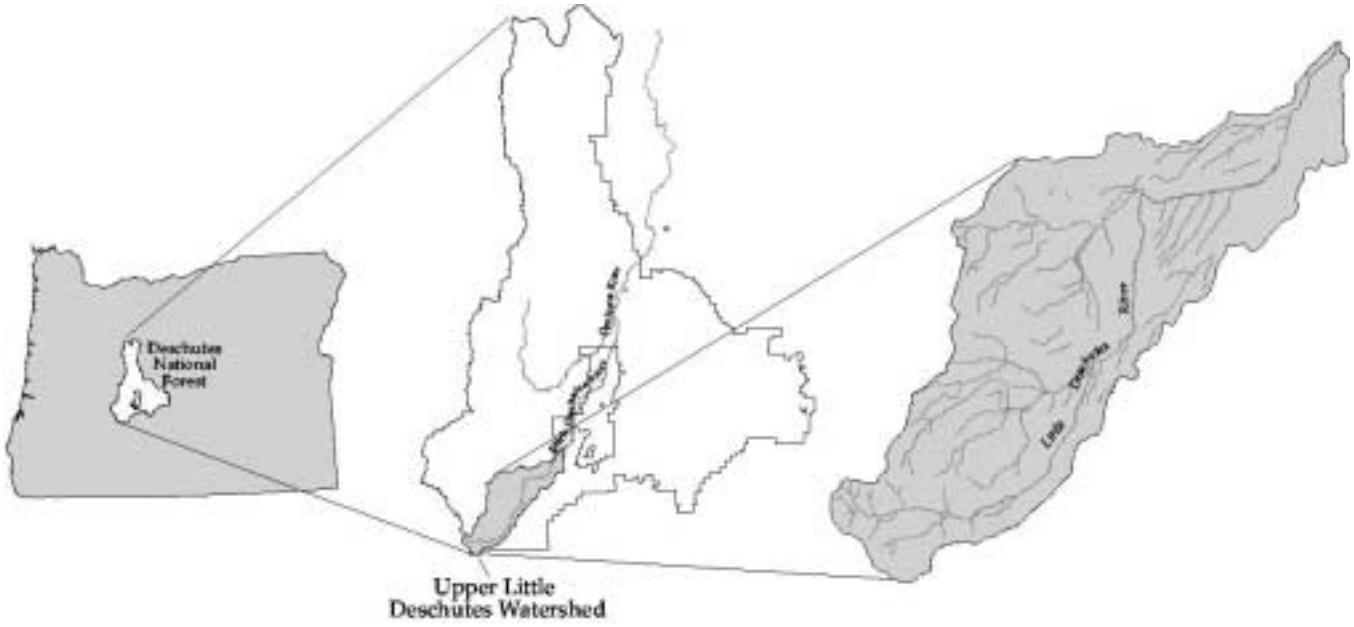
Roads Analysis

Upper Little Deschutes Watershed



December 2002

Crescent Ranger District
Deschutes National Forest

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Introduction

This roads analysis has used the guidance contained in *Roads Analysis: Informing Decisions About Managing the National Forest Transportation System* (FS-643), which describes the six-step procedure for conducting roads analysis.

On January 12, 2001, the U.S. Department of Agriculture, Forest Service, developed manual direction (FSM 7700) to address both the access benefits and ecological costs of road-associated effects, give priority to reconstructing and maintaining needed roads, and decommissioning unneeded roads, or where appropriate, converting them to other less costly and more environmentally beneficial uses. Responsible officials are directed to use a Roads Analysis process to ensure that road management decisions are based on identification and consideration of social and ecological effects.

Roads Analysis is not a decision-making process. Rather, it is designed to provide an assessment of existing forest roads from a landscape perspective.

Analysis Procedure

An interdisciplinary team was assembled to conduct the analysis, which is a six-step process. The steps are designed to be sequential with the understanding the process may require feedback and iteration among steps. The process provides a set of analysis questions, of which the answers can inform choices about road system management.

Six steps of the roads analysis process:

Step 1 - Setting up the Analysis

The Team outlined the objectives of the analysis, which are to:

- Identify need for changes by comparing current and desired conditions.
- Review previous access management decisions.
- Adequately inform any decisions that affect the transportation system.
- Provide an adequate transportation system while protecting resources.
- Identify unclassified roads.
- Furnish maps, tables, and narrative descriptions of the road system.

The team also identified which roads to consider during the analysis:

- Classified system roads (open and intermittent maintenance)
- Unclassified roads (such as user-defined, special use, and not yet classified)
- Roads that cross analysis area boundary (include where logical)
- Non-Forest Service jurisdiction (could be important in some contexts)

A process plan was developed for completing the rest of the steps.

Step 2 - Describing the Situation

Section II includes a thorough discussion of the analysis area, existing road system, and management direction.

Step 3 - Identifying Issues

The interdisciplinary team identified the most important road-related issues in the Upper Little Deschutes Watershed. This is documented in Section III, Issues and Evaluation.

Step 4 - Assessing Benefits, Problems, and Risks

The major uses of the road system, and the effects the roads have on the environment were assessed by answering key analysis questions. These questions and the responses are included in Section IV, Key Analysis Questions.

Step 5 - Describing Opportunities and Setting Priorities

The results of the roads analysis process are recommendations for changes in road management activities including changes to the road maintenance levels, as well as improvement (e.g. reconstruction projects or culvert replacement). General recommendations are discussed in Section V, with the recommendations for each road in Appendix C.

Step 6 – Reporting

This document and the accompanying graphics and appendices satisfy the requirements of Step 6 of the roads analysis process.

Public Involvement

Input from the public was solicited by a letter sent to the District's regular mailing list of people who are usually interested in our project planning.

About 120 individuals, agencies, and organizations were invited to provide input to the Roads Analysis. The mailing was focused on people who live in the watershed and special use permit holders. An article appeared in *The Bend Bulletin* that described the road analysis process for the Upper Little Deschutes watershed. It included a map and contact information.

Five responses were received: two from government agencies and three from individuals. The Bonneville Power Administration’s comments related to access to their transmission line right-of-way. The Oregon Department of Fish and Wildlife provided input on the risks to fish and wildlife associated with roads and road density.

The individual respondents listed several reasons why roads are important to them and suggested that all roads remain open to use by the public. The usefulness of roads to these people includes access for recreation, camping, matsutake mushroom season and gathering of other forest products, hunting and fishing, emergency medical response, fire suppression, sightseeing, trailhead access, and administrative access.

INSERT VICINITY MAP

Current Situation

Analysis Area

The Upper Little Deschutes 5th field watershed encompasses an area of approximately 80,375 acres and the following 6th field watersheds: Gilchrist, Bunny Butte, Little Odell, Mowich, Hemlock, Clover Butte, and Swamp Creek. This watershed has diverse land types and uses, ranging from rugged wilderness to residential areas.

About 25,715 acres (32%) of the watershed are in private ownership. Timberlands, residential areas, ranches, and a railroad corridor are some of the activities occurring on the non-Forest Service land.

Existing Road System

The Location of all Roads

The existing road system is unevenly distributed throughout the analysis area, outside of the Oregon Cascades Recreation Area (OCRA) and Mt. Thielsen Wilderness. West of the Little Deschutes River, roads are generally widely distributed, while a greater abundance of roads can be found south of Two Rivers subdivision and on private land in the northern portion of the analysis area. Within the OCRA, there are approximately 2 ½ miles of Road. 5830300 runs up the Little Deschutes River canyon in the OCRA while approximately 1 ½ mile of abandoned decommissioned roadbed can be found at the southern end of the analysis area in the Mt. Thielsen Wilderness.

The majority of roads within the analysis area are located on relatively gentle terrain, with ground slopes rarely exceeding 15%. Scattered roads can be found in midslope positions on slopes at or beyond 30%. Most such roads are in the lower Little Deschutes River canyon south of the Two Rivers subdivision, along the southwest side of the analysis area adjacent to the Oregon Cascades Recreation Area boundary, and within the watershed boundary on Odell Butte.

Ages and Development Histories of Roads

The majority of roads within the analysis area have been in existence for better than 40 years, with few additions having been constructed in the recent past. Some portions of the system date back to early railroad logging days in the early 20th Century centered around the sawmill facility at Mowich; in fact, some of the current roads in earlier days served as locations for railroad grades. With few exceptions, the roads on which attention is being focused in this Road Analysis have been constructed for access to timber harvest areas; a small number of roads on private land have been developed as infrastructure in support of developing subdivisions (Two Rivers, Schoonover Estates).

Road Surface Types and Existing Maintenance Levels

The local (seven-digit) roads being analyzed by this Road Analysis are almost exclusively native-surface roads. They are maintained as either open roads suitable for high-clearance

vehicles (designated as Maintenance Level 2 for Forest Service roads) or are closed to vehicular traffic after being treated to be self-maintaining (Forest Service roads in this category are designated Maintenance Level 1). The open roads do not receive any sort of scheduled recurring annual maintenance, but instead are reviewed on an occasional basis (usually every few years) to determine if there are any pressing maintenance issues that need to be addressed to protect adjacent resource values. Recurring maintenance only occurs when timber harvest activity increases use on specific roads associated with that harvest. Timber sale purchasers perform this work as a condition of their contracts.

Existing Road Management Objectives

The existing management objectives for roads within the analysis area generally call for roads to be managed primarily for administrative and land management purposes, with public access being a secondary consideration. Absent the traffic associated with timber harvest activities, seasonal average daily traffic values for the open roads are quite low, usually below one vehicle per day. Virtually all of the seven-digit local roads being analyzed are managed – when open – as being suitable for high-clearance vehicles. Generally they have been designed and constructed to be single-user facilities during periods of log haul because of narrow road widths and lack of turnouts.

Road Use Patterns Over Time, Now, And In The Future

The local roads within the analysis area generally have a pattern of use common to low-standard forest roads in the absence of residential enclaves or developed recreation. With the exception of roads immediately adjacent to subdivisions such as Two Rivers, where all-terrain vehicle (ATV) use can be extensive, these roads see little use other than administrative traffic through the course of the spring and summer. Timber sale activity can contribute substantially to daily traffic values, but the pattern of such activity is usually isolated to one particular area at any given time.

In past years when active grazing allotments were located within the analysis area, there was a small usage component provided by permittee vehicles, but that has ended with the abandonment of the allotments. The bulk of use, especially southwest of State Highway 58, comes in the late summer and fall with the commencement of deer and elk hunting season and the matsutake mushroom picking season.

The existing road system is employed by two specific users in support of their commercial endeavors. Union Pacific Railroad holds road use permits to maintain access to their main rail line running through the analysis area, and Mid-State Electric Cooperative uses parts of the existing system to service their electrical lines that pass through the analysis area. These uses, although not a significant component of the total usage, have occurred for many years (especially in the case of the railroad access for the former Southern Pacific Railroad) and will continue into the foreseeable future.

The anticipated future use patterns will most likely reflect current trends, with the majority of summer usage being comprised of administrative traffic with occasional isolated increases resulting from timber sale activity, followed by increased late summer/fall traffic due to hunting and mushroom picking activity.

Primary Destinations of Road System Users

The analyzed roads within the analysis area do not generally serve any particular destinations. Rather, they provide access to areas of interest for various users. For land managers, these roads serve as access to areas where reforestation or vegetative management activities are ongoing or planned. For hunters, they provide access to popular hunting areas like Beales Butte or the boundary of the Oregon Cascades Recreation Area. For matsutake mushroom pickers, these roads provide entry into a number of prolific picking areas in the southwest portion of Crescent Ranger District.

Connectivity between the Road System and The Stream System

There are few points of proximity or intersection between the road system and the stream system, especially in the portions of the Analysis Area that are under Forest Service jurisdiction. Most stream crossings are on two- and four-digit roads that have been analyzed as part of the Forest-Level Road Analysis, with Rd. 5830 having the most significant stream crossing interaction due to crossings of Spruce Creek, Swamp Creek, Hemlock Creek (twice), and Basin Creek. The Little Deschutes River has the most length in proximity to roads. Road 5830300 runs for nearly 5 miles along its upper reaches and other road segments are in relatively close proximity on private and public land from Highway 58 north to the watershed boundary. In most instances this proximity does not lend itself to actual connectivity in terms of sediment delivery, owing to the relatively flat terrain on which both the roads and the stream channel are located.

Social and Cultural Values of the Area

Within the small communities in and adjacent to the analysis area (Crescent, Gilchrist, Chemult, Crescent Lake Junction), residents primarily earn a living from natural resource extraction (sawmill, logging, post and pole harvest, firewood cutting, special forest products), from the Klamath County School District, from natural resource management, or from the service industry (restaurants, stores, gas stations). Residents of the scattered subdivisions throughout the analysis area are either locally employed or are retired.

There is a strong connection for many residents, both within the communities and in the subdivisions, with local National Forest land, both as a source of jobs and as a source of recreational opportunities. Some of the residents living on small parcels (and many of the owners of recreational residences) hail from larger communities and purchased these parcels not only for their own remote location but also their readily available access to the vast expanse of surrounding wildlands. Accessibility to those wildlands is a given assumption within the local culture; unlike the adjacent private timberland, which is owned by a specific entity that can dictate terms of access, these National Forest lands are theirs by right as citizens. Access is generally a component of that perceived right and proposals that threaten to affect access are usually looked upon with distaste.

Local, Regional, and National Social and Economic Benefits Derived From Existing Roads

Roads within the BLT analysis area provide primary or secondary access to four different rural residential areas, affording opportunities for both year-round residences and weekend cabins. The surrounding road system provides immediate recreational access for both these residents and others who live in the small nearby communities of Crescent, Gilchrist, and Chemult, with hunting and snowmobiling being the predominant recreational activities. The road system provides the same access for the wider region, drawing hunters and others from Deschutes and

Klamath counties as well as from the Willamette Valley. This usage contributes to the economies of area communities through the purchases of vehicle fuel, food, and other supplies in local establishments.

An extensive population of people who make a significant portion of their living through harvesting, buying, and selling mushrooms exists throughout the western United States. The road system within this analysis area provides access to several popular matsutake mushroom harvesting areas, and this access provides opportunities for many of these individuals and families to engage in harvest activities for both commercial and cultural purposes. The annual influx of many hundreds of mushroom harvesters and the buyers to whom they sell their mushrooms brings an increase in commerce to the local communities in the same manner that the advent of hunting season does. In addition, the Forest Service collects tens of thousands of dollars in permit fees from commercial mushroom harvesters.

The primary original reason for the existence of the majority of the existing road system was to provide access for timber harvest. The need to have access for vegetative management still exists today as a primary reason for the continued existence of the road system. Access for timber sales and other silvicultural contracts provides for local employment opportunities to support surrounding communities. Revenue for the federal government is also generated by the sale of timber, posts and poles, and firewood.

Road Densities within the Analysis Area

Overall road density within the entire analysis area is 4.13 miles per square mile (mi./sq. mi.). This includes established drivable roads on private land and classified roads on National Forest land. Unclassified roads on National Forest land and their equivalent on private land are not included in these figures. National Forest unclassified roads are not included because they are almost exclusively so-called temporary roads constructed as part of timber sale operations. These roads either have been or will in the near future be closed and subsoiled so that, even though they may appear for years to come on aerial photographs, they have been rendered undrivable and are not part of the actual transportation network.

On private land, and especially on private timberland, there are a number of roads that are not identified in any known inventory. Many of these private roads are gated or otherwise inaccessible to the public. Forest Service planning maps show a particularly high density of roads on land owned by Crown Pacific. The majority of these are tertiary logging system roads accessing specific stands and are not generally maintained for travel on a regular basis. These roads are not being addressed in this analysis because there are no recommendations that would be made concerning these roads.

On private land, the overall density of established drivable roads is 5.34 mi./sq. mi. On National Forest land, the overall road density is 3.55 mi./sq. mi. Open road density on National Forest land is 2.93 mi./sq. mi. Road density within the National Forest portion of the analysis area tends to be somewhat variable, ranging from virtually nothing in the Oregon Cascade Recreation Area and Mt. Thielsen Wilderness, to very few roads northeast and south of Muttonchop Butte, to relatively dense road distribution south of the Two Rivers subdivision and on the flanks of Odell Butte.

Management Direction

Current direction for road management is found in the 1990 Land and Resource Management Plan (LRMP) for the Deschutes National Forest. According to the LRMP the goal of the Forest's transportation system is "To plan, design, operate, and maintain a safe and economical transportation system providing efficient access for the movement of people and materials involved in the use and protection of National Forest Lands." Forest-wide Standards and Guidelines for the transportation system and direction for each management area are included as Appendix A to this document. Figure 2 shows the location of these management areas.

Table 1. Management Areas for the Upper Little Deschutes Watershed.

LRMP Management Area	Acres
Mt. Thielsen Wilderness	6,610
Oregon Cascades Recreation Area	7,820
Little Deschutes River Wild and Scenic River Corridor (Overlaps OCRA and Wilderness)	2,450
General Forest	33,460
Scenic Views	3,390
Old Growth	1,020

About 25,715 acres (32%)within the watershed are in private ownership. The Deschutes National Forest administers the other 53,800. National Forest land saw a net increase of about 1,925 acres in the watershed through a land exchange in 1999.

About one-third of the watershed falls within the area covered by the Northwest Forest Plan (*1994 Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl),* which amended the 1990 LRMP. To the east of the Owl Range Line, The LRMP is amended by the Regional Forester's Forest Plan Amendment #2 (Eastside Screens) and by INFISH.

Table 2. Northwest Forest Plan Allocations in Upper Little Deschutes Watershed.

NWFP Allocations	Acres
Congressionally Reserved	14,727
Matrix	10,577
LSR	38
Riparian Reserve (overlaps other allocations)	3,600

An additional source of direction comes from the Little Deschutes River Wild and Scenic River Plan. Written in 2001, this plan provides direction for management within the river corridor with the intent of protecting the outstandingly remarkable values for which the Little Deschutes was included in the Wild and Scenic Rivers System (USFS 2001).

Standards and Guidelines related to the transportation system in the Wild and Scenic Corridor include:

- Forest Roads 5820300 and 5825300 are essential to the river corridor use and management. These roads should remain open. Any resource damage associated with these access routes should be solved by other means than road closure. Other roads may be closed as particular reasons for doing so arise.
- New road construction within the corridor would not be allowed, unless justified by a compelling need for resource protection.
- Road density within the corridor will not exceed 2 miles per square mile, which is currently considered the minimal amount as long as Roads 5820 and 5835 remain open.
- Unless necessary to meet other resource needs (e.g. to allow winter, over-snow logging), these roads will not be plowed out in the winter.
- Road maintenance on Road 5820300 will be the minimal level needed to maintain adequate drainage and to provide other resource protections (such as avoiding sediment delivery to streams). The intent of this low maintenance level is to preserve the aesthetic character and sense of remoteness created by the current winding road.
- Road maintenance on Road 5835 should also be minimal, with the intent to preserve current access.

INSERT FOREST PLAN MAP

INSERT NWFP MAP

Issues and Evaluation

In Step 3 of the Roads Analysis Process, the most important road-related issues in the analysis area are described. The following is a list of issues present in the watershed:

Noxious weeds – Motorized vehicles and/or their cargo are the single most important vector for the introduction and spread of noxious weeds and other non-native plant species in the Upper Little Deschutes Watershed. Several types of noxious weeds are known to exist in the watershed.

Road Density – Forest Plan guidelines provide target road densities for mule deer summer range (2.5 miles per square mile) and key elk areas (0.5 - 1.5 miles per square mile). The road density for the Upper Little Deschutes watershed exceeds the recommended levels for mule deer summer range at 2.93 miles per square mile (on National Forest land only). The recommended road density for key elk areas is also exceeded in the watershed.

Administrative and Contract Access - When roads are closed for resource protection, an indirect effect is the increased cost to access areas for administrative purposes and where contracts are being administered.

Access for Fire Suppression – The ability to reach wildfires with engines greatly improves the ability to put them out quickly. Roads are a double-edged sword with regards to fire, though, as they increase the presence of ignition sources in the forest.

Public Access for Recreation and Special Uses – Input received from the public highlighted some of the reasons people use the roads in the planning area. Roads provide access for numerous uses, including recreation and access to utility corridors.

Evaluation Process

Step 4 of the Roads Analysis Process involves assessing the benefits, problems, and risks associated with the road system. The Risk-Benefit rating system for roads was based on road-related factors from each resource area (i.e. wildlife, botany, aquatic, and human uses). These factors were used to evaluate the risks and benefits of each road (the description of each rating factor is included in Appendix B). The team used a low, medium, high rating system and gave each road a corresponding 0, 1, 2, or 3 on the road rating spreadsheet. This information is provided as Appendix C.

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KEY ANALYSIS QUESTIONS

The following analysis questions were adapted from *Roads Analysis: Informing Decisions About Managing the National Forest Transportation System (FS-643)*. The team answered those questions they felt were relevant to the planning area and the watershed scale and some were modified or combined. The alphanumeric code assigned to the questions was used for cross-referencing with the road rating factors that were applied to each road (see Appendix B). These questions were used to assess benefits, problems, and risks, and for identifying issues. The information can be used during project planning and to direct more in-depth analysis.

Ecosystem Functions and Processes (EF)

EF(1): What ecological attributes, particularly those unique to the region, would be affected by roading of current unroaded areas?

There are no Inventoried Roadless Areas in the Upper Little Deschutes Watershed. The Mount Thielsen Wilderness comprises 6,611 acres of unroaded forestland in the watershed. This remote and rugged wilderness area is protected from road construction. The majority of the Oregon Cascades Recreation Area remains unroaded. Ecological attributes of this area that would be affected by roading include wildlife habitat, watershed values, and scenery.

EF(2): 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?

Motorized vehicles and/or their cargo are the single most important vector for the introduction and spread of noxious weeds and other non-native plant species in the Upper Little Deschutes Watershed on the Crescent Ranger District, Deschutes National Forest. Existing road systems, new roads, and conversion of existing roads to trails are currently the most vulnerable type of improvement for weed introduction and spread. The railroad right-of-way is also vulnerable to the introduction and spread of non-native plants. In the past, timber harvest units have been vulnerable to weed introduction and spread when logging equipment was moved from infested areas, usually on other forests, to non-infested areas in the watershed. The risk from introductions of this type has been greatly reduced by the inclusion of clean equipment provisions in timber sale contracts.

St. Johnswort, spotted knapweed, common toadflax, Dalmation toadflax, Canada thistle, bull thistle, and cheatgrass are noxious weeds known to exist in the Upper Little Deschutes Watershed. Other non-native plant species that are not State listed noxious weeds exist in the watershed as well. All these non-native species threaten native plant communities, increase fire hazards, reduce the quality of recreational experiences, poison livestock, and replace wildlife forage.

EF(3): To what degree do the presence, type, and location of roads contribute to the control of insects, diseases, and parasites?

Road access facilitates the control of forest insects and diseases. A road system that meets the needs for managing the suitable timber base and other lands would adequately contribute to the control of insects and diseases.

EF(4): How does the road system affect ecological disturbance regimes in the area?

Within the Upper Little Deschutes watershed, common disturbance regimes include fire, insect, and disease. Bark beetles are the primary insect disturbance agent. Dwarf mistletoe is the primary disease disturbance agent. The road system has little direct effect on the functioning of these insect and disease disturbance agents.

The ponderosa pine vegetation type fire regime exhibits a historical fire return interval that is generally 1 to 30 years. The current transportation system provides adequate access for suppression activities throughout the planning area. This allows fire suppression crews to prevent most fires from becoming high-intensity, stand replacing wildfires that can alter habitat and soil productivity.

EF(5): What are the adverse effects of noise caused by developing, using, and maintaining roads?

In general, vehicle noise within the watershed is not a significant issue. Adverse effects of noise from roads are generally localized within the analysis area. The primary adverse noise effect is experienced by local subdivision residents and is centered on the Two Rivers North subdivision, which is roughly bisected by Road 5830 (which is not a road of interest in this analysis).

To a much lesser degree, roads that are being analyzed pose the potential to provide a source for adverse noise effects to those engaged in recreation activities within the analysis area. There is a minor impact to those fishing, hunting, or camping in dispersed recreation sites which is dampened by the fact that these roads are operated at low speed under which little adverse noise effect is generated.

Motorized recreationists expect to hear other motorized activities. Snowmobiles using roads and trails will create higher noise levels. The limited duration of noise associated with the maintenance of roads is of very little effect.

Aquatic, Riparian Zone, and Water Quality (AQ)

AQ(1): How and where does the road system modify the surface and subsurface hydrology of the area?

In forested lands of the Central Cascades, modification of surface flow results from roadbeds being constructed perpendicular to natural water flow patterns. This occurs on hill slopes or in valley bottoms when soils are saturated with water or frozen, or when soil structure inhibits

water absorption. Road interception of subsurface flow occurs mainly on steep hillside where the roadbed is cut deep enough into the hillside to intercept some or all of the subsurface flow. Ditches associated with these roads are an extension of the natural channel system and transport the water more efficiently increasing the potential of storm runoff, magnitude of peak flows, and sediment delivery to larger stream channels (Wemple et al. 1990).

There is relatively little overland flow in the Upper Little Deschutes Watershed due to the high infiltration rates of the soils and the flat topography. Likewise, subsurface flow interaction with roads is rare for the same reasons, but might occur in isolated areas during extreme storm events. However, there is a small amount of user-created roads and dispersed campsites that may contribute runoff and sediment to the Little Deschutes River in the upper reaches along Forest Service Road 5830300. Road drainage culverts increase hydrologic connectivity affecting surface hydrology. In the Little Deschutes Watershed the relatively flat terrain limits much or the effects.

AQ(2): How and where does the road system generate surface erosion?

Surface erosion from road surfaces is dependent upon the erodibility of the soil, infiltration rates of the soil, slope of the road, and the amount of precipitation. In the Upper Little Deschutes Watershed, soils have high infiltration rates and water storing capacity. Slopes are generally flat and annual precipitation is low (18 and 24 inches), with most falling as snow between October and May. These factors make surface erosion potential from roads in the Upper Little Deschutes Watershed limited to small-dispersed campsites that are adjacent to the Little Deschutes River along Forest Service Road 5830300. The soils in these areas have been compacted decreasing infiltration rates and may increase overland flow.

AQ(3): How and where does the road system affect mass wasting?

The factors that influence mass wasting are: hill slope, bedrock geology, soil structure, vegetation, road construction and drainage, and precipitation. Due to the flat topography, infiltration rates of the soils, and precipitations amount, mass wasting is a rare occurrence in the Upper Little Deschutes Watershed.

AQ(4): How and where do road-stream crossings influence local stream channels and water quality?

The road systems are an extension of the channel network (Wemple et al. 1996). Channels are formed from routing the concentration of water along road ditches to established stream channels. Jones and Grant (1996) found roads alone advanced the timing of peak discharge and slightly increase discharge. These functions of the road network ultimately affect the hydrograph of a stream increasing bankfull discharges and larger events. Due to the high infiltration rates of the volcanic soils in the watershed, these increases in discharge will be slight.

During high flow events culverts at stream crossings pose a high risk of large sediment inputs if: the culvert becomes plugged, flows exceed the culvert capacity, or the stream overtops the road causing the road fill to erode and causing it to fail. There are three road crossings on perennial streams that occur on seven-digit roads in the watershed. These are located on Forest Service Roads 5830100, 5830840 and 6100132. Seventeen crossings of intermittent or ephemeral

channels also occur. Even though flows are low most of the time of the year the potential for over topping is high during large storm events or on a rain-on-snow event.

AQ(5): How and where does the road system create potential for pollutants, such as chemical spills, oils, de-icing salts, or herbicides, to enter surface waters?

The potential for pollutants exists primarily at stream crossings and at those locations where roads or roadside dispersed recreation sites are in close proximity to streams. Most stream crossings in the analysis area are associated with arterial and collector roads and are therefore outside the scope of this analysis.

Use of dispersed sites and user-created OHV trails in the vicinity of the Two Rivers North subdivision along the Little Deschutes River, in addition to system roads along both sides of the river corridor, may allow contamination of pollutants to occur. Oils and fuels may enter the stream system at these locations from vehicles or other machinery that come in direct contact with the water. Roads in this analysis area that convert to snowmobile routes in winter allow for potential pollution from oils and fuel from the machines and trail groomer that may also come in contact with the water. This could occur at the crossing of the Little Deschutes on Forest Road 5835.

The most likely mechanism for delivery of pollutants into surface waters would be as the result of a vehicle accident caused by improper operation on a low standard road near those surface waters that resulted in an overturned vehicle leaking fluids. The privately controlled portion of the road system offers some indirect risk for pollutants as a result of its association with private home lots that, in some cases, have direct frontage on the Little Deschutes River.

AQ(6): How and where is the road system "hydrologically connected" to the stream system? How do the connections affect water quality and quantity (such as, the delivery of sediments and chemicals, thermal increases, elevated peak flows)?

When there is a direct connection (roadside ditch) between the road system and the stream channel there is always a risk of affecting the water quality with rapid runoff (Wemple et all 1996; Jones 1996). During rapid runoff sediments, chemicals, and elevated peak flows may occur. As mentioned earlier in AQ (4), there are few seven-digit roads in this watershed that are "hydrologically connected" to the stream system. Stream channels in this watershed appear to be stable with no signs of increased sediment or water quantity.

AQ(7): 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?

The downstream beneficial uses of water in the area, as defined by Oregon Department of Environmental Quality are: public domestic water supply, livestock watering, irrigation, industrial water supply, water contact recreation, salmonid spawning and rearing, aesthetic quality, boating, aquatic life and private domestic water supply. Presently, the demand for water, both domestic and non-domestic is low in the Upper Little Deschutes Watershed since the area is sparsely populated. However, the demand for instream water rights and increases on ground

water in the lower Deschutes Basin is of a major concern. No known or expected uses are at risk from road-derived pollutants at this time.

AQ(8): How and where does the road system affect wetlands?

Roads affect wetlands by disrupting the natural flow paths of surface and subsurface water. Roads that are constructed on the boundaries or directly through wetlands can alter natural flow regimes. This may cause ponds to develop or limit the natural development of aquatic vegetation. Roads located in these areas may also limit the movement of aquatic dependent species by creating a barrier to them. There are few, if any Forest Service roads that are located in wetlands in the planning area.

User-made extensions off many system roads throughout the Little Deschutes river corridor have allowed for dispersed sites to be created and also for user created OHV trail systems. This use affects the wetlands by direct encroachment or by possible changes in hydrology.

AQ(9): 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?

Due to the relatively flat topography and road locations in the Upper Little Deschutes watershed, channel migration, isolation of floodplains, and the movement of fine organic matter is not an issue. Migration of woody material downstream of road crossings maybe restricted due to culvert placement on perennial stream crossings.

AQ(11): How does the road system affect shading, litterfall, and riparian plant communities?

Past primary considerations for road planning, construction, and maintenance were traffic levels and economics, with little concern for environmental effects (Gardner 1979, in Meehan 1991). This often resulted in construction of roads in valley bottoms, where the road system frequently infringes on the streambanks and floodplains. Vegetation, including riparian shrubs and trees, is removed during road construction and maintenance. Stream shade, potential nutrients to the stream system from litterfall, and the abundance and vigor of riparian vegetation are all reduced.

The road system effects to shading, litterfall, and riparian plant communities in the Upper Little Deschutes watershed occur primarily where the road system crosses or is directly adjacent to streams. Many of the crossings are on intermittent streams where the effects to shade, litterfall, and riparian vegetation have less impact than on perennial streams such as the Little Deschutes River, and Basin, Hemlock, Spruce, and Swamp Creeks. Road construction and maintenance affect shading, litterfall, and riparian vegetation wherever roads cross streams. Off-road vehicles and other recreation activities affect riparian vegetation on the Little Deschutes River along the 5830-300 road.

Roads that cross perennial streams are: 5830100, 5830840, and 5834010. Roads that cross intermittent streams are: 5825080, 5825300, 5825340, 5825360, 5825370, 5825450, 5825696, 5825820, 5830540, 5830570, 5830870, 5834300, 5835100, 6020390, 6100190, 9758500,

9770500, 9770600, and 9770700. Less than 50 linear feet are affected at each crossing for a total of approximately 1200 linear feet affected in the Upper Little Deschutes watershed.

Aquatics Biological

AB(1): How and where does the road system restrict the migration and movement of aquatic organisms and what species are affected?

According to the USFS culvert analysis performed in this watershed, no culverts in this analysis area significantly restricted fish movement. Of concern are jump pool height for juvenile fish and velocities within the culverts. In this watershed the only potential at risk species is the Regional Forester's sensitive species redband trout (*Oncorhynchus mykiss*). Redband trout have been reported scarce in the Little Deschutes River (Kostow 1995). A 1990 and 1992 Inventory of the Little Deschutes by ODFW found only one redband above LaPine (Fies et all 1996). Surveys conducted by electro-fishing and snorkeling by Forest Service personnel found no redband above Gilchrist Mill Pond (Houslet 2001).

Terrestrial Wildlife (TW)

This analysis does not include all private roads or roads on lands recently acquired in a land exchange. The land exchange area was intensively managed. The results are high road densities and large blocks of early seral habitat. A road inventory of the area was not available for this analysis. While every effort to reduce densities in this area is recommended, restoration work requiring access is currently needed.

TW(1): What are the direct effects of the road system on terrestrial species, habitat, unique communities, or special features?

The construction and maintenance of roads for vehicular traffic result in a direct loss of wildlife habitat as well reducing the effectiveness of habitat available for wildlife species (Figure 6). Obviously, the wider the road width the greater the loss of habitat. Due to roads taking the place of habitat in the watershed there is a loss of approximately 1,300 acres of habitat or 1.6% (assuming an average road width of 20').

Table 3. Habitat loss due to Roads

Area	Acres	Acres of Roads	% of Area
Watershed	80375	1331.00	1.65599
Riparian Reserves	6,970	46.6	0.66
Key Elk	2511	38.76	1.54354
NRF	3620	28.16	0.7779
Old Growth	1291	5.28	0.40883
OG 12	348	1.57696	0.45315
OG 18	313	1.664	0.53163
OG 20	269	5.66784	2.107
OG 21	361	4.60288	1.27504

Habitat effectiveness adjacent to open roads is generally reduced for some species such as elk, which tend to avoid open road systems. Research by (Rowland, Wisdom, Johnson, and Kie, 2000) within the Starkey Experimental Forest in Oregon showed that cow elk consistently select areas away from open roads during the spring and summer months. Their research also showed that the spatial distribution of roads could affect elk habitat use. Regularly spaced roads had the greatest percentage of habitat influenced by roads, and randomly spaced roads the least. They also stated that clumped patterns of roads produced comparatively larger continuous blocks of habitat unaffected by roads. Having unroaded blocks of habitat available is important to reduce vulnerability to hunters, maintain access to favored resources, and retain elk populations distributed across the landscape. Within the Upper Little Deschutes River watershed, the greatest concentration of elk use occurs in the Hemlock Key Elk Area, Beales Butte/ Chinquapin Butte area, Swamp Creek basin and in the Upper Little Deschutes River canyon. These are also the areas with the greatest need to reduce open road densities.

Road systems also provide access to conduct forest management activities on public lands. Edge habitat is created by the presence of roads and/or through forest management that changes stand age and structure. Generally, edge habitat increases species richness, and more species are positively than negatively associated with edge habitat (Rochelle 1998). However, some species such as the northern spotted owl can be negatively affected by habitat fragmentation by increasing their risk to predation from edge species such as the great horned owl. In this watershed the highest road density areas such as Beales Buttes, Chinquapin Butte, Basin and Hemlock Creek, and along the Little Deschutes River correspond to the areas with the greatest amount of habitat fragmentation (i.e., young forest vs. older forest).

There are four designated Old Growth Management Areas in the watershed and they have road densities ranging from 1.14 miles per square mile to 3.12 miles per square mile. Roads within these areas can have three negative effects. First, they remove habitat for the species for which they were intended (goshawks, black-backed woodpeckers), secondly they introduce edge habitat available for habitat generalist species, and finally, they can increase the risk of windthrow events which can remove even more old growth habitat for the intended species.

Amphibians and mollusks species can be impacted by road induced mortality as well as the change in microclimatic conditions. When roads are created, the forest canopy is reduced allowing more sunlight and wind to reach the forest floor. This can negatively impact amphibians and mollusks that depend on specific microclimatic conditions to persist.

TW(2): How does the road system facilitate human activities such as the legal and illegal harvest of animals from trapping, hunting, poaching, vehicular/animal collisions, and the harassment of wildlife?

Roads can result in wildlife mortality caused by motor vehicle collisions. The greatest impact on big game animals occurs on those portions of Highway 97 and 58 within the watershed. Spring and fall migrations of deer and elk result in dozens of road-killed animals in addition to the day-to-day collisions of animals that cross the highway for food or water resources. The two highways are also impacting smaller mammals such as chipmunks, squirrels, resident and neotropical birds. On the secondary roads that comprise most of the road mileage in the watershed, the impacts are less severe.

At the present time the open road density in the watershed exceeds the recommended levels for mule deer summer range. The Deschutes National Forest plan recommends a level no greater than 2.5 miles of open road per square mile of land (USDA 1990). The present open road density is 2.93 miles on national forest roads only. Within the Hemlock Key Elk Area, the open road density is 3.8 miles per square mile of land, which greatly exceeds the 0.5 to 1.5 miles per square mile described in the forest plan (USDA 1990).

Table 4. Road Densities

Area	Area mi2	Total Miles (corrected for closed)	Rd density mi/mi2
Entire Watershed	125.58	519	4.13
Riparian Reserve	10.89	17	1.56
Key Elk	3.92	14.89	3.80
NRF	5.66	11	1.94
Old Growth			
OG 12	0.54	0.616	1.14
OG 18	0.49	0.65	1.33
OG 20	0.56	1.745	3.12
OG 21	0.42	0.716	1.70

High open road densities provide greater and easier access to game species whether they are taken legally or illegally. A study on elk by Phillips and Alldredge (2000) in Colorado found that open roads and repeated human induced disturbance during the elk calving season may increase calf vulnerability to predation either through increased calf movement, nutritional stress, desertion, or a combination of these factors. Higher road densities increase hunter access. Hunting seasons begin in late August and continue through mid- November. Most of the deer and elk have migrated to winter ranges off the Crescent Ranger District by the end of October or early November.

All terrain vehicle use is relatively common. Use occurs during the hunting seasons and also by the public that live in the subdivisions such as Two River North. Some of this use occurs on roads that have been closed to vehicle access. It is unknown how much impact this may be having on big game or other wildlife species.

In most years snowmelt allows vehicle access at the lower elevations beginning in April. Woodcutting begins at this time as roads and access to cutting areas melt out. The other major traffic period on the secondary roads is hunting season as mentioned above. Matsutake mushroom season overlaps the hunting seasons that begins in September and continues until late October. In some years several thousand mushroom gatherers will collect matsutake in the watershed. Normally by the end of November, snow accumulation naturally closes most roads in the watershed to vehicle traffic. The exceptions are Highway 58 and 97 and those system roads that access subdivisions that are plowed as needed.

Designated snowmobile routes are present in the watershed including the 5825 road system. Other national forest system roads are used as well although the amount of use that is occurring

is unknown. Snowmobile users would not impact big game because the animals have already migrated off the district. Some trapping of furbearer species such as marten and beaver may be occurring although we do not know to what extent.

District records do not show any threatened, endangered, or sensitive species nests in the Upper Little Deschutes River watershed. There are three northern goshawk (forest plan management indicator species) nests in the watershed although all occur in the unroaded portion of the watershed.

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?

The road system directly affects agency revenues by providing existing access to locations where revenue-producing activities occur. Commercial post-and-pole sales, commercial and personal use firewood sales, commercial mushroom picking, and timber sales all rely on the existing tertiary road system that is the subject of this analysis.

Direct agency costs generally derive from maintenance work and administrative activity:

Maintenance: Although virtually none of the roads being analyzed receive recurrent maintenance, the need for maintenance accrues as time passes. The cost incurred by the agency for this deferred maintenance is most commonly presented when scheduled timber sale activity requires that the road be brought to a minimum standard suitable for log haul. This cost is represented in the timber sale appraisal as an overhead cost that reduces timber sale revenue.

Administrative Activity: Road closures implemented for the enhancement of other resource values result in adding time – and, consequently, cost – to activities such as timber sale layout and planning area reconnaissance because of increased complexity in gaining access to areas behind closures. Costs are also generated by the opening and reclosing of closed roads for administrative or contract access.

The low standard of the road system also results in a revenue reduction, although it is probably a minor cost and is one that is rather difficult to quantify. This reduction occurs as a result of the increased haul times for timber sale operators over that which they might experience operating on higher standard roads.

Commodity Production
Timber Management (TM)

TM(1): How does road spacing and location affect logging system feasibility?

Logging systems that have been historically employed within the analysis area had – as a common theme – ground-based yarding of logs to centralized landings. This is especially

reflected in a lengthy history of tractor yarding that has been used up to current times. The significant outcome of this history with regard to future logging system feasibility is that roads are situated to deal with logs being skidded downhill to landings. Roads, as a result, commonly tend to be located toward the bottom of slopes and drainages. Slope restriction guidelines implemented over the last decade have dictated giving strong consideration to cable yarding systems instead of tractor yarding systems that were the driving force behind establishment of the current road system. Cable systems usually call for access at the top of the stand being harvested; as a result, consideration of cable systems is complicated by the fact that the existing road system is not suited for the access needs of these systems.

TM(2): How does the road system affect managing the suitable timber base and other lands?

Access routes have been established throughout the managed portion of the analysis area because of past timber harvest dating back to early in the last century. Access to the timber base, as well as to the perimeter of the Oregon Cascades Recreation Area (OCRA) and Mt. Thielsen Wilderness, are provided by this road system. Management of the timber base is enhanced by the presence of the road system in that convenient access is provided; this reduces the monetary cost and time that would otherwise be required in the absence of roads. Also, harvest activities resulting from recent environmental analysis efforts have been and will be done with greater practical and economic efficiency because little new permanent road construction was or will be required to gain access. This was a particular boon in the effort to recover large acreages of relatively low-value windstorm-downed timber in the Upper Little Deschutes drainage.

At the same time, the existing road system affects management of other lands not included in the suitable timber base by providing access to the boundary (but not into the interior) of the OCRA and the wilderness; access is provided for foot traffic by hunters and mushroom harvesters into these essentially roadless areas. This allows for commercial harvesting of matsutake mushrooms from the OCRA (where it is legal to do so) and from the wilderness (where it is not). This accessibility has a downside, however; there is limited accessibility for fire suppression forces to reach fire starts that occur in these roadless areas during hunting and mushroom harvesting season.

TM(3): How does the road system affect access to timber stands needing silvicultural treatment?

As noted above, a well-developed transportation system has been established in the analysis area through past harvest practices. This system, when viewed without regard to whether the roads are open or closed, provides basic access to virtually every stand that may need future silvicultural treatment. Effective access through the various stages of planning and implementation can be variable because of current and proposed road closures; these closures increase the need for foot travel to certain stands during planning activities and add to the cost of implementing certