (Medium Risk)**

Based on this example, the overall score for this road would be medium for benefit and medium for risk. Appendix A – Benefit and Risk Assessment displays each resource rating and overall benefit and risk results for each road.

Distribution of Benefit and Risk Assessment

Benefit and Risk Matrix for all System (ML 1 to ML 5) Roads

Of the total 7948 miles of existing National Forest System Roads (ML1 – ML5), approximately 5409 miles, 68 percent, rated medium or high benefit. These medium and high benefit roads are important for Forest Service management and public use. Of those roads that ranked medium or high benefit, 3,202 miles, 40 percent of total miles, rated high risk due to resource concerns. These high risk/medium benefit and high

risk/high benefit roads should be the focus of road maintenance funds to mitigate adverse effects and lower impacts of the transportation system on natural resources. As noted earlier, the IDT adjusted matrix cell benefit and risk score group numbers (05-08-14 IDT meeting, Appendix J) to identify road management opportunities and distribute road miles by rating values. The team then developed rules for each matrix cell (05-08-14 IDT meeting, Appendix J) to identify management opportunities.

Table 8 is the summary risk and benefit matrix with miles and percent of miles for all roads analyzed with general management opportunities and priorities within the groups.

Table 8. Roads risk and benefit matrix for existing National Forest System roads

ROADS - OPERATIONAL ML1 TO ML5				
RISKS [1]	BENEFITS [2]			
	Scores	**Low 5-7**	**Medium 8-11**	**High 12-15**
	High 22-27	(HL) Decommission, Lower ML, or Mitigate – High Priority **(731)[3] or (9%)[4]**	(HM) Decommission, Mitigate, Close or Lower ML – High Priority **(1057 or (13%)**	(HH) Maintain and Mitigate - High Priority **(2145) or (27%)**
	Medium 16-21	(ML) Close, Mitigate, Decommission or Lower ML, Medium Priority **(1407) or (18%)**	(MM) Mitigate and Maintain – Medium Priority **(980) or (12%)**	(MH) Mitigate and Maintain - Medium Priority **(958) or (12%)**
	Low 9-15	(LL) Mitigate, Lower ML, Close or Decommission, Low Priority **(401) or (5%)**	(LM) Maintain, Low Priority **(202) or (3%)**	(LH) Maintain, Low Priority **(67) or (1%)**
TOTAL OPERATIONAL ML1 TO ML5 = 7,948 MILES				

[1] Risks represent the range of total risk scores assigned to each category.
[2] Benefits represent the range of total benefit scores assigned to each category.
[3] Road miles assigned to each cell in the matrix.
[4] Percent of road miles in each cell.

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 Okanogan-Wenatchee National Forest are shown in Table 9 below.

Table 9. 5 year average road funding

Budget Line Item	Forest Operational Budget					5 Year Average	% to Rd Mtc	Average Mtc Budget
	2010	2011	2012	2013	2014			
CMRD	3,201	2,356	1,754	1,847	1,824	2,196	66%	$1,450
CMLG	1,964	323	278	363	315	649	15%	$97
CWF2	170	75	195	195	200	167	53%	$89
Other FS	91	158	145	138	30	112	100%	$112
Purchaser Mtc	45	23	3	18	73	32	100%	$32
							Total:	**$1,780**

5YR Ave Mtc Budget	Range	
	-20%	+20%
$1,780	**$1,424**	**$2,136**

With funds being far below what is necessary to keep the road system properly maintained, many roads do not get the maintenance treatments they need on schedule and 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 Okanogan-Wenatchee NF, would need approximately $158 million to bring their entire road system back up to standard, and about $17 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 Okanogan Wenatchee NF would still require about $10.2 million per year to keep the current road system fully maintained to standard. Table 9 above, shows that on average, the Okanogan-Wenatchee N.F. only receives about $1.8 million dollars per year, (including maintenance performed by commercial users), that can be applied toward road maintenance work, only about 18% 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 Okanogan-Wenatchee National Forest were to focus their available appropriated funds on a given set of roads to fully maintain to standard, they would only be able to maintain about 195 miles of roads if they were all paved, or about 365 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 Okanogan-Wenatchee 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 G. 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 Okanogan-Wenatchee NF would be about $5.8 million dollars per year, or roughly three times the amount of currently available funding for this type of work. 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 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 Appendix G.

