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Roads Analysis Report



March 2004

USDA Forest Service

UMATILLA NATIONAL FOREST

ROADS ANALYSIS REPORT

MARCH 2004

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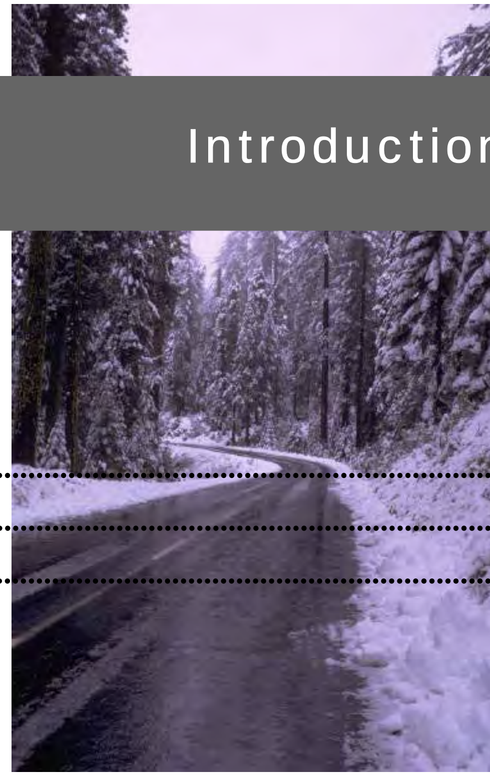

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Background

In August 1999, the Washington Office of the USDA Forest Service published Miscellaneous Report FS-643, *Roads Analysis: Informing Decisions about Managing the National Forest Transportation System*. The objective of roads analysis is to provide decision-makers with critical information to develop road systems that are safe and responsive to public needs and desires, are affordable and efficiently managed, have minimal negative ecological effects on the land, and are in balance with available funding for needed management actions.

In October 1999, the agency published Interim Directive 7710-99-1 authorizing units to use, as appropriate, the road analysis procedure embodied in FS-643 to assist land managers in making major road management decisions.

On March 3, 2000, the Forest Service proposed to revise 36 CFR Part 212 to shift emphasis from transportation development to managing administrative and public access within the capability of the lands. The proposal was to shift the focus of National Forest System road management from development and construction of new roads to maintaining and restoring needed roads and decommissioning unneeded roads within the context of maintaining, managing, and restoring healthy ecosystems.

On January 12, 2001, the Forest Service issued the final National Forest System Road Management Rule. This rule revised regulations concerning the management, use, and maintenance of the National Forest Transportation System. Consistent with changes in public demands and use of National Forest System resources and the need to better manage funds available for road construction, reconstruction, maintenance, and decommissioning, the final rule removes the emphasis on transportation development and adds a requirement for science-based transportation analysis. The final rule is intended to help ensure that additions to the National Forest System road network are deemed essential for resource management and use; that construction, reconstruction, and maintenance of roads minimize adverse environmental impacts; and that unneeded roads are decommissioned and restoration of ecological processes are initiated.

On December 14, 2001, the agency published Interim Directive 7710-2001-3 which removed interim requirements of Section 7712.16. This section addressed road management activities in inventoried roadless and contiguous unroaded areas and reserved to the Chief decision authority over some road construction and reconstruction in roadless and unroaded areas. The directive clarified how and when decisions on roads are made and what actions and activities require roads analysis. Interim directive 7710-2001-2 was removed from 7710 but remains in effect with some change and was simultaneously reissued as an interim directive to Chapter 1920. Interim directive 7710-2001-1 was superseded by 7710-2001-3. Interim Directive 7710-2001-3 expires June 14, 2003.

An optimum road system supports land management objectives. For the Forest Service, those objectives have markedly changed in recent years. How roads are managed must be reassessed in light of those changes. Expanding road networks have created many opportunities for new uses and activities in national forests, but they have also dramatically altered the character of the landscape. The Forest Service must find an appropriate balance between the benefits of access to the national forests and the costs of road-associated effects to ecosystem values. Providing road systems that are safe to the public, responsive to public needs, environmentally sound, affordable, and efficient to manage is among the agency's top priorities. Completing an assessment of the road system is a key step to meeting this objective.

Roads analysis is an integrated ecological, social, and economic approach to transportation planning, addressing both existing and future road systems. The analysis is designed to be scaleable, flexible, and driven by road-related issues important to the public and managers. It uses a multi-scale approach to ensure that these issues are examined in context and provides a set of analytical questions to be used in fitting analysis techniques to individual situations. Roads analysis is intended to complement and integrate existing laws, policy, guidance, and practice into the analysis and management of roads on national forests.

The detail of the analyses must be appropriate to the intensity of the issues addressed. Where ecosystem analyses or assessments are completed, roads analysis will use that information rather than duplicating efforts. Roads analysis may be integrated as a component of watershed analysis, landscape assessments, and other analyses supporting existing decision processes.

Roads analysis neither makes decisions nor allocates lands for specific purposes. Line officers, with public participation, make decisions. The roads analysis report informs the decision-maker about effects, consequences, options, and priorities, and provides information about important ecological, social, and economic issues.

Roads analysis may be conducted at multiple scales to inform road management decisions. Generally, road management decisions should be informed by roads analysis at a broad scale. Accordingly, all units of the National Forest System should conduct a forest-scale roads analysis (FSM 7710, Section 7712.13).

Roads analysis at the forest-scale will generally provide the context for informing road management decisions and activities at the watershed, area, and project level. However, it is generally expected that road inventories and road condition assessments such as 1) identification of needed and unneeded roads; 2) identification of road associated environmental and public safety risks; 3) identification of site-specific priorities and opportunities for road improvements and decommissioning; 4) identification of areas of special sensitivity, unique resource values, or both; and 5) any other specific information that may be needed to support project-level decisions would be completed at the watershed or project scale (sub-forest scale), not the forest scale.

Process

Roads analysis is a six-step process. The steps are designed to be sequential; the process may require feedback and iteration among steps over time as the analysis matures. The amount of time and effort spent on each step differs by project based on specific situations and available information. The process provides a set of possible issues and analysis questions; the answers can help managers make choices about road system management. Decision-makers and analysts determine the relevance of each question, incorporating public participation as deemed necessary. The following six steps guided the process.

Step 1: Setting up the analysis

Step 2: Describing the situation

Step 3: Identifying the issues

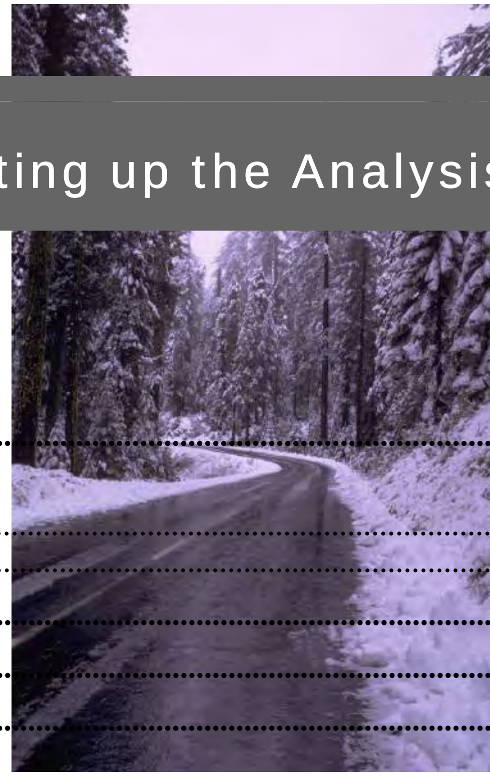
Step 4: Assessing benefits, problems, and risks

Step 5: Describing opportunities and setting priorities

Step 6: Reporting (Key Findings)

Report

- The product of this analysis is a report for the Forest Supervisor and the public. The report documents the information and analyses used to identify opportunities and set guidelines and priorities for the Umatilla National Forest road system. Maps and spreadsheets displaying the known road system for the analysis area and the values, risks, and opportunities for each road or road segment are included.



Chapter 2 Setting up the Analysis

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Objectives of the Analysis

Establish the Level and Type of Decision-Making the Analysis will Inform

This roads analysis report will be used to support the Umatilla National Forest Plan revision; subsequent watershed, area, or project-scale roads analyses; and other future site-specific road related NEPA analysis and decision-making. It is intended to identify prioritized opportunities that address watershed health or road maintenance.

Identify Scale/Analysis Area

The analysis will:

- Be at the Forest scale for the Umatilla National Forest (1.4 million acres) in Region 6 of the National Forest System.
- Concentrate on the Forest's primary transportation system. This system is predominately objective maintenance level (ObML) 3, 4, and 5 roads (those maintained for low clearance vehicle use). Operational Maintenance Level (OpML) 1 and OpML 2 collectors were also included in the analysis.
- Be spatial or Geographic Information System (GIS) based whenever possible.
- Use only existing information and data.

Team Members

Name	Area of Responsibility
Craig Busskohl	Soils, Land Stability
Caty Clifton	Hydrology
Linda Dillavou	Writer-Editor
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Charlie Gobar	Terrestrial Wildlife, Threatened, and Endangered Species
David Hatfield	Team Leader, Planning
Andrew Lacey	GIS and Database Analysis
Dave Powell	Ecology, Silviculture, Timber
John Sanchez	Aquatic, Threatened, and Endangered Species
Terry Warhol	Transportation Planning

Analysis Plan

This analysis considered 1,423 miles of road with Forest Service jurisdiction: 117 miles of ObML 1, collectors; 364 miles of ObML 2 collector roads; 644 miles of ObML 3 roads; 190 miles of ObML 4 roads, and 108 miles of ObML 5 roads. These road miles were subdivided into road segments already established and used in the INFRA database. This step facilitated identifying forest-scale values and risks. It is expected that subsequent watershed and project-scale analyses will identify specific social values and environmental risks for specific miles of road. Based on the forest-scale road related issues (Chapter 4) the team identified three social-economic value factors and six environmental-ecological risk factors.

The three value factors were:

1. Recreation use values
2. Upland forest values
3. Resource management values

The six risk factors were:

1. Watershed risk
2. Aquatic risks
3. Wildlife risk
4. Noxious Weeds
5. Financial risks (annual and deferred maintenance costs)
6. Engineering concerns

The roads analysis team developed a low, medium, or high classification protocol for the three value factors and the six risk factors (Appendix A) and then all road segments were classified into a single low, medium, or high rating for the three value factors and the six risk factors. All value and risk ratings were then averaged into a single, low, medium, or high rating for each road segment. Medium values and medium risks were collected along an x-axis or y-axis and defaulted into the adjacent high value or high risk quadrant so that effectively no medium categories were possible in the final allocation. This resulted in each road segment having a set of descriptive coordinates that indicated their averaged value and risk (e.g., high value, low risk). The descriptive coordinates for each road segment (and associated road miles) were plotted on a graph with four quadrants representing the following categories:

- High Value, Low Risk
- High Value, High Risk
- Low Value, High Risk
- Low Value, Low Risk

Once the roads were assigned one of the four categories, recommendations for future actions could be limited to those categories. This simplified the final product and made it possible to map the possible future road system at the forest–scale. The results of this exercise are listed in the Road Management Category column on the road matrix table (Appendix B) and in the Road Risk-Value Graph (Chapter 6, Figure 1). Only those roads under Forest Service jurisdiction, or those short portions of county, state, or private roads where the Forest Service is the primary maintainer, were assigned categories. The resource-specific analyses for the three social-economic value factors and six environmental-ecological risk factors were also used to help respond to the questions in Chapter 5 – Assessing Benefits, Problems, and Risks.

Information Needs

The IDT identified the following information sources for use in the analysis:

- Umatilla National Forest Travel Management Decisions
- Heppner Ranger District – July 1992
- Pomeroy Ranger District – July 1993
- North Fork John Day District – July 1992
- Walla Walla District – July 1993
- Social and economic assessment (Umatilla Forest Plan, 1990)
- Deferred and annual maintenance costs in INFRA
- INFRA travel routes
- Potential Public Forest Service Road (PFSR) project submittals
- Suitable Timber Base (Umatilla Forest Plan, 1990)
- Inventoried roadless areas (Umatilla Forest Plan, 1990)

The IDT also identified the following GIS base map needs:

- Roads (all)
- Trails
- 5th-level watersheds
- Streams and riparian areas
- Geological hazards
- Landtype associations and soil map units
- Management Area prescriptions from 1990 Forest Plan
- 1990 recreation opportunity spectrum inventory
- Developed recreation sites
- Land status
- Occurrence of threatened and endangered species

Communications Plan

The IDT was concerned about the possibility of public confusion on what this forest-scale roads analysis process was and was not. Because the process would not involve an action proposal resulting in a decision, it would be difficult to collect public input at the forest scale.

The communication effort was low-key, informative, aimed at stakeholders with a direct and meaningful interest in National Forest road system management. This was appropriate for three main reasons. First, this is not a NEPA analysis requiring a legally mandated level of public scoping and involvement (that will come later, when road-specific decisions are made). Second, this effort was to be completed in a few months, necessitating an adequate, but not overdone, public involvement effort. Finally, numerous public scoping efforts related to road and travel management NEPA decisions have preceded this analysis. Because of these on-going contacts with the public about road related issues, an adequate base of knowledge exists and will be considered to identify opportunities.

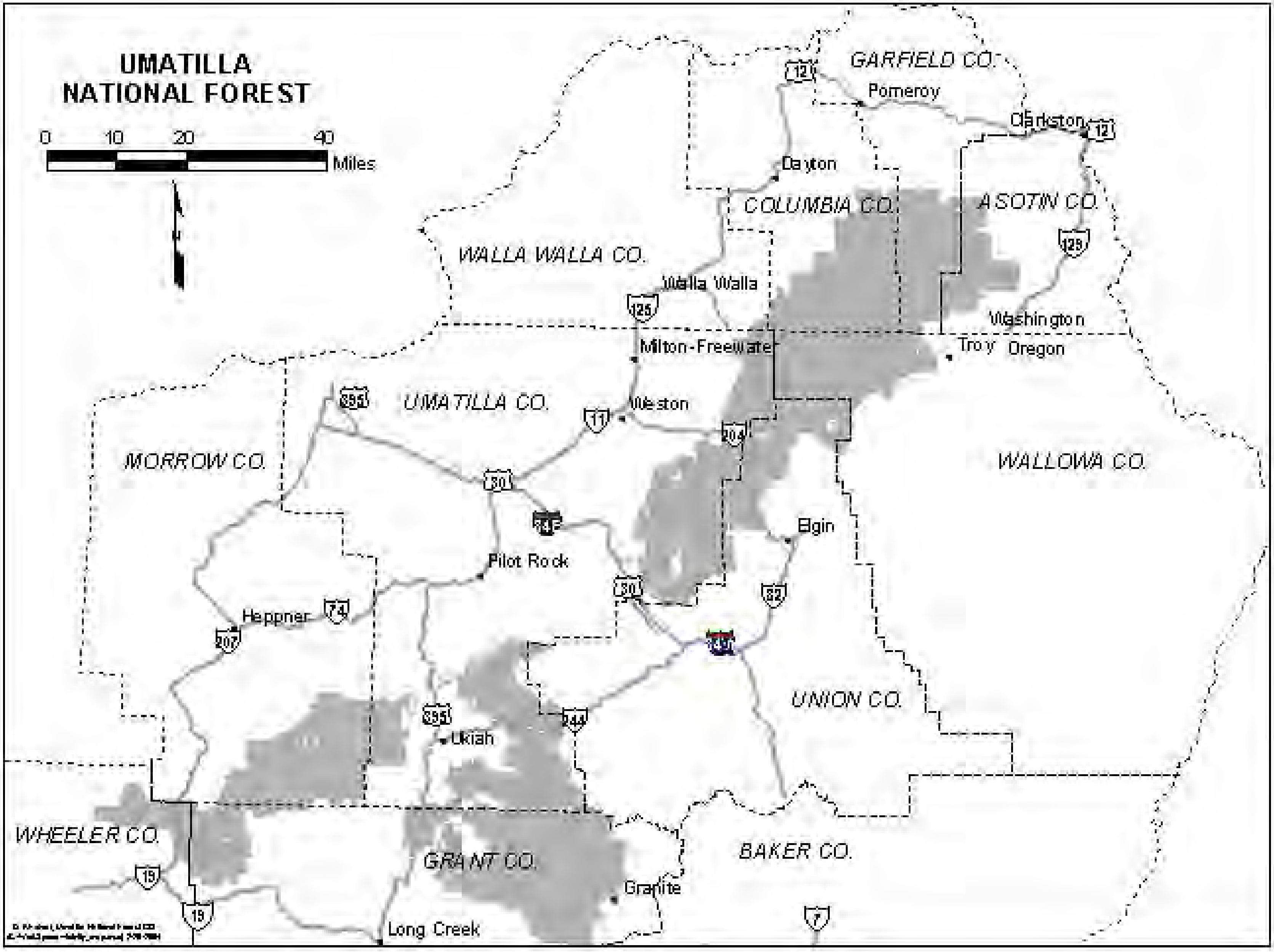
The IDT felt that county commissioners and tribal representatives, who have the actual road management knowledge and information that could be useful in identifying mutual (county, tribe, and Forest Service) opportunities and issues, were the key contacts for public involvement.

Public Contacts

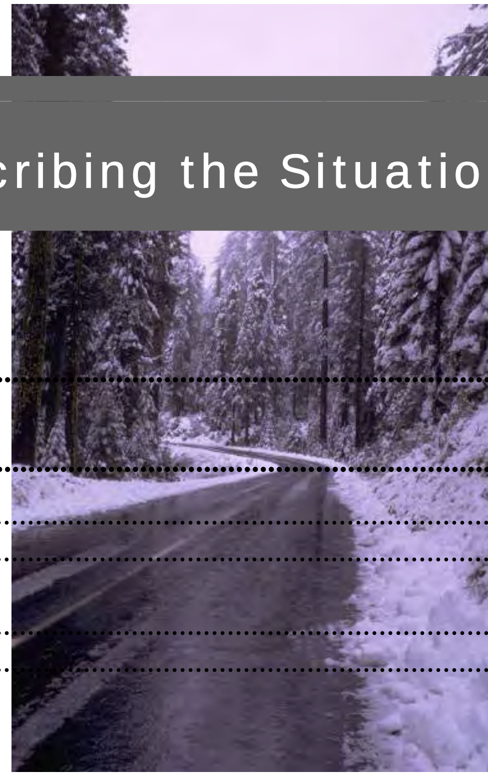
Over the past 15 years, the Umatilla National Forest has been heavily involved in Access and Travel Management. During this time, many contacts were made with local, county and state officials. Some of these were formal contacts with the District Ranger making presentations at monthly commissioner meetings. Some were more informal with the District Ranger, District staff, and/or Forest Engineering Staff making contacts with individual commissioners, mayors, clubs and groups. Forest Service representatives explained the Roads Analysis Process; provided copies of the January 12, 2001, and December 14, 2001, Federal Roads Policy and Rule; and discussed mutual road-related issues and potential opportunities. In addition, the commissioners were asked to review the already identified issues, clarify them if necessary, and offer any new issues.

Generally, there was agreement that existing level 3, 4, and 5 roads are the main transportation system and are important for public access and management of the forest. None of the existing level 3, 4, and 5 roads are expected to be closed.

Figure 1. Map of the Umatilla National Forest



Chapter 3 Describing the Situation



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The Analysis Area

The Umatilla National Forest (about 1.4 million acres) is located in northeast Oregon and southeast Washington (Figure 1). Tribal, federal, state, and county road systems connect the areas.

Assessment of Forest-scale road impacts requires general consideration of the physical characteristics of climate, geology, and topography. The north half of the Forest has a marine-influenced climate with average annual precipitation ranging from 30-65 inches. Winter conditions often include rain mixed with snow in mid elevations (2000-4500') as a result of moist marine air intrusions. Basic geology is dominated by Columbia River basalt flows, which have been uplifted and dissected, forming gentle upland plateaus, narrow ridges, steep slopes and confined, narrow valleys. Watersheds of the Lower Snake are deeply incised, and moderately dissected. In contrast, the south half of the Forest has a more continental climate, with annual precipitation ranging from 20-55 inches, and colder winters dominated by snow. Geology is more complex and includes Columbia River basalts in some areas overlying older John Day volcanics and intrusive granitics. The southeast part of the Forest has the highest elevations (up to 8000'), with glaciated landforms, and areas of landslide deposits. Landforms are more complex with rolling mountain ridges, separated by steep canyons. Watersheds on the south half of the Forest are moderately incised, and moderately dissected.

Most of the 1,423 miles of OpML 3-5 and OpML 1-2 collector roads are gravel surfaced (1037 miles). The remainder is broken down as follows: 200 miles are native surfaced, 78 miles are paved, and 108 miles are improved.

A prominent transportation feature is Interstate 84 that transects the middle portion of the Forest and transports large numbers of recreationists, travelers, and commercial traffic. US 395 accesses most of the southern part of the Forest, and US HWY 12 parallels the western edge of the north half of the Forest. Both of these highways are tributary to Interstate 84.

Numerous motorized (ATV and motorcycle) and non-motorized (hiking, biking, and equestrian) trails can be found throughout the Forest. Recreationists use the road and trail system in summer, fall, and spring for sight seeing, hiking, ATV use, dispersed camping, fishing, and hunting.

The National Forest Transportation System

General Description

The transportation system on the Umatilla National Forest serves a variety of resource management and access needs. Most roads on the Forest were originally constructed for commercial purposes including grazing, timber, and mineral extraction. Over the past 100 years, an extensive road network has been developed, serving commercial, recreation, and administrative purposes while also providing access to private lands.

There are currently 6,846 miles of classified[1] forest roads on the Umatilla National Forest Transportation System. The Forest has jurisdiction for 4,957 miles while approximately 1,889 miles have county, state, BLM, or private jurisdiction. The four Ranger Districts: Heppner, Pomeroy, North Fork John Day, and Walla Walla, share management of the road system. There are public roads with state and county jurisdiction within each of the Ranger Districts.

National forest system (NFS) roads are maintained to varying standards depending on the level of use and management objectives. Roads may currently be maintained at one level with plans for maintenance at a different level at some future date. The operational maintenance level (OpML) is the maintenance level currently assigned to a road considering today's needs, road condition, budget constraints, and environmental concerns. In other words, it defines the level to which the road is currently being maintained. The objective maintenance level (ObML) is the maintenance level to be assigned at a future date considering future road management objectives, traffic needs, budget constraints, and environmental

[1] Classified roads are wholly or partially within or adjacent to NFS lands that are determined to be needed for long-term motor vehicle use, including state roads, privately owned roads, NFS roads, and other roads authorized by the Forest Service.

concerns. The objective maintenance level may be lower, the same as, or higher than the operational maintenance level (Table 3-2a, b). The transition from operational maintenance level to objective maintenance level typically depends on reconstruction, or decommissioning. There are five maintenance levels used by the Forest Service to determine the work needed to preserve the investment in the road. These maintenance levels as described in *Forest Service Handbook (FSH) 7709.58 – Transportation System Maintenance Handbook* are as follows:

Level 1: Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed one year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level.

Roads receiving level 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses.

Level 2: Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses

Level 3: Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material.

Level 4: Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated.

Level 5: Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated.

Approximately 17 percent (821 miles) of Umatilla National Forest roads are managed (OpML) and maintained for public use with low-clearance vehicles (passenger cars). These roads carry more traffic and are the most costly to maintain to standard. Table 3-1 summarizes the miles of collectors (level 1 and 2) and those roads under Forest Service jurisdiction (level 3, 4, 5).

Table 3-1. Objective Maintenance Level 1 and 2 (collectors) and 3, 4, and 5 Roads (USFS Jurisdiction) by Ranger District (miles).

Maintenance Level	Heppner	Pomeroy	North Fork John Day	Walla Walla	Forest Total
1	28	7	42	39	116
2	92	6	141	125	364
3	113	151	230	150	644
4	0	19	80	91	190
5	8	9	50	41	108
Total	241	192	544	446	1,423
% of Total	17	13	38	31	100

The remaining 3,518 miles of inventoried NFS roads either have restrictions on motorized vehicle traffic use (maintenance level 1) or are managed for high-clearance vehicles such as pickup trucks and four-wheel drive vehicles (maintenance level 2). These roads are single-purpose, low volume roads, normally single-lane and 2,125 miles are un-surfaced.

Many routes on NFS land are not recognized as part of the transportation system. An estimate of 300 miles is used on the Umatilla. The majority of these routes have been created by off-road vehicle traffic. Some of these routes were once classified system roads that the Forest attempted to decommission; use is still occurring on routes where such efforts were unsuccessful. Management decisions on whether or not to include theses routes as part of the transportation system or to decommission or restrict them from further use will be made at the watershed or project scale.

The focus of this forest-scale roads analysis is the Forest's primary transportation system. This system is predominately the 19 percent of roads that are objective maintenance level 3, 4 and 5. Roads not included in the 20 percent that still function as an integral part of the Forest's transportation system include maintenance level 1 and 2 collectors, which are included in this analysis.

Meeting Forest Plan Objectives

Arterials and collectors are the roads used to provide primary access to large portions of NFS lands. Arterials normally serve as connections between towns, major county roads, or state highways and are main thoroughfares through the Forest. Collectors link large areas of the Forest to arterials or other main highways.

As a goal, the Umatilla Forest Plan set the standards and guidelines for the Forest's transportation system - Provide and manage a safe and economical road … system and facilities needed to accomplish the land and resource management and protection objectives on the Umatilla National Forest. The Forest Plan anticipated quite a bit more road development than has actually occurred.

Table 3-2a. Operational Levels of National Forest System Roads (UFSF Jurisdiction): Arterial and Collectors (miles)

Maintenance Level	Arterial	Collector	Local	Total
1	0	65	8	73
2	24	493	11	528
3	183	325	36	544
4	200	0	0.3	200
5	72	2	3	77
Total miles	479	885	58	1422
Percent of Total	34%	62%	4%	100%

Table 3-2b. Objective Maintenance Levels of National Forest System Roads (UFSF Jurisdiction): Arterial, Collector and Local (miles)

Maintenance Level	Arterial	Collector	Local	Total
1	0	107	9	116
2	17	337	11	365
3	172	438	34	644
4	188	0	2	190
5	103	2	3	108
Total miles	480	884	59	1423
Percent of Total	34%	62%	4%	100%

Federally Designated Forest Highways, and Scenic Byways

The analysis area contains a number of Forest Highways designated under the Public Lands Highways program of the Transportation Equity Act for the 21st Century (TEA21). These routes are state or county owned roads qualifying for federal funding for improvement or enhancement. They provide access to and within the national forest Currently these roads are under review, and a new list will be developed.

Forest Highway funding can be used for planning, design, and construction or reconstruction of these designated routes. Other work can include enhancements, such as parking areas, interpretive signing, acquisitions of scenic easements or sites, sanitary and water facilities, and pedestrian and bicycle paths. The Umatilla National Forest has made good use of the Forest Highway Program, in conjunction with the States of Oregon and Washington, and many counties.

Creation and maintenance of scenic byways under the Oregon Scenic Byways Program is a 'grassroots' effort. Residents, businesses and agencies that are interested in preserving and enhancing local scenic roads, diversifying the local economy, and/or promoting tourism opportunities are encouraged to apply.

The Umatilla National Forest has one State of Oregon-designated Scenic Byway, the Blue Mountains Scenic Byway. This 130-mile long Byway starts on Interstate 84, west of Arlington, Oregon, and ends 20 miles north of Sumpter, Oregon. Approximately 53 miles of the Byway (Forest Roads 52 and 53) are under Forest Service jurisdiction. Funding for maintenance of the Byway is a priority for the Forest.

Budget

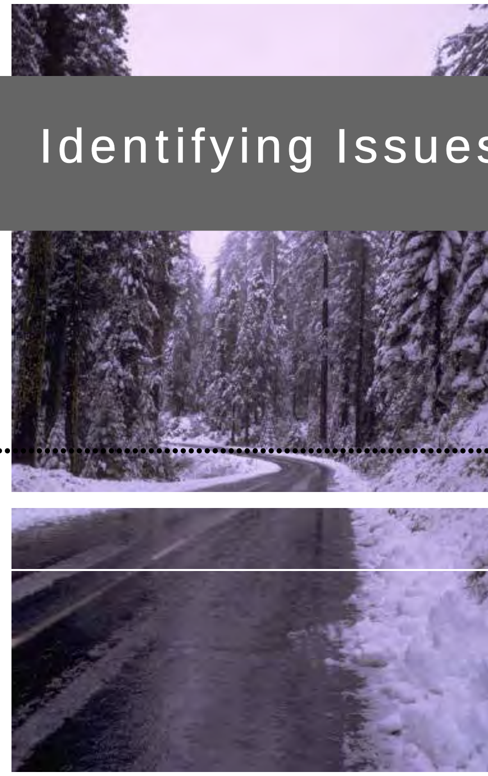
The Forest budget allocation for planning, construction, and maintenance of roads averaged $1,400,000 per year from 1997 to 2001. The annual cost to maintain the entire road system to standard is considerably higher than the amount allocated by Congress. In prior years, congressionally appropriated road funding was supplemented by road construction and maintenance work performed by timber purchasers through the commercial timber sale program. This program has declined steadily over the last decade.

From 1999 through 2003, the Forest has conducted road condition surveys to determine the annual cost of maintaining the road system to the assigned objective maintenance level. Road maintenance needs were also recorded to determine the cost of road maintenance deferred in previous years due to lack of funding. Finally, road improvement work necessary to bring the roads up to the desired objective was identified and documented. As part of this roads analysis, the data was used to determine Forest Service budget needs for the primary transportation system. The numbers found in the table below demonstrate the need for additional funding.

Table 3-3. Summary of Needed Funds for Road Maintenance and Operations for Primary Transportation System.

Total Miles	Annual Maintenance		Deferred Maintenance		Capital Improvements	
	$/mile	Total $	$/mile	Total $	$/mile	Total $
780	**$712**	**$555,619**	**$26,968**	**$21,035,398$**	**$11,714**	**$9,137,283**

Chapter 4 Identifying Issues



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Identifying Issues

The current Umatilla National Forest road system provides access to developed and dispersed camping areas, trailheads, and to administrative facilities such as communication towers, utility corridors, fire lookouts, reservoirs, and private recreation residences. The road system also provides access to perform ecosystem restoration projects such as prescribed fire or timber harvest and access to livestock grazing pastures, mining claims, and for suppression of unwanted wildland fires.

Issues were generated from public response to the Umatilla National Forest Travel Management Decisions (Heppner Ranger District (7/92), Pomeroy Ranger District (7/93), North Fork Ranger District (7/92), and Walla Walla Ranger District (7/93)), annual forest stakeholder meetings, public response to a variety of project proposals, local knowledge of roads, responses to the National Roadless EIS process in 2002, and discussion with other public agencies. Issues could be addressed at the forest, area, watershed, or project scale; watershed or landscape assessments; or as part of site-specific project proposals. Forest-scale issues will be addressed through this roads analysis document and sub-forest-scale roads analyses will develop issues appropriate to the sub-forest scale.

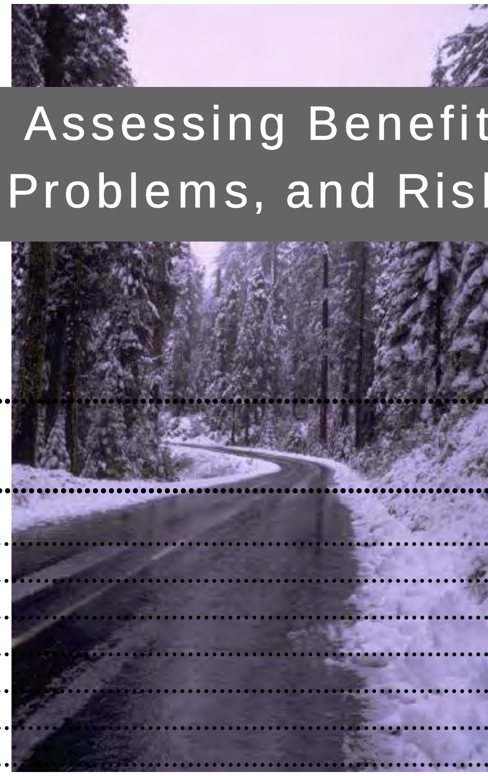
Forest-Scale Issues

1) Policy issues considered in this analysis were the interrelationship of state, county, tribal, and other federal agency transportation facility effects on land and resource management plans and programs; transportation investments necessary for meeting plan and program objectives; and current and likely funding levels available to support road construction, reconstruction, maintenance, and decommissioning.
2) Road maintenance funding is not adequate to maintain and sign roads to the objective maintenance level. Conversely, the road system may be too large to adequately maintain to the objective maintenance level with existing budgets.
3) The current Umatilla National Forest classified road system has unwanted environmental impacts to water quality and aquatic and terrestrial wildlife species, five of which are listed under the Endangered Species Act. Unauthorized, user-created roads and trails result in unwanted environmental impacts to soil productivity, wildlife, and the spread of invasive exotic plant species.
4) Some roads have been under Forest Service jurisdiction for many years and may not be under the appropriate jurisdiction. Due to changing use, it might be more appropriate for some roads to be under county or state jurisdiction or special use permits. In addition, some road realignments, widening, and surfacing are needed to accommodate anticipated increases in vehicle volumes and additional vehicle types.

Sub-forest-scale Issues

1) Road values and road related risks should be further addressed. There are unwanted environmental impacts from the current Forest road system (including road density) and from unauthorized, user-created roads and trails. Roads causing unacceptable impacts should be evaluated for disposition or mitigation at the sub-forest level.
2) The public expressed concern that reducing or reconfiguring the Forest's transportation system might occur without the benefit of public involvement. Public involvement shall be an integral part of the sub-forest-scale analyses process and any site-specific project decisions.

Chapter 5 Assessing Benefits, Problems, and Risks



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Introduction

For this step in roads analysis, the USDA Forest Service Miscellaneous Report FS-643, "Roads Analysis: Informing Decisions about Managing the National Forest Transportation System" was supplemented with the June 11, 2001, version of a Region 2 Roads Analysis document. The Region 2 document provides information and suggestions about the best scale at which each question could be answered. The IDT used the overall guidance provided but decided it would attempt to answer most of the questions at the forest-scale to provide background information for each question for referencing and citing purposes during sub-forest-scale roads analyses. The following discussions are applicable to all Forest roads; however, detailed analyses (ratings by road segment) were conducted only on the primary road system (approximately 30 percent of all Forest roads).

Current Road System Benefits, Problems, and Risks

Aquatic, Riparian Zone, and Water Quality (AQ)

Many of the 5th level watersheds in this analysis extend beyond the Forest boundary. This analysis is confined to Federal jurisdiction roads within the Forest portions of these watersheds.

AQ1: How and where does the road system modify the surface and subsurface hydrology of the area?

Assessment of Forest-scale road impacts on hydrologic processes requires general consideration of the physical characteristics of climate, geology, and topography. The north half of the Forest has a marine-influenced climate with average annual precipitation ranging from 30-65 inches. Winter conditions often include rain mixed with snow in mid elevations (2000-4500') as a result of moist marine air intrusions. Basic geology is dominated by Columbia River basalt flows, which have been uplifted and dissected, forming gentle upland plateaus, narrow ridges, steep slopes and confined, narrow valleys. Watersheds of the Lower Snake are deeply incised and moderately dissected. In contrast, the south half of the Forest has a more continental climate, with annual precipitation ranging from 20-55 inches, and colder winters dominated by snow. Geology is more complex and includes Columbia River basalts in some areas overlying older John Day volcanics and intrusive granitics. The southeast part of the Forest has the highest elevations (up to 8000'), with glaciated landforms, and areas of landslide deposits. Landforms are more complex with rolling mountain ridges separated by steep canyons. Watersheds on the south half of the Forest are moderately incised and moderately dissected.

Roads affect watershed hydrology through multiple pathways by intercepting and routing precipitation, changing timing and rate of runoff, infiltration, and shallow subsurface flow, and altering stream channel networks and morphology. Numerous reports and publications are available that address the general effects of roads on watershed hydrology (USDA, 1998, 2001). Relatively few studies have examined specific hydrologic effects of roads (Megahan 1988, Wemple 1994).

In general, roads connect hillslopes to streams, changing the dynamics (rate, timing, magnitude) of runoff to streams and subsequent routing of stream discharge. There are three principal ways roads influence water movement: by **intercepting** rain, snow, and subsurface flow; by **concentrating** flow on the road surface, ditch or adjacent channel; and by **diverting or rerouting** surface and subsurface flow (USDA, 2001). Effects include changing the timing and magnitude of peak flows, although these changes are probably detectable only at the subwatershed or catchment scale (100s to 10,000s acres). Peak flow changes are most likely in watersheds with higher road densities and areas in mid-elevation zone. Overall, the effect of roads on water yield at the Forest scale is probably small and overwhelmed by other factors including climatic variability and changes in vegetation composition and distribution as a result of logging, fire (suppression and wildfire), insect and disease, and invasive species. Effects also vary depending on dominant vegetation, whether forested or grassland (40 percent of the Forest is classified as non-forested).

Roads impact watershed function during hydrologic extremes (floods and drought). Flood impacts related to roads were evaluated after the 1996-1997 floods, which affected much of the north half and localized areas of the south half of the

Forest (Clifton et al, 1999). Major valley-bottom or midslope roads such as segments of roads 4700, 6400, 6500, 3200, and 5400, intercepted and altered flow paths, and contributed sediment to streams. Culverts failed during the storms by becoming plugged with sediment and debris and diverting flows onto roads or hillslopes. Drought effects as a result of roads are less well understood and have not been quantified locally. However, roads probably decrease shallow subsurface storage volume in meadows and floodplains (by intercepting subsurface flow) and may contribute to lower baseflows. There are few if any studies of this specific process and detection at the Forest-scale is unlikely.

Hydrologic effects of roads vary with other attributes including road location (slope position and steepness), rock and soil characteristics, subsurface flow and groundwater conditions, and design factors (cut and fill, stream crossings, surface type). Each of these attributes influence hydrologic processes of interception, concentration, and routing of precipitation and runoff. Roads on ridgetops and midslope positions may extend channel networks by initiating new channels or extending the existing network. Concentrated runoff from ditches and relief culverts erode gullies or intermittent channels on hillslopes and previously unchannelized drainages. Midslope roads in some locations intercept groundwater and convert subsurface to surface flow, and also extend channel networks where connected to drainages. Runoff on unsurfaced roads lacking water bars or dips often concentrates and erodes gullies on the road surface and adjacent hillsides.

Overall, hydrologic effects are specific to process, landscape and storm characteristics, and road design. Not all processes occur in all landscapes during every storm. All roads have some level of effect on watershed processes. In general, the mid elevations on the north half of the Forest are more susceptible to mixed rain and snow winter storms. Roads located on interflow zones of Columbia River basalts are susceptible to groundwater influences (6200, 6222). Valley-bottom roads directly interact with streams and floodplains and affect flood routing through a variety of mechanisms. Roads developed in floodplains occupy land the stream once used for meandering and dissipating energy, effectively concentrating discharge out of the basin. Road-stream crossings also influence stream dynamics by concentrating flows and locally accelerating stream velocities.

AQ2: How and where does the road system generate surface erosion?

Surface erosion (erosion by detachment, transport, and deposition of surficial soil and rock material) is the dominant erosion process on the Forest. Factors influencing surface erosion include: climate (precipitation intensity), geologic and pedologic character (erodibility of rocks and soil), topography (slope steepness), and vegetation (cover type and density). These factors influence location, timing, and rates of surface erosion. Precipitation intensity varies across the Forest. In general, intensities are low compared to other mountainous areas of the West. The highest precipitation intensities occur during summer convective storms, which tend to be localized, and winter frontal storms, which tend to be regional with varying precipitation accumulation. Areas of the Forest most susceptible to convective storms include Sharp Ridge and much of the headwaters of the North Fork John Day watershed.

Roads can generate surface erosion directly due to erosion of the road surface and/or cut and fill slopes of the road template, or by concentrating and directing runoff onto adjacent slopes. Background erosion varies by geology with highest rates in granitics and deposition soil types (ash and wind-deposited silt), and lowest in some of the basalt rocks of the Columbia River group. Accelerated surface erosion on roads (cut and fill) can occur when revegetation is inhibited and exposed soil and fractured rock subject to rain impact, flow from slopes above, and dry ravel. Road tread erosion can occur when the road surfacing is either non-existent (native surface) or inadequate to eliminate sedimentation. Traffic, especially from large trucks, occurring during rain and snow runoff events can increase movements of fines from the roadbed.

Surface erosion is highly dependent on soils, road surfacing, road grade, road age, traffic volumes, and the effectiveness and spacing of drainage structures. The greatest surface erosion problems occur in highly erodible terrain. This would include areas with soils derived from granitics and wind-deposited soil types (volcanic ash and wind-deposited glacial silt). Older volcanic material on the south end of the North Fork John Day district also tend to be more prone to road-related erosion problems. Roads in the Oriental Creek basin are the most extensive of those in granitic material and tend to have the most problems with cut slope vegetation reestablishment and (therefore) cut and fill stability. Depositional soil material is found across the Forest so specific areas of erosion problems tend to be very localized. Ash and loess soil, while subject to erosion from concentrated water flow, generally revegetates easily providing stabilizing vegetation in most cut and fill locations. The drier parts of the Forest (most of Heppner and lower elevations on the North Fork John Day district) generally are more difficult to reestablish and maintain grasses (in particular) due to droughty conditions. Erosion hazard was one of several factors used in the watershed risk analysis.

AQ3: How and where does the road system affect mass wasting?

Roads are affected by and can cause mass wasting. Road-caused mass wasting results from:

- Improper placement and construction of road fills and stream crossings.
- Inadequate culvert sizes to accommodate the peak flows, sediment loads, and woody debris.
- Roads located on soils prone to mass wasting.
- Water concentration on unstable hillslopes.

Mass wasting is rare on the Umatilla National Forest. This is not to say it has never happened, but it is infrequent as geologic formations on the Forest are relatively stable. Road related failures tend to be fill failures due to placement in susceptible areas. Notable fill failures or problem areas are: 64 Road below Lookout Mountain, a segment of 6437 on Chase Mountain, on 5505 near the headwaters of Otter Creek, and above the Lookingglass hatchery on the 63 Road. This last section is off the Forest and under County jurisdiction.

Some roads are affected by reception of debris flow material due to their placement in susceptible areas—the Tucannon Road experienced debris flow deposition during 1996/97 flood events. The Touchet Road is likely at higher risk for debris flow deposition as it is situated in a toeslope and floodplain position similar to the Tucannon Road, with like geology.

AQ4: How and where do road-stream crossings influence local stream channels and water quality?

Road-stream crossings directly impact stream channel morphology and water quality at the crossing site and for varying distances upstream and downstream. Road-stream crossings and ditch relief culverts are often sites of ongoing or potential erosion. Road-stream crossings include the structure itself (pipe, bridge, or ford) and the fill used to stabilize and anchor the structure. Structures alter the stream by straightening and narrowing the channel. Fills function as dams blocking downward passage of water, organic matter, and sediment. Effects range from localized and minor scour and deposition in the stream channel, to more extensive alteration of channel and floodplain form. Crossings are common sites of chronic erosion from ditches and exposed cuts and fills. All structures have potential for failure by plugging or deterioration. Road-stream-crossing failure during unusual weather conditions leads to more catastrophic impacts to streams. For example, in 1998, dam-burst type failures of plugged crossings in Oriental Creek occurred as a result of localized convective storm events after a wildfire. Cascading fill failures occurred on roads 5506 and 5507, significantly altering the stream channel and delivering sediment to the North Fork of the John Day River.

Practices for road-stream crossing design have changed considerably in the last 10 years. The general approach for replacement and maintenance of road-stream crossings today is to “design for failure” during moderate or extreme weather conditions. Following the 1996 and 1997 floods, many crossings were replaced with design criteria that address plug and diversion potential.

Road impacts to water quality occur through a variety of mechanisms and include increased delivery of sediment to streams, loss of streamside shade and increased stream temperatures, and alterations in channel form and aquatic habitat. Risk of discharge of hazardous materials including fuel and other chemicals is highest on major roads near streams. Many of the primary access roads to the Forest follow perennial, fish-bearing streams (4600, 6300, 6400, 3200, 1000, 5506, 2300). These roads pose the greatest risk for toxic spill and direct water quality impacts. Emergency spill plans are generally in place but because of travel distances and lag time in response, clean-up is rarely 100 percent effective. Dust and other pollutants from unsurfaced roads in fine sediment (ash and silt deposits) near streams may be a significant source of air-born fine sediment during the dry season. See AQ5.

AQ5: How and where does the road system create potential for pollutants, such as chemical spills, oils, deicing salts, or herbicides, to enter surface waters?

Roads that cross or are located adjacent to streams and floodplains are potential sites for chemical pollutants to enter surface and groundwater. Chemical materials and other pollutants are often transported on National Forest roads. Accidental spill during transport of chemicals is probably the greatest risk to water. Application of chemicals generally poses a smaller risk because of EPA requirements for human health and mitigation requirements in operating plans. Weed prevention and control programs that use herbicides create some potential for pollutant contribution in the event of vehicle or equipment accidents. Log haulers and other heavy equipment associated with harvest and road activities carry fuel and oil and also pose a risk to water quality. Provisions in weed prevention plans and timber sale contracts may specify haul speeds, chemical handling, fueling practices, weather or road moisture limitations, and other aspects of operations to minimize risk of accidental spill. Similar risks and preventive measures are associated with chemicals transported for ski hill operations, mining activities, and road maintenance. Spill plans are required for operations permitted by the Forest, using larger quantities of chemicals. These plans generally include spill containment systems.

Highways where deicing salts are used pose some risk of affecting water quality. Effects are generally localized, not likely to exceed water quality standards, and are diluted as salts move downstream through the system. State Highways 204 and 208, US Highway 395, and Interstate 84 through the Forest are the highest risk roads as they parallel and cross perennial streams.

Magnesium Chloride and Calcium Chloride are currently not used on Forest roads but have been proposed for dust abatement purposes on Forest roads 1000 and 4700. San Dimas Technology Development Center is considering a study of application rates and environmental effects on a section of the 4700 road.

The Umatilla National Forest Spill Prevention and Response Plan (2001) assigned responsibilities and identified actions and notification procedures to minimize the likelihood of spills occurring and plan for response when they occur. The spill checklist includes provisions for containment, clean-up, and sampling. The states of Washington and Oregon also have response and reporting systems for spills.

The Umatilla National Forest Environmental Assessment for the Management of Noxious Weeds (1995) included numerous measures for reducing environmental effects such as requiring pilot vehicles for transport of larger volumes of chemicals, prohibiting mixing near streams, and buffering streams to reduce transport to surface waters.

AQ6: How and where is the road system "hydrologically connected" to the stream system? How do the connections affect water quality and quantity?

The entire road system is fundamentally hydrologically connected to the stream system because roads are part of watersheds. Roads capture and release snow and rain, alter patterns and direction of runoff, erosion rates and processes, and expand the channel network affecting routing of stream discharge. The most hydrologically connected roads cross streams or are located in floodplains and wetlands. See AQ1-5 for further discussion of hydrologic effects of roads including expansion of channel networks, effects to discharge rates, timing, and magnitude, and erosion, and water quality effects. Roads in valley bottoms are generally the most hydrologically connected, these include segments of 1000, 1003, 1012, 2100, 2104, 2107, 2128, 2300, 2406, 3200, 3727, 3738, 3974, 3986, 4100, 4620, 4700, 4712, 4713, 5300, 6300, 6400, and 6500.

AQ7: What downstream beneficial uses of water exist in the area? What changes in uses and demand are expected over time? How are they affected or put at risk by road-derived pollutants?

Beneficial uses of water for the State of Oregon are designated by River Basin (Table 5-1). Many of these uses apply on-Forest and most downstream.

General criteria and water uses for Washington River Basins on the National Forests are designated by waterbodies as follows: all surface waters within National Forests are classified Class AA (extraordinary). Characteristic (beneficial) uses shall include, but not be limited to, the following:

- Water supply (domestic, industrial, agricultural, stock watering)
- Stock watering
- Fish and shellfish:
  - salmonid migration, rearing, spawning, and harvesting.
  - other fish migration, rearing, spawning, and harvesting.
- Wildlife habitat
- Recreation (primary contact recreation, sport fishing, boating, and aesthetic enjoyment)
- Commerce and Navigation

Specific water body classifications (AA, A) and water quality criteria are listed for the Grande Ronde River, Mill Creek, Touchet River, Tucannon River, and lower Snake tributaries.

Table 5-1. Beneficial uses by River Basin for Oregon.

Beneficial Uses	River Basin			
	John Day	Umatilla	Grande Ronde	Walla Walla
Public domestic water supply	X	X	X	X
Private domestic water supply	X	X	X	X
Industrial water supply	X	X	X	
Irrigation	X	X	X	X
Livestock watering	X	X	X	X
Anadromous fish passage	X	X	X	X
Salmonid fish rearing	X	X	X	X
Salmonid fish spawning	X	X	X	X
Resident fish and aquatic life	X	X	X	X
Wildlife and hunting	X	X	X	X
Fishing	X	X	X	X
Boating	X	X	X	X
Water contact recreation	X	X	X	X
Aesthetic quality	X	X	X	X
Hydropower		X		X
Commercial navigation and transportation				

The dominant on-Forest uses are instream aquatic life, including anadromous fish passage, rearing, spawning and other aquatic life. Water resources are also highly valued for aesthetics, recreation, and boating uses. Consumptive uses on the Forest include livestock and wildlife, and administrative uses at campgrounds and recreation sites. The Forest is also used and regulated for water supply for downstream communities. Permitted or regulated uses of water from the Forest include public and private water supply and irrigation. Several ditches divert water from tributaries to the North Fork of the John Day into adjacent basins (Willow, Umatilla, and Burnt). Municipal watersheds include Mill Creek watershed, congressionally designated for water supply for the City of Walla Walla, WA. The City of Pendleton and community of Dale, OR also use water originating from the National Forest for public water supply. Increased human population growth and development guarantee increased demand for water resources from the Forest. At the same time, declining fisheries, and impacts to other water-dependent species necessitate protection of Forest water resources through watershed protection and restoration. Proper management of roads that impair water resources is critically important to help support present and future uses on the Forest and downstream.

AQ8: How and where does the road system affect wetlands?

Wetlands are defined as areas that are (at least) seasonally saturated and have hydric soil characteristics and vegetation types. Roads affect wetlands directly by encroachment and indirectly by altering hydrologic surface and subsurface flow paths. Encroachment results in a loss of wetland area directly proportional to the area disturbed by the road. Alteration of flow paths may change wetland functions extending beyond the area directly impacted by the road. Effects include loss of water storage, reduced baseflows, alteration of biochemical functions, and loss of habitat diversity. The area in wetlands on the Umatilla National Forest is very small (less than 5 percent) and generally associated with rivers and streams. Isolated wetlands occur on hillslopes in association with groundwater sources and atypical soil types (glaciated or landslide landforms). Small in area but great in value, wetlands have unique physical and biological functions and provide essential habitat to many species of plant and animals. Most of the roads identified as hydrologically connected in AQ6 also impact wetlands.

AQ9: How does the road system alter physical channel dynamics, including isolation of floodplains, constraints on channel migration, and the movement of large wood, fine organic matter, and sediment?

Roads directly affect physical channel dynamics when they encroach on floodplains or restrict lateral channel migration. Floodplains dissipate stream energy during high flows and recharge soil moisture and groundwater. Floodplain function is altered where roads encroach on or isolate floodplains. Increased velocities, bank erosion, loss of streamside vegetation, increased sedimentation, and channel incision are common effects. When peak flows increase, more water is available for in-channel erosion, which in turn, affects channel stability. Restricting channel migration can cause channel straightening which increases the stream energy available for channel erosion and also results in channel instability. Altering channel pattern affects a stream's ability to transport materials, including wood and sediment.

Road-stream crossings effects on channel dynamics were discussed in AQ4.

Roads also have indirect effects on channel processes. The morphology of a stream is dependent on flows and sediment loads supplied from the watershed, as well as gradients, soils, geology, and vegetation (Megahan 1988). Increased sediment loads affect channel width, depth, and substrate. In constrained valleys with roads, channels may be incised, have steep unstable banks, and coarse streambeds. In wider valleys affected by roads, streams may have braided channels indicative of sediment loads and finer-texture substrate.

AQ10: How and where does the road system restrict the migration and movement of aquatic organisms? What aquatic species are affected and to what degree?

Providing up and downstream passage of aquatic species through road crossings at a broad range of stream flows is important to both anadromous and resident fish populations as well as vertebrate and invertebrate wildlife. In 2001, the Umatilla NF completed a survey of fish passage at road crossings that helps answer the question of how the road system effects the movement up and downstream of aquatic organisms on the Umatilla NF.

The majority of culverts (87%) in the ten 5th field watersheds surveyed rated out in the impaired fish passage (Table 5-2). Most of these pipes are partial fish passage barriers, which occur in headwater streams. The majority of culverts have impacted resident redband trout and anadromous steelhead. The Forest has a long history of fish passage improvement work with a focus on upstream passage of anadromous fish. Spring chinook adult fish migration barriers were identified in the 1980's and impaired passage was improved using the best techniques available at that time.

Table 5-2. The number of culverts by drainage and fish passage rating.

5th Field Watershed	Culverts passing all	Culverts of	Culverts impairing

	live stages of fish present	unknown fish passage status	fish movement
Walla Walla River	1	2	1
Tucannon River	2	4	3
Lower Grande Ronde	0	0	1
Asotin Creek	0	0	4
Lower John Day	0	0	22
Middle John Day	0	0	1
North Fork John Day	4	14	192
Willow Creek	0	0	6
Umatilla River	0	3	10
Upper Grande Ronde	2	10	45
Total	9	33	285

The following is a summary by stream drainage of the Umatilla NF Fish Passage at Road Crossings Assessment completed December 2001:

Walla Walla River – Tributaries of the Walla Walla River drain lands in both Oregon and Washington. The Oregon tributaries, Mill Creek, North and South Forks of the Walla Walla River drain Forest roadless areas. The North Fork Touchet River near Dayton, Washington, is the location of the four culverts identified in this assessment. Occupied habitat for Mid-Columbia steelhead, Columbia River bull trout, and resident redband trout make this 4-mile long headwater stream reach an important fish resource area. The two pipe arches on Road 64 were modified in the early 80's with step weirs at their outlets to improve fish passage. Adult fish and juvenile fish at most flows can pass through these structures. Replacement with structures that simulate natural stream bottom would ensure fish passage of all life history stages at all flows. The two culverts found on short roads off Road 64 are partial migration barriers. The culvert on Road 6400700 deserves additional analysis to clearly define passage flows. It is a probably a partial migration barrier at both high and low flows blocking access to 0.5 miles of habitat for all juvenile and resident species. The culvert on 6400650 is a fish passage barrier blocking access to the extreme headwaters of the North Fork Touchet River. An estimated 0.1 miles of habitat at low flow is blocked.

Tucannon River –Three culverts on Hixon Creek, a Tucannon River tributary with 1.1 miles of habitat for Columbia River bull trout, and Snake River steelhead impair fish passage. The Hixon Creek culvert sites are within and adjacent to the Tucannon Campground near the Camp Wooten Environmental Learning Center. All road crossings over the Tucannon River are bridges providing unobstructed fish passage. Three culverts in the Pataha Creek portion of the Tucannon River watershed were found to block an estimated 7 miles of habitat for both redband trout and brook trout.

Lower Grande Ronde River –The Lower Grande Ronde River 5th field watershed in the northeastern part of the Forest contains a very small portion of the Forest, with few roads in the headwaters of Grouse Creek and Wenatchee Creek. A culvert on County Road 116 blocks 0.5 miles of habitat for resident redband trout. There are no roads on the National Forest in the Wenatchee Creek watershed.

Asotin Creek – Anadromous fish adult migration is unobstructed on Asotin Creek and its major tributaries, North and South Forks Asotin Creek. Culverts are found on the National Forest on two tributaries of Asotin Creek, Charlie Creek and Lick Creek. The culvert on Charlie Creek at Road 4206 is a migration barrier to 0.6 miles of resident redband trout habitat. It is possible that Snake River steelhead trout use this portion of the creek, but their presence has not been documented. There are three culverts on Lick Creek on the Forest that are fish migration barriers. Lick Creek is in a degraded condition and provides very harsh habitat for resident redband trout. The stream reaches with culverts are typically dry during the summer. Fish passage improvement at road crossings would need to be part of an extensive watershed restoration project to have a positive effect on fish populations.

Lower John Day River – The west end of the Heppner Ranger District is drained by seven small streams that are headwater tributaries to streams that flow directly to the John Day River near Spray, Oregon, at river mile 70 and two small headwater tributaries to Rock Creek which enters the John Day River at river mile 20. The streams are very small and typically dry in the summer. One site is a candidate for fish passage enhancement. The box culvert under Highway 207 at Tamarack is a barrier to fish passage blocking upstream redband trout movement to 1.7 miles of habitat.

Middle John Day River – Three streams drain the southwestern portion of the North Fork John Day Ranger District into the Middle Fork John Day River. Only one culvert on Indian Creek was found to be a fish passage at road crossing concern. Road 3990 and Indian Creek is a high and low flow barrier to 2 miles of Mid-Columbia River steelhead trout habitat and 6 miles of resident redband trout habitat. The 6 miles of resident fish habitat is also identified as historic Columbia River bull trout habitat (Buchanan et. al. 1997).

North Fork John Day River – The North Fork John Day drainage includes portions of the Heppner and North Fork John Day Ranger Districts. A total of 210 fish passage at road crossing sites were identified in the assessment. This is a large area, but it has a disproportionate large number of culverts with approximately two-thirds of the culverts in the assessment. The forest was heavily roaded for timber harvest with many miles of stream adjacent roads and stream crossings. Mid-Columbia steelhead, Columbia River bull trout, Mid-Columbia Chinook salmon, and native redband trout are all found in this drainage making fish passage at road crossings a very important consideration.

The North Fork John Day River headwaters are found above the North Fork John Day River Wilderness Area. Forest Road 52 from Ukiah, Oregon, to Granite, Oregon, crosses the headwaters of several tributaries of the North Fork. Fish passage is impaired at Winom Creek and Road 52 but presently is a partial barrier to brook trout. Passage improvement could be considered if a proposed brook trout eradication project is completed and bull trout are established in Winom Creek. Road 52 crossings impair redband trout fish passage at Big Creek, White Creek, Squaw Creek, and Crane Creek. South Fork Meadow Creek and Road 5225 is another site to consider for redband trout fish passage improvement. Three culverts in the Ten cent Creek drainage are candidates for fish passage restoration. Fish passage could be improved on Lightning Creek at Road 1310 in the headwaters of Clear Creek for redband and Mid-Columbia steelhead trout. This site is below occupied bull trout habitat and could also benefit bull trout. Downstream below the North Fork John Day Wilderness on Texas Bar Creek are five culverts that should be considered for fish passage improvement starting at the mouth of Texas Bar and Road 5506 and going upstream for 4 miles of Mid-Columbia steelhead and redband trout habitat. Several culverts in the Meadow Creek drainage above Dale, Oregon, could be considered for fish passage restoration. Highway 395 crosses West Meadow Creek six times with cement box culverts that are each low flow passage barriers for redband trout in this 2.5-mile stream reach. Four additional culverts are found in the East Fork Meadow Creek drainage that impairs fish passage.

Desolation Creek, a drainage where all the fish species of concern are present, is a Blue Mountain Demonstration Project Area. Twenty-one culverts were identified and all could be considered for passage improvement. Two sites come to the top of the list, Road 45 and the North and South Fork Desolation each impair fish passage to 3 miles of Mid-Columbia steelhead and Columbia River bull trout habitat and 5 miles of redband trout habitat. Another important problem are the culverts on closed roads in both the Junkens and Beeman Creek drainages. Two culverts on each creek impair passage to a combined 3.5 miles of redband trout habitat.

Camas Creek drainage is plagued by low summer stream flows and high water temperature. Sixty culverts were identified in the assessment. Most were small culverts compromising juvenile steelhead and resident trout access to small tributaries that could be summer survival habitat or spring high flow refuge habitat. A few high priority sites are found on North Fork Cable Creek and Frazier Creek. Two culvert sites in Bear Wallow Campground are also high priority for fish passage improvement.

The Wall Creek subwatershed on the Heppner Ranger District can be characterized as relatively flat topography and dry in the summer. It is habitat for Mid-Columbia steelhead and redband trout. Forty-four culverts were identified in the assessment. Most are barriers to less than 0.5 miles of upstream habitat. Six culverts are of high priority in this subwatershed for passage enhancement because they impair passage to steelhead habitat or over one mile of redband trout habitat. Swale Creek at road 21 and road 2107 are two culverts at the top of steelhead habitat that will benefit from fish passage restoration. Two culverts on the 21 Road, Alder Creek and Skookum creek both are candidates for fish passage improvement at the top of steelhead trout spawning and redband trout habitat. One culvert on Big Wall Creek at the upstream limit of steelhead trout spawning habitat is also a high priority for fish passage restoration. The assessment also identified a culvert on Colvin Creek that blocks habitat to over one mile of redband trout habitat at both high and low flows.

The Potamus Creek and Ditch Creek subwatersheds had a combined 31 culverts in the assessment. Fish passage restoration sites are found above Mid-Columbia steelhead spawning habitat on Ellis Creek and Road 2105 and the headwaters of Ditch and Potamus Creeks. Ditch Creek at Road 53 and 5300-253 and Potamus Creek at Road 53 and Kelly Prairie culverts impair redband trout fish passage. Pole Creek and Road 53 is another site to consider for fish passage improvement.

Willow Creek - Willow Creek is a Columbia River tributary entering the Columbia River 10 miles above the town of Arlington. It flows through the town of Heppner, Oregon, the site of the Willow Creek Reservoir. The reservoir dam is a block to all anadromous fish migration. Resident redband trout are found on the Forest above the Willow Creek Reservoir. Six culverts were identified in the assessment as fish passage at road crossing sites. Three of the sites, two on Shaw Creek and one on Herren Creek are barriers located near the end of roads and should be considered for culvert removal and road obliteration to restore fish passage to 0.7 miles of resident redband trout habitat.

Umatilla River – The Umatilla River watershed drains land assigned to both the Walla Walla Ranger District and the North Fork John Day Ranger District. The 2.3 miles of redband trout habitat reported blocked is in the headwaters of Thomas Creek on the Walla Walla Ranger District and Johnson Creek on the North Fork John Day District. Correcting passage at these sites would be low priority. The three culverts on Pearson Creek on the North Fork John Day Ranger District were all classified as needing additional study. The lowest culvert in the watershed was not installed as designed due to unexpected shallow bedrock and will be replaced to improve fish passage. Further study is needed to determine passage flows for the two upstream culverts.

Upper Grande Ronde River - Tributaries of the Grande Ronde River drain the east side of the Walla Walla Ranger District between the communities of Elgin and Troy, Oregon. They make up a small portion of the Upper Grande Ronde River 5th field watershed. Fifty-six culverts are found in the four subwatersheds that drain this portion of the forest. Lookingglass Creek is the largest subwatershed by area and had 19 culverts identified in the assessment. Four partial fish migration barriers were identified as highest benefit for passage improvement. Mottet Creek at Road 62 is a partial migration barrier to 0.7 miles of habitat for Snake River steelhead, Columbia River bull trout and redband trout. Two culverts in the headwaters of Little Lookingglass Creek on Road 6413 are partial barriers to 0.5 and 0.8 miles of redband trout habitat. Passage to 8 miles of redband trout habitat is also impaired on Jarboe Creek at Road 62.

Twenty culverts were included in the assessment in the Phillips Creek area. Three sites reported in the Watershed Assessment as impairing fish passage have been identified for fish passage improvement in the Pedro-Colt Environmental Assessment. The culvert at Phillips Creek headwaters at Road 3738 impairs passage to 0.5 miles of habitat, and Pedro Creek at Road 3734-060 also impairs passage to 0.5 miles of habitat. The culvert on Little Phillips Creek at the Road 3734 crossing has also been identified for replacement.

The Sheep Creek watershed is habitat to resident redband trout only. A waterfall at River mile 1.0 blocks steelhead passage to habitat on the forest. Twelve culverts were assessed for fish passage. All were partial migration barriers to resident trout. The four highest priorities for restoration of fish passage are on Sheep Creek, starting with the lowest culvert in the subwatershed and work upstream. The culverts are on Roads 6234, 6231, 62, and 6232.

The remaining tributaries draining into the Upper Grande Ronde are Bear Creek, Squaw Creek, and Elbow Creek. Five culverts were included in the assessment. None of the culverts would be considered high priority for restoration of fish passage due to the small amount of available habitat found in these steep streams draining into the Grande Ronde River Wild and Scenic River Canyon.

AQ11: How does the road system affect shading, litterfall, and riparian plant communities?

The road system directly affects riparian communities where it impinges on riparian areas. Roads can indirectly affect riparian communities by intercepting surface and subsurface flows and routing these flows so riparian areas dry up, and the riparian vegetation is replaced with upland vegetation. Riparian communities play a vital role in providing shade. Removal or degradation of these communities can affect stream stability and water temperatures, which in turn affects aquatic habitat.

AQ12: How and where does the road system contribute to fishing, poaching, or direct habitat loss for at-risk aquatic species?

High traffic roads adjacent to streams with fish are most likely to contribute to fishing and poaching. Generally, this is a localized issue on the Umatilla Forest and does affect aquatic populations and at-risk aquatic species where roads are adjacent to occupied fish habitat. Poaching is most tempting with spring Chinook salmon holding in shallow pools just prior to spawning or during spawning in August and September of each year. Clear Creek and Granite Creek with stream adjacent Roads 10 and 1035 are examples of a road system facilitating poaching.

The road system contributes to direct habitat loss where mass movements associated with roads directly impact stream channels (AQ3), where sediment is delivered directly to the stream channel through connected disturbed areas (AQ6), at road-stream crossings (see AQ4), and where the road system is restricting channel migration and isolating floodplains (see AQ9). Watersheds with bull trout populations are of particular concern. This concern is included in the watershed risk ratings for aquatic species. Opportunities to address problem areas would be similar to those previously identified.

AQ13: How and where does the road system facilitate the introduction of non-native aquatic species?

The introduction of non-native species occurs primarily through stocking of non-native fish. The Oregon Department of Fish and Wildlife and Washington Department of Natural Resources coordinates stocking locations with the Forest Service to ensure that non-native aquatic species are not being introduced into waters containing native fish species or waters that provide high quality habitat for native species reintroduction. Generally, only isolated ponds are stocked; not those with connection to free flowing water.

The Umatilla NF has very few lakes. However, all six would be susceptible to inadvertent or intentional stocking with non-natives as all have easy access. Direct access by road is provided to Jubilee Lake, Olive Lake, Bull Prairie Lake, and Penland Lake. Jump Off Joe Lake is a short, ½-mile hike from a well marked trailhead on Road 45. Lost Lake is a 2-mile hike by trail or over a closed road.

AQ14: To what extent does the road system overlap with areas of exceptionally high aquatic diversity or productivity or areas containing rare or unique aquatic species or species of interest?

The level 3, 4, and 5 road system crosses many watersheds identified in the conservation strategies for ESA listed fish species. This was incorporated into the watershed risk rating to determine the overall risk to aquatic species. The risk to highest quality aquatic habitats was evaluated high risk if the road segment passes through a portion of a watershed mapped in the Umatilla NF Watershed Prioritization Version 10.04.02 as highest quality fish habitat on the Forest, Figure 7-1. A moderate risk was scored if a portion of the road segment is within the floodplain of occupied stream habitat of ESA listed aquatic species. A road segment not near occupied ESA listed aquatic species habitat or habitat mapped as aquatic refuge habitat in Watershed Prioritization, Figure 7-1 was ranked low risk to highest quality aquatic habitat. The risk to highest quality habitat factor was scored high for 46 percent of the total road segments assessed. The overall risk to aquatic species was scored high for 33 percent of the total road segments assessed.

Terrestrial Wildlife (TW)

TW1: What are the direct and indirect effects of the road system on terrestrial species habitat?

Roads have both direct and indirect effects on wildlife. Wildlife habitat is impacted by the construction and use of roads. The area contained within the roadway reduces the total area of habitat. Additionally, wildlife is impacted by the use of roads. For individuals such impacts can mean death or injury from collisions with vehicles. Another, more frequent impact is avoidance of the area adjacent to roadways. The area avoided depends upon the species of concern as well as individual characteristics. Additional impacts include harassment and disturbance resulting from increased human presence.

Table 5-3. Road–associated factors that negatively affect habitats or populations of terrestrial vertebrates, a generalized description of each factor's effect in relation to roads, and example citations linking roads as a facilitator of the factors and effects (Wisdom et al. 2000).

Road-associated factor	Effect of factor in relation to roads	Example citations
Snag reduction	**Reduction in density of snags due to their removal near roads, as facilitated by road access**	**Hann and other (1997), Quigley and others (1996)**
Down log reduction	**Reduction in density of large logs due to their removal near roads, as facilitated by road access**	**Hann and other (1997), Quigley and others (1996)**
Habitat loss and fragmentation	**Loss and resulting fragmentation of habitat due to establishment and maintenance of road right-of-way**	**Forman and others (1997), Reed and others (1996)**
Negative edge effects	**Specific case of fragmentation for species that respond negatively to openings or linear edges crated by roads (such as habitat-interior species [Marcot and others [1994]])**	**Forman and others (1997), Mader (1984), Reed and others (1996)**
Over-hunting	**Nonsustainable or nondesired legal harvest by hunting, as facilitated by road access**	**Christensen and others (1991), Unsworth and others (1993)**
Over-trapping	**Nonsustainable or nondesired legal harvest by hunting, as facilitated by road access**	**Bailey and others (1986), Hodgman and others (1994)**
Poaching	**Increased illegal take (shooting or trapping of animals, as facilitated by road access**	**Cole and others (1997), McLellan and Shackleton (1988)**
Collection	**Collection of live animals for human uses (e.g., amphibians and reptiles collected for use as pets), as facilitated by the physical characteristics of roads or by road access.**	**Nussbaum and others (1983)**
Harassment or disturbance at specific use sites	**Direct interference of life functions at specific use sites due to human or motorized activities, as facilitated by road access (e.g., increased disturbance of nest sites, breeding leks, or communal roost sties)**	**Forman (1995), White (1974)**
Collisions	**Death or injury resulting from a motorized vehicle running over or hitting an animal on a road**	**Blumton (1989), Boarman and Sazaki (1996), Vestijens (1973)**
Movement barrier	**Preclusion of dispersal, migration, or other movements as posed by a road itself or by human activity on or near a road or road network**	**Bennet (1991), Mader (1984)**
Displacement or avoidance	**Spatial shift in populations or individual animals away from a road or road network in relation to human activities on or near a road or road network**	**Forman and Hersperger (1996), Mech and others (1988)**
Chronic, negative interactions with humans	**Increased mortality of animals (e.g. euthanasia or shooting of gray wolves or grizzly bears) due to increased contact with humans, as facilitated by road access**	Mace and others (1996), Thiel (1985)

From: Wisdom, M.J., R.S. Holthausen, B.C. Wales, C.D. Hargis, V.A. Saab, D.C. Lee, W.J. Wendel, T.D. Rich, M.M. Rowland, W.J. Murphy, M.R. Eames. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. Volume 1-Overview. Gen. Tech. Rep. PNW-GTR485. Portland, OR: U.S> Department of Agriculture, Forest Service, Pacific Northwest Research Station. 3 vol. (Quigely, T.M., tech. Ed,; Interior Columbia Basin Ecosystem Management Project: scientific assessment)

Many species, for example big game, can become habituated to vehicles along roadways. As long as the vehicles do not stop, these species appear to be unaffected by the roadway or traffic. On the other hand, people camping, picnicking, fishing, or hiking (in the majority of instances) displace some species, unless these activities are frequent enough in certain spots that animals become habituated in these locations as well. Sporadic and infrequent use of areas often displaces wildlife. This can vary widely depending on the species and the availability of habitat. . The indirect effect of the road system is primarily related to movement and displacement. Table 5-3 identifies direct and indirect effects associated with roads.

Improperly designed and constructed stream crossings can adversely affect wetland habitats and species such as waterfowl and associated amphibians. Some such impacts are the result of sedimentation and lowered water tables.

The construction and use of roads has contributed to the expansion of populations of noxious weeds throughout much of the Forest . Weed seeds are transported on vehicles in mud and by other means. It is common to find small populations of noxious weeds along roads. The rapid expansion of noxious weeds is having an adverse impact on wildlife habitat as desirable native forage and cover species are replaced with noxious weeds.

Improved and expanded road systems bring about additional human activities, including human-caused fires. Fires can have both adverse and beneficial effects on terrestrial species habitat.

Most of the Forest is above big game wintering ranges, although there are some exceptions. Some roads have seasonal restrictions to prevent harassment on winter ranges. The majority of the Forest is inaccessible by vehicles for the most part in winter, although some Level 3, 4, and 5 roads to ski areas and snowmobile areas are kept open. Although most big game have moved far below these areas, snowmobile use of the road system probably disturbs other species to some degree.

Recently, habitat management for lynx has become a concern. It is suspected that there may be isolated lynx on or traveling through the Umatilla NF, but no cohesive population is believed to exist. The Forest is managing habitat in accordance with policy direction of the Lynx Conservation Assessment and Strategy (LCAS). The LCAS advises that preliminary information suggests lynx do not avoid roads, except in high traffic volumes. Management considerations include trying to maintain the natural competitive advantage lynx have in deep snow conditions. Road activities which plow snow or open roads in winter, remove hiding cover for prey species or impinge on forested stringers and or ridgetops must be carefully considered.

TW2: How does the road system facilitate human activities that affect habitat?

The Umatilla National Forest is known widely for its big game hunting opportunities in the Fall. The road system is integrally related to the hunting experience. Some hunters enjoy driving many miles to scout for hunting spots and look over the landscape. Driving for pleasure while hunting is probably as much of an objective as hunting itself. The Forest has more user days in the Fall devoted to hunting than any other activity. Conversely, some hunters support road closures in order to provide areas where a "walk-in" experience can be had. These hunters feel their hunting success is improved in areas with no traffic. They tend to prefer more of a primitive experience which includes the peaceful attributes of enjoying the outdoors, by walking or riding horses away from the hustle and bustle of other people and vehicles as they hunt.

Pleasure driving to enjoy the Forest is probably the highest recreation use category. Snow pack closes the road system to motorized vehicles during the winter months. Developed campgrounds are located at certain points in the network. Dispersed camping and trailheads serve picnickers, mountain bikers, rock climbers, wildflower enthusiasts, hunters, and equestrians. Recreational activities, with the exception of hunting, cause minor temporary displacement of wildlife (Ward 1973). The avoidance areas reduce the usefulness of the habitat for the displaced species and create more wildlife use in other areas.

The road system provides access to a relatively small number of private inholdings. Except near high use areas, these inholdings do not seem to greatly affect habitat use. In the Granite mining area, where access to many mining inholdings exist in a localized area, there are some road related effects which negatively affect aquatic species.

Because of fuel wood gathering, there are fewer snags or dead trees close by the most accessible roads on the Forest. This has slightly reduced the number of potential nesting trees for primary and secondary cavity nesters, as well as foraging habitat for woodpeckers.

The road system makes wildlife habitat management activities (such as prescribed burns, aspen regeneration, and seeding of native species on disturbed areas) easier and more efficient.

TW3: How does the road system affect legal and illegal human activities? What are the effects on wildlife species?

The Forest road system supports a high volume of legal human outdoor recreational activities, which have a moderate affect on wildlife populations. Visitors from the urban areas of the Willamette Valley as well as locals use the Forest at an increasing rate. Recently, ATV use is increasing rapidly, and the road system allows ATV users to easily disperse throughout the area. Such activities temporarily displace big game animals. Due to growing dispersed recreational use of all types, higher densities of human use, and a concern for human safety, ATV use is being encouraged in some locations and discouraged in others. Increased, unregulated ATV use has an adverse effect on many wildlife species as they are displaced from their preferred habitat and forced into more crowded, less desirable habitat.

Hunting is permitted on all areas of the Forest. Annually, hunters legally harvest upland game, mule deer, and elk. The most sought-after (limited) license is for elk. Illegal human activities such as poaching occur throughout the Forest with several cases being reported and prosecuted each year.

The roads in certain areas are closed during late spring and early summer to provide security for big game during parturition (birthing) and the first few weeks of life and to protect the road surface. Some roads are also closed in the winter to protect game on winter ranges and to protect the road surface. Illegal entry beyond these gates does affect wildlife and their use of available habitat.

Proximity to communities has brought a certain amount of illegal dumping—old appliances, carpets, etc. The effect on wildlife is negligible.

The road system makes it possible to conduct legal as well as illegal activities (refer to AU2). The legal hunter and the poacher use the same system. The firewood cutter with a legal permit uses the same roads as the person who illegally cuts firewood without a permit. Fortunately, the small percentages of illegal activities that occur are not substantially affecting terrestrial wildlife populations. In many instances, the legal activities have a positive effect on wildlife populations, and the illegal activities have a negative effect. Road density is directly related to wildlife security.

TW4: How does the road system directly affect unique communities or special features in the area?

The communities that are unique to terrestrial wildlife on the Forest are escarpments (cliff faces), talus slopes, small bogs, wetlands, and old growth timber. Such areas provide nesting habitat for many raptor species including goshawks, Golden and Bald Eagles, and an occasional Peregrine Falcon. These areas are largely unaffected by roads because of the difficulty of constructing roads in such areas. The road system does make these areas more accessible to humans and human-caused impacts.

The unique communities or special features in the Forest are directly affected by the road system, which provides easier access to members of the scientific community or wildlife enthusiasts. The road system and the access it provides do not appear to be degrading or diminishing wildlife habitat, wildlife populations, or special features. The road system can be managed to regulate potential impacts to wildlife values and important habitat.

Ecosystem Functions and Processes (EF)

EF1: What ecological attributes, particularly those unique to the region, would be affected by roading of currently unroaded areas?

There are at least five types of special management designation from the Forest Plan that could potentially be affected by roading: Research Natural Areas (2 are designated now; 6 additional RNAs were proposed by the Forest Plan); Mill Creek

Municipal Watershed; 22 roadless areas; 2 scenic areas (Vinegar Hill-Indian Rock and Grande Ronde); and the Fremont Powerhouse Historic District. Designated Wilderness is not included in this list because it is not available for roading, although development of new roads adjacent to wilderness areas can certainly affect their integrity and management. These special areas are managed for their unique recreational opportunities and scientific values. One ecological attribute of unique importance to this region is called "grass-tree mosaic," which is defined as stringers or ribbon-like forest communities that alternate with nonforested communities (herblands (grassland and forbland) and/or shrublands). The origin of grass-tree mosaic can be traced to several factors – in some situations, it occurs under restricted edaphic or physiographic conditions (such as shallow soils on steep, southerly exposures); in other instances, it represents a disturbance-maintained ecosystem where historical fire patterns allowed the nonforest matrix to "hold its ground" against tree invasion. Seven of the 22 roadless areas considered by the Forest Plan had grass-tree mosaic as a major issue. Roading could reduce the value of these areas for scientific studies and primitive recreational experiences.

EF2: To what degree do the presence, type, and location of roads increase the introduction and spread of exotic plant and animal species, insects, diseases, and parasites? What are the potential effects of such introductions to plant and animal species and ecosystem function in the area?

There are at least six exotic insect, disease (pathogen), and parasite organisms that have been introduced in the western United States and are being closely monitored because of their high potential to cause detrimental impacts to wildland ecosystems. These organisms are: white pine blister rust; larch casebearer; Asian gypsy moth; pine shoot beetle; balsam woolly adelgid, and Asian longhorned beetle. None of these organisms are directly affected by roads in terms of their introduction or spread. Roads can affect the treatment or suppression of these organisms, however, as discussed in item EF4.

The construction and use of roads has contributed to the expansion of undesirable exotic plants and noxious weed populations throughout much of the Forest. Roads are the primary spread corridors for weedy species as vehicles readily transport seeds on their undersides and on muddy tires. Large populations of noxious weeds and exotic plants are found along roads that access forest land from agricultural areas. Smaller populations are found throughout the forest, with the highest concentrations found along heavily traveled roads. Weedy species are detrimental to native plant communities, displacing natives and potentially converting entire communities to exotic groundcover. Adverse effects include a loss of species diversity in understory plant communities, degradation of wildlife habitat and range forage, and loss of soil-holding capacity leading to increased erosion and sedimentation. Grasslands and grass-tree mosaic communities are most at risk from expanding weed populations. Several of these already contain rapidly expanding populations of yellow starthistle, knapweed, ventenata grass and medusahead.

Besides providing transport routes, roads provide prime seedbeds for weedy species. New road construction and regular maintenance activities create the bare soil and early seral conditions that offer advantage to these aggressively invasive plants.

Roads also offer an advantage of easy access for monitoring and treatment of noxious weed populations that are already established. Closing roads that currently support noxious weed populations can impede treatment access.

Control efforts, in cooperation with the counties, are concentrated along the road and trail system. Neither Oregon nor Washington have certified weed-free hay programs, so requiring it's use by livestock permittees, hunters, and others using horses is problematic.

<u>Summary</u>

The presence, type, and location of road systems have increased the introduction and spread of exotic plant species. The Umatilla National Forest has various levels (from localized to widespread) of undesirable exotic (noxious weeds) plants. The levels of noxious weeds are of high concern, and without ongoing management and control, noxious weed populations may become unmanageable.

EF3: How does the road system affect ecological disturbance regimes in the area?

Understanding disturbance ecology is a key part of ecosystem management. To have an effective ecosystem management policy, resource managers and the public must understand nature, ecological resiliency and stability, and the role of natural disturbance on sustainability. Efforts to suppress disturbance agents have reduced biodiversity and compromised ecosystem health. It is not a question of whether disturbance will happen but when, where, and what kind. The types of disturbances that are likely within specific ecosystems, the criteria for predicting where particular disturbances may happen, and the probability of occurrence must be incorporated into forest and project plans. This information and the management objectives for those areas can help resource managers better determine appropriate alternatives (Averill, 1994).

The most common disturbance agents affecting forest ecosystems on the Umatilla National Forest include bark beetles (insects that feed on tree cambium), insect herbivory (insects that feed on tree foliage), ungulate herbivory (wild and domestic ungulates that consume plant foliage), parasites and pathogens (fungi and dwarf mistletoes that cause tree disease), wildfire, and windthrow (trees toppled or snapped off by high winds).

Fire is thought to be the most significant natural disturbance agent in mid and high elevation forests. It has shaped the vegetation mosaic for thousands of years by causing repeated underburns as well as stand-replacing disturbances on a variety of scales.

The Umatilla National Forest recently experienced three decades of continual disturbance – mountain pine beetle from the late 1960s to the late 1970s, Douglas-fir tussock moth in the early 1970s and the early 2000s, western spruce budworm from 1980 to 1992, and stand-initiating wildfire beginning in the mid 1980s (1986 in particular) and continuing to the present. The most recent major fire events occurred in 1996 when about 90,000 acres was burned by four large fires (Bull, Summit, Tower, and Wheeler Point).

The combination of tree mortality from the budworm epidemic of the early 90's, drought, low live/dead fuel moistures, higher than average temperatures, and lower than average humidity plus winds were the major factors contributing to large fire growth.

Roads have variable effects on disturbance agents. They have no direct effect on bark beetles, but do allow access for control treatments and salvage timber harvest of killed trees. Roads have no direct effect on defoliators but they provide useful access for control treatments and for monitoring (monitoring outbreak status and treatment efficacy). Roads may indirectly affect wild ungulate herbivory by contributing to suppression of deer and elk populations (noise, poaching, hunting, etc.). Roads have been known to serve as spread vectors for certain pathogens (a root disease affecting southern Oregon forests, for example,) but has not been the case for the Umatilla National Forest. Roads can act as direct barriers to the spread of benign surface fires in certain situations (generally those with flame lengths of 3 feet or less), they can serve as a focal point for human-caused ignitions (both arson and accidental), and they are very important as an access source for fire suppression activities. Roads can exacerbate windthrow damage, particularly when they are wide enough to cause significant canopy disruption and allow the wind to dip down to the ground surface on the lee side of the road opening. Roads are beneficial in terms of allowing access for salvage of wind-caused tree mortality.

Although roads facilitate access to the Forest and human caused fires do happen, the predominate agent for fire starts is lightening. The kind of resources dispatched vary from aviation delivered to walk in or engine units, depending on the available access to the fire area.

Summary

Ecosystems in which the major disturbance regimes (such as fire) have been significantly altered are unduly stressed. Most of these disturbances operate with or without a road system; what varies is our response to these disturbances. Human activates affect the disturbance cycles, some positively and some negatively; and most activities are facilitated or hindered by various access. It is essential to understand and incorporate disturbance process, whether natural or human-induced, in resource management. The consequences of trying to suppress a natural disturbance agent (such as lighting-caused fires) must be considered and possibly counteracted by inducing human caused disturbance events or management of natural ignitions. In most cases, roads indirectly affect ecological disturbance regimes, as they are necessary for management access when human-induced disturbance events are part of active resource management.

EF4: To what degree does the presence, type, and location of roads contribute to the control of insects, diseases, and parasites?

Road access can provide both direct and indirect effects on control of insects, diseases, and parasites. Some of the direct effects of roads include access for suppression treatments (application of insecticides, fungicides, etc. for control of pathogens and insects) and access for monitoring and evaluation activities. Insect, disease, and pathogen populations must be monitored to determine whether a suppression response is warranted or not and, if so, when such a response would be most effective. If a direct suppression response is implemented, road access is valuable for monitoring the treatment effects, not just on the target organism but also on secondary organisms that may have been directly or indirectly affected by the treatment.

Many of the indirect effects related to control of insects, diseases, and parasites are centered on treatments designed to change the susceptibility or vulnerability of forest ecosystems to insects and pathogens. Thinning, for example, has been shown to have important effects on tree vigor, including production of phenols, terpenes and other resins that serve as defensive chemicals to ward off insects or diseases. Bark beetles and defoliators are two wide-ranging insect organisms that can be indirectly managed using thinning, fertilization, and other silvicultural treatments that have a positive effect on tree vigor and resistance. Basically, road access allows thinning, prescribed fire, and other treatments to be implemented; these activities are used to modify habitat for insects and diseases.

In general, road access facilitates the control of forest insects, disease, and parasites. Whether the type of control is direct (such as burning or removal of infested materials) or indirect (altering stand conditions to reduce insect and disease impacts), road access certainly facilitates these control efforts by allowing crews and equipment to easily access and treat sites.

One goal of the Forest Plan is to "Monitor effects of insect and disease and treat vegetation to reduce the risk of epidemic outbreaks". The Forest Plan general direction includes, "Prevent or suppress epidemic insect and disease populations that threaten forest tree stands with an integrated pest management (IPM) approach consistent with resource management objectives". The idea of integrated pest management is to manage resources in a manner that limits or reduces the development or perpetuation of pest problems. Silvicultural treatment of affected or susceptible tree stands can prevent and suppress insects and disease occurrences. As trees grow old, they decrease in growth rate and vigor and become less resistant to insect or disease attack. Severe conditions such as drought and overstocking can reduce tree growth rate, which also reduces resistance to insects or disease. An important characteristic indication of a healthy forest is the diversity and distribution of tree stand ages and species composition. The greater the diversity and distribution of stand ages and species, the more resistant the entire Forest is to damage from any single insect or disease.

<u>Summary</u>

Most bark beetle detection, prevention, and suppression activities require road access. Without road access, insect and disease management on suitable timberland and other tentatively suitable timberland where management may be needed to meet desired conditions is not feasible.

EF5: What are the adverse effects of noise caused by developing, using, and maintaining roads?

This is not an issue at the forest scale. It will be addressed if it is an issue at the sub-forest scale.

Economics (EC)

EC (1): How does the road system affect the agency's direct costs and revenues? What, if any, changes in the road system will increase net revenue to the agency by reducing cost, increasing revenue, or both?

In FY02, the Umatilla National Forest received about $1.44 million for road maintenance and construction. The forest received an additional $307,000 for Capital Investment, and $265,000 to use on deferred maintenance and restoration.

About 30 percent of this money went to indirect (overhead) costs. The remainder can be thought of as the direct costs for maintaining a *portion* [1] of our current road system.

Currently, the Forest Service does not charge the general public to use roads. Thus, public, noncommercial use does not generate revenue. To generate revenue, the Forest Service could charge a fee to enter the National Forest [2], similar to the fees charged by the National Park Service when entering National Parks. The amount that would be generated is difficult to estimate because we do not currently have a scientifically sound estimate of the number of visitor days the Forest receives each year. In a couple of years, when the National Visitor Use Monitoring project is completed, we will have a scientifically sound estimate of forest use. However, the estimate will be based on use that currently is "free". If an entrance fee were charged, the level of use would probably change.

The Forest Service collects fees for commercial use of roads through road use permits and timber sale contracts. However, the rates, which are updated periodically, are based on the concept that "the user pays only for the amount of wear and tear caused by the use". To increase revenue from commercial use, laws and/or agency policies would have to change to a concept of "the Forest Service makes a profit on commercial use".

There are several ways to reduce road system costs. The Forest could reduce the number of miles of road, thereby reducing overall maintenance costs. The Forest could reduce the maintenance levels of the road system, which would reduce the amount of money spent on maintenance. A combination of these two things could be done. Regardless, it would not increase revenue because if road costs were reduced, the Forest would simply elect to receive the money in another under funded program area, such as recreation, wildlife, and fisheries, etc[3]. While it is a worthwhile goal to reduce the amount of money spent on the road system, it would not result in increased revenue.

EC (2): How does the road system affect the priced and non-priced consequences included in economic efficiency analysis used to assess net benefits to society?

This is a project-scale question, not a forest scale question.

EC (3): How does the road system affect the distribution of benefits and costs among affected people?

This is a watershed-scale question, not a forest scale question.

Commodity Production (TM, MM, RM, SP, SU)

Timber Management (TM)

TM1: How does the road spacing and location affect logging system feasibility?

Logging feasibility is a function of human capability, machine capability and economics. Road spacing and location affects all of these factors. In most instances, roads facilitate logging operations. The more roads there are, the closer together roads are, which makes logging operations easier. However, as more miles of road are constructed, road construction and maintenance costs increase, and net returns from logging begin to decrease. In other words, a point of diminishing returns is

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[1] The portion of the annual maintenance that is not done because of insufficient funding is tracked as deferred maintenance.

[2] Instituting such a charge system would be extremely unpopular. The costs of enforcement would probably far outweigh the revenues generated for many years.

[3] Under the current budgeting process used by the Forest Service (BFES), the Forest has discretion in how much money is allocated to road maintenance and construction. The Forest could reduce the amount of money allocated to roads. However, it would not result in an overall reduced cost to the government, but merely a shift to another program area.

reached. For every combination of logging system and terrain type, there is an economically optimum road spacing. Given these relationships, this question would be best addressed within a sub-forest scale roads analysis.

TM 2-3: How does the road system affect managing the suitable timber base and other lands? How does the road system affect access to timber stands needing silvicultural treatment?

Under the Forest Plan, the Umatilla has 618,800 acres of suitable land. Not all of this land had road access when the Forest Plan was implemented in 1990. Many areas of the suitable land base, outside of inventoried roadless areas, do not have a road system in place that would allow economical harvest of timber (see discussion which follows on economic viability of timber harvesting).

When considering the scale and scope of this analysis, the question is: did the Forest Plan identify any additional need for arterial or collector road access in order to accomplish its timber management objectives? The answer to that question is "no." Page 4-17 of the Forest Plan shows no new construction of arterial or collector roads during a 50-year planning horizon. Reconstruction of arterial and collectors roads was envisioned, however, with the annual reconstruction mileage varying between 33 and 22 miles on a decadal basis. This also means that it was assumed that none of the roadless areas with scheduled timber harvest required development of arterial or collector roads to accomplish their timber management objectives. Note that this does not mean that road access was not envisioned for those areas; it was just anticipated that any road development in roadless areas could meet the timber management objectives using lower standard roads than arterials and collectors.

About 90,000 acres of inventoried roadless areas were assigned to management areas with scheduled timber harvest, meaning they were part of the suitable land base (the 618,800 acres). However, it does not necessarily follow that these 90,000 acres of suitable land base did not have road access, because several of those "roadless" areas already had roads in them. As reported for the Roadless Area Conservation EIS, about 5 miles of road were built into inventoried roadless areas after the Forest Plan was implemented in 1990. Still, the majority of the acreage within inventoried roadless areas selected as suitable does not contain a road system that would provide economically viable timber production.

As yarding distance increases, logging costs increase. At some distances it becomes too costly to manage an area for timber, and may be beyond human or machine capability, as well. Thus, an area may be biologically capable of growing commercial timber (suitable land), but strictly from the logging feasibility perspective, may not be economically viable. The question as to how the road system affects managing other lands depends on for what purpose they are managed. If access by humans is needed to manage those lands, then obviously roads will facilitate management.

The simple answer to the second question above, on how the road system affects access to timber stands needing silvicultural treatments, is that any silvicultural treatment, whether done by hand or by machine, is facilitated by road access.

Going a little deeper into this, the concept of economic viability applies to silvicultural treatments as well as to logging feasibility. As road access decreases, costs increase because workers need to hike in, and equipment and materials must either be carried by workers, or transported by some other means (animal or aircraft). Because of limited funding to carry out silvicultural treatments (burning, thinning, pruning, fertilizing, etc.), economics plays a big part in determining where to spend those dollars. The land currently needing treatment greatly exceeds what we can afford to treat. We generally try to maximize the number of acres we treat any given year by selecting the least costly (most cost-effective) acres first, never getting to the costlier areas. As examinations identify new areas in need of treatment each year, the prioritization process starts again, and the costlier areas have less chance of being treated.

Road access affects the financial feasibility of silvicultural treatments. For example, road and trail closures often result in long "walk in" distances for project crews (whether force account or contract). Some of those project crews are carrying heavy thinning or planting equipment (chain saws, planting augers, etc.), adding to the impact of not having road access to project sites or their vicinity. A lack of road access has consistently resulted in higher bid rates on silvicultural contracts, thereby increasing the unit cost of that work and resulting in less money being available for on-the-ground treatments.

Minerals Management (MM)

MM1: How does the road system affect access to locatable, leasable, and salable minerals?

Mineral resources are addressed in the Umatilla Forest Plan (pages 2-22, 3-16, 4- 81, 5-21). Existing classified roads are used for primary access to mineral operations (locatable, leasable, and salable) and are generally sufficient for that purpose. In some cases, existing forest system roads must be improved to higher standards to accommodate the proposed increased volume and type of vehicles and provide for continued safe use by other existing forest traffic.

Construction of new temporary and/or classified mineral-related roads is usually closed to public use. Unless otherwise authorized, roads that are no longer needed for mineral operations are reshaped to as near a natural contour as practicable and stabilized. Bonding is required, as appropriate, to assure road maintenance and reclamation are completed.

Range Management (RM)

RM1: How does the road system affect access to range allotments?

The network of roads on the Umatilla National Forest lands has positive direct effects on the administration of the grazing program. As roads are improved and vehicles speeds increase, the likelihood of livestock-vehicle accidents increases, although this is not a common occurrence.

Indirectly, the prominence of noxious weeds along roads displaces native forage for livestock. Some noxious weeds are poisonous to livestock and their introduction along the road system can have a harmful effect. See EF2.

Roads have replaced stock driveways as a means for transporting sheep and cattle to and from mountain allotments. Stock driveways were predominately used in the first half of the last century, and their effects can still be observed in some places. As a result of trucking livestock to the mountains, the vegetative condition and overall health of these driveways have improved dramatically.

The road network on the Umatilla National Forest has increased the administration capability of the range management program. The road network allows range management specialists to access allotments quickly by using vehicles rather than horses. Grazing permittees have likely experienced lower operating costs because of motorized access to allotments.

National Forest road systems are essential for administering the grazing program. Compliance enforcement particularly benefits from forest roads. Roads also allow timely access to allotments.

<u>Summary</u>

Umatilla National Forest maintenance level 3, 4, and 5 roads are an important part of grazing management. Roads are an important component of the compliance and administration of the Forest's grazing program. Roads have an ecological effect on the Forest's range program because of their role in the spread and management of noxious weeds (see EF2).

Water Production (WP)

WP1: How does the road system affect access, constructing, maintaining, monitoring, and operating water diversions, impoundments, and distribution canals or pipes?

The existing road system provides sufficient access to existing water diversions, impoundments, and distribution canals and pipes. Extensive use or new access by the permittee is usually addressed with maintenance requirements in their permit, analyzed through the NEPA process, and addressed in the associated decision.

WP2: How does road development and use affect water quality in municipal watersheds?

This is addressed by project on a case-by-case basis. Thus far, use has not been identified as a water quality concern or problem in drinking water source areas. The Mill Creek watershed provides water to Walla Walla, Washington. A permit, managed by the city, is required to enter this watershed.

WP3: How does the road system affect access to hydroelectric power generation?

There are no hydroelectric power generation facilities on the Umatilla NF.

Special Products (SP)

SP1: How does the road system affect access for collecting special forest products?

The current maintenance level 3, 4, and 5 road system provides adequate access for collecting special forest products such as mushrooms, recreational rock collections, ferns, transplants, Christmas trees, and firewood. If road closure or seasonal closure is considered in a project or watershed analysis, access needs for special forest products will be considered.

Special Use Permits (SU)

SU1: How does the road system affect managing special-use permit sites (concessionaires, communication sites, utility corridors, and so on?

Special use permits fall into two categories – recreation and land use. The existing road system is sufficient to deal with almost all recreation special uses. Most recreation special use proposals/authorizations are designed around the existing road system. Safe and efficient access to areas under Special Use Authorization has a direct effect on the economics of an operation, either through volume of customers, or operation and maintenance costs.

Access and Forest Service responsibility under Alaska National Interest Lands Conservation Act (ANICLA) and RS2477 are discussed in the General Public Transportation (GT) report for this document. The Umatilla National Forest has about 253 Special Use Authorizations. Many of these uses rely on the existing road access or utility corridors to accommodate construction, operation, and maintenance. Some land use authorizations have no access. Some mineral requests require reconstruction or new construction to meet their needs. These requests are analyzed through the NEPA process and are addressed in the associated decisions at the project scale.

General Public Transportation (GT)

GT (1): How does the road system connect to public roads and provide primary access to communities?

National Forest system roads connect to numerous public roads managed and operated by either the states of Oregon and Washington or county governments. Some Forest roads can serve as alternate routes that connect communities during the summer. During the winter, all of the roads that act in this capacity are closed by snow. Some roads have been identified as Public Forest Service roads or PFRS. The PFRS roads serve a greater need of the public such as interconnection routes to state or county roads, and access to large recreation centers or popular recreation sites. Of greater importance is how the county roads and state highways give communities, tourists, and industries access to the Forest. These roads connect to arterial, collector, and local forest roads where the traffic is dispersed into the Forest for a variety of uses. Some county or state roads traverse into or through the Forest. Examples of these are Highway 204, between Weston and Elgin, OR; Highway 207 between Heppner and Spray, OR; and Highway 244 between Ukiah and La Grande, OR. These are State of Oregon Highways and are maintained throughout the year. Few county roads cross completely through the Forest. Road 22 crosses through the Forest and has jurisdiction by Grant and Morrow counties at their respective county lines. Some roads have been under Forest Service jurisdiction for many years and may not be under the appropriate jurisdiction. Due to changing use, it might be more appropriate for some roads to be under county or state jurisdiction or special use permits. In 2003, the Forest worked successfully with Morrow County to change a number of roads over to County jurisdiction. This is in line with the County's creation of an ATV park along Hwy 207, south of Heppner, Oregon.

GT (2): How does the road system connect large blocks of land in other ownership to public roads?

The main arterial roads are connected to federal, state, or county highways. Many small parcels and some large blocks of public and private ownership are scattered across the Forest. A few large timberlands owned by private landowners were accessed in the late 1960's to early 1970's under rights-of-way agreements. These agreements were used to exchange easements across each party's land that set forth a method of sharing the cost of developing new access and upgrading roads to make them suitable for hauling forest products and accommodate public travel. Joint planning and development provided a way to gain access into areas where access did not exist and benefited both parties by reducing the cost of development to each landowner and provided a cost effective transportation system.

GT (3): How does the road system affect managing roads with shared ownership or with limited jurisdiction? (RS2477, cost share, prescriptive rights, FLPMA easements, FRTA easements, DOT easements)

The exchange of easements established a deeded right-of way that continues from owner to owner via an Agreement. The agreements set forth the process of sharing maintenance responsibilities and the allocation of construction costs. One Cost Share Agreement and two maintenance Agreements remain.

There are 49.9 miles under a Cost Share Agreement and supplements with Boise Cascade Corporation. The cost share cooperator is actively involved with the maintenance of the 21 roads under agreement. All but three roads are open to public travel. Two of the roads are forest collectors.

The maintenance agreements were the result of the original owner of the involved parcels selling the land. When the new owner acquired the land, they agreed to share maintenance responsibilities under a Maintenance Agreement. The Maintenance Agreement is different from a Cost Share Agreement since it does not hold the parties to equitably share road construction, reconstruction, and restoration costs construction related to upgrades of the road system. The Maintenance Agreement simply covers the recurrent and deferred road maintenance needed during the calendar year.

The most recent landowner has sold the land to multiple new owners. The largest block is in the Desolation Creek drainage, a tributary of the North Fork John Day River. The land, once owned by Louisiana Pacific Corp. was sold to Pioneer Resources in the 1990's. There were 122.5 miles of road under the Maintenance Agreement. Pioneer Resources has broken the parcel up into small blocks and is selling all the acquired lands. Approximately 14,000 acres, has been purchased by Hood River County, Oregon. The only access to this parcel is across National Forest land. Connection of this parcel to US Highway 395 is via two Forest Service roads (55 and 10). A block of about 10,000 acres of other ownership is located within the North Fork John Day River drainage. These parcels are currently owned by four other owners.

Another Maintenance Agreement with Pioneer Resources existed on the Heppner Ranger District. While most of the ownership is currently outside the District Boundary the roads to the main highway system is through the Forest on National Forest Roads that were under Right-of-way Agreement with the previous owner, Kinzua Corporation. There are 129.4 miles under the current Maintenance Agreement.

With some exceptions, the only access to these parcels is across National Forest land, via several roads. New owners will be given the option of selecting an agreement with the Forest Service that meets their respective needs. This agreement will detail the obligations and process of sharing maintenance based on the intended use of the land.

A number of roads crossing the Forest fall under the jurisdiction of agencies other than the Forest Service, as mentioned in GT (1). The Umatilla works with two States, Washington and Oregon, and eleven counties within the two States. The Forest is working on building working agreements with the various Counties and States. These agreements will identify county and forest system roads that would benefit from cooperation for maintenance and improvements needed for public, administrative, and commercial access through the Forest. These agreements will set forth general procedures for planning, programming, environmental studies, design, construction and maintenance of common roads, such as designated forest highways. For a listing of forest highways on the Umatilla currently designated by the Federal Highway Administration, refer to Table 4 in Chapter 2.

Rights of access by law, reciprocal rights, or easements are recorded in the Tri-Forest Lands Zone, in Baker City, OR, and county courthouse documents. The Forest recognizes these rights and works with the owners to preserve access while protecting the natural resources and facilities on adjacent NFS lands.

GT (4): How does the road system address the safety of road users?

In 1975, the Forest Service developed a Memorandum of Understanding with the Federal Highway Administration that required the Forest Service to apply the requirements of the National Highway Safety Program, established by the Highway Safety Act, to all roads open to public travel. In 1982, this agreement was modified to define "open to public travel" as "those roads passable by four-wheeled standard passenger cars and open to general public use without restrictive gates, prohibitive signs…" Most roads maintained at level 3, 4, and 5 meet this definition. Design, maintenance, and traffic control on these roads emphasizes user safety, comfort, and economic efficiency.

The largest proportion of road maintenance and improvement funds allocated to the Forest is spent on maintenance level 3-5 roads. Safety work such as surface maintenance, brush clearing, and installation and maintenance of warning and regulatory signs are performed on an annual basis. Traffic control signing follows standards set forth in the Manual on Uniform Traffic Control Devices (MUTCD). Exceptions are permitted where state or county practices on similar public roads deviate from these guidelines. Signing should conform with local practice in situations where use of MUTCD guidelines would be confusing to the motorist.

Often, when accidents occur on Forest roads, the Forest Service is not immediately informed unless an employee is involved. Accidents involving only public motorists are reported to the local sheriff or state patrol, if reported at all. When the Forest does become aware of an accident, an investigation is initiated to attempt to identify the cause. If a feature of the road is found to be unsafe, addressing the condition becomes a high priority.

Road condition surveys conducted from 1999 to 2003 reveal a backlog in deferred maintenance, health and safety, and capital investment needs on level 3, 4 and 5 roads. A large portion of this backlog is a result of deteriorated surfacing on aggregate-surfaced roads. In the past, road-resurfacing projects were planned as part of commercial timber sale activities. The decline of this program has reduced the Forest's ability to fund this work. Built originally for commercial use, design considerations did not always emphasize the high volume of public recreational traffic that the roads are experiencing today. Many road sections are lacking sight distance, turnouts, and adequate lane width for the current volume and speed of traffic. Another high-cost item is roadside brushing. Level 3-5 roads need to be placed on a recurring schedule to maintain sight distance and a safe clear zone. While this work has been part of the annual maintenance program, it is often scaled back in years when budget allocations are down. Finally, warning and regulatory signing contributes significantly to the backlog. Sign maintenance after installation is part of the annual maintenance program of work.

Maintenance level 1 roads are closed. Maintenance level 2 roads that intersect higher standard roads need to be clearly distinguishable from those that are managed for passenger car use. This can be accomplished in a variety of ways. The surface type and condition of the lower standard road should convey the impression that a high clearance vehicle is needed. The road number signs are vertically aligned. Distinctive or rectangular shaped signs are used on level 3, 4, and 5 roads. The closure devices on roads that are maintained at level 1 are visible from the intersection, have reflective barricade markers for traffic approaching the closure, or have a sign notifying the traveler of a closure ahead. During watershed and project-scale analysis, Forest officials should give high priority to recommending decommissioning of roads that pose the greatest risk to public safety or are no longer needed for resource management.

Travel management regulations are posted on the ground and described in the Forest Access and Travel maps. These regulations have been established by the Forest to enable safe motorized travel while protecting natural resources and minimizing conflicts between users. These roads have been entered into either the Capital Investment Program, PFSR, or Deferred Maintenance program for funding. In recent years, the Forest has made good use of these programs.

Administrative Use (AU)

AU1: How does the road system affect access needed for research, inventory, and monitoring?

The road system provides adequate access for research, inventory, and monitoring activities of the Umatilla National Forest. The 1990 Umatilla Forest Plan's Management Prescription D2 was applied to Research Natural Areas (Forest Plan, page 4-175 thru 177). The Plan's standards and guidelines state new transportation facilities may be acceptable, subject to valid existing mineral rights or as part of an authorized study. All other new transportation facilities are not acceptable. Camping is limited or restricted as necessary. Wildland fires are suppressed using minimum impact suppression techniques.

AU2: How does the road system affect investigative or enforcement activities?

The Umatilla National Forest road system facilitates, either directly or indirectly, most criminal activity occurring on national forest lands. Virtually all forest crimes are committed in conjunction with a vehicle that has accessed the forest via national forest roads. The large forest road system provides egress at many different locations making it difficult for law enforcement personnel to intercept violators. The road system inside the forest is diverse and wide ranging. This allows those in search of illegal forest products a large area in which to operate. It also serves to make apprehending such violators extremely challenging.

The road system itself impacts law enforcement in activities several different ways. Providing safety for the users of the road system has become an emphasis over the past few years. The Level 3, 4 and 5 system has experienced an increase in accidents and incidents of careless operation. Forest Service law enforcement personnel have had to deal increasingly with traffic related issues such as suspended drivers and excessive speed. In addition, Law Enforcement Officers have had to investigate numerous traffic accidents, some of which have resulted in citations. These cases often have resulted in litigation and the need to respond to FOIA requests from those involved.

Because of road density issues and the need to protect threatened and endangered species, the Umatilla National Forest has closed a large number of roads to motorized use. These closures include both permanent and seasonal restrictions. Forest terrain often makes skirting closure devises easy, resulting in a significant number of violations. Law enforcement personnel spend a considerable portion of their time investigating and patrolling for such violations, especially in hunting season. Officers also investigate numerous instances of vandalism to closure devices and signs.

ATV use has increased dramatically on the forest over recent years. Many roads are closed to ATV use, which has impacted enforcement activities. In addition, a significant portion of the forest is closed to off-road motorized travel. Violators have been numerous and difficult to catch. The extensive road system provides ATV's a myriad of opportunities from which to travel off road in violation of this prohibition.

There are increasing incidences of minors in possession of alcohol and illegal drugs on the Forest. Much of this activity is in the form of evening partying, which often occurs near local towns adjacent to level 3, 4, and 5 roads. These gatherings often result in other resource and property vandalism.

Protection (PT)

PT1: How does the road system affect prescribed fire and mechanical management on the forest?

The Umatilla National Forest road system provides adequate access for wildland fire and fuels management.

The forest also relies upon a variety of equipment to manage prescribed fire activities. Crews, engines, all terrain vehicles and helicopters are utilized to ignite, hold, and mop-up prescribed burns.

Forest roads perform several important roles in fuels management on the Umatilla NF:

- They often serve as secure fire perimeters, especially on landscape scale prescribed burns. This reduces the risk of escape as engines can be utilized quickly and effectively on roads. This also reduces impacts on forest resources as dozer line and hand line construction is unnecessary or minimized. This ultimately results in reduced cost.

- Roads serve to provide access to engines and tenders so burned areas can be secured quickly through mop-up. This reduces risk of escapes and minimizes smoldering particulate emissions.
- Forest roads provide access for equipment used for mechanical fuels treatments. This equipment is usually moved to a work site via transport.

PT2: How does the road system affect the capacity of the Umatilla National Forest and cooperators to suppress wildland fire?

The fire management strategy on the Umatilla National Forest is to utilize a mix of initial attack resources, both ground based (engines, tenders, dozers and handcrews) and aerial delivered, (heli-rappel and single engine air tanker) to achieve rapid containment of wildland fires. This allows the fire managers the flexibility of concentrating resources on fires in either roaded or un-roaded areas.

In multiple fire situations, which are common on the Umatilla NF, aerial delivered resources are often quickly used up. Forest roads provide access for ground based IA reinforcements to help prevent the rapid draw down of smokejumpers and heli-rappellers.

Forest roads provide access for heavy equipment deployment. This is often critical during extended attacks or rapid fire growth as dozers and water tenders can utilized. This can mean the difference between a small fire and a large fire, which translates into minimal resource damage and suppression or sizeable resource effects and astronomical cost.

PT3: How does the road system affect risk to firefighters and public?

Many forest roads are single track, low maintenance routes that do not provide both ingress and egress during wildland fire operations. This also can complicate any evacuation of forest users.

Due to the nature of the topography in the Blue Mountains, many roads, especially on the north end of the forest, follow the ridge tops. This can be a safety concern as ground crews have go down to the fire to engage. Moving down hill toward an active fire requires several mitigation measures to do safely.

Roads often provide fire fighters with defensible space in which safe suppression operations can be conducted with high probability of success. They also are often utilized as escape routes and/or safety zones when fire fighters are overwhelmed

PT4: How does the road system contribute to airborne dust emission resulting in reduced visibility and human health concerns?

Every mile of unpaved road will contribute some dust into the air. Air quality impacts from the Forest road system are associated with vehicle emissions and dust from traffic on unpaved roads. These effects typically are localized and temporary, and their extent depends on the amount of traffic. Of the 1,423 miles evaluated here, 1,345 of those miles are unpaved, either aggregate (1037 miles), native surfaced (200 miles), or improved (108 miles). Dust from unpaved roads increases with dryness as well as vehicle weight. Forest roads are usually unpaved and used for recreational purposes (such as passenger car and four-wheel-drive use), as well as resource management purposes related to livestock grazing, timber harvest.

Motorized recreation occurs year-round. Summer use includes off-highway, two-wheel and four-wheel drive vehicles. When these vehicles travel on unpaved surfaces, they can stir up dust. As use of Forest roads increases with visitation, road dust impacts to sensitive areas may need to be addressed.

Vehicular travel on unpaved roads is heavy during resource management activities such as timber harvest or road work. These uses typically require dust abatement measures to reduce the air quality impacts of sustained and heavy traffic use. When funds are available, the Forest has applied dust abatement products to higher public use forest roads that pass through or near residential areas as part of its annual maintenance plan. Other mitigation measures such as reducing haul speeds, watering, limiting the number of trips per day, and the timing of operations may be necessary. On un-surfaced roads, temporary increases in dust emissions occur during and after routine surface maintenance when conditions are dry.

Watering during blading or scheduling maintenance when natural moisture content is higher would help reduce dust emissions.

Specifying the type of dust abatement product or method and frequency of use is not a programmatic issue. This is a relatively expensive activity and is dependent on budget levels and priorities. Dust abatement should be considered as a mitigation measure for higher traffic volumes resulting from commercial activities and special use permits, particularly on arterials and major collectors and when traffic is expected near developed recreation sites. It should also be considered on higher volume roads that are in riparian areas where dust could have unacceptable affects to sensitive plants and animals.

Special Use Permits (SU)

SU1: How does the road system affect managing special-use permit sites (concessionaires, communication sites, utility corridors, and so on?

Special use permits fall into two categories – recreation and land use. The existing road system is sufficient to deal with almost all recreation special uses. Most recreation special use proposals/authorizations are designed around the existing road system. Safe and efficient access to areas under Special Use Authorization has a direct effect on the economics of an operation, either through volume of customers, or operation and maintenance costs.

The Umatilla National Forest has about 103 recreation and 148 non-recreation Special Use Authorizations. Many of these uses rely on the existing road access or utility corridors to accommodate construction, operation, and maintenance. Some land use authorizations have no access.

Recreation – Unroaded (UR) and Roaded (RR)

Recreation (UR1, RR1) Is there now or will there be in the future excess supply or demand for roaded or unroaded recreation opportunities?

The demand for vehicle-based recreation appears to be increasing, especially at the more popular developed recreation sites. Whether it's the usual summer recreation, OHV use, fall hunting, or winter snowmobiling, vehicle-based recreation demand is on the rise. Currently, the demand for roaded recreation is probably not exceeding supply, but is probably more a function of use being overly concentrated in a few popular areas.

Unroaded recreation opportunities exceed demand. Of the 22 inventoried roadless areas addressed in the Forest Plan, 7 were designated to remain undeveloped, 8 were to have parts developed, and 7 were to be developed. About 144,523 acres of inventoried roadless areas will not have road construction under the current Forest Plan, and hence are available for unroaded recreation opportunities, although access to the Mill Creek watershed (about 21,740 acres) is limited to special big hunts by permit only.

The Forest also has a total of 304,396 acres in three wilderness areas, which also are available for unroaded recreation.

There are user conflicts between winter motorized and Nordic non-motorized forest users. Generally, these take the form of snowmobile intrusions into Nordic ski areas, or into wilderness areas. Specific areas include Horseshoe Prairie Nordic Area, Spout Springs Nordic Area, and the Wenaha-Tucannon Wilderness. The objective is to separate motorized from non-motorized users in one of two ways: 1) by establishing separate points of departure into snow country for motorized users and non-motorized users or 2) by providing access to a common starting point for all users and separating the users once they arrive. There is also rising demand for trails and roads dedicated to summer use of ATVs. Roads rated with low value may be converted to trails and meet some of that demand while minimizing costs and adverse resource impacts from new trail construction.

UR2 and RR2: Is developing new roads into unroaded areas, decommissioning of existing roads, or changing the maintenance of existing roads causing substantial changes in the quantity, quality, or type of unroaded (or roaded) recreation opportunities?

No roads have been built into inventoried roadless areas in several years. Probably the largest single factor affecting roaded recreation opportunities on the Umatilla National Forest was the passage of the 1984 Oregon Wilderness Act, when the 107,000-acre North Fork John Day Wilderness was created. Eighteen roads leading into the area were closed with the creation of the wilderness. Much vehicular and OHV recreation use was displaced by this designation.

Numerous road closures across the Forest for wildlife and other resource protection have reduced the miles of roaded recreation opportunities available.

Recent reductions in the road maintenance budget has meant fewer miles of road can be maintained at historic levels. Many miles of roads previously maintained at maintenance level 4 (maintained for passenger vehicles – smooth surface) are now at an operational maintenance level 3 (passenger vehicles – surface not smooth) or lower. The quality of roaded recreation opportunities has gone down, and the changes have been noted by numerous complaints from the public.

UR3 and RR3: What are the effects of noise and other disturbances caused by developing, using, and maintaining roads on the quantity, quality and type of unroaded (and roaded) recreation opportunities?

A good portion of Forest visitors state they come to the forest to get away from noise and other aspects of urban living and for environmental relief during the summer months. Further road building would predictably reduce opportunities for a quiet forest experience and generally degrade unroaded recreation. Developing, using, and maintaining roads would force visitors into areas where these activities do not occur.

UR4 and RR4: Who participates in unroaded (and roaded) recreation in the areas affected by constructing, maintaining, and decommissioning roads?

Visitors to the Forest come from a variety of places including local communities, other locations in the state, and also from other states and countries. Those who come to the Forest participate in a variety of recreational activities, both roaded and unroaded, with a majority participating in unroaded activities such as hunting and both summer and winter trail riding.

UR5 and RR5: What are these participants' attachment to the area, how strong are their feelings, and what are alternative opportunities and locations available?

Locals and visitors from the Willamette Valley are often attached to specific areas of the Forest, due to a history of using these areas for generations, especially for hunting. Because of these strong attachments, there is resistance to alternative opportunities and locations.

UR6 and RR6: How does the road system affect the Scenic Integrity? How is developing new roads, decommissioning of existing roads, or changing the maintenance of existing roads into unroaded areas affecting the Scenic Integrity?

Scenic Integrity indicates the degree of intactness and wholeness of the landscape character. Human alterations may raise, maintain, or lower the intactness of a landscape. In the case of roads, development could only maintain or even lower the scenic integrity level for landscape character.

Forest visitors will drive the roads to view outstanding scenery and will enjoy their experience. For them, the road becomes a part of the scenery and is acceptable to their experience. On the other hand, for the visitor who views the Forest from more of a purist standpoint, any development, including roads, could deviate from the intactness of the landscape character.

New road development can be compatible with Scenic Integrity levels in a landscape, as long as basic design elements become a part of the whole picture, such as form, line, color, and texture. A road which has flowing lines, established cut and fill banks, and fits well with the landform could add to, or at least maintain, the intactness of the landscape; whereas, a road that does not fit well with the landscape could lower levels of landscape intactness.

Because the old roadbeds and visual scars will remain, decommissioning of existing roads will not have much affect for the first few years. In the long-term, grasses and vegetation will become established, and the visual effects will fade and disappear. Decommissioning would have a beneficial effect after vegetation becomes established.

Changing maintenance levels will not have much of a visual effect on the landscape, because existing cuts and fills will remain apparent.

The effect of roads on Scenic Integrity needs to be analyzed at the project level using the Visual Quality Objectives (VQO) for the particular area. The visual qualities that are the objectives for a particular area would determine the degree of effects of developing new roads, decommissioning of existing roads, and changing the maintenance of existing roads in unroaded areas.

Passive-Use Values (PV)

Questions PV 1-4 have been combined into the following question.

PV3: Who currently holds passive use values and what will be the potential effect, positive and negative, of building, closing, or decommissioning roads on passive-use values?

This does not neatly fall into either a watershed scale or a forest scale issue. Forest visitors have specific areas and landscapes that are of interest to them. Local populations have modern historic roots in the area with attachments at different scales. Other groups of people (environmental groups) have a more generic interest in unroaded areas, and they operate at a forest-wide scale.

Social Issues (SI), Civil Rights and Environmental Justice (CR)

SI-1: What are peoples perceived needs and values for roads? How does road management affect people's dependence on, need for, and desire for roads?

Roads are used to access recreation and commercial opportunities. Well-maintained roads facilitate recreation and commerce; poorly maintained roads make travel difficult or impossible. Roads are not always viewed as beneficial. Many people feel the national forests have too many roads and no further road construction is necessary. Others view roads as beneficial to their experience and to forest management.

Driving for pleasure is a major activity across the forest, especially during hunting season. General use is during the spring, summer, and fall seasons when the roads are free of snow. Some snow sports areas are maintained and accessible during the winter. The Blue Mountain Scenic Byway enhances tourism along its 130-mile route from Arlington, Oregon, through Heppner and Ukiah to its junction with the Elkhorn Scenic Byway in Granite, Oregon. This scenic byway is open only during the summer. The Elkhorn Scenic Byway continues across the Wallowa-Whitman National Forest to Baker City, Oregon. State Highway 244 bisects the Walla Walla Ranger District from Athena to Elgin, Oregon. The high point along this road includes the Tollgate winter sports area.

SI-2: What are people's perceived needs and values for access? How does road management affect people's dependence on, need for, and desire for access?

Most of the major roads in the Forest were built to access and harvest timber and grazing allotments. Once people have legal access by road to an area, that area becomes somebody's favorite place. Users feel a good transportation system allows them appropriate access. Some in older age groups prefer easier access to their favorite recreation spots; others want access to trailheads to discover the backcountry. In either case, a well-designed road system is imperative for their access.

Timber harvest, grazing, and local mining operations continue to be economic factors in the communities surrounding the Forest. However, the majority of road use today occurs from recreational activities including hunting, sightseeing, car camping, and day use with a few locations open in the winter.

Year-round accessible recreation opportunities are becoming more important to many residents in the communities around the Forest. Getting to the Forest and to favorite spots is extremely important, as evidenced by the list of favorite sites mentioned in county plans. Hunters depend on a certain amount of access to get to their hunting area. If access to an area becomes unavailable, the hunt may not take place as planned.

SI-3: How does the road system affect access to paleontological, archaeological, and historical sites?

Many historical and a few paleontological and archaeological sites along arterial, collector, or local roads have been recorded. Most sites have not been interpreted in order to retain scientific values. A road system increases access to sites, making them more accessible for vandalism and theft of artifacts, however, many forest visitors enjoy learning about local history and visiting small interpretive sites.

SI-4: How does the road system affect cultural and traditional uses (such as plant gathering, and access to traditional and cultural sites), and American Indian Treaty Rights? SI-9: What are the traditional uses of animal and plant species within the area of analysis? *SI-4 and SI-9 have been answered together.*

The road system has positive and negative effects on such sites. The degree of isolation of these sites is important to traditional users. They had been used long before there were roads. The road system allows other users and non-traditional users access to the same areas, which can cause conflicts and a loss of the values important to Native Americans. Effects can extend beyond individual watershed boundaries.

SI-5: How does road management affect historic roads? (*This question has been re-worded)*

There are no historic roads on the Umatilla NF. Historic roads could be affected by upgrading the standard to which the road is maintained.

****SI-6: How may local community social and economic health be affected, positively and negatively, by road management (for example, lifestyles, businesses, wood products, tourism industry, infrastructure maintenance)?**

Road management is subtle, yet necessary to Forest management. Use of the Umatilla National Forest is dependent on proper, timely road management. Commodity users rely on the existing road system, as do forest visitors. Most of the roads in the Forest were built to facilitate timber harvest, grazing, and recreation. Today, the majority of traffic is from recreation.

Recreation traffic includes local and non-local users, many of whom are sight seeing. Across the National Forest System, managers have indicated that nearly 40 percent of Forest use is by people who never get out of their vehicles.

Tourism is generally viewed as a benefit to the local economy. A properly designed and coordinated road system can direct publics to nearby communities for goods and services instead of allowing travelers to pass through the Forest without stopping at local businesses.

Most users expect to go long distances quickly and to be able to travel through the Forest in comfort. Maintenance is increasingly important to facilitating the demands of these visitors.

SI-7: What is the perceived social and economic dependency of a community on an unroaded area versus the value of that unroaded area for its intrinsic existence and symbolic values?

or SI-7: For communities adjacent to the Forest with industries dependent upon Forest –related resources (wood products, mineral, grazing, tourism), what are the local values of currently unroaded areas surrounding the communities? These may include the value of roading the area for continued access to resources, expanded roaded opportunities, or maintaining unroaded areas and opportunities.

Smaller communities view themselves as dependent on forest resources. These residents see roads as imperative to the management of the Forest for recreation, timber harvest, or grazing. Other residents believe that the Umatilla National Forest has too many roads that adversely impact fish and wildlife habitat, water quality, and a sense of solitude often found in undeveloped areas.

The current road system appears to sufficiently disperse use; however, concentration areas are becoming evident, requiring more intense management. There are few opportunities to increase the miles of maintained roads, and there is no impetus to close any of the level 3, 4, or 5 roads. Maintenance of existing roads is imperative for continuing the dispersal of users, most of whom are pleasure driving for scenery, hunting, or just accessing favorite areas for day-use activities.

SI-8: How does road management affect wilderness attributes, including natural integrity, natural appearance, opportunities for solitude, and opportunities for primitive recreation?

There are three wilderness areas on the Umatilla National Forest: North Fork John Day, North Fork Umatilla, and Wenaha-Tucannon. Roads have indirect impacts to wilderness values because the roads can be seen and heard from inside the wilderness area. There are un-authorized motorized uses that start from the road system. There are several short segments of level 2 roads that provide authorized access to mining operations and water ditches in the North Fork John Day wilderness.

SI-10: How does road management affect people's sense of place?

People's sense of place is directly tied to the aspects of an area, including the area within a road corridor, that invoke a special feeling or attachment. Factors include the area's vegetation, the amount of sunlight available, the views, the solitude, the opportunities that make it a destination, and familiarity with the area. The road facilitates the type and amount of use. The design and course of the road allow individuals to see various aesthetic attributes visible alongside the road. These attributes are directly related to road management. Forest roads provide a variety of enjoyment, open views of wide vistas as well as confined narrow roads where the forest comes in close to the traveler. Any change in road management or the development of a road without considering these things will create a change in current use.

If a road is managed as a level 3 and the decision is made to upgrade it, additional users with different values might begin to use the area. This will change the character of the area for users who consider the area special. It will change the user's experience and may displace them to other areas for their recreation activities. Conversely, a road currently managed as a level 5 and downgraded in maintenance will not be as drivable, and the area will become inaccessible for some current users. This problem is evident for the elderly who have used the area for years. Because a variety of different people use the existing road system, they need to be considered before changing road management.

CR1: How does the road system, or its management, affect certain groups of people (minority, ethnic, cultural, racial, disabled, and low-income groups)?

The road system is used by all groups of people. Changes in road management, including closing or decommissioning of any roads would have an effect on all groups of people, including minorities and different cultures. Changes in road management have a great effect on the disabled and elderly who have no means of access other than mechanized. Lower road standards negatively affect low-income groups who may not have suitable modes of transportation (ATVs and OHVs) to use lower standard roads.

Chapter 6 Describing Oppo g es

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Problems and Risks Posed by the Current Road System

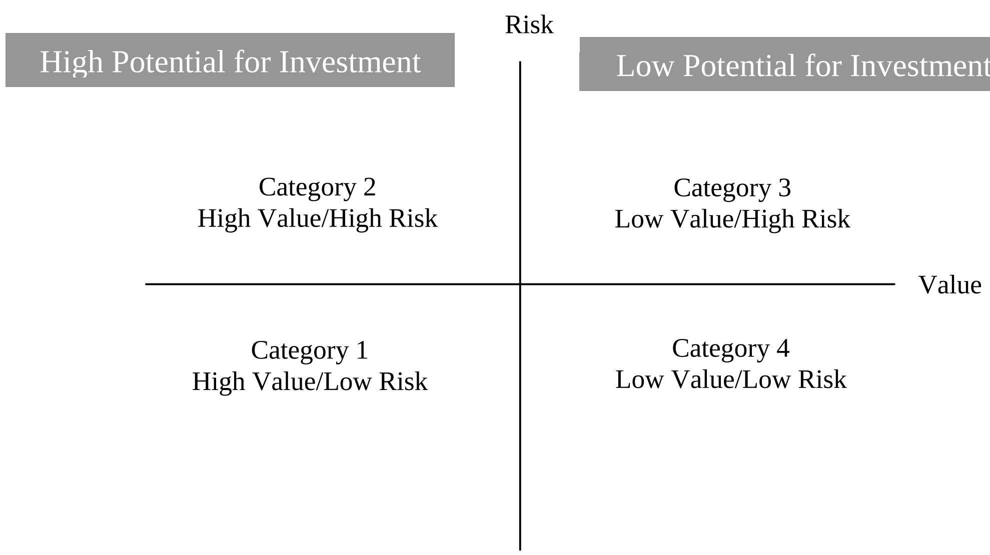
Introduction

To assess the problems and risks posed by the current road system, the IDT evaluated the primary transportation system on the Umatilla National Forest using the following tools: a GIS assessment, a road matrix, and a road management graph. There were some inherent limitations in the data used.

GIS Assessment: The effect of roads on the watershed and aquatic resources was analyzed using GIS computer technology combined with the Forest transportation inventory and cartographic feature files.

The Road Matrix (Appendix B) lists every road considered part of the primary transportation system. This includes all of the objective maintenance level 3, 4 and 5 roads on the Forest as well as the objective maintenance level 2 collector roads. The matrix assigns low, moderate, or high values to resources, and includes annual and deferred maintenance costs. This is a broad assessment, so the detail and accuracy for road risk and values contain a degree of subjectivity and potential for inaccuracies. However, this road matrix provides road-specific information that will help define the potential minimum road system, identify roads that pose high risk to other resources, and prioritize sub-forest-scale projects. As more information becomes available, the road matrix information should be validated and updated.

The Road Risk-Value Graph (Figure 2) was developed to display the information in the road matrix. It categorizes the values and risks of the current road system and helps identify opportunities for managing the road system and prioritizing expenditures of Forest road maintenance and improvement funds. This graph is only a management guide; it is not firm direction as it combines many of the road matrix risk and value variables.



Resource Risks versus Road Use Values

The risks and values from the road matrix (Appendix B) and the road management graph are defined below.

Road-Related Risks

Watershed: Watershed risk was developed through GIS analysis (Appendix A) using 5th level watersheds. Road segments in each watershed were assigned the appropriate risk level (high, medium or low). This was intended to guide sub-forest-scale analysis.

Aquatic Species: Watershed risk was developed through GIS analysis using 5th level watersheds. Road segments in each watershed were assigned the appropriate risk level (high, medium or low). This was intended to guide sub-forest-scale analysis.

Wildlife Species: Many scientific studies have documented impacts to wildlife, including direct mortality, habitat fragmentation, edge effects, viability and sustainability, and nesting and rearing disturbances. The IDT utilized these studies as well as the Forest's annual monitoring reports to evaluate wildlife risks. The monitoring reports clearly demonstrated that the current road system has minimal effects on the management indicator species listed in the Forest Plan. Most of the wildlife risk values assigned to each road on the Forest were low, a few were moderate, and none were in the high category.

The nearness to roads of important habitat characteristics was used as the main criteria in determining the rating. Each road segment was rated as having a High (H) = serious risk; Moderate (M) = moderate risk; or Low (L) = low, or no known risk to federally listed endangered and threatened species, and Forest Service sensitive species. The important habitat characteristic for bird species with a relative low tolerance for disturbance was nests near a roadway. For plant species, it was the occurrence of the plant in or immediately adjacent to the roadway.

More information about road impacts to wildlife on the Umatilla National Forest can be found in the TW section (Chapter 4) of this report.

Invasive Plant Species: For each road segment, noxious weed risk was evaluated by four key factors that control or strongly influence the introduction, spread, and impact of noxious weeds. These include: (1) seed availability and consequences of further spread (areal extent of existing weed infestations for high and low risk weed species), (2) habitat potential (vegetation and climatic conditions), and (3) spread potential (level of grazing activity). Data sources used in the model incorporate GIS coverages and databases of current (2001) noxious weed inventories, Forest transportation layer, grazing allotments, existing vegetation, and potential vegetation groupings

Financial Risks: Annual and deferred maintenance costs were included in the risk/value categories for the road management graph. These costs were included to reflect the Forest's financial commitment to maintain the road system and to identify the link between maintenance and resource protection. If basic annual road maintenance (such as drainage maintenance) is not performed, roads have an increased potential for loss of investment and environmental damage. The same is true for deferred maintenance, such as replacing major culverts in perennial streams at the end of their service life. A catastrophic drainage failure will have a direct negative impact on the associated watershed and aquatic health.

Engineering Concerns: Factors such as geology, soils, slope, and past development activities affect the costs and difficulties of maintaining or improving a road. These factors become concerns when they lead to excessive erosion of the road surface and prism, tendency for rutting, recurring maintenance, or slope failure that could damage or remove portions of a road. Engineering concerns are rated high, medium, and low. Development of redundant alignments is also considered an engineering concern. Such conditions occur in areas of timber development, high recreation, or OHV use.

Road-Related Values

Resource Management Values: This value was based on two factors: road length and the variety of land and resource management access needs provided by the road. Initially, each road was given a default value rating based on its length.

Roads 10 miles in length or greater, received a high value rating. Roads from 0.0 to 7.0.9 miles in length were given a low value. Roads greater than 7 and less than 22.0 miles long were rated moderate. Roads greater than 22 miles long were rated high. For the second step, the following seven criteria were used on a road-by-road basis to adjust the default values. They were access to the suitable timber base, rangelands, private land, electronic sites, administrative facilities, water production or storage facilities, and minerals exploration and extraction. These criteria were used either alone**,** in cases where one use was very important for management of that resource**,** or in combination where the road served two or more access needs.

Recreation Use Values: The value of recreation use of the road system was rated separately. High values were assigned to roads that provided direct access to developed recreation sites or were key recreation access roads to the Forest. Moderate to high values were assigned to dispersed recreation areas along roads with heavy summer and fall use. Low values were often assigned to roads that provided only seasonal dispersed recreation use.

Road Management Categories and Graph

After performing a road-by-road rating of risk and value based on the established criteria, the following road management categories and graph were developed to display the information and present opportunities for road management. The matrix and watershed assessment provide a basis for sub-forest-scale roads analyses. The following four categories of roads were identified based on value and risk. Within each category, there are possible management options for the roads.

Category 1: High Value and Low Risk – Ideal Situation

Options:

- Focus road maintenance funds on these roads to keep them in this category.
- High priority for the Public Forest Service Road designation.
- These roads form part of the potential minimum road system for the Forest.

Category 2 – High Value and High Risk – Priorities for Capital Improvements

Options:

- High priority for sub-forest-scale roads analysis to identify opportunities to reduce high risks. High priority for capital improvement funding, PFSR designation, road improvement, deferred maintenance and capital improvement funding. Shift road maintenance funds to these roads to keep their resource risks from increasing.
- These roads are the remainder of the potential minimum road system for the Forest.

Category 3 – Low Value and High Risk – Priorities for Analysis and Action to Reduce Risk

Options:

- High priority for sub-forest-scale roads analysis to identify opportunities to reduce high risks and confirm use value.
- High potential for reducing traffic and use load, functional classification, and/or maintenance level. Options include decommissioning, storm-proofing techniques, or heavy maintenance.

Category 4 – Low Value and Low Risk – Priorities for Reducing Maintenance Level

Options:

- Lowest priority for expending annual road maintenance funding.
- Moderate potential for reducing maintenance level and/or functional classification.
- Moderate potential for decommissioning following sub-forest-scale risk/value analysis.
- High potential for converting some of these roads to trails where there is a recreational demand.

The Road Risk-Value Graph (see following page) was the tool used to identify roads for the road management categories (above). Several factors must to be understood to correctly interpret this graph and the identification of roads in the different categories.

Roads with a value of more than 6 (left side of the vertical axis), represent those roads that constitute the Potential Minimum Road System for management and use of the Umatilla National Forest by passenger cars. Those roads with a value of 5.9 or less are roads that are potentially not needed for use by passenger cars on the Forest, at least possibly not needed at their current maintenance level. The situation is similar for the horizontal axis. Those roads with a risk rating 12 or more represent roads that may be causing unacceptable resource impacts, while those with a rating of less than 11.9 are not as much of a resource concern.

Of special note: it needs to be emphasized that just because a road falls below the horizontal axis does not mean it is not causing resource impacts. The risk rankings are a sum of the wildlife, watershed, aquatic, noxious weeds, maintenance costs, and engineering concerns. Low costs and higher resource risks could still result in an overall ranking of less than 12 (low risk) on the graph. The road matrix (Appendix B) needs to be used with the graph to identify the actual risks and values that have been assessed through this analysis.

Figure 2. Road Risk Value Graph

High Potential for Investment | **Low Potential for Investment**

Risk 17

Minimum Primary Road System (obML 3, 4, 5 roads)

Category 2
High Value/High Risk

Priority for investment
(CIP, PFSR, etc.)
Focus on resource

395.25 miles
$10,259,768 deferred maint
$ 375,238 annual maint.

Category 3
Low Value/High Risk

Priority for risk analysis
Consider reducing maintenance level
Consider decommissioning
Focus on resource concerns

117.55 miles
$ 2,719,509 deferred maint.
$ 24,474 annual maint.

9 (5.9/11.90) *3* *Value*

Category 1
High Value/Low Risk

Ideal condition
Maintain to standard
Review for potential resource concerns

384.53 miles
$10,775,630 deferred maint
$ 180,381 annual maint

Category 4
Low Value/Low Risk

Consider reducing maintenance level
Consider decommissioning
Review for potential resource

525.54 miles
$ 12,246,406 deferred maintenance
$ 103,951 annual maintenance

6

Note: Not to Scale
Value **= Recreation value + Resource management + Upland Forest Value (minimum value = 3, maximum = 9)**
Risk **= Watershed risk + Wildlife risk + Aquatic Risk + Noxious Weeds + (Deferred+Annual maintenance)/2 + Engineering Concerns (maximum=17)**
Horizontal axis: =< 5.9 = low potential for investment (low value). **Vertical axis: =< 11.9 = low risk.**
=> 6 = high potential for investment (high value). **=>12 or greater = high risk**

Road Maintenance Costs – Identification of the Potential Minimum Road System

One purpose of a roads analysis is to identify ways to more efficiently spend the limited road maintenance dollars allocated to the forests. One approach is to reduce or eliminate expenditures on roads that are not needed or not needed at their current maintenance level. The process described above identifies the Potential Minimum Primary Road System.

Some conclusions can be made by comparing annual road maintenance funding needed for each road to the road maintenance graph. If all of the roads to the right of the vertical axis were to be decommissioned, the needed annual road maintenance funding for just the primary road system on the Forest would be reduced from $656,863 to $555,619. The actual allocated road maintenance funding for the entire combined Umatilla National Forest has been dropped from $1,440,000 in 2001 to $719,000 in 2004. This amount pays for salaries, vehicles, materials and supplies, overhead, and actual road maintenance. More road maintenance funding is needed to support the road system infrastructure.

Decommissioning Guidelines

Discussion

Road decommissioning results in the removal of a road from the road system. The impacts of the road on the environment are eliminated or reduced to an acceptable level. To accomplish this a number of techniques can be used, such as posting the road closed and installing waterbars, posting and installing barriers and barricades, ripping and seeding, converting the road to a trail, and full reclamation by 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.

Decommissioning level 1 and 2 roads can consist of removing the few culverts, ripping and seeding, posting closed with signs, and installing waterbars to discourage unauthorized motorized vehicle use and ensure proper drainage occurs over time.

Decommissioning level 3, 4, and 5 roads is more expensive than decommissioning most level 1 and 2 roads. When choosing a technique for road decommissioning, the objective is to eliminate the need for future road maintenance.

When roads to be decommissioned have adequate surfacing, reclaiming the aggregate for use elsewhere may be advantageous.

Level 3, 4, and 5 roads are usually wider than level 1 and 2 roads, have culverts installed at designed intervals to cross drain the road, are 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. 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 the cost. For a particular road (level 3, 4, or 5), high deferred maintenance costs may exceed the costs of decommissioning.

Guidelines

- Balance cost with resource risk and effectiveness of the treatment when selecting methods for decommissioning roads.
- Convert roads to trails as a decommissioning method when analysis of recreation demand indicates a need to expand, connect, or improve the existing trail system in the area. Provide adequate trailhead parking as part of this treatment method.
- Decommission by restoring the road to original contours when the Forest Plan requires mitigating visual impacts or when necessary to assure the elimination of vehicular traffic.

Capital Improvement Guidelines

Discussion

This analysis does show there is a need to reconstruct existing roads to correct deferred maintenance work items or to improve some roads to meet increasing use and traffic requirements. Funding limitations require prioritization of reconstruction work. The Road Risk-Value Graph (Figure 1) provides a starting point for developing priorities. The following guidelines are to be used in conjunction with the graph when selecting, prioritizing, and implementing road reconstruction and construction projects.

Guidelines

- Conduct road location reviews before all new construction and road relocations. Assure the location meets public and agency needs while mitigating environmental impacts identified in the analysis. Responsible line officers and resource and engineering specialists should participate in the review.
- Continue with the traffic counting program to identify high use roads and traffic patterns.
- Roads with seasonal average daily traffic volumes exceeding 100 vehicles per day should be considered for reconstruction to two lanes.
- Use motor vehicle accident safety investigations and reports to help identify road safety hazards.
- Use the following categories to prioritize road investments planned to reduce deferred maintenance backlog on roads: 1 – Critical Health and Safety; 2 – Critical Resource Protection; 3 – Critical Forest Mission. Data for these work items can be found in the Infrastructure database.
- Coordinate reconstruction and construction work with other agencies whenever possible. Utilize interagency agreements to develop investment and maintenance partnerships.

Road Management Guidelines

- If a road's operational maintenance condition has decreased, consider the need for the road and the historic use, as well as alternative roads in the area before permanently changing the maintenance level.
- Reduce the operational maintenance level on identified low value level 3, 4, and 5 roads being analyzed in sub-forest-scale roads analyses. This can be a cost effective alternative. Reduced maintenance should not result in any increased watershed risks from these roads, as the most basic road maintenance will focus on maintaining road drainage. The reduced maintenance should only result in reduced user comfort, and hence, reduced use over time will further reduce the potential for road related watershed risks.
- It is important for travelers to have the sort of information necessary to make a decision about the road on which they are about to travel. When appropriate, utilize entrance treatments, warning signs, route markers, and information bulletin boards to advise travelers of conditions ahead.
- Do not post speed limit and other regulatory signs on roads under Forest Service jurisdiction without a Forest Supervisor's order and a law enforcement plan.
- To reduce annual maintenance costs, implement seasonal travel restrictions on roads susceptible to damage during wet or thawing conditions.
- Collect road maintenance and surface rock replacement deposits (as appropriate) on all commercial use of classified roads (include timber haul).

General Guidelines

The following are general road-related guidelines:

- Require authorized, permitted operations utilizing NFS roads to pay their fair share of road maintenance costs.

- Consider road decommissioning when planning projects that involve the construction and use of short-term, single resource roads. For example, roads planned for mineral projects that undergo exploration, development, and abandonment phases. By incorporating decisions to decommission the single resource roads at the end of the project, rather than not addressing this issue up front, the Forest will better demonstrate a commitment to managing its road system toward the minimum road system needed. Document planned decommissioning in road management objectives, as well as databases and GIS.
- Develop an annual maintenance plan to prevent deferred maintenance costs from accruing on high value rated roads
- Update the road system databases and keep them current.
- Use an interdisciplinary process to develop, update, and implement road management objectives for all system roads. Assure that information in the transportation atlas and inventory conforms to approved road management objectives.
- At appropriate intervals, update the data contained in the Road Matrix (Appendix B). Analyze the changes to determine new opportunities that may have developed as new information is collected.
- Incorporate yearly Forest road changes into the annual Forest Plan Monitoring Report (via the forest plan revision process). These road changes can include miles of road decommissioned (classified and unclassified), miles of road converted to trail (motorized and non-motorized), miles of road reconstructed (by maintenance level), and miles of road constructed (also by maintenance level).
- Continue performing road condition surveys on a two-year rotation per current Washington Office direction on objective maintenance level 3, 4, and 5 roads. Continue with condition surveys on the random sample of maintenance level 1 and 2 roads per Washington Office direction.

Opportunities for Addressing Problems and Risks

Travel Management: For roads in the low value rating, either decommission, reduce maintenance level, or consider ways to raise this value. For example, provide recreation opportunities along the road. Overall recreation use on the Forest is increasing, and road related opportunities exist to better disperse this use and lessen recreation impacts that are occurring elsewhere. An example of increasing recreation use on a low value road would be to develop a trailhead and trail system at the end of the road. There are many opportunities on the Forest to convert unclassified and level 1 and 2 roads to motorized and non-motorized trails.

Watershed: The following opportunities could remedy road impacts for specific watershed or aquatic situations such as surface/subsurface hydrology and surface erosion.

Reword these Opportunities/recommendations to consider if roads are likely to modify surface and subsurface hydrology:

- Design roads to minimize interception, concentration, and diversion potential.
- Design measures to reintroduce intercepted water back into slow subsurface pathways.
- Use outsloping and drainage structures to disconnect road ditches from stream channels rather than delivering water in road ditches directly to stream channels.
- Evaluate and eliminate diversion potential at stream crossings.

Opportunities to address concerns in riparian areas include:

- Relocate roads out of riparian areas.
- Limiting clearing distances in riparian areas during construction, reconstruction, and maintenance.
- Restore the hydrology in riparian areas that have been dewatered by the road system.

Opportunities to reduce surface erosion include:

- Increase the number and effectiveness of drainage structures.
- Improve the road surface by either gravelling or adding a binding material to those roads that have native surfaces with no inherent binder.

Opportunities to address existing roads in areas with mass wasting potential include:

- Relocation to an area with more stable soils.
- Relocation of drainage structures so outlets are on less sensitive areas which may include flatter slopes and better-drained soils.
- Additional drainage structures to reduce the concentration of water at any given location.
- Reducing the maintenance and service level of the road.

Opportunities to reduce the effects of the road system on wetlands include the following:

- Relocate roads out of wetland areas.
- Where relocation is not an option, use measures to restore the hydrology of the wetland. Examples include raised prisms with diffuse drainage such as french drains.
- Set road crossing bottoms at natural levels of wet meadow surfaces.

Opportunities to improve road/stream crossings include:

- Design crossings to pass all potential products including sediment and woody debris, not just water.
- Realign crossings that are not consistent with the channel pattern.
- Change the type of crossing to better fit the situation. For example, consider bridges or hardened crossings on streams with floodplains, and consider bottomless arch culverts in place of round pipe culverts
- Add cross-drains near road-stream crossings to reduce the length of road ditch discharging into the stream system.
- Reduce the number of road-stream crossings to minimize the potential for adverse effects

Opportunities to address road-stream crossings that restrict migration and movement of aquatic organisms include:

- Eliminate the culvert, through road decommissioning.
- Improve aquatic passage with stream simulation. Replace the culvert, using state-of-the-art techniques such as Stream Simulation.

Forest Plan Revision: This roads analysis can be used to identify needs for change during forest plan revision.

Fuel Reduction: Anticipated funding related to the Healthy Forest Initiative and the Healthy Forest Restoration Act for the next several years presents another opportunity to address growing risks to communities from unwanted wildland fire. The IDT placed high resource management values on many of the level 3 and 4 roads that provide primary access to areas around and within the Forest with high densities of cabins, homes, and other structures. These roads may be important access routes for fuel reduction projects, especially any commercial projects that could involve log hauling, provide important access for wildfire suppression, and evacuation egress. The IDTs for fuel reduction planning projects can use the road matrix (Appendix B) to begin identifying the existing access/egress situation to help define the road related project proposals.

Deferred Maintenance Backlog: This Umatilla National Forest Roads Analysis clearly demonstrates that annual maintenance funding is inadequate to maintain the road system on the Forest. Over time, these roads will continue to incur additional deferred maintenance costs and degrade unless significant road reconstruction funding becomes available. The agency is addressing this issue nationally by proposing a new funding category for the 2004 federal highway transportation funding authorization called Public Forest Service Roads (PFSR). The road matrix table (Appendix B) displays those roads that are potential PFSR's. The Forest currently has a good working relationship with the counties in regards to shared road maintenance. The Forest should continue to pursue additional formal road maintenance agreements with the counties interested in sharing maintenance to more efficiently use taxpayer funds.

Areas Needing Additional Access: The Umatilla National Forest is adequately roaded, from an overall transportation perspective. Small areas may need road access for timber harvest, but, when possible, should be accessed by temporary roads that can be decommissioned when finished.

NEPA Analysis Needs

This roads analysis is not a federal action under the National Environmental Policy Act. It does provide information and opportunities to be considered during forest plan revision, sub-forest-scale roads analyses, and site-specific project analyses. Road related activities identified during sub-forest-scale roads analyses, that are taken into the NEPA process, will be required to be supported by the appropriate level of NEPA.

Road Number	Name	BMP	EMP	District	Segment Length	Functional Class	Jurisdiction	Operational Mntc Level	Objective Mntc Level	Def & Ann average cost rating	Capital Improvement Costs	Recreation Use Value[3]	Recreation Use Number	Resouce Mgmt Value[4]	Resouce Mgmt Number	Upland Forest Value	Upland Forest Number	Noxious Weed Risk	Noxious Weed Number	Watershed Risk Number	Aquatic Number	Wildlife Number	Engineering Concerns Number	Potential PFSR	Total Value	Total Risk
1000000	OLIVE LAKE DRIVE	0	27.6	North Fork	27.6	A	FS	4	4	2		H	3	H	3	H	3	L	1	3	3	3	2	POT	9	14
1000000	OLIVE LAKE DRIVE	27.6	36.1	North Fork	8.5	A	FS	4	4	2		H	3	H	3	H	3	L	1	2	3	3	1	POT	9	12
1000000	OLIVE LAKE DRIVE	36.1	39.5	North Fork	3.4	A	FS	4	4	2		H	3	H	3	H	3	L	1	2	3	3	2	POT	9	13
1000480	OLIVE LAKE CG	0	0.637	North Fork	0.637	L	FS	3	4	1.5		H	3	H	3	H	3	L	1	2	3	3	1		9	11.5
1000481	OLIVE LAKE CG	0	0.6	North Fork	0.6	L	FS	3	4	1.5		H	3	H	3	H	3	L	1	2	3	3	1		9	11.5
1003000	ONION FLAT RD.	0	2.3	North Fork	2.3	C	FS	3	3	1.5		L	1	M	2	H	3	L	1	3	2	3	2		6	12.5
1003000	ONION FLAT RD.	2.3	5.55	North Fork	3.25	C	FS	2	2	1.5		L	1	M	2	H	3	L	1	1	2	1	1		6	7.5
1003000	ONION FLAT RD.	5.55	7.5	North Fork	1.95	L	FS	2	2	1.5		L	1	M	2	H	3	L	1	1	2	1	1		6	7.5
1003000	ONION FLAT RD.	7.5	8	North Fork	0.5	L	FS	2	2	1.5		L	1	M	2	H	3	L	1	1	2	1	1		6	7.5
1003000	ONION FLAT RD.	8	9.87	North Fork	1.87	L	FS	2	2	1.5		L	1	M	2	H	3	L	1	1	2	1	1		6	7.5
1006000		0	7.046	North Fork	7.046	L	FS	1	1	1		L	1	L	1	H	3	L	1	3	3	3	1		5	12
1007000		0	6.203	North Fork	6.203	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	2	2	1	1		5	8.5
1007000		6.203	6.5	North Fork	0.297	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	1	2	1	1		5	7.5
1007000		6.5	11.5	North Fork	5	C	FS	1	1	1.5		M	2	L	1	H	3	L	1	2	2	2	1		6	9.5
1009000		0	2.25	North Fork	2.25	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	2	3	2	1		5	10.5
1009000		2.25	2.721	North Fork	0.471	C	FS	1	1	1		L	1	L	1	H	3	L	1	1	3	1	1		5	8
1010000		0	5.9	North Fork	5.9	C	FS	3	3	1.5		H	3	L	1	H	3	L	1	2	2	3	1		7	10.5
1010000		5.9	9.4	North Fork	3.5	C	FS	2	2	1.5		H	3	L	1	H	3	L	1	1	2	2	1		7	8.5
1010000		9.4	15.3	North Fork	5.9	C	FS	2	2	1		H	3	L	1	H	3	L	1	1	2	2	1		7	8
1010000		15.3	17.1	North Fork	1.8	C	FS	2	2	1.5		H	3	L	1	H	3	L	1	2	2	3	1		7	10.5
1011000		0	3.42	North Fork	3.42	C	FS	2	2	1		L	1	L	1	H	3	L	1	2	3	2	1		5	10
1011000		3.42	3.65	North Fork	0.23	C	FS	1	1	1		L	1	L	1	H	3	L	1	1	2	1	1		5	7
1012000		0	2.1	North Fork	2.1	C	FS	1	1	1		L	1	L	1	H	3	L	1	2	3	2	1		5	10
1012000		2.1	2.683	North Fork	0.583	C	FS	1	1	1		L	1	L	1	H	3	L	1	2	3	2	1		5	10
1014000		0	4.7	North Fork	4.7	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	2	2	2	1		5	9.5
1030000		0	2.4	North Fork	2.4	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	1	2	1	1		5	7.5
1031000		0	5.074	North Fork	5.074	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	2	2	2	1		5	9.5
1035000	GRANITE CREEK	0	5.762	North Fork	5.762	C	FS	3	3	1.5		M	2	L	1	H	3	M	2	3	3	3	2		6	14.5
1038000		0	6.196	North Fork	6.196	C	FS	2	2	1.5		M	2	L	1	H	3	L	1	3	3	2	1		6	11.5
1300000		0	2.636	North Fork	2.636	C	FS	2	3	1.5		L	1	L	1	H	3	L	1	2	3	2	1		5	10.5
1310000		0	0.3	North Fork	0.3	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	2	3	1	1		5	9.5
1310000		0.3	4.58	North Fork	4.28	C	FS	2	2	1		L	1	L	1	H	3	L	1	3	3	1	1		5	10
1310000		4.58	5.2	North Fork	0.62	C	FS	2	2	1		L	1	L	1	H	3	L	1	2	3	2	1		5	10
2000400	FAIRVIEW CG	0	0.527	Heppner	0.527	L	FS	3	3	1.5		H	3	M	2	M	2	L	1	2	1	2	1		7	8.5
2039000	BULL PRAIRIE	0	2.04	Heppner	2.04	C	FS	5	5	3	$ 200,000	H	3	L	1	H	3	L	1	2	3	2	2	POT	7	13
2039000	BULL PRAIRIE	2.04	2.371	Heppner	0.331	C	FS	5	5	3		H	3	L	1	H	3	L	1	2	2	2	2	POT	7	12
2039000	BULL PRAIRIE	2.371	2.95	Heppner	0.579	C	FS	3	3	1.5		H	3	L	1	H	3	L	1	2	2	2	1	POT	7	9.5
2039000	BULL PRAIRIE	2.95	3.846	Heppner	0.896	C	FS	2	2	1		H	3	L	1	H	3	L	1	2	3	2	1		7	10
2039030	BULL PR CG	0	0.436	Heppner	0.436	L	FS	5	5	2		H	3	L	1	H	3	L	1	2	2	2	1		7	10
2039050	BULL PR BOAT	0	0.278	Heppner	0.278	L	FS	3	3	1.5		H	3	L	1	H	3	L	1	2	2	2	1		7	9.5
2100000	OLD WESTRN RT	3.82	17.25	Heppner	13.43	A	FS	3	3	1.5		H	3	M	2	H	3	L	1	2	3	3	1	POT	8	11.5
2100000	OLD WESTRN RT	20.15	20.25	Heppner	0.1	A	FS	3	3	1.5		H	3	M	2	H	3	L	1	1	1	2	1	POT	8	7.5

2100000	OLD WESTRN RT	20.25	28.15	Heppner	7.9	A	FS	3	3	1.5	H	3	M	2	H	3	M	2	0	1	3	1	POT	8	8.5
2100000	OLD WESTRN RT	28.15	31.15	Heppner	3	A	FS	3	3	1.5	H	3	M	2	H	3	L	1	1	2	2	1	POT	8	8.5
2100000	OLD WESTRN RT	31.15	36.14	Heppner	4.99	A	FS	3	3	1.5	H	3	M	2	H	3	M	2	1	2	2	1	POT	8	9.5
2100000	OLD WESTRN RT	36.14	45.05	Heppner	8.91	A	FS	3	3	1.5	H	3	M	2	H	3	H	3	1	3	3	1	POT	8	12.5
2100160	TUPPER WC	0	0.23	Heppner	0.23	L	FS	3	3	1.5	L	1	M	2	H	3	M	2	1	1	1	1		6	7.5
2100300	KINZUA RELOAD	1.36	1.92	Heppner	0.56	L	FS	3	1	1.5	L	1	L	1	H	3	L	1	2	1	1	1		5	7.5
2103030	PENLAND LAKE	0	0.293	Heppner	0.293	L	FS	3	3	1.5	H	3	L	1	H	3	L	1	2	2	3	1		7	10.5
2104000	RITTER ROAD	7.27	11.55	Heppner	4.28	C	FS	2	2	1	M	2	L	1	H	3	H	3	3	2	3	1		6	13
2105000	EAST WEST ROAD	0	8.5	Heppner	8.5	C	FS	3	3	1.5	L	1	L	1	H	3	H	3	2	3	3	2		5	14.5
2105000	EAST WEST ROAD	8.5	9.823	Heppner	1.323	C	FS	2	3	1.5	L	1	L	1	H	3	L	1	2	2	3	1		5	10.5
2106000		0	5	Heppner	5	C	FS	3	3	1.5	L	1	L	1	H	3	L	1	2	1	3	1		5	9.5
2107000		0	4.09	Heppner	4.09	C	FS	2	2	1.5	L	1	L	1	H	3	L	1	2	2	2	2		5	10.5
2107000		4.09	7.71	Heppner	3.62	C	FS	2	2	1	L	1	L	1	H	3	L	1	2	3	3	2		5	12
2110000		0	3.31	Heppner	3.31	C	FS	2	2	1.5	L	1	L	1	H	3	M	2	1	2	2	1		5	9.5
2110000		3.31	5.86	Heppner	2.55	C	FS	2	2	1.5	L	1	L	1	H	3	M	2	1	2	3	1		5	10.5
2110000		5.86	7.34	Heppner	1.48	L	FS	2	2	1.5	L	1	L	1	H	3	L	1	1	1	1	1		5	6.5
2115000		0	0.99	Heppner	0.99	C	FS	2	2	1.5	L	1	L	1	H	3	L	1	2	1	2	1		5	8.5
2115000		0.99	1.95	Heppner	0.96	C	FS	2	2	1.5	L	1	L	1	H	3	L	1	2	1	2	1		5	8.5
2115000		1.95	2.75	Heppner	0.8	L	FS	2	2	1.5	L	1	L	1	H	3	L	1	2	2	3	1		5	10.5
2115000		2.75	3.76	Heppner	1.01	L	FS	1	1	1.5	L	1	L	1	H	3	L	1	1	1	2	1		5	7.5
2115000		3.76	4.5	Heppner	0.74	L	FS	2	2	1.5	L	1	L	1	H	3	M	2	2	1	2	1		5	9.5
2120000		0.8	3.94	Heppner	3.14	C	FS	2	2	1.5	M	2	L	1	H	3	M	2	2	2	2	1		6	10.5
2120000		3.94	5.94	Heppner	2	C	FS	2	2	1	M	2	L	1	H	3	M	2	2	1	2	1		6	9
2120000		5.94	7.86	Heppner	1.92	C	FS	2	1	1	M	2	L	1	H	3	L	1	2	2	2	1		6	9
2122000		0	6.18	Heppner	6.18	C	FS	2	2	1.5	L	1	L	1	H	3	L	1	3	3	3	1		5	12.5
2128000		0	2.95	Heppner	2.95	C	FS	3	3	1.5	M	2	L	1	H	3	L	1	3	3	2	1		6	11.5
2128000		2.95	4.55	Heppner	1.6	C	FS	3	3	1.5	M	2	L	1	H	3	L	1	2	3	2	1		6	10.5
2128000		4.55	10.64	Heppner	6.09	C	FS	3	3	1.5	M	2	L	1	H	3	M	2	3	3	2	1		6	12.5
2140000		0	2.979	Heppner	2.979	C	FS	2	2	1	L	1	L	1	H	3	L	1	1	2	2	1		5	8
2141000	HENRY CREEK	0	0.82	Heppner	0.82	C	FS	2	2	1	L	1	L	1	M	2	L	1	1	2	2	1		4	8
2141000	HENRY CREEK	0.82	2.39	Heppner	1.57	C	FS	2	2	1	L	1	L	1	M	2	L	1	2	2	2	1		4	9
2141000	HENRY CREEK	2.39	4.63	Heppner	2.24	C	FS	2	1	1	L	1	L	1	M	2	L	1	2	1	2	1		4	8
2141000	HENRY CREEK	4.63	4.88	Heppner	0.25	C	FS	2	1	1	L	1	L	1	M	2	L	1	1	1	1	1		4	6
2141000	HENRY CREEK	4.88	6.1	Heppner	1.22	C	FS	2	2	1.5	L	1	L	1	H	3	L	1	2	2	2	1		5	9.5
2142000		0	1.9	Heppner	1.9	C	FS	2	2	1.5	L	1	L	1	H	3	M	2	2	1	2	1		5	9.5
2142000		1.9	4.47	Heppner	2.57	C	FS	2	2	1	L	1	L	1	H	3	L	1	2	1	2	1		5	8
2142000		4.47	6.47	Heppner	2	C	FS	2	2	1.5	L	1	L	1	H	3	L	1	1	1	2	1		5	7.5
2145000		0	0.04	Heppner	0.04	C	FS	2	1	1.5	L	1	L	1	H	3	L	1	1	1	2	1		5	7.5
2145000		1.244	1.74	Heppner	0.496	C	FS	2	1	1.5	L	1	L	1	H	3	L	1	2	3	2	1		5	10.5
2145000		1.74	1.859	Heppner	0.119	C	FS	2	1	1.5	L	1	L	1	H	3	M	2	1	2	2	1		5	9.5
2202000		0	2.15	Heppner	2.15	C	FS	2	2	1	L	1	L	1	H	3	L	1	2	1	2	1		5	8
2202000		2.15	3.05	Heppner	0.9	C	FS	2	2	1	L	1	L	1	H	3	L	1	2	1	1	1		5	7
2202000		3.05	3.39	Heppner	0.34	C	FS	1	1	1.5	L	1	L	1	H	3	L	1	2	2	2	1		5	9.5
2202000		3.39	4.35	Heppner	0.96	C	FS	1	1	1	L	1	L	1	H	3	L	1	2	3	2	1		5	10
2202000		4.35	4.75	Heppner	0.4	C	FS	1	1	1	L	1	L	1	H	3	L	1	2	3	2	1		5	10
2202000		4.75	6.198	Heppner	1.448	C	FS	1	1	1	L	1	L	1	H	3	L	1	2	2	2	1		5	9
2202000		6.198	6.23	Heppner	0.032	C	FS	2	2	1	L	1	L	1	H	3	L	1	2	1	2	1		5	8
2202000		6.23	7.12	Heppner	0.89	C	FS	2	2	1	L	1	L	1	H	3	L	1	2	1	2	1		5	8
2300000		0	2	Heppner	2	A	FS	3	3	1.5	M	2	L	1	H	3	L	1	2	2	2	1		6	9.5
2300000		2	4.9	Heppner	2.9	A	FS	3	3	1.5	M	2	L	1	H	3	L	1	2	3	2	2		6	11.5
2300000		4.9	8.9	Heppner	4	A	FS	3	3	1	M	2	L	1	H	3	M	2	3	3	3	2		6	14

2300000		8.9	12.16	Heppner	3.26	A	FS	2	2	1		M	2	L	1	H	3	L	1	3	3	3	2		6	13	
2307000		0	1.3	Heppner	1.3	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	2	2	2	1		5	9.5	
2307000		1.3	2.9	Heppner	1.6	C	FS	2	2	1.5		L	1	L	1	H	3	M	2	2	1	1	1		5	8.5	
2307000		2.9	8.5	Heppner	5.6	C	FS	2	2	1		L	1	L	1	H	3	L	1	2	2	2	1		5	9	
2309000	BELL SPRINGS	0	0.15	Heppner	0.15	C	FS	1	1	1		L	1	L	1	H	3	L	1	2	2	2	1		5	9	
2309000	BELL SPRINGS	0.15	5.23	Heppner	5.08	C	FS	2	2	1		L	1	L	1	H	3	L	1	2	3	3	1		5	11	
2400000	HAPPY JACK	0	3	Heppner	3	A	FS	3	3	1.5		M	2	M	2	H	3	M	2	2	2	2	1		7	10.5	
2400000	HAPPY JACK	3	6.6	Heppner	3.6	A	FS	3	3	1.5		M	2	M	2	H	3	M	2	1	2	3	1		7	10.5	
2400000	HAPPY JACK	6.6	18.25	Heppner	11.65	A	FS	3	3	1.5		M	2	M	2	H	3	L	1	3	3	3	1		7	12.5	
2402000		0	0.1	Heppner	0.1	C	FS	2	2	1		L	1	L	1	H	3	L	1	1	2	1	1		5	7	
2402000		0.1	5.78	Heppner	5.68	C	FS	2	2	1		L	1	L	1	H	3	H	3	3	3	2	1		5	13	
2406000	TAMARACK	0	2.8	Heppner	2.8	C	FS	2	2	1.5		M	2	L	1	M	2	H	3	2	3	3	1		5	13.5	
2406000	TAMARACK	2.8	5.7	Heppner	2.9	C	FS	2	2	1.5		M	2	L	1	M	2	H	3	2	3	3	1		5	13.5	
2407000		0	1.8	Heppner	1.8	C	FS	2	2	1.5		H	3	M	2	M	2	L	1	2	1	3	1		7	9.5	
2408000		0	3.84	Heppner	3.84	C	FS	2	1	1.5		L	1	L	1	M	2	H	3	2	2	2	1		4	11.5	
2408000		3.84	4.29	Heppner	0.45	L	FS	2	2	1.5		L	1	L	1	M	2	M	2	1	2	1	1		4	8.5	
2500000	WHEELER PT	0	14.33	Heppner	14.33	A	FS	3	3	1.5		M	2	M	2	H	3	H	3	3	3	3	1		7	14.5	
2500000	WHEELER PT	14.33	15.641	Heppner	1.311	A	FS	3	3	1.5		M	2	M	2	H	3	M	2	2	1	2	1		7	9.5	
2513000		0	1.36	Heppner	1.36	C	FS	2	2	1.5		L	1	L	1	M	2	M	2	2	3	2	1		4	11.5	
2516000	BULL PRAIRIE CUT OFF	0	3.764	Heppner	3.764	C	FS	3	3	1.5		H	3	L	1	M	2	L	1	1	1	2	1		6	7.5	
2519000		0	2.67	Heppner	2.67	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	2	1	2	1		5	8.5	
2519000		2.67	2.87	Heppner	0.2	C	FS	2	1	1.5		**L**	1	L	1	H	3	L	1	1	1	1	**1**		5	6.5	
3030000	HORSESHOE	0	3.7	Walla Walla	3.7	C	FS	2	3	1.5		L	1	L	1	M	2	L	1	2	2	2	1		4	9.5	
3030000	HORSESHOE	3.7	8.219	Walla Walla	4.519	C	FS	2	3	1		L	1	L	1	M	2	L	1	3	2	2	1		4	10	
3032000	CROW_RIDGE	3.14	5.4	Walla Walla	2.26	C	FS	2	2	1		L	1	L	1	M	2	L	1	1	1	1	1		4	6	
3033000	HURON_RIDGE	3.22	4.125	Walla Walla	0.905	C	FS	2	2	1.5		L	1	L	1	M	2	L	1	1	2	1	1		4	7.5	
3100000	SUMMIT	0	3.7	Walla Walla	3.7	A	FS	4	4	2		H	3	H	3	L	1	L	1	2	2	2	1	POT	7	10	
3100000	SUMMIT	3.7	5.5	Walla Walla	1.8	A	FS	4	4	2		H	3	H	3	L	1	L	1	1	1	2	1	POT	7	8	
3100000	SUMMIT	5.5	11.7	Walla Walla	6.2	A	FS	4	4	2		H	3	H	3	M	2	L	1	2	2	2	1	POT	8	10	
3100000	SUMMIT	11.7	12.5	Walla Walla	0.8	A	FS	4	4	2		H	3	H	3	L	1	L	1	2	2	2	1	POT	7	10	
3100000	SUMMIT	12.5	18.6	Walla Walla	6.1	A	FS	4	4	2		H	3	H	3	M	2	L	1	2	2	3	1	POT	8	11	
3100000	SUMMIT	18.6	21.7	Walla Walla	3.1	A	FS	4	4	2		H	3	H	3	L	1	L	1	1	2	3	1	POT	7	10	
3100000	SUMMIT	21.7	27.4	Walla Walla	5.7	A	FS	4	4	2		H	3	H	3	M	2	M	2	2	2	3	1	POT	8	12	
3100000	SUMMIT	27.4	30.3	Walla Walla	2.9	A	FS	4	4	2		H	3	H	3	M	2	M	2	1	2	2	1	POT	8	10	
3100000	SUMMIT	30.3	32.8	Walla Walla	2.5	A	FS	5	5	1		H	3	H	3	L	1	M	2	1	2	2	1	POT	7	9	
3100000	SUMMIT	32.8	36.7	Walla Walla	3.9	A	FS	5	5	1		H	3	H	3	M	2	M	2	1	2	3	1	POT	8	10	
3100000	SUMMIT	36.7	38	Walla Walla	1.3	A	FS	5	5	1		H	3	H	3	M	2	L	1	1	2	3	1	POT	8	9	
3100000	SUMMIT	38	38.827	Walla Walla	0.827	A	FS	5	5	1		H	3	H	3	L	1	L	1	1	2	3	1	POT	7	9	
3100270		0	1.9	Walla Walla	1.9	L	FS	3	3	1.5		L	1	L	1	M	2	L	1	1	2	2	1		4	8.5	
3100330	SHAMROCK SPR	0	2.3	Walla Walla	2.3	L	FS	3	3	1.5		M	2	L	1	M	2	L	1	1	2	2	1		5	8.5	
3100330	SHAMROCK SPR	2.3	2.4	Walla Walla	0.1	L	FS	2	3	1		M	2	L	1	M	2	L	1	1	1	1	1		5	6	
3102000	ROCK SPR	0	1.05	Walla Walla	1.05	C	FS	2	3	1.5		L	1	L	1	L	1	L	1	1	1	1	1		3	6.5	
3102000	ROCK SPR	1.05	3.382	Walla Walla	2.332	C	FS	2	1	1.5		L	1	L	1	M	2	L	1	1	2	1	1		4	7.5	
3102000	ROCK SPR	3.382	3.383	Walla Walla	0.001	C	FS	2	1	2.5		**L**	1	L	1	M	2	L	1	2	2	1	**1**		4	9.5	
3109000	SPRING MTN	0	2.8	Walla Walla	2.8	C	FS	3	3	1.5		**H**	3	L	1	M	2	L	1	2	1	2	**1**		6	8.5	
3113000	WILBUR MTN	0	3.3	Walla Walla	3.3	C	FS	3	3	1.5		M	2	L	1	M	2	L	1	2	1	1	1		5	7.5	
3113015	SUMMMIT FS STA	0	0.1	Walla Walla	0.1	L	FS	3	3	1.5		M	2	M	2	M	2	L	1	1	1	1	1		6	6.5	
3116000	HUCKLEBERRY	0	1.2	Walla Walla	1.2	C	FS	2	3	1.5		L	1	L	1	M	2	M	2	1	1	1	1		4	7.5	
3116000	HUCKLEBERRY	1.2	2.285	Walla Walla	1.085	C	FS	2	3	1		L	1	L	1	M	2	M	2	2	1	2	1		4	9	
3128000	BLACK MTN	0	11	Walla Walla	11	C	FS	2	3	1.5		M	2	M	2	M	2	L	1	2	1	1	1		6	7.5	
3128000	BLACK MTN	11	18.434	Walla Walla	7.434	C	FS	2	3	1		M	2	M	2	M	2	L	1	1	1	2	1		6	7	
3130000	SHIMMIEHORN_RIGDE	0	4.865	Walla Walla	4.865	C	FS	2	2	1.5		L	1	L	1	M	2	L	1	1	1	1	1		4	6.5	
3133000	GOODMAN RIGDE	0	3.5	Walla Walla	3.5	C	FS	2	2	1.5		L	1	L	1	M	2	L	1	1	1	1	1		4	6.5	
3133000	GOODMAN RIGDE	3.5	5.2	Walla Walla	1.7	C	FS	2	2	1		L	1	L	1	M	2	L	1	2	1	1	1		4	7	
3135000	JUNCTION SPG.	0	4.503	Walla Walla	4.503	C	FS	2	2	1.5		L	1	L	1	M	2	L	1	2	2	2	1		4	9.5	

3145000	SPRING_CREEK	0	2.286	Walla Walla	2.286	C	FS	2	2	1.5		L	1	L	1	M	2	M	2	2	2	1	1		4	9.5	
3148000	GLENN CANYON	0	0.608	Walla Walla	0.608	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	1	1	1	1		3	6.5	
3148000	GLENN CANYON	0.608	4.321	Walla Walla	3.713	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	2	3	2	1		3	10.5	
3148000	GLENN CANYON	4.321	4.4	Walla Walla	0.079	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	2	3	2	1		3	10.5	
3150000	BUCK MTN	0	1.2	Walla Walla	1.2	C	FS	2	2	1.5		M	2	2	0	M	2	L	1	1	2	2	1		4	8.5	
3150000	BUCK MTN	1.2	3.5	Walla Walla	2.3	C	FS	2	2	1.5		M	2	2	0	M	2	L	1	1	1	1	1		4	6.5	
3150000	BUCK MTN	3.5	3.77	Walla Walla	0.27	C	FS	2	2	1		M	2	L	1	M	2	L	1	1	1	1	1		5	6	
3180000	S. NINEMILE RIDGE	0	2.7	Walla Walla	2.7	C	FS	2	1	1.5		L	1	L	1	M	2	L	1	1	1	3	1		4	8.5	
3180000	S. NINEMILE RIDGE	2.7	5.1	Walla Walla	2.4	C	FS	1	1	1		L	1	L	1	L	1	L	1	2	1	0	1		3	6	
3200000	CORPORATION	0	10.998	Walla Walla	10.998	A	FS	4	4	2	$ 125,000	H	3	H	3	M	2	H	3	3	3	2	2		8	15	
3200000	CORPORATION	10.998	16.523	Walla Walla	5.525	A	FS	4	4	2		H	3	M	2	M	2	H	3	3	3	2	2		7	15	
3200030	NF UMATILLA CG	0	0.062	Walla Walla	0.062	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	2	3	3	1		6	11.5	
3200035	UMATILLA FORKS CG	0	0.314	Walla Walla	0.314	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	2	3	3	1		6	11.5	
3200045	BUCK CR	0	0.295	Walla Walla	0.295	L	FS	3	3	1		H	3	L	1	M	2	L	1	2	2	3	2		6	11	
3217000	FINLEY CR	0	0.113	Walla Walla	0.113	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	0	2	1	1		3	6.5	
3217000	FINLEY CR	0	0.113	Walla Walla	0.113	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	2	3	2	1		3	10.5	
3217000	FINLEY CR	0.113	0.879	Walla Walla	0.766	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	0	2	2	1		3	7.5	
3217000	FINLEY CR	0.113	0.879	Walla Walla	0.766	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	2	2	2	1		3	9.5	
3700020	WOODWARD CG	0	0.8	Walla Walla	0.8	L	FS	5	5	2		H	3	L	1	L	1	L	1	1	1	2	1		5	8	
3700021	WOODWARD CG	0	0.109	Walla Walla	0.109	L	FS	5	5	1		H	3	L	1	L	1	L	1	1	1	2	1		5	7	
3700022	WOODWARD CG	0	0.079	Walla Walla	0.079	L	FS	5	5	1		H	3	L	1	L	1	L	1	1	1	2	1		5	7	
3700030	SUMMER HOME PIT	0	1.427	Walla Walla	1.427	L	FS	3	3	1.5		M	2	L	1	L	1	L	1	1	1	2	1		4	7.5	
3700050	SUMMER HOMES	0	0.462	Walla Walla	0.462	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	1	1	1	1		6	6.5	
3700051		0	0.19	Walla Walla	0.19	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	1	1	1	1		6	6.5	
3700052		0	0.276	Walla Walla	0.276	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	1	1	1	1		6	6.5	
3700080	WOODLAND CG	0	0.295	Walla Walla	0.295	L	FS	3	3	2		H	3	L	1	M	2	L	1	1	2	2	1		6	9	
3700100	SNOW PARK	0	0.192	Walla Walla	0.192	L	FS	5	5	1		H	3	L	1	M	2	L	1	1	1	2	1		6	7	
3701000	EAGLE SPRING	0	4	Walla Walla	4	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	1	2	2	1		3	8.5	
3701000	EAGLE SPRING	4	4.5	Walla Walla	0.5	C	FS	2	2	1		L	1	L	1	L	1	L	1	1	1	1	1		3	6	
3715000	MCDOUGALL CAMP	0	3.1	Walla Walla	3.1	C	FS	3	3	1.5		M	2	L	1	M	2	L	1	2	1	1	1		5	7.5	
3718000	COYOTE	0	1.5	Walla Walla	1.5	C	FS	2	2	1.5		L	1	L	1	M	2	L	1	1	2	2	1		4	8.5	
3718000	COYOTE	1.5	3.4	Walla Walla	1.9	C	FS	2	2	1		L	1	L	1	M	2	L	1	1	2	1	1		4	7	
3719000	WOODWARD CR	0	4.7	Walla Walla	4.7	C	FS	3	3	1.5		M	2	L	1	M	2	L	1	2	2	2	1		5	9.5	
3719040		0	0.61	Walla Walla	0.61	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	1	1	1	1		6	6.5	
3719040		0.61	1.11	Walla Walla	0.5	L	FS	2	1	1.5		H	3	L	1	M	2	L	1	1	1	1	1		6	6.5	
3725000	BALLOON TREE	0	3.8	Walla Walla	3.8	C	FS	3	3	1.5		M	2	H	3	L	1	L	1	1	1	3	1		6	8.5	
3725000	BALLOON TREE	3.8	5.898	Walla Walla	2.098	C	FS	2	3	1		M	2	L	1	L	1	L	1	1	1	2	1		4	7	
3727000	GORDON CR	0	0.07	Walla Walla	0.07	C	FS	2	2	1.5		L	1	L	1	M	2	M	2	1	2	2	1		4	9.5	
3727000	GORDON CR	0.07	3.813	Walla Walla	3.743	C	FS	1	1	1.5		L	1	L	1	L	1	L	1	2	2	3	1		3	10.5	
3728000	HORSESHOE PRAIRIE	0	1.692	Walla Walla	1.692	C	FS	3	3	1.5		M	2	L	1	M	2	L	1	1	2	2	1		5	8.5	
3734000	MIDDLE RIDGE	0	1.2	Walla Walla	1.2	C	FS	1	2	1		L	1	L	1	L	1	L	1	1	3	2	1		3	9	
3734000	MIDDLE RIDGE	1.2	4.7	Walla Walla	3.5	C	FS	1	1	1.5		L	1	L	1	L	1	M	2	2	3	2	1		3	11.5	
3734000	MIDDLE RIDGE	4.7	5.312	Walla Walla	0.612	C	FS	1	1	1.5		L	1	L	1	L	1	M	2	2	3	3	1		3	12.5	
3738000	PHILLIPS CR	0	6.5	Walla Walla	6.5	C	FS	3	3	1.5		L	1	L	1	L	1	H	3	3	3	2	1		3	13.5	
3740000	CRAIG'S CABIN	0	3.881	Walla Walla	3.881	C	FS	2	2	1		L	1	L	1	L	1	M	2	3	3	3	1		3	13	
3900100	DALE	0	0.267	North Fork	0.267	L	FS	3	3	1		L	1	M	2	H	3	L	1	2	3	3	1		6	11	
3900100	DALE	0.267	0.996	North Fork	0.729	L	FS	3	3	1		L	1	M	2	M	2	L	1	2	3	3	1		5	11	
3900101		0	0.111	North Fork	0.111	L	FS	3	3	1.5		L	1	M	2	H	3	L	1	2	3	3	1		6	11.5	
3900102		0	0.105	North Fork	0.105	L	FS	3	3	1		L	1	M	2	H	3	L	1	2	3	3	1		6	11	
3900105	TRAILER COURT	0	0.5	North Fork	0.5	L	FS	3	3	1.5		L	1	M	2	H	3	L	1	2	3	3	1		6	11.5	
3900110	HELIPORT	0	0.544	North Fork	0.544	L	FS	3	3	1.5		L	1	M	2	H	3	L	1	2	3	3	1		6	11.5	
3900120	DALE RES.	0	0.2	North Fork	0.2	L	FS	3	3	1.5		L	1	M	2	H	3	L	1	2	3	3	1		6	11.5	
3963000	BONE POINT	0	0.5	North Fork	0.5	C	FS	2	2	1.5		L	1	M	2	H	3	L	1	2	3	2	1		6	10.5	

3963000	BONE POINT	0.5	6.262	North Fork	5.762	C	FS	2	2	1.5		L	1	M	2	H	3	M	2	2	3	3	1		6	12.5
3969000		0	3.035	North Fork	3.035	C	FS	3	1	1.5		L	1	L	1	H	3	L	1	2	3	2	1		5	10.5
3969000		3.035	3.1	North Fork	0.065	C	FS	3	1	1.5		L	1	L	1	H	3	L	1	2	3	2	1		5	10.5
3969000		3.1	6.823	North Fork	3.723	C	FS	3	1	1		L	1	L	1	H	3	L	1	2	2	2	1		5	9
3969000		6.823	6.892	North Fork	0.069	C	FS	3	2	1.5		L	1	L	1	H	3	L	1	1	1	2	1		5	7.5
3969000		6.892	8.7	North Fork	1.808	C	FS	3	2	1.5		L	1	L	1	H	3	L	1	2	2	2	1		5	9.5
3971000		0	4.8	North Fork	4.8	C	FS	2	2	1		L	1	L	1	H	3	L	1	2	3	3	1		5	11
3972000		0	2.303	North Fork	2.303	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	2	2	2	1		5	9.5
3972000		2.303	3.1	North Fork	0.797	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	1	1	2	1		5	7.5
3974000		0	5.5	North Fork	5.5	C	FS	3	3	1.5		M	2	L	1	H	3	L	1	2	3	3	1		6	11.5
3980000		3.563	13.2	North Fork	9.637	C	FS	3	3	1.5		M	2	L	1	H	3	L	1	3	2	3	1		6	11.5
3980000		13.2	13.44	North Fork	0.24	C	FS	3	3	1		M	2	L	1	H	3	L	1	2	2	1	1		6	8
3986000		0	5.3	North Fork	5.3	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	2	3	3	1		5	11.5
3986000		5.3	10.5	North Fork	5.2	C	FS	2	1	1.5		L	1	L	1	H	3	L	1	2	3	3	1		5	11.5
3986000		10.5	10.589	North Fork	0.089	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	1	2	1	1		5	7.5
3986000		10.589	10.774	North Fork	0.185	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	1	2	1	1		5	7.5
3986000		10.774	13.6	North Fork	2.826	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	1	2	2	1		5	8.5
3986000		13.6	13.701	North Fork	0.101	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	1	2	1	1		5	7.5
3988000		0	6.4	North Fork	6.4	C	FS	2	2	1.5		M	2	L	1	H	3	M	2	2	3	3	1		6	12.5
3990000		0	4.6	North Fork	4.6	C	FS	2	2	1		L	1	L	1	H	3	M	2	2	2	3	1		5	11
4000000	POMEROY-GROUSE	0	0.12	Pomeroy	0.12	A	FS	5	5	1		H	3	H	3	H	3	L	1	1	1	2	1	POT	9	7
4000000	POMEROY-GROUSE	0.12	1.5	Pomeroy	1.38	A	FS	4	5	2		H	3	H	3	H	3	L	1	1	1	3	1	POT	9	9
4000000	POMEROY-GROUSE	1.5	16.4	Pomeroy	14.9	A	FS	4	4	2		H	3	H	3	H	3	M	2	1	1	3	1	POT	9	10
4000000	POMEROY-GROUSE	16.4	16.48	Pomeroy	0.08	A	FS	3	3	1.5		H	3	H	3	M	2	L	1	1	1	2	1		8	7.5
4000000	POMEROY-GROUSE	16.48	16.68	Pomeroy	0.2	A	FS	3	3	1	$ 300,000	H	3	H	3	M	2	L	1	1	1	2	1		8	7
4000000	POMEROY-GROUSE	16.68	24.39	Pomeroy	7.71	A	FS	3	3	1		H	3	M	2	M	2	L	1	2	2	3	3		7	12
4000012	FOREST BOUNDARY CG	0	0.12	Pomeroy	0.12	L	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	2	1		7	7.5
4000040	ROSE SPRING REC. HOMES	0	0.57	Pomeroy	0.57	L	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	2	1		7	7.5
4000140	STENTZ SPRING REC. RESIDENCE	0	0.57	Pomeroy	0.57	L	FS	3	3	1.5		H	3	L	1	H	3	L	1	2	2	3	1		7	10.5
4000185	CLEARWATER LOOKOUT	0	0.1	Pomeroy	0.1	L	FS	3	3	1.5		H	3	M	2	H	3	L	1	1	1	3	1		8	8.5
4000185	CLEARWATER LOOKOUT	0.1	0.18	Pomeroy	0.08	L	FS	3	3	1		H	3	M	2	H	3	L	1	1	1	2	1		8	7
4000200	TEAL CG	0	0.48	Pomeroy	0.48	L	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	3	1		7	8.5
4000215	HUNTER SPRING	0	0.28	Pomeroy	0.28	L	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	2	1		7	7.5
4016000	STEVENS RIDGE	0	3.7	Pomeroy	3.7	C	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	3	1		7	8.5
4016000	STEVENS RIDGE	3.7	5.88	Pomeroy	2.18	C	FS	3	3	1		H	3	L	1	H	3	L	1	2	2	1	1		7	8
4018000	ABELS RIDGE	0	2.654	Pomeroy	2.654	C	FS	3	3	1.5		M	2	L	1	H	3	L	1	1	1	3	1		6	8.5
4018000	ABELS RIDGE	2.654	3.5	Pomeroy	0.846	C	FS	2	2	1		L	1	L	1	H	3	M	2	1	1	2	1		5	8
4022000	WILLOW SPRING ROAD	0	5.93	Pomeroy	5.93	C	FS	3	3	1.5		M	2	L	1	H	3	L	1	1	1	3	1		6	8.5
4027000	HARD-TO-GET-TO RIDGE	0	3.59	Pomeroy	3.59	C	FS	3	3	1.5		M	2	L	1	H	3	L	1	2	1	3	1		6	9.5
4027000	HARD-TO-GET-TO RIDGE	3.59	5.44	Pomeroy	1.85	C	FS	1	1	1.5		L	1	L	1	H	3	L	1	1	1	1	1		5	6.5
4030000	MISERY-DIAMOND PEAK ROAD	0	2.03	Pomeroy	2.03	C	FS	3	3	1.5		H	3	M	2	H	3	L	1	2	2	3	1		8	10.5
4030000	MISERY-DIAMOND PEAK ROAD	2.03	5.12	Pomeroy	3.09	C	FS	3	3	1		H	3	M	2	H	3	L	1	2	2	3	1		8	10
4030020	MISERY SPRING CG	0	0.43	Pomeroy	0.43	L	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	3	1		7	8.5
4038000	BRUSHY	0	0.059	Pomeroy	0.059	C	FS	2	2	1		L	1	L	1	M	2	M	2	1	1	1	1		4	7
4038000	BRUSHY	0.059	2.633	Pomeroy	2.574	C	FS	1	1	1		L	1	L	1	M	2	H	3	2	1	1	1		4	9
4038000	BRUSHY	2.633	3.702	Pomeroy	1.069	C	FS	2	2	1.5		L	1	L	1	M	2	H	3	2	1	1	1		4	9.5
4039000	SOUTH BOUNDARY	0	0.122	Pomeroy	0.122	C	FS	3	3	1.5		L	1	L	1	M	2	M	2	1	1	1	1		4	7.5
4039000	SOUTH BOUNDARY	0.122	7.006	Pomeroy	6.884	C	FS	3	3	1.5		L	1	L	1	M	2	H	3	2	1	2	1		4	10.5
4039000	SOUTH BOUNDARY	7.006	8.761	Pomeroy	1.755	C	FS	3	3	1.5		H	3	L	1	M	2	M	2	2	1	1	1		6	8.5
4100000	LICK CREEK ROAD	0	4	Pomeroy	4	A	FS	3	3	1.5		M	2	M	2	H	3	L	1	1	2	3	1	POT	7	9.5
4100000	LICK CREEK ROAD	4	12.203	Pomeroy	8.203	A	FS	3	3	1.5		H	3	M	2	H	3	L	1	2	3	3	1	POT	8	11.5
4200000	IRON SPRING ROAD	0	8.05	Pomeroy	8.05	A	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	3	1	POT	7	8.5
4200125	BIG SPRING CG	0	0.32	Pomeroy	0.32	L	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	2	1		7	7.5

4206000	CHARLEY CREEK ROAD	0	4.73	Pomeroy	4.73	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	3	3	2	1		5	11.5
4206000	CHARLEY CREEK ROAD	4.73	6.37	Pomeroy	1.64	C	FS	3	3	1		L	1	L	1	H	3	L	1	2	3	2	1		5	10
4206000	CHARLEY CREEK ROAD	6.37	7.9	Pomeroy	1.53	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	1	2	2	1		5	8.5
4300000	CLOVERLAND ROAD	0	3.81	Pomeroy	3.81	A	FS	3	3	1.5		H	3	M	2	H	3	L	1	1	1	3	1	POT	8	8.5
4300000	CLOVERLAND ROAD	3.81	7.063	Pomeroy	3.253	A	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	3	1	POT	7	8.5
4300062	WENATCHEE GUARD STATION	0	0.11	Pomeroy	0.11	L	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	2	1		7	7.5
4302000	HOGBACK ROAD	0	0.03	Pomeroy	0.03	C	FS	3	3	1.5		M	2	L	1	H	3	L	1	1	2	2	1		6	8.5
4302000	HOGBACK ROAD	0.03	8.544	Pomeroy	8.514	C	FS	3	3	1.5		M	2	L	1	H	3	L	1	2	3	3	1		6	11.5
4302000	HOGBACK ROAD	8.544	9.407	Pomeroy	0.863	C	FS	3	3	1.5		M	2	L	1	H	3	L	1	1	2	2	1		6	8.5
4304000	WENATCHEE-BIG BUTTE	0	6.95	Pomeroy	6.95	C	FS	3	3	1.5		M	2	M	2	M	2	M	2	1	1	3	1	POT	6	9.5
4305000	LITTLE BUTTE	0	2.17	Pomeroy	2.17	C	FS	3	3	1.5		L	1	L	1	M	2	L	1	1	1	2	1		4	7.5
4305000	LITTLE BUTTE	2.17	3.5	Pomeroy	1.33	C	FS	2	2	1		L	1	L	1	M	2	L	1	1	1	1	1		4	6
4305000	LITTLE BUTTE	3.5	3.55	Pomeroy	0.05	C	FS	1	1	1		L	1	L	1	M	2	L	1	1	1	1	1		4	6
4400000	SMOOTHING IRON	0	4.39	Pomeroy	4.39	A	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	3	1	POT	7	8.5
4400000	SMOOTHING IRON	4.39	5.3	Pomeroy	0.91	A	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	3	1	POT	7	8.5
4400000	SMOOTHING IRON	5.3	10.099	Pomeroy	4.799	A	FS	3	3	1.5		H	3	L	1	H	3	M	2	2	2	3	1	POT	7	11.5
4500000	SUSANVILLE	0	4.5	North Fork	4.5	C	FS	2	3	1.5		L	1	L	1	H	3	L	1	2	3	3	2		5	12.5
4500000	SUSANVILLE	4.5	4.934	North Fork	0.434	C	FS	2	3	1		L	1	L	1	H	3	L	1	1	2	2	1		5	8
4600000	KENDALL SKYLINE ROAD	0	10.76	Pomeroy	10.76	A	FS	3	3	1.5		H	3	M	2	H	3	M	2	1	1	3	1		8	9.5
4600000	KENDALL SKYLINE ROAD	10.76	13.81	Pomeroy	3.05	A	FS	3	3	1.5		H	3	M	2	M	2	L	1	1	1	3	1		7	8.5
4600000	KENDALL SKYLINE ROAD	13.81	21.24	Walla Walla	7.43	A	FS	3	3	1.5		H	3	M	2	M	2	L	1	1	1	3	1		7	8.5
4600300	TWIN BUTTES ROAD	0	5.18	Pomeroy	5.18	L	FS	3	3	1		H	3	L	1	M	2	L	1	1	1	2	1		6	7
4600301	SLICKEAR RECREATION RESIDEN	0	1.63	Pomeroy	1.63	L	FS	3	3	1		H	3	L	1	M	2	L	1	1	1	1	1		6	6
4608000	GODMAN-TEEPEE	0	4.35	Pomeroy	4.35	C	FS	3	3	1.5		H	3	L	1	H	3	L	1	1	1	3	1		7	8.5
4608000	GODMAN-TEEPEE	4.35	6.38	Pomeroy	2.03	C	FS	3	3	1		H	3	M	2	H	3	L	1	2	2	3	1		8	10
4610000	TALLOW FLAT ROAD	0	2.6	Pomeroy	2.6	C	FS	2	2	1.5		L	1	L	1	H	3	L	1	1	2	2	1		5	8.5
4610000	TALLOW FLAT ROAD	2.6	4.21	Pomeroy	1.61	C	FS	1	1	1.5		L	1	L	1	H	3	L	1	1	2	2	1		5	8.5
4610000	TALLOW FLAT ROAD	4.21	5.09	Pomeroy	0.88	C	FS	1	1	1		L	1	L	1	H	3	L	1	1	1	1	1		5	6
4620000	PATRICK GRADE	0.23	3.13	Pomeroy	2.9	C	FS	3	3	1.5		M	2	L	1	H	3	M	2	3	3	3	2		6	14.5
4620000	PATRICK GRADE	3.13	3.98	Pomeroy	0.85	C	FS	3	3	1.5		M	2	L	1	H	3	M	2	2	3	3	2		6	13.5
4625000	MALONEY MOUNTAIN	0	4.17	Pomeroy	4.17	C	FS	3	3	1.5		L	1	L	1	M	2	L	1	2	1	3	1		4	9.5
4625000	MALONEY MOUNTAIN	4.17	4.54	Pomeroy	0.37	C	FS	3	3	2		L	1	L	1	M	2	L	1	1	1	3	1		4	9
4700000	TUCANNON RIVER ROAD	20.413	28.141	Pomeroy	7.728	A	FS	5	5	2		H	3	H	3	H	3	H	3	3	3	3	1	POT	9	15
4700000	TUCANNON RIVER ROAD	28.141	31.887	Pomeroy	3.746	A	FS	4	4	2		H	3	H	3	H	3	H	3	3	3	3	2	POT	9	16
4700160	TUCANNON CG	0	0.1	Pomeroy	0.1	L	FS	3	3	2		H	3	L	1	H	3	L	1	2	3	3	2		7	13
4700160	TUCANNON CG	0.1	0.49	Pomeroy	0.39	L	FS	3	3	1.5		H	3	L	1	H	3	L	1	3	3	3	1		7	12.5
4700165	HIXON CANYON	0	0.1	Pomeroy	0.1	L	FS	3	3	2		H	3	L	1	H	3	L	1	2	3	3	1		7	12
4712000	UPPER TUCANNON	0	3.77	Pomeroy	3.77	C	FS	3	3	1.5		H	3	L	1	H	3	H	3	3	3	2	2		7	14.5
4712000	UPPER TUCANNON	3.77	4.85	Pomeroy	1.08	C	FS	3	3	1.5		H	3	L	1	H	3	M	2	3	3	2	2		7	13.5
4712040	LADYBUG CG	0	0.09	Pomeroy	0.09	L	FS	3	3	1.5		H	3	L	1	H	3	L	1	2	3	2	1		7	10.5
4713000	MEADOW CREEK ROAD	0	0.27	Pomeroy	0.27	C	FS	3	3	1.5		H	3	L	1	H	3	M	2	2	3	3	2		7	13.5
4713000	MEADOW CREEK ROAD	0.27	2.49	Pomeroy	2.22	C	FS	3	3	1.5		H	3	L	1	H	3	H	3	3	3	2	2		7	14.5
4713000	MEADOW CREEK ROAD	2.49	3.72	Pomeroy	1.23	C	FS	3	3	1.5		H	3	L	1	H	3	M	2	3	3	3	2		7	14.5
4713020	PANJAB CG	0	0.07	Pomeroy	0.07	L	FS	3	3	1		H	3	L	1	H	3	M	2	2	3	2	1		7	11
5200000	UKIAH GRANITE	5.277	35.1	North Fork	29.823	A	FS	5	5	2		H	3	H	3	M	2	M	2	2	3	3	1	POT	8	13
5200000	UKIAH GRANITE	35.1	38.7	North Fork	3.6	A	FS	5	5	2		H	3	H	3	M	2	L	1	2	3	2	1	POT	8	11
5200440	WINNOM CREEK CG	0	0.9	North Fork	0.9	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	2	3	3	1		6	11.5
5200995		0	0.5	North Fork	0.5	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	2	3	2	1		6	10.5

5209000		0	0.861	North Fork	0.861	C	FS	1	1	1.5		L	1	L	1	M	2	L	1	2	2	2	1		4	9.5	
5209000		0.861	0.98	North Fork	0.119	C	FS	1	1	1.5		L	1	L	1	M	2	L	1	1	1	1	1		4	6.5	
5209000		0.98	2.86	North Fork	1.88	C	FS	1	1	1.5		L	1	L	1	M	2	L	1	2	2	2	1		4	9.5	
5212000		0	4.43	North Fork	4.43	C	FS	1	1	1.5		L	1	L	1	M	2	L	1	2	2	2	1		4	9.5	
5225000		0	0.9	North Fork	0.9	C	FS	3	3	1.5		H	3	L	1	M	2	L	1	1	2	3	1		6	9.5	
5225000		0.9	9.7	North Fork	8.8	C	FS	2	2	1		H	3	L	1	M	2	L	1	3	3	3	1		6	12	
5226000	TOWER MTN	0	1.2	North Fork	1.2	C	FS	2	3	1.5		H	3	M	2	M	2	L	1	3	3	3	1		7	12.5	
5226000	TOWER MTN	1.2	18	North Fork	16.8	C	FS	2	3	1		H	3	M	2	M	2	L	1	3	3	3	1		7	12	
5226000	TOWER MTN	18	20.09	North Fork	2.09	C	FS	3	3	1.5		H	3	M	2	M	2	L	1	2	3	3	1		7	11.5	
5226020	FRAZIER CG	0	0.9	North Fork	0.9	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	2	3	3	1		6	11.5	
5300000	WESTERN RTE	22.59	27.63	Heppner	5.04	A	FS	5	5	2		H	3	H	3	H	3	H	3	2	3	0	1	POT	9	11	
5300000	WESTERN RTE	27.63	32.25	North Fork	4.62	A	FS	5	5	2		H	3	H	3	M	2	H	3	2	3	2	1	POT	8	13	
5300000	WESTERN RTE	32.25	44.64	North Fork	12.39	A	FS	5	5	2		H	3	H	3	M	2	H	3	2	3	2	1	POT	8	13	
5300140		0	1.7	North Fork	1.7	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	2	1	2	1		6	8.5	
5300140		1.7	3.2	North Fork	1.5	L	FS	2	2	1.5		L	1	L	1	M	2	L	1	2	3	2	1		4	10.5	
5300155	DAY USE AREA - SNOW PARK	0	0.38	Heppner	0.38	L	FS	3	3	1		H	3	L	1	M	2	L	1	1	1	2	1		6	7	
5305000		0	3.283	North Fork	3.283	C	FS	2	2	1.5		L	1	L	1	M	2	M	2	2	3	2	1		4	11.5	
5308000		0	2.811	North Fork	2.811	C	FS	2	3	1		L	1	L	1	H	3	L	1	1	1	2	1		5	7	
5308000		2.811	3.9	North Fork	1.089	C	FS	2	3	1		L	1	L	1	H	3	L	1	2	1	2	1		5	8	
5309000		0	7	North Fork	7	C	FS	2	2	1.5		L	1	L	1	M	2	H	3	1	1	2	1		4	9.5	
5311000		0	2.6	North Fork	2.6	C	FS	3	3	1.5		L	1	L	1	M	2	L	1	2	2	2	1		4	9.5	
5311000		2.6	3.9	North Fork	1.3	C	FS	2	3	1		L	1	L	1	M	2	L	1	2	3	2	1		4	10	
5312000		0	6.8	North Fork	6.8	C	FS	3	3	1.5		L	1	L	1	M	2	L	1	3	3	2	1		4	11.5	
5314000		0	1.8	North Fork	1.8	C	FS	3	3	1.5		L	1	L	1	M	2	L	1	1	1	2	1		4	7.5	
5314000		1.8	4.1	North Fork	2.3	C	FS	3	3	1.5		L	1	L	1	M	2	L	1	1	1	2	1		4	7.5	
5314000		4.1	6	North Fork	1.9	C	FS	1	1	1.5		L	1	L	1	M	2	M	2	2	1	2	1		4	9.5	
5316000		0	0.9	North Fork	0.9	C	FS	2	2	1.5		M	2	L	1	M	2	L	1	2	1	2	1		5	8.5	
5316000		0.9	16.3	North Fork	15.4	C	FS	2	2	1.5		M	2	L	1	H	3	M	2	2	3	3	1		6	12.5	
5316000		16.3	16.6	North Fork	0.3	C	FS	2	2	1		M	2	L	1	H	3	M	2	1	1	2	1		6	8	
5318000		0	1.987	North Fork	1.987	C	FS	2	2	1.5		L	1	L	1	M	2	M	2	1	1	1	1		4	7.5	
5320000		0	2.6	North Fork	2.6	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	2	3	2	1		5	10.5	
5320000		2.6	5.978	North Fork	3.378	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	1	3	2	1		5	9.5	
5320060		0	0.5	North Fork	0.5	L	FS	3	3	1.5		L	1	L	1	H	3	L	1	2	1	2	1		5	8.5	
5321000		0	3.58	Heppner	3.58	C	FS	2	2	1.5		L	1	L	1	H	3	M	2	2	1	3	1		5	10.5	
5322000		0	1.6	Heppner	1.6	C	FS	2	2	1.5		L	1	L	1	H	3	M	2	2	1	2	1		5	9.5	
5322000		1.6	2.59	Heppner	0.99	C	FS	2	1	1.5		L	1	L	1	H	3	L	1	2	1	2	1		5	8.5	
5326000	SHAW	4.21	7.94	North Fork	3.73	C	FS	2	3	1.5		L	1	L	1	H	3	L	1	2	3	2	1		5	10.5	
5327000		0	0.7	North Fork	0.7	C	FS	3	3	1.5		H	3	L	1	M	2	L	1	2	2	2	1		6	9.5	
5327000		0.7	8	North Fork	7.3	C	FS	3	3	1.5		H	3	L	1	H	3	L	1	2	3	2	1		7	10.5	
5327000		8	9.8	North Fork	1.8	C	FS	3	3	1.5		H	3	L	1	M	2	L	1	2	2	2	1		6	9.5	
5327290		0	0.4	North Fork	0.4	L	FS	3	3	1.5		L	1	L	1	M	2	L	1	2	2	2	1		4	9.5	
5327290		0.4	1.1	North Fork	0.7	L	FS	2	2	1.5		H	3	L	1	M	2	L	1	1	2	1	1		6	7.5	
5350000		0	8.49	Heppner	8.49	C	FS	2	1	1.5		L	1	L	1	H	3	H	3	3	3	3	1		5	14.5	
5370000		0	2.98	Heppner	2.98	C	FS	2	1	1.5		L	1	L	1	H	3	M	2	2	3	1	1		5	10.5	
5380000		0	1.9	Heppner	1.9	C	FS	2	1	1		L	1	L	1	H	3	M	2	2	1	1	1		5	8	
5400000	PEARSON CR	0	11.4	North Fork	11.4	A	FS	4	4	2		M	2	M	2	H	3	L	1	3	3	0	3	POT	7	12	
5400000	PEARSON CR	11.4	25.1	North Fork	13.7	A	FS	4	4	2		M	2	M	2	H	3	M	2	3	3	3	1	POT	7	14	
5400000	PEARSON CR	25.1	30.945	North Fork	5.845	A	FS	3	4	1.5		M	2	M	2	M	2	L	1	3	3	2	1	POT	6	11.5	
5400000	PEARSON CR	30.945	33.5	North Fork	2.555	A	FS	3	4	1.5		M	2	M	2	M	2	L	1	2	2	3	1	POT	6	10.5	
5400500		0	0.538	North Fork	0.538	L	FS	3	3	1		L	1	L	1	M	2	L	1	1	1	2	1		4	7	
5411000		0	4.394	North Fork	4.394	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	1	1	3	1		5	8.5	
5411000		4.394	6.2	North Fork	1.806	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	1	1	3	1		5	8.5	
5412000		0	6.12	North Fork	6.12	C	FS	3	3	1.5		M	2	L	1	H	3	M	2	1	1	3	1		6	9.5	
5412030		0	1.4	North Fork	1.4	L	FS	3	3	1.5		L	1	L	1	M	2	L	1	1	1	3	1		4	8.5	
5415000		0.842	3.1	North Fork	2.258	C	FS	2	3	1		L	1	L	1	H	3	L	1	2	1	3	1		5	9	

5417000		0	1.3	North Fork	1.3	C	FS	1	2	1		L	1	L	1	M	2	L	1	1	1	3	1		4	8	
5417000		1.3	1.927	North Fork	0.627	C	FS	1	2	1		L	1	L	1	M	2	L	1	2	1	2	1		4	8	
5417000		2.514	3.54	North Fork	1.026	C	FS	1	1	1		L	1	L	1	M	2	L	1	1	1	1	1		4	6	
5417000		3.625	4.058	North Fork	0.433	C	FS	1	1	1		L	1	L	1	M	2	L	1	2	1	2	1		4	8	
5425000		0	2.2	North Fork	2.2	C	FS	2	2	1		L	1	L	1	M	2	L	1	2	1	2	1		4	8	
5425000		2.2	4.8	North Fork	2.6	C	FS	2	2	1.5		L	1	L	1	M	2	L	1	1	1	1	1		4	6.5	
5425000		4.8	5.649	North Fork	0.849	C	FS	2	2	1		L	1	L	1	M	2	L	1	1	1	1	1		4	6	
5425000		5.649	5.87	North Fork	0.221	C	FS	2	2	1		L	1	L	1	M	2	L	1	1	1	1	1		4	6	
5425000		5.87	6.133	North Fork	0.263	C	FS	2	2	1		L	1	L	1	M	2	L	1	1	1	1	1		4	6	
5425000		7.35	7.674	North Fork	0.324	C	FS	1	1	1		L	1	L	1	M	2	L	1	2	1	1	1		4	7	
5425000		8.213	8.479	North Fork	0.266	C	FS	1	1	1		L	1	L	1	M	2	L	1	2	1	2	1		4	8	
5427000		0	2	North Fork	2	C	FS	3	3	1		L	1	L	1	H	3	M	2	1	1	3	1		5	9	
5427000		2	5.4	North Fork	3.4	C	FS	3	3	1		L	1	L	1	H	3	L	1	1	1	2	1		5	7	
5427000		5.4	11.8	North Fork	6.4	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	1	1	3	1		5	8.5	
5427000		11.8	13.2	North Fork	1.4	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	1	1	2	1		5	7.5	
5427000		13.2	13.4	North Fork	0.2	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	1	1	2	1		5	7.5	
5427000		13.4	14.097	North Fork	0.697	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	1	1	2	1		5	7.5	
5428000		0	3.4	North Fork	3.4	C	FS	2	3	1.5		L	1	L	1	M	2	L	1	2	2	2	1		4	9.5	
5435000		0	2.5	North Fork	2.5	C	FS	2	3	1		L	1	L	1	M	2	M	2	1	2	2	1		4	9	
5435000		2.5	4.6	North Fork	2.1	C	FS	2	3	1		L	1	L	1	M	2	M	2	2	3	3	1		4	12	
5440000		0	7.5	North Fork	7.5	C	FS	2	2	1		M	2	L	1	M	2	L	1	3	3	2	1		5	11	
5445000		0	2.213	North Fork	2.213	C	FS	2	3	1		L	1	L	1	M	2	M	2	3	3	2	1		4	12	
5445000		2.213	2.4	North Fork	0.187	C	FS	2	3	1		L	1	L	1	M	2	L	1	3	3	2	1		4	11	
5445000		2.4	4.5	North Fork	2.1	C	FS	1	1	1		L	1	L	1	M	2	L	1	2	3	2	1		4	10	
5448000		0	4.2	North Fork	4.2	C	FS	3	3	1.5		M	2	L	1	M	2	L	1	2	3	3	1		5	11.5	
5448000		4.2	5.3	North Fork	1.1	C	FS	2	2	1		M	2	L	1	M	2	L	1	2	3	3	1		5	11	
5450000		0	3.364	North Fork	3.364	C	FS	3	3	1.5		M	2	L	1	M	2	L	1	2	2	3	1	POT	5	10.5	
5450000		3.364	4.8	North Fork	1.436	C	FS	1	1	1		M	2	L	1	M	2	L	1	2	2	2	1		5	9	
5500000	TEXAS BAR	0	5.7	North Fork	5.7	A	FS	4	4	2		H	3	M	2	M	2	L	1	3	3	3	2	POT	7	14	
5500000	TEXAS BAR	5.7	13.3	North Fork	7.6	A	FS	3	3	1.5		H	3	M	2	M	2	M	2	3	3	3	1	POT	7	13.5	
5505000		0	2.4	North Fork	2.4	C	FS	3	3	1.5		M	2	M	2	M	2	L	1	3	3	3	1		6	12.5	
5505000		2.4	2.6	North Fork	0.2	C	FS	3	3	1.5		M	2	M	2	M	2	L	1	2	2	1	1		6	8.5	
5505000		2.6	14.234	North Fork	11.634	C	FS	3	3	1.5		M	2	M	2	H	3	L	1	3	3	3	1		7	12.5	
5506000		0	2.3	North Fork	2.3	C	FS	3	3	1.5		H	3	M	2	M	2	L	1	3	3	3	3		7	14.5	
5506000		2.3	5.9	North Fork	3.6	C	FS	3	3	1.5		H	3	M	2	M	2	M	2	3	3	3	3		7	15.5	
5506000		5.9	10.7	North Fork	4.8	C	FS	2	3	1		H	3	M	2	M	2	L	1	3	3	1	3		7	12	
5507000		0	2.8	North Fork	2.8	C	FS	3	3	1		L	1	L	1	M	2	L	1	3	3	3	2		4	13	
5507000		2.8	3.6	North Fork	0.8	C	FS	3	3	1		L	1	L	1	M	2	L	1	3	3	2	2		4	12	
5507000		3.6	3.9	North Fork	0.3	C	FS	3	3	1		L	1	L	1	M	2	L	1	3	3	2	2		4	12	
5507000		3.9	4.1	North Fork	0.2	C	FS	3	3	1		L	1	L	1	M	2	L	1	2	2	2	2		4	10	
5507000		4.1	4.4	North Fork	0.3	C	FS	3	3	1		L	1	L	1	M	2	L	1	2	2	2	2		4	10	
5507000		4.4	13.2	North Fork	8.8	C	FS	3	3	1		L	1	L	1	M	2	L	1	3	3	3	2		4	13	
5507000		13.2	13.8	North Fork	0.6	C	FS	3	3	1		L	1	L	1	M	2	L	1	1	2	1	2		4	8	
5507000		13.8	16	North Fork	2.2	C	FS	3	3	1.5		L	1	L	1	M	2	L	1	2	3	3	2		4	12.5	
5510000		0	1.3	North Fork	1.3	C	FS	2	3	1.5		L	1	L	1	M	2	L	1	2	2	2	2		4	10.5	
5510000		1.3	9.8	North Fork	8.5	C	FS	2	3	1.5		L	1	L	1	M	2	L	1	3	3	3	3		4	14.5	
5730000	COUNTY 771	6.65	10.36	North Fork	3.71	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	3	3	3	1		5	12.5	
5730000	COUNTY 771	10.36	11.1	North Fork	0.74	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	2	2	1	1		5	8.5	
5900011	NFJD RS	0	0.3	North Fork	0.3	L	FS	4	4	2		L	1	M	2	M	2	L	1	1	1	1	1		5	7	
5900070		0	0.32	North Fork	0.32	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	3	2	2	1		6	10.5	
5900240		0	0.221	North Fork	0.221	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	3	2	2	1		6	10.5	
5916000	WEST END RD 5916	0	4	North Fork	4	C	FS	2	3	1.5		L	1	L	1	M	2	L	1	2	2	2	1		4	9.5	
5916000	WEST END RD 5916	4	5.5	North Fork	1.5	C	FS	3	3	1.5		L	1	L	1	M	2	L	1	2	2	3	1		4	10.5	
6200000	LOOKINGLASS-TROY	0	11.4	Walla Walla	11.4	A	FS	4	4	2		H	3	H	3	L	1	H	3	3	3	3	1	POT	7	15	
6200000	LOOKINGLASS-TROY	11.4	31.982	Walla Walla	20.582	A	FS	4	4	2		H	3	H	3	L	1	H	3	3	2	3	1	POT	7	14	

6200290	ELK FLAT	0	0.685	Walla Walla	0.685	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	1	2	2	1		6	8.5
6206000	ARLO RICHMAN	0	1.9	Walla Walla	1.9	C	FS	2	2	1.5		L	1	L	1	M	2	L	1	1	2	1	1		4	7.5
6206000	ARLO RICHMAN	1.9	2.646	Walla Walla	0.746	C	FS	1	1	1		L	1	L	1	M	2	L	1	2	2	1	1		4	8
6206000	ARLO RICHMAN	2.646	4.645	Walla Walla	1.999	C	FS	1	1	1		L	1	L	1	M	2	L	1	2	2	2	1		4	9
6208000	WENAHA BREAKS	0	2.2	Walla Walla	2.2	C	FS	2	2	1		L	1	L	1	M	2	L	1	2	2	2	1		4	9
6208000	WENAHA BREAKS	2.2	4.004	Walla Walla	1.804	C	FS	1	1	1.5		L	1	L	1	M	2	L	1	1	2	1	1		4	7.5
6209000	NINE BARK	0	0.119	Walla Walla	0.119	C	FS	2	2	1		L	1	L	1	M	2	L	1	1	2	1	1		4	7
6209000	NINE BARK	0.119	0.774	Walla Walla	0.655	C	FS	2	2	1		L	1	L	1	M	2	L	1	2	2	1	1		4	8
6209000	NINE BARK	0.774	5.092	Walla Walla	4.318	C	FS	2	2	1		L	1	L	1	M	2	L	1	3	2	2	1		4	10
6212000	CUMMINGS	0	3.65	Walla Walla	3.65	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	2	1	3	1		3	9.5
6212000	CUMMINGS	3.65	4.3	Walla Walla	0.65	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	2	1	2	1		3	8.5
6213000		0	6.1	Walla Walla	6.1	C	FS	2	2	1		L	1	L	1	L	1	L	1	2	2	3	1		3	10
6213000		6.1	6.3	Walla Walla	0.2	C	FS	2	2	1		L	1	L	1	L	1	L	1	2	1	2	1		3	8
6214000		0	4.077	Walla Walla	4.077	C	FS	3	3	1.5		L	1	L	1	L	1	M	2	2	2	2	1		3	10.5
6214000		4.077	5	Walla Walla	0.923	C	FS	3	3	1.5		L	1	L	1	M	2	L	1	2	2	1	1		4	8.5
6217000		0	2.8	Walla Walla	2.8	C	FS	3	3	1.5		M	2	L	1	M	2	M	2	1	1	2	1		5	8.5
6217000		2.8	3.6	Walla Walla	0.8	C	FS	1	1	1.5		M	2	L	1	M	2	L	1	1	1	1	1		5	6.5
6219000	LITTLE ELBOW	0	2.8	Walla Walla	2.8	C	FS	2	2	1.5		L	1	L	1	M	2	M	2	2	1	1	1		4	8.5
6219000	LITTLE ELBOW	2.8	4.881	Walla Walla	2.081	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	2	2	2	1		3	9.5
6222000		0	7.846	Walla Walla	7.846	C	FS	3	3	1.5		L	1	L	1	L	1	H	3	3	2	3	1		3	13.5
6230000		0	0.312	Walla Walla	0.312	C	FS	2	1	1.5		L	1	L	1	L	1	L	1	1	1	2	1		3	7.5
6230000		0.312	2.3	Walla Walla	1.988	C	FS	2	1	1.5		L	1	L	1	L	1	L	1	2	2	3	1		3	10.5
6230000		2.3	5.107	Walla Walla	2.807	C	FS	2	1	1		L	1	L	1	L	1	L	1	2	2	2	1		3	9
6231000	PALMER JCT.	1.465	1.608	Walla Walla	0.143	C	FS	3	3	1.5		M	2	M	2	L	1	L	1	1	1	1	1		5	6.5
6231000	PALMER JCT.	1.954	4.71	Walla Walla	2.756	C	FS	3	3	1.5		M	2	M	2	L	1	L	1	2	2	3	1		5	10.5
6232000	SHEEP CREEK	0	3.2	Walla Walla	3.2	C	FS	2	2	1.5		M	2	L	1	L	1	L	1	2	3	3	1		4	11.5
6234000		0	3.238	Walla Walla	3.238	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	3	3	3	1		3	12.5
6234000		3.238	4.518	Walla Walla	1.28	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	2	1	2	1		3	8.5
6234000		4.518	5.3	Walla Walla	0.782	C	FS	2	2	1.5		L	1	L	1	L	1	L	1	1	2	1	1		3	7.5
6234000		5.3	6.6	Walla Walla	1.3	C	FS	1	1	1.5		L	1	L	1	L	1	L	1	2	2	2	1		3	9.5
6235000	FRY MEADOW	0	1.213	Walla Walla	1.213	C	FS	3	3	1.5		M	2	L	1	L	1	M	2	2	2	3	1		4	11.5
6236000		0	2.5	Walla Walla	2.5	C	FS	3	3	1.5		M	2	L	1	L	1	L	1	1	2	3	1		4	9.5
6300000	LOOKINGLASS	0	5.692	Walla Walla	5.692	A	FS	4	4	2		H	3	H	3	L	1	L	1	3	3	3	1	POT	7	13
6300000	LOOKINGLASS	5.692	6.934	Walla Walla	1.242	A	FS	4	4	2		H	3	H	3	L	1	M	2	3	3	2	1	POT	7	13
6300000	LOOKINGLASS	6.934	12.23	Walla Walla	5.296	A	FS	4	4	2		H	3	H	3	L	1	H	3	3	3	3	3	POT	7	17
6300031		0	0.393	Walla Walla	0.393	C	FS	1	1	1.5		L	1	L	1	L	1	L	1	1	2	1	1		3	7.5
6306000		0	5.3	Walla Walla	5.3	C	FS	2	2	1.5		L	1	L	1	L	1	H	3	2	2	3	1		3	12.5
6307000		0	3.573	Walla Walla	3.573	C	FS	1	1	1.5		L	1	L	1	L	1	L	1	2	3	2	1		3	10.5
6308000		0	4.276	Walla Walla	4.276	C	FS	1	1	1.5		L	1	L	1	L	1	L	1	2	3	2	1		3	10.5
6400000	JUBILEE	0	3.6	Walla Walla	3.6	A	FS	4	5	2		H	3	H	3	L	1	L	1	2	2	3	2	POT	7	12
6400000	JUBILEE	3.6	8.2	Walla Walla	4.6	A	FS	4	5	2	$ 690,000	H	3	H	3	L	1	L	1	2	3	3	2	POT	7	13
6400000	JUBILEE	8.2	8.85	Walla Walla	0.65	A	FS	4	5	2	$ 97,500	H	3	H	3	L	1	L	1	1	1	2	2	POT	7	9
6400000	JUBILEE	8.85	9	Walla Walla	0.15	A	FS	4	5	2	$ 22,500	H	3	H	3	L	1	L	1	1	1	2	2	POT	7	9
6400000	JUBILEE	9	11.05	Walla Walla	2.05	A	FS	4	5	2	$ 307,500	H	3	H	3	L	1	L	1	2	3	3	2	POT	7	13
6400000	JUBILEE	11.05	11.1	Walla Walla	0.05	A	FS	4	5	2	$ 7,500	H	3	M	2	L	1	L	1	1	1	2	2	POT	6	9
6400000	JUBILEE	11.1	14.03	Walla Walla	2.93	A	FS	3	3	1.5		H	3	L	1	L	1	L	1	3	3	3	1	POT	5	12.5
6400000	JUBILEE	14.03	14.63	Walla Walla	0.6	A	FS	3	3	1.5		H	3	L	1	L	1	L	1	1	1	2	1	POT	5	7.5
6400000	JUBILEE	14.63	28.1	Walla Walla	13.47	A	FS	2	2	1		H	3	L	1	M	2	L	1	2	2	2	1		6	9
6400000	JUBILEE	28.1	35.9	Walla Walla	7.8	A	FS	2	5	1		H	3	L	1	M	2	L	1	2	2	3	1		6	10
6400000	JUBILEE	35.9	39.1	Walla Walla	3.2	A	FS	3	5	1.5		H	3	L	1	M	2	L	1	2	2	3	1		6	10.5
6400000	JUBILEE	39.1	46.575	Walla Walla	7.475	A	FS	4	5	2	$ 2,055,625	H	3	H	3	M	2	L	1	3	3	3	2	POT	8	14
6400250		0	1.5	Walla Walla	1.5	L	FS	5	5	1		H	3	L	1	L	1	L	1	1	2	2	2		5	9
6400650		0	0.7	Walla Walla	0.7	L	FS	3	3	1.5	$ 175,000	H	3	L	1	M	2	L	1	2	3	3	1	POT	6	11.5
6401000		0	1.6	Walla Walla	1.6	C	FS	3	3	1.5		H	3	L	1	M	2	L	1	2	1	2	1		6	8.5
6401000		1.6	3.134	Walla Walla	1.534	C	FS	2	2	1.5		M	2	L	1	M	2	L	1	2	1	2	1		5	8.5

6401050		0	1.3	Walla Walla	1.3	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	2	2	3	1		6	10.5	
6401051	TARGET MEADOWS CG	0	0.316	Walla Walla	0.316	L	FS	3	3	1.5		H	3	L	1	M	2	L	1	1	1	2	1		6	7.5	
6403000	KENDALL SKYLINE	0	2.1	Walla Walla	2.1	C	FS	2	3	1		M	2	L	1	L	1	L	1	1	1	2	1		4	7	
6403000	KENDALL SKYLINE	2.1	2.4	Walla Walla	0.3	C	FS	2	3	1		M	2	L	1	L	1	L	1	1	1	1	1		4	6	
6403000	KENDALL SKYLINE	2.4	8.7	Walla Walla	6.3	C	FS	2	3	1		M	2	L	1	L	1	L	1	2	1	3	1		4	9	
6403000	KENDALL SKYLINE	8.7	9.3	Walla Walla	0.6	C	FS	2	3	1		M	2	L	1	M	2	L	1	2	1	2	1		5	8	
6403000	KENDALL SKYLINE	9.3	11.296	Walla Walla	1.996	C	FS	2	3	1		M	2	L	1	M	2	L	1	2	2	3	1		5	10	
6403120	MOTTET CG	0	0.307	Walla Walla	0.307	L	FS	3	3	1		H	3	L	1	L	1	L	1	2	2	3	1		5	10	
6406000		0	3.359	Walla Walla	3.359	C	FS	2	2	1.5		L	1	M	2	L	1	L	1	2	3	2	1		4	10.5	
6411000	JUBILEE-SKYLINE	0	1.729	Walla Walla	1.729	C	FS	2	2	1		L	1	L	1	L	1	L	1	1	1	1	1		3	6	
6413000		0	6.1	Walla Walla	6.1	C	FS	2	3	1.5		M	2	L	1	L	1	L	1	3	3	3	1		4	12.5	
6413000		6.1	14.259	Walla Walla	8.159	C	FS	3	3	1.5		M	2	L	1	L	1	L	1	2	3	3	1		4	11.5	
6415000	TIMOTHY	0	3.3	Walla Walla	3.3	C	FS	2	2	1.5		M	2	L	1	M	2	L	1	2	2	3	1		5	10.5	
6415000	TIMOTHY	3.3	9	Walla Walla	5.7	C	FS	2	3	1.5		M	2	L	1	M	2	L	1	2	3	2	1		5	10.5	
6415000	TIMOTHY	9	10.061	Walla Walla	1.061	C	FS	3	3	1.5		M	2	L	1	L	1	L	1	1	2	3	1		4	9.5	
6436000	GRIFFIN PEAK	0	1.5	Walla Walla	1.5	C	FS	2	2	1.5		L	1	L	1	M	2	L	1	1	1	3	1		4	8.5	
6436000	GRIFFIN PEAK	1.5	4.767	Walla Walla	3.267	C	FS	1	1	1.5		L	1	L	1	M	2	M	2	1	1	2	1		4	8.5	
6437000	CHASE MTN	0	5.8	Walla Walla	5.8	C	FS	2	2	1.5		L	1	L	1	M	2	L	1	2	1	3	1		4	9.5	
6500000	TIGER CREEK	0	2.8	Walla Walla	2.8	A	FS	3	3	1.5		H	3	L	1	M	2	M	2	3	3	2	3		6	14.5	
6500000	TIGER CREEK	2.8	10	Walla Walla	7.2	A	FS	3	3	1.5		H	3	L	1	M	2	M	2	3	2	3	3		6	14.5	
6500000	TIGER CREEK	10	12.214	Walla Walla	2.214	A	FS	3	3	1.5		H	3	L	1	M	2	L	1	2	3	3	3		6	13.5	
6500000	TIGER CREEK	12.214	12.914	Walla Walla	0.7	A	FS	3	3	1.5		H	3	L	1	M	2	L	1	1	2	3	3		6	11.5	
6511000	GOVERNMENT MTN	0	5.811	Walla Walla	5.811	C	FS	2	2	1		M	2	L	1	M	2	L	1	2	2	2	1		5	9	
6512000	TABLE SPRING	0	7.069	Walla Walla	7.069	C	FS	2	2	1		M	2	L	1	M	2	L	1	2	2	2	1		5	9	
7350000		0	4.1	North Fork	4.1	C	FS	3	3	1.5		L	1	L	1	H	3	L	1	3	3	2	1		5	11.5	
					1422.86																						

Appendix D — Literature Cited

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Appendix E Glossary

Access rights. A privilege or right of a person or entity to pass over or use another person's or entity's travel way. (36 CFR 212.1, FSM 5460.5 – Rights of Way Acquisition, FSM 7700 – Transportation System)

All terrain vehicle (ATV) - Motorized, off-highway vehicle 50 inches or less in width, having a dry weight of 600 pounds or less that travel on 3 or more low-pressure tires with a seat designated to be straddled by the operator. Low-pressure tires are 6 inches or more in width and designated for use on wheel rim diameters of 12 inches or less, utilizing an operating pressure of ten pounds per square inch (psi) or less as recommended by the vehicle manufacturer.

ANICLA – Alaska National Interest Lands Conservation Act. December 2, 1980. (Public Law 96-487, Title XII: 94 Stat. 2457; 16 U.S.C. 3210). States that Forest Service is required to provide reasonable access to non-federally owned lands within the boundaries of the National Forest System. See the Act for complete reference.

Annual maintenance. 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. Unscheduled or catastrophic failures of components or assets may need to be repaired as a part of annual maintenance. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Annual road maintenance – Road maintenance that takes place on a recurring schedule and includes any expenditure relating to the upkeep of a road necessary to retain the road's approved traffic service level.

Arterial road - A forest road that provides service to large land areas and usually connects with other arterial roads or public highways (FSH 7709.54 – Forest Transportation Terminology Handbook, no longer in print).

Capital improvement. The construction, installation, or assembly of a new fixed asset, or the significant alteration, expansion, or extension of an existing fixed asset to accommodate a change of purpose. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Classified road - Roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including state roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service (36 CFS 212.1).

Collector road - A forest road that serves smaller land areas than an arterial road. Usually connects forest arterial roads to local forest roads or terminal. (FSH 7709.54 – Forest Transportation Terminology Handbook, no longer in print)

Construction (new). The erection, construction, installation, or assembly of a new fixed asset. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Critical need. A requirement that addresses a serious threat to public health or safety, a natural resource, or the ability to carry out the mission of the organization. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Critical vehicle. The vehicle, normally the largest (by weight, size, or unique configuration), whose limited use on the road is necessary to complete the planned activity. (FSH 7709.56, Sec 4.1 – Road Preconstruction Handbook)

Culvert - A conduit or passageway under a road, trail, or other obstruction. A culvert differs from a bridge in that it is usually constructed entirely below the elevation of the travel way. (EM772-100R and EM 7720-100LL section 102).

Decommission. Demolition, dismantling, removal, obliteration and/or disposal of a deteriorated or otherwise unneeded asset or component, including necessary cleanup work. This action eliminates the deferred maintenance needs for the fixed asset. Portions of an asset or component may remain if they do not cause problems nor require maintenance. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Deferred maintenance. 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. Deferred maintenance needs may be categorized as critical or noncritical at any point in time. Continued deferral of noncritical maintenance will normally result in an increase in critical deferred maintenance. Code compliance (e.g. life safety, ADA, OSHA, environmental, etc.), Forest Plan Direction, Best Management Practices, Biological Evaluations other regulatory or Executive Order compliance requirements, or applicable standards not met on schedule are considered deferred maintenance. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Design speed. The speed determined for design and correlation of the physical features of a route that influence vehicle operation. The maximum safe speed that the design vehicle can maintain over a specified segment of a route when conditions are so favorable that the design features of the road, rather than operational limitations of the vehicle, govern. The design speed is the safe speed for the design situation only. (FSH 7709.56, Sec 4.25 – Road Preconstruction Handbook)

Design vehicle. The vehicle frequently using the road that determines the minimum standard for a particular design element. No single vehicle controls the standards for all the design elements for a road. Determine the maximum and minimum standards from the type and configuration of the vehicles using the road. Analyze each design element to determine which vehicle governs the standard for that element. (FSH 7709.56, Sec 4.1– Road Preconstruction Handbook)

Emergency need. An urgent maintenance need that may result in injury, illness, or loss of life, natural resource, or property; and must be satisfied immediately. Emergency needs generally require a declaration of emergency or disaster, or a finding by a line officer that an emergency exists. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Forest road. As defined in Title 23, Section 101 of the United States Code (23 U.S.C. 101), any road wholly or partly within, or adjacent to, and serving the National Forest System and which is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources. (FSM 7705 – Transportation System)

Forest highway. A forest road under the jurisdiction of, and maintained by, a public authority and open to public travel. (USC: Title 23, Section 101(a)).

Forest transportation atlas. An inventory, description, display, and other associated information for those roads, trails, and airfields that are important to the management and use of National Forest System lands or to the development and use of resources upon which communities within or adjacent to the National Forests depend. (36 CFR 212.1)

Forest transportation facility. A classified road, designated trail, or designated airfield, including bridges, culverts, parking lots, log transfer facilities, safety devices and other transportation network appurtenances under Forest Service jurisdiction that is wholly or partially within or adjacent to National Forest System lands. (36 CFR 212.1, FSM 7705 – Transportation System)

Forest transportation system management. The planning, inventory, analysis, classification, record keeping, scheduling, construction, reconstruction, maintenance, decommissioning, and other operations undertaken to achieve environmentally sound, safe, cost-effective, access for use, protection, administration, and management of National Forest System lands. (FSM 7705 – Transportation System)

Functional class. The way a road services land and resource management needs, and the character of service it provides. (FSH 7709.54, Forest Transportation Terminology Handbook, no longer in print)

Forest highway - A forest road under the jurisdiction of, and maintained by, a public authority and open to public travel (USC: Title 23, Section 101(a)).

Forest road - As defined in Title 23, Section 101 of the United States Code (23 U.S.C. 101), any road wholly or partly within, or adjacent to, and serving the National Forest System and which is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.

Forest scale – See scale.

Forest transportation system - Those facilities, including Forest Service roads, bridges, culverts, trails, parking lots, log transfer facilities, road safety and other appurtenances, and airfields, in the transportation network and under Forest Service jurisdiction.

FSH – Forest Service Handbook. The principal source of specialized guidance and instruction for carrying out the direction in the FSM

FSM – Forest Service Manual. Contains legal authorities and objectives, policies, responsibilities, instructions, and guidance needed on a continuing basis by Forest Service line officers and primary staff in more than one unit to plan and execute assigned programs and activities.

Health and safety need. A requirement that addresses a threat to human safety and health (e.g. violations of National Fire Protection Association 101 Life Safety Code or appropriate Health Code) that requires immediate interim abatement and/or long-term permanent abatement. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Highway safety program -The Highway Safety Act of 1966 (P.L. 89-564). Title 23 of the Code of Federal Regulations, Part 1230, makes the Highway Safety Act applicable to all Federal agencies that control roads. Requires Federal agencies, through cooperation with the Federal Highway Administration (FHWA) and the National Highway Traffic Safety Administration (NHTSA), to determine the applicability of the specific highway standards to agency roads. 7709.59 Ch. 40.

Inventoried roadless area - Those areas identified in a set of inventoried roadless area maps contained in Forest Service Roadless Area Conservation Final Environmental Impact Statement, Volume 2, dated November, 2000, which are held at the National Headquarters of the Forest Service, or any update, correction, or revision of those maps.

Jurisdiction. The legal right to control or regulate use of a transportation facility. Jurisdiction requires authority, but not necessarily ownership. The authority to construct or maintain a road may be derived from fee title, an easement, or some other similar method. (FSM 7705 – Transportation System)

Local road - A forest road that connects terminal facilities with forest collector, forest arterial or public highways. Usually forest local roads are single purpose transportation facilities (FSH 7709.54 – Forest Transportation Terminology Handbook, no longer in print).

Maintenance. The preservation of the entire highway, including surface, shoulders, roadsides, structures and such traffic-control devices as are necessary for its safe and efficient utilization. (USC: Title 23, Section 101(a)).

Maintenance. The upkeep of the entire forest development transportation facility including surface and shoulders, parking and side areas, structures, and such traffic-control devices as are necessary for its safe and efficient utilization. (36 CFR 212.2(i)).

Maintenance. The act of keeping fixed assets in acceptable condition. It includes preventive maintenance normal repairs; replacement of parts and structural components, and other activities needed to preserve a fixed asset so that it continues to provide acceptable service and achieves its expected life. Maintenance excludes activities aimed at expanding the capacity of an asset or otherwise upgrading it to serve needs different from, or significantly greater than those originally intended. Maintenance includes work needed to meet laws, regulations, codes, and other legal direction as long as the original intent or purpose of the fixed asset is not changed. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Maintenance level - Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria (FSH 7709.58, 10. Sec 12.3-Transportation System Maintenance Handbook).

Maintenance level 1 - Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed one year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level and perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate." Roads receiving level 1 maintenance may be of any type, class or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be open and suitable for non-motorized uses (FSH 7709.58).

Maintenance level 2 - Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either 1) discourage or prohibit passenger cars or 2) accept or discourage high clearance vehicles.

Maintenance level 3 - Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed materials. Appropriate traffic management strategies are either “encourage” or “accept”. “Discourage” or “prohibit” strategies may be employed for certain classes of vehicles or users.

Maintenance level 4 - Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic management strategy is “encourage”. However, the “prohibit” strategy may apply to specific classes of vehicles or users at certain times.

Maintenance level 5 - Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is "encourage".

Major culvert. A culvert that provides an opening of more than 35 square feet (3.3 m2) in a single or multiple installation. A major culvert may consist of a single round pipe, pipe arch, open or closed-bottom box, bottomless arch, or multiple installation of these structures placed adjacent or contiguous as a unit. Certain major culverts are classified as bridges when they provide an opening of more than 20 feet (6.1 m), measured parallel to the roadway; such culverts may be included in the bridge inventory. See "Federal Highway Administration Coding Guide for Bridge Inventory and Appraisal," items 49 and 112 (sec. 8.08) for culverts being classified as bridges. (FSH 7709.56b, Sec 05 – Transportation Structures Handbook)

Minor culvert. Any culvert not classified as a major culvert. (FSH 7709.56b, Sec 05 – Transportation Structures Handbook)

Mission need. A requirement that addresses a threat or risk to carrying out the mission of the organization. Needs related to administration and providing services (transportation, recreation, grazing, etc.). Needs not covered by health and safety or natural resource protection. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

National forest system road. A classified forest road under the jurisdiction of the Forest Service. The term "National Forest System roads" is synonymous with the term "forest development roads" as used in 23 U.S.C. 205. (FSM 7705 – Transportation System)

New construction. The erection, construction, installation, or assembly of a new fixed asset. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Noncritical need. A requirement that addresses potential risk to public or employee safety or health, compliance with codes, standards, regulations etc., or needs that address potential adverse consequences to natural resources or mission accomplishment. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

New road construction Activity that results in the addition of forest classified or temporary road miles. (36 CFR 212.1, FSM 7705 – Transportation System)

Noxious weeds - Those plants designated as noxious weeds by the Secretary of Agriculture or by a responsible State official. Noxious weeds generally posses one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, and being native or new to or not common to the United States or parts thereof.

Objective maintenance level. The maintenance level to be assigned at a future date considering future road management objectives, traffic needs, budget constraints, and environmental concerns. The objective maintenance level may be the same as, or higher or lower than, the operational maintenance level. (FSH 7709.58, Sec12.3 – Transportation System Maintenance Handbook)

Open for public travel. The road section is available and passable by four-wheeled standard passenger cars, and open to the general public for use without restrictive gates, prohibitive signs, or regulation other than restrictions based on size, weight or class of registration, except during scheduled periods, extreme weather or emergency conditions. (23 CFR 460.2(c)).

Operational maintenance level. The maintenance level currently assigned to a road considering today's needs, road condition, budget constraints, and environmental concerns. It defines the level to which the road is currently being maintained. (FSH 7709.58, Sec 12.3 – Transportation System Maintenance Handbook)

Other system. Additional network(s) of travel ways serving a common need or purpose, managed by an entity with the authority to finance, build, operate and maintain the routes. (U.S.C. 101 23 CFR 660, FSM 7740.5 – Federal Lands Highway Programs)

Primary maintainer. The agency or party having primary (largest share) financial responsibility for maintenance. (FSH 7709.58, Chapter 13 – Transportation System Maintenance Handbook)

Primary transportation system - This system is objective maintenance level (ObML) 3 and 4 roads (those maintained for low clearance vehicle use) greater than 0.5 miles in length and ObML 2 collectors.

Private road. A road under private ownership authorized by easement to a private party, or a road which provides access pursuant to a reserved or private right. (FS-643, Roads Analysis; Informing Decisions About Managing the National Forest Transportation System, August 1999.).

Public authority. A Federal, State, county, town or township, Indian tribe, municipal or other local government or instrumentality thereof, with authority to finance, build, operate or maintain toll or toll-free highway facilities. (23 CFR 460.2(b))

Public forest service road. A designated public road under Forest Service jurisdiction that meets the definition of 23 U.S.C. Section 101.

Public road. Any road or street under the jurisdiction of and maintained by a public authority and open to public travel. (23 U.S.C. 101(a), 23 CFR 460.2(a), FSM 7705 – Transportation System)

Resource protection need. A requirement that addresses a threat or risk of damage, obstruction, or negative impact to a natural resource. (Financial Health – Common Definitions for Maintenance and Construction Terms, July 22, 1998)

Road. A motor vehicle travelway over 50 inches wide, unless designated and managed as a trail. A road may be classified, unclassified, or temporary. (36 CFR 212.1, FSM 7705 – Transportation System)

Road construction - Activity that results in the addition of forest classified or temporary road miles.

Road decommissioning - Activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFS 212.1), (FSM 7703)

Road improvement - Activity that results in an increase of an existing road's traffic service level, expands its capacity, or changes its original design function.

Road maintenance. The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective. (FSM 7705 – Transportation System)

Road management objectives (RMO). Defines the intended purpose of an individual road based on management area direction and access management objectives. Road management objectives contain design criteria, operation criteria, and maintenance criteria. (FSH 7709.55, Sec 33 – Transportation Planning Handbook)

Road realignment. Activity that results in a new location of an existing road or portions of an existing road and treatment of the old roadway. (FSM 7705 – Transportation System)

Road reconstruction - Activity that results in improvement or realignment of an existing classified road.

Road risk – A relative (e.g., low, medium, and high) estimate of the likelihood that an event would lead to circumstances that adversely affect important resource values. The risks estimated are those associated with the inherent ecosystem disturbance processes, such as ongoing management practices (road maintenance).

Roadless areas - Undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act and the planning regulations at 36 CFR 219.17 that were inventoried during the Forest Service’s formal

Roadless area review and evaluation (RARE II) process, and that remain roadless through forest planning decisions. Designated roadless areas do not overlap with roadless areas.

Roads analysis - an interdisciplinary science-based roads analysis into multi-Forest, Forest-, area- watershed-, and project-scale analyses and assessments to inform planners and decisionmakers of road system opportunities, needs, and priorities that support land and resource management plan objectives. FSM 7712.1

RS2477 – A law enacted by congress in 1866 that granted right-of-way for the construction of highways across public land not reserved for public uses. Congress repealed RS 2477 in the

FLPMA (Federal Land Policy and Management Act) but did not terminate valid rights-of-way existing at the time of enactment. Controversies still arise about whether a public highway was actually established under this statute, and if so, the extent of rights-of-way obtained under the grant.

Scale – In this document, the level of resolution under consideration, for example forest-scale (forest-wide) or subforest scale (watershed or site specific project).

Scenic backway – These roads generally do not meet full federal safety standards, meaning they are not wide enough, or graded enough, or level enough to be safe year-round for passenger cars. However, they do meet the highest standard of scenic, recreational, and historical criteria.

Scenic byway - Major roads that are regularly traveled. Some welcome visitors with information centers, interpretive brochures, and signage. Some offer simply a stretch of undisturbed views.

Service life. The length of time that a facility is expected to provide a specified service. (FSH 7709.56b, Sec 05 – Transportation Structures Handbook)

State. Any one of the 50 states, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, and American Samoa. (23 CFR 460.2(e))

Subforest scale – See scale.

Subject to the Highway Safety Act. National Forest System roads that are open to use by the public for standard passenger cars. This includes roads with access restricted on a seasonal basis and roads closed during extreme weather conditions or for emergencies, but which are otherwise open for general public use. (FSM 7705 – Transportation System)

Temporary road. Road authorized by contract, permit, lease, other written authorization, or emergency operation not intended to be a part of the forest transportation system and not necessary for long-term resource management. (36 CFR 212.1, FSM 7705 – Transportation System)

Traffic service level. Describes the significant characteristics and operating conditions of a road. (FSH 7709.56, Ch 4 – Road Preconstruction Handbook, FSM 7705 – Transportation System)

Transportation facility jurisdiction. The legal right to control or regulate use of a transportation facility derived from fee title, an easement, an agreement, or other similar method. While jurisdiction requires authority, it does not necessarily reflect ownership. (FSM 7705 – Transportation System)

Traveled way. The portion of the roadway used for the movement of vehicles; not including turnouts, exclusive of shoulders and auxiliary lanes. (EM 7720-100LL, Section 102.)

Temporary road - Roads authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be a part of the forest transportation system and not necessary for long-term resource management (36 CFR 212.1).

Transportation atlas - The purpose of the atlas is to display the system of roads, trails, and airfields of the unit. The atlas consists of the geo-spatial, tabular, and other data to support analysis needs and resource management objectives identified in land management plans. FSM 7711.01

Unclassified road - Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon termination of the authorization (36 CFR 212.1).

Unroaded area - Any area without a classified road that is at least 50 inches wide and was constructed or is maintained for vehicle use. The size of the area must be sufficient and in a manageable configuration to protect the inherent values associated with the unroaded condition. Unroaded areas do not overlap with designated roadless areas.

User-created roads and trails – Unclassified roads and trails on National Forest System lands that were initially developed by forest users traveling off of the designated road and trail system. The roads and trails have not been improved and remain in existence through repeated use.

Wet travel factor - Most of the native soils on the Forest are high in silt and/or clay content making the majority of native surfaced roads extremely slick under wet conditions. The wet travel factor was established based on existing surface type. Roads with a native surface were given a poor rating, roads with select native surfacing were given a fair rating, and roads with aggregate surfacing or pavement were given a good rating.