Step 5: Describe Opportunities and Priorities

Purpose

The purpose of this step is to:

- Compare existing motor vehicle use with desired conditions, and describe options for modifying the forest transportation system that would achieve desired conditions.
- Identify management opportunities and priorities and formulate proposals for changes to the forest transportation system that respond to the issues, risks, and benefits identified previously in the analysis.
- Develop guidelines for mitigating road risks

Road Management Opportunities

Management opportunities for roads were identified through the GIS risk/benefit rating evaluation for each resource in Step 4 of the analysis. Road groups by maintenance level in each matrix cell were evaluated by the IDT for opportunities based on the combined total benefit and risk rating score.

Road maintenance funding needs were also a consideration when identifying management opportunities. A roads analysis helps identify ways to more efficiently spend the limited road maintenance dollars allocated to the Forest. One approach is to reduce or eliminate expenditures on roads not needed or not needed at their current maintenance level. Maintenance level road groups described in Table 9 and 10, along with the roads list spreadsheet in Appendix A, identify management opportunities and can be used to prioritize roads for available maintenance funds.

Final management decisions would be done after ground truthing and scoping with site-specific project level NEPA analysis. A complete road list with overall rankings, and specific management opportunities, for each road segment, is located in Appendix A.

Management opportunities for road miles in each of the nine matrix cells from Table 8, and included in Appendix A spreadsheet for each road, include these risk/benefit groups (risk/benefit):

1. HL, Decommission, reduce maintenance level or mitigate – high priority
2. HM, Decommission, close, reduce maintenance level or mitigate – high priority
3. HH, Mitigate, maintain - high priority
4. ML, Close, decommission, reduce maintenance level or mitigate – medium priority
5. MM, Mitigate and maintain - medium priority
6. MH, Mitigate and maintain - medium priority
7. LL, Close, reduce maintenance level, decommission or mitigate – low priority
8. LM, Maintain – low priority
9. LH, Maintain – low priority

Table 9 displays road management opportunities, total road miles and road miles by maintenance level for each risk/benefit category.

Table 10. Road management opportunities for risk/benefit categories

Risk / Benefit	Opportunities for Roads
Low Risk / Low Benefit	**Decommission, close,[1] lower maintenance level, or mitigate – Low Priority**
401 miles **316 miles of ML1 Roads** **80 miles of ML2 Roads** **3 miles of ML3 Roads** **0 miles of ML4 Roads** **0 miles of ML5 Roads**	If there is no long-term administrative or public need for a road, consider decommissioning. If there is a future need for the road but no immediate need, consider retaining on the system as a closed (ML1) road. Closed roads are closed for at least one year, but can be re-opened for future administrative or public access needs. The low risk associated with these routes indicates low need and priority for mitigation. Drainage feature maintenance and erosion prevention are the highest priority issues for these low risk roads. Mitigate adverse effects on other resources.
Low Risk / Medium Benefit	**Maintain – Medium Priority**
202 miles **98 miles of ML1 Roads** **103 miles of ML2 Roads** **1 mile of ML3 Roads** **0 miles of ML4 Roads** **0 miles of ML5 Roads**	The majority of these roads should remain open for administrative and public use, depending on access and resource management objectives. The Forest Service may consider working with cooperating agencies or user groups to provide adequate maintenance for roads in this category that are important for public access. Low risk associated with these routes indicates low need and low priority for mitigation.
Low Risk / High Benefit **67 miles** **1 mile of ML1 Roads** **66 miles of ML2 Roads** **0 miles of ML3 Roads** **0 miles of ML4 Roads** **0 miles of ML5 Roads**	**Maintain – Low Priority** The Forest Service should work with cooperating agencies to provide adequate maintenance for roads in this category that are important for public access. Low risk associated with these routes indicates low need and priority for mitigation.
Medium Risk / Low Benefit **1407 miles** **1067 miles of ML1 Roads** **307 miles of ML2 Roads** **30 miles of ML3 Roads** **3 miles of ML4 Roads** **0 miles of ML5 Roads**	**Decommission, close, mitigate or reduce maintenance level – Medium Priority** General public motorized access is not recommended for these roads, unless the road is essential for public access. Most of these roads should be closed or decommissioned. If there is no long-term public or administrative need for the road, it should be considered for decommissioning. If there is long-term public or administrative need for the road, consider lowering the maintenance level.

[1] To "close" a road means that its maintenance level is lowered to ML 1. These roads still exist on the ground in a stabilized state, but vehicular access is prohibited. Future required use is foreseen.

Table 10. Road management opportunities for risk/benefit categories

Risk / Benefit	Opportunities for Roads
Medium Risk / Medium Benefit	**Mitigate – Maintain – Medium Priority**
980 miles **396 miles of ML1 Roads** **558 miles of ML2 Roads** **17 miles of ML3 Roads** **9 miles of ML4 Roads** **0 miles of ML5 Roads**	The majority of these roads should remain open. Associated medium resource risks may require mitigation. Mitigation depends upon specific risks and may include, but is not limited to: drainage structure improvement, spot surfacing, additional maintenance, reconstruction, relocation, or seasonal road closure. The scale and frequency of these activities would depend on risk severity and available funds. Roads ranked Medium Risk/Medium Benefit could be considered for lowering the maintenance level.
Medium Risk / High Benefit	**Mitigate and Maintain - Medium Priority**
958 miles **6 miles of ML1 Roads** **722 miles of ML2 Roads** **220 miles of ML3 Roads** **9 miles of ML4 Roads** **1 mile of ML3 Roads**	The majority of these roads will remain open for administrative and public use, depending on resource and recreation management objectives. Associated medium risks may require mitigation. Mitigation depends upon specific risks and may include, but is not limited to: drainage structure improvement, spot surfacing, additional maintenance, reconstruction, relocation, or seasonal road closure. The scale and frequency of these activities will depend on risk severity and available funds. Roads ranked Medium Risk/High Benefit and High Risk/High Benefit categories may be allocated for higher priority mitigation and maintenance funding or lowering maintenance level.
High Risk / Low Benefit	**Decommission, mitigate or lower maintenance level – High Priority**
731 miles **455 miles of ML1 Roads** **263 miles of ML2 Roads** **12 miles of ML3 Roads** **1 mile of ML4 Roads**	Vehicle access is not recommended on some of these roads based on the Risk/Benefit Analysis. Roads in this category should be considered for closure or decommissioned. If benefits are sufficient to retain the road as open or maintenance level 1 (closed), it is a high priority for mitigating risks. Coordinate with county government or private landowners to determine maintenance responsibility on roads needed for access to private lands. If a road's primary use is access to communities, request public roads agencies (county, towns, state government) to assume road operational jurisdiction. If a road is needed exclusively for access to private land or needed to manage activities under special use permits, consider issuing a permit for the road that places maintenance responsibilities on the permittee If roads or road segments are not open to the public and not under permit, consider decommissioning.

Table 10. Road management opportunities for risk/benefit categories

Risk / Benefit	Opportunities for Roads
High Risk / Medium Benefit **1057 miles** **233 miles of ML1 Roads** **636 miles of ML2 Roads** **162 miles of ML3 Roads** **24 miles of ML4 Roads** **2 miles of ML5 Roads**	**Mitigate, close, lower maintenance level or decommission – High Priority** Consider closing or lowering maintenance level on roads within this category that have public benefit. Decommission roads not needed for future management access. Reducing maintenance levels allows for more aggressive and less costly mitigation measures. High risks associated with these routes may require mitigation. Mitigation depends upon specific risks and may include, but is not limited to: drainage structure improvement, spot surfacing, additional maintenance, reconstruction, relocation, or seasonal road closure. The scale and frequency of mitigation activities would depend on risk severity and available funds.
High Risk / High Benefit **2145 miles** **13 miles of ML1 Roads** **1105 miles of ML2 Roads** **801 miles of ML3 Roads** **179 miles of ML4 Roads** **47 miles of ML5 Roads**	**Maintain and mitigate or close - High Priority** Most of these routes are needed for resource management or general public access to the Forest. Some routes may be open for administrative use only, to control access to sensitive cultural or biological resources. High risks associated with these routes may require mitigation. Mitigation depends upon specific risks and may include, but is not limited to: drainage structure improvement, spot surfacing, additional maintenance, reconstruction, relocation, or seasonal road closure. The scale and frequency of these activities would depend on risk severity and available funds.

Table 11 displays maintenance level road miles (summarized in Table 8) and percent of total road miles for each matrix cell. Table 10 road miles are subdivided by maintenance level with applicable management opportunity options developed by the IDT in Table 10. Management opportunities for each road (by road number) are shown in Appendix A spreadsheet.

Table 11. Road management opportunities by risk/benefit categories, all system roads, miles and % of total (7948) road miles (05-16-14)

Score	5-8 Benefit	9-11 Benefit	12-15 Benefit
Risk 20-27	**HL**[1] ML1 (455 miles) • Mitigate and retain ML1, high benefit for rec, special uses, admin, fire (41 miles) • Decommission all other ML1 (414 miles) ML2 (263 miles) • Mitigate if high benefit for rec, special uses/admin, fire (92 miles) • Decommission all other ML2 roads (171 miles) ML3 (12 miles) Change to ML 2 and mitigate (12 miles) ML4 (1 mile) Change to ML 3 and mitigate (1 mile) ML5 (0 miles) **Total miles 731 (9%)**[2]	**HM** ML1 (233 miles) • If rec or special uses and fire is high or medium, mitigate (233 miles) • Decommission remainder of ML 1 roads (0 miles) ML 2 (636 miles) • If rec or special uses and fire is high or medium, retain at existing ML 2 and mitigate (636 miles) • If rec or special uses is low or if fire, vegetation or range is high close (change to ML1) (0 miles) • Remainder of ML 2 close – change to ML 1 (0 miles) ML 3, (162 miles) • If rec is high or medium, retain (mitigate) at existing ML 3 (118 miles) • Remainder of ML 3 roads change to ML 2 (44 miles) ML 4 (24 miles) Mitigate and retain at existing ML 4 ML 5 (2 miles) Mitigate and retain at existing ML 5 **Total miles 1057 (13%)**	**HH** ML1 (13 miles) • If high benefit for rec, special uses/admin, or fire, mitigate (retain at ML1) (13 miles) • Decommission all other ML 1 roads (0 miles) ML2 (1105 miles) • If rec or fire is high, and aquatics is high, mitigate. (retain at ML 2) (1100 miles) • If rec is medium or low, and aquatics is high, close (change to ML1) (5 miles) • Remainder ML 2 roads mitigate and retain at ML 2 (0 miles) ML3, (801 miles) • Retain ML 3 roads with high recreation benefit rating at ML 3 (399 miles) • Remaining ML-3 roads, or (roads with medium and low rec benefit) reduce to ML-2 (402 miles) ML 4 (179 miles) ML 5 (47 miles) Retain at existing ML and mitigate. Highest priority **Total miles 2145 (27%)**
Risk 16-19	**ML**[1]	**MM**	**MH**

	ML1 (1067 miles) • If high benefit for rec, special uses/admin, or fire, mitigate (retain at ML1) (68 miles) • Decommission remaining ML1 roads (999 miles) ML2 (307 miles) • If high benefit for rec, high and moderate for special uses/admin, or high for fire, mitigate (retain at ML2) (106 miles) • If veg benefit is high, and watershed aquatics risk is medium, close (change to ML1) (0 miles) • Remaining ML 2, close (change to ML1) (201 miles) ML3 (30 miles) • If rec rating is high, retain at ML 3 and mitigate (3 miles) • Other existing ML 3, change to ML 2 (27 miles) ML4 (3 miles) mitigate **Total miles 1407 (18%)**	Mitigate and maintain – Second Priority ML1 (396 miles) ML2 (558 miles) ML3 (17 miles) ML4 (9 miles) ML5 (0 miles) **Total miles 980 (12%)**	Mitigate and maintain – Second Priority ML1 (6 miles) ML2 (722 miles) ML3 (220 miles) ML4 (9 miles) ML5 (1 mile) **Total miles 958 (12%)**
Risk 9-15	**LL**[1] ML1 (316 miles) • If high benefit for rec, special uses/admin, or fire, mitigate (retain at ML1) (23 miles) • Remaining ML1 roads, decommission (293 miles) ML2 (80 miles) • If high and/or moderate benefit for rec, special uses/admin, or fire, - mitigate (retain at ML 2) (25 miles) • Remaining ML2 roads, close (change to ML1) (55 miles) ML3 (5 miles) • If rec rating is high, mitigate at ML 3 (1 mile) • Remaining ML3 roads, change to ML 2 (4 miles) **Total miles 401 (5%)**	**LM** Maintain – Third priority ML1 (98 miles) ML2 (103 miles) ML3 (1 mile) ML4 ML5 **Total miles 202 (3%)**	**LH** Maintain – Third priority ML1 (1 miles) ML2 (66 miles) ML3 ML4 ML5 **Total miles 67 (1%)**

[1]-Note: Score rating, H = high (3), M = medium or moderate (2), L = low (1); First letter is risk, second letter is benefit.
[2] Percent of total road miles

Actions that Respond to the Issues

The following are suggested strategies the Forest may employ in project planning (see Step 3). The scale at which these actions may be implemented depends on site specific needs and compatibility of the action with overall forest plan management direction for the project area. The list below is intended to provide options that project leaders and decision-makers may consider when implementing changes to the road system.

Issue 1: Insufficient resources for maintaining existing system roads

Action: Reduce the number of road miles that need to be maintained or reduce the maintenance level to reduce maintenance costs. Reducing road miles that need to be maintained by converting closed roads to motorized trails would increase trail maintenance costs and is not a recommended action to reduce maintenance costs.

Action: Leverage funds to increase maintenance capabilities. Continue to seek opportunities with other Forests, counties and private individuals to increase the amount of maintenance through cooperative funding. Work with volunteers to maintain trails to free up more funding for road maintenance.

Action: Prioritize roads that could be transferred to county jurisdiction for county maintenance. NFS roads that provide access to private inholdings could be transferred to county jurisdiction or maintained by private parties.

Issue 2: Need for landowner access to private lands and state lands

Action: Maximize cooperation from landowners by proposing to issue a reciprocal easement.

Action: Transfer road jurisdiction to the county.

Action: Enter into a special use agreement with landowners, stipulating that the permittee has maintenance responsibilities.

Issue 3: Human-caused fire and need for evacuation routes during wildfires.

Action: Close roads (rather than decommission) in high fire risk areas, for use as fire control lines, motor vehicle and equipment access during prescribed burns and wildfires.

Issue 4: Need for evacuation routes during wildfires.

Action: Retain selected roads for public evacuation if a wildfire should occur.

Issue 5: Restrict motorized vehicle use on the forest to designated system roads and trails through travel management.

Action: Install travel control signs, physical barriers or other devises that discourage using unauthorized roads. Use natural material to prevent use (downed trees, boulders, etc.) where feasible.

Action: Monitor unauthorized roads after barriers are installed and other mitigation measures are implemented. Keep records of successful and unsuccessful strategies for discouraging travel to improve restoration actions.

Issue 6: Need for access to firewood and other forest products gathering areas.

Action: Identify areas with suitable firewood or other forest products along open system roads, and provide maps to the public. Periodically or seasonally open closed roads with firewood supplies (recent tree mortality) to reduce fuels and use of closed or unauthorized roads.

Issue 7: Road effects on wildlife, plant habitat

Action: Reduce the number of roads located in occupied habitat for species-of-concern, species-of-interest, Threatened or Endangered, or Sensitive species.

Action: Place seasonal restrictions on roads through key nesting areas, roosting areas and other key wildlife habitat areas.

Action: Reduce road width and maintenance level to minimum needed for safe vehicle passage and to meet the intended need in important wildlife areas.

Issue 8: Road effects on watershed conditions.

Action: Implement National Forest Service Best Management Practices (BMPs) for mitigating road risks to reduce soil and water impacts from roads.

Action: Provide information and education about motor vehicle regulations and responsible use of motorized vehicles on the National Forest. Provide information at trailheads, recreation sites, parking areas, web site and news releases.

Action: Install route numbers on system roads to assist users with compliance of motor vehicle use regulations.

Action: Use education material to create public understanding of problems created by off road driving. Inform users of the motorized travel policy.

Action: Use enforcement to curtail off-road driving. Implement patrols and field presence at appropriate times of year (such as hunting season, holidays, weekends, etc.) in identified use areas. Inform users of the travel policy.

Action: Rehabilitate areas damaged by off-route driving. State recreation trail programs, EPA's Clean Water Act 319 grant program, and state OHV funds are potential outside funding sources to rehabilitate and re-vegetate damaged areas in addition to federal appropriations.

Issue 9: Roads provide public access for recreational purposes

Action: Maintain access to developed recreational sites.

Action: Maintain and update the Motor Vehicle Use Map.

Action: Maintain road signs in accordance with handbook direction.

Issue 10: Roads provide access for general forest management.

Action: Identify infrequently used roads, and effectively close ML 1 roads to reduce road maintenance costs (change other ML roads to ML1 or to a lower maintenance level).

Action: Maintain and update the Motor Vehicle Use Map if roads are closed through NEPA analyses and decisions.

Action: During project level NEPA process, consider closing (ML1) open roads or reducing maintenance level in the project area to reduce maintenance costs.

Guidelines for Mitigating Road Risks

General guidelines for mitigating risks discussed in previous sections are listed below.

- Maintain, improve, reconstruct drainage structures
- Construct additional cross drains, add culverts
- Rock cross drains
- Add energy dissipaters
- Blade, remove ruts, crown or reshape
- Improve surface to reduce sediment delivery
- Reduce clearing width or narrow road width where applicable
- Close or seasonally restrict road use to minimize adverse effects on water, soil, wildlife and other resources
- Continue inventory and evaluate extent of invasive plant species, spray or cut to prevent seed development and spread
- Incorporate non-native invasive species prevention and control in road maintenance plans
- Eradicate non-native invasive species before roads are decommissioned; monitor and follow-up treatment where needed

Decommissioning Guidelines

Road decommissioning results in removal of a road from the road system. The goal is to return the roadway to a more natural state where the roadway is hydrologically self-maintaining and to permanently remove it from the transportation system. To accomplish this, a number of techniques can be used, such as installing waterbars or earthen barriers, soil decompaction, seeding, scattering slash or boulders, planting vegetation, converting the road to a trail, and full reclamation by recontouring and restoring the original topography. There is a different cost associated with each of these techniques, and their effectiveness for deterring unauthorized motorized vehicle use varies as well. Planning decommissioning methods and locations is important to ensuring effectiveness.

Decommissioning maintenance level 1 and 2 roads can consist of removing culverts, soil decompaction, seeding, installing waterbars to ensure proper drainage and scattering large woody debris to promote vegetation growth. The objective is to restore natural hydrologic and biological function to the previous road structure.

Decommissioning level 3, 4, and 5 roads is generally more expensive than decommissioning most level 1 and 2 roads. Decommissioning objectives are the same as maintenance level 1 and 2 roads.

Level 3, 4, and 5 roads are usually wider than level 1 and 2 roads, have more culverts installed at designed intervals to cross drain the road, may be ditched, have better sight distances designed on horizontal and vertical curves, have larger cuts and fills, and are designed through the topography rather than with the topography. It is much more expensive to decommission these roads than level 1 and 2 roads. Given the cost, it may be cheaper to maintain level 3, 4, and 5 roads than to decommission them. However, future

maintenance costs may not be the only factor to consider; other resource considerations may outweigh cost. For some level 3, 4, or 5 roads, high deferred maintenance costs may exceed decommissioning cost.

Decommission Options

- Balance cost with resource risk and treatment effectiveness when selecting methods for decommissioning roads.
- Convert roads to trails as a decommissioning method when recreation analysis indicates a need to expand, connect or improve the existing trail system in the area.
- Decommission by restoring the road to original contours when mitigating visual impacts is required by the forest plan or when necessary to assure eliminating vehicular traffic.

Step 6: Reporting

Purpose

The purpose of this step is to report key findings of the analysis.

Desired Condition of the Future Road System

Travel Management Rule, 36 CFR 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 applicable 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."

Key Findings of the Analysis

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). From the matrix opportunities described in Steps 4 and 5, approximately 1,877 road miles, 24 % of the road system, (1,706 miles of ML1 and 171 miles of ML2 roads), are likely not needed for future resource management purposes and should be further analyzed in NEPA for decommissioning. Approximately 261 miles of existing ML2 roads could be closed or changed to ML1. Approximately 489 miles could have the maintenance level reduced from ML 3 to ML 2, and 1 mile of ML4 roads could be lowered to ML 3.

Appendix A spreadsheet displays all roads with management opportunities for each road. The benefit - risk rating process was used to develop opportunities for making changes to the road system identified previously in Tables 9 and 10. Management opportunities included in the road spreadsheet data, Appendix A, were used to develop the Road Maintenance Level Opportunity maps (seven maps in Appendix D). The road maintenance level opportunity maps in Appendix D also display roads that are likely not needed for future use and will be further examined in the NEPA process for decommissioning and removal from the road system. Existing road maintenance levels are shown on maps in Appendix C.

Table 12 displays a summary of potential changes to the road system by maintenance level.

Table 12. Opportunities for changes to the existing road system

Maintenance Level	Existing Miles	Potential Miles	ML Changes Miles	Likely Not Needed Miles
ML 1	2585	1140		1706
ML 2	3839	3896	261	171
ML 3	1248	760	489	
ML 4	226	225	1	
ML 5	50	50		
Total	7948	6070	-	1877

Table 12 summarizes the opportunities identified by the IDT based on the risk/benefit analysis in this report. Prior to any travel management decisions being made, including any roads being added or deleted from the system, site-specific analysis, including public involvement, would be completed through the NEPA process at an appropriate scale.

In addition to the totals in Table 12, there are another 191 miles (190.88) of existing roads that have tabular data in the Forest's corporate database, but lack geospatial data, this is 2% of total system road miles. These roads were identified after the specialists evaluated and scored all roads included in the database for benefits and risks (Appendix A). Missed roads are generally short, often providing access to old log landings, trail heads, campground loops, structures, corrals or other features. Since GIS spatial data was not available, resource specialists' criteria and rule sets could not be applied in the geospatial environment, and thus score the roads for benefit and risk. As a proxy method of evaluating and rating these roads, forest staff applied scores to these roads based on score ratings of the geographically nearest roads, with consideration of the road's attributes. Missed roads attribute data, (road number, road name, miles, operator maintenance level, recommended maintenance level, etc.) and benefit/risk evaluation results, is included in Appendix A as a separate spreadsheet ((Appendix A, PivotTable_ML_OW_RoadCore_NullRecords_03-12-2015.xlsx). Missed road miles are not included in Table 8. (Roads risk and benefit matrix and recommendations for existing National Forest System roads) matrix road miles and are not included in Table 10, (Road management recommendations by risk/benefit categories, all system roads, miles and % of total 7,948 road miles) management recommendations. Missed road miles are not included in the economic analysis. Each road lacking geospatial data was located on a hard copy map (Forest map, past timber sale maps and other special use maps), evaluated, and assigned a risk and benefit score, maintenance level and management recommendation. Missed road miles by existing and recommended maintenance level are shown in Table 12.

Table 12, Displays roads lacking geospatial data, existing maintenance level miles and recommended management (maintenance level change or decommission) miles

Management Attribute	Likely Not Needed	ML 1	ML 2	ML 3	ML 4	ML 5	Total
Existing ML	-	98.23	91.16	0.14	0.58	0.77	190.88
Recommended ML	64.92	69.47	55.00	0.14	0.58	0.77	190.88

The Financial Analysis in Appendix G includes a scenario using the total mileages from the opportunity categories 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 $2.1 million per year in annual maintenance funding. This is a reduction of approximately $3.7 million per year in routine annual maintenance funding needs, which is within 20% of

the previous 5 year average funding level for the forest, and therefore would reflect long-term funding expectations according to Region 6 guidelines.

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. The estimated costs to implement the opportunities described above are:

Figure 6: Estimated capital costs of improvement and decommissioning work

Category	Miles	Cost / Mile	Total Cost
Estimated Cost to put roads in storage	261	3,500	$913,000
Estimated Cost to decommission roads	1877	6,000	$11,262,000
Estimated Cost for improvement work	1,500	2,800	$4,200,000
			$16,375,000

For example, the cost to prepare 261 miles of road for storage as ML 1 roads is estimated to be around $900,000 dollars. The cost to decommission 1877 miles of road would be about $11.2 million and the cost to perform a variety of road improvement work to mitigate resource concerns identified in the TAP would cost somewhere in the neighborhood of $4 million.

Given the current trend in reduced funding for road maintenance work, and the enormous gap between current funding and need, it does not appear possible to identify a future road system where the entire cost of annual maintenance work necessary to fully maintain the roads to standard would be in balance with available funding, (i.e., to include annual maintenance items and cyclic capital costs for replacement of gravel surfacing, pavements, structures, bridges, etc.). In the Pacific Northwest Region, the size of road system to meet that requirement would be less than 200 miles per National Forest and would not allow forests to meet resource management objectives in their Forest Plans or to meet statutory and regulatory requirements. Because we will not have enough funding available to keep all road surfacing materials and structures replaced on schedule, we can expect the deferred maintenance backlog to continue to grow, and we will continue to see a decline in the overall serviceability of our road system.

However, even though we can't alter the road system so much as to be fully affordable and sustainable within today's budget levels, we can certainly take steps to move it in a better direction. By utilizing the opportunities identified from the Okanogan-Wenatchee NF Travel Analysis Process, we can certainly move the Okanogan-Wenatchee NF road system to a much more affordable and sustainable state.

Appendix

Appendix A: Existing System Roads Benefit and Risk Assessment, and Management Recommendations (two) Spreadsheets
Appendix B: Vicinity Map
Appendix C: Existing Road System by Maintenance Level, 7 Maps
Appendix D: Road Management Recommendations by ML, 7 Maps
Appendix E: Minimum Road System, Road risk/Benefit assessment, 7 Maps
Appendix F: R6 TAP Task List, (Travel Analysis Process) and Directions (3 documents)
Appendix G: Financial Analysis (4 documents)
Appendix H: Missed Roads Data (2 documents)
Appendix I: WO Directions (5 documents)
Appendix J: O-W Forest Directions (4 documents)
Appendix K: Resource Benefit risk Evaluation Descriptions (6 documents)
Appendix L: Glossary (2 documents)
Appendix M: Roads Analysis Process Summary
Appendix N: O – W Travel Management Public Scoping (2 documents)

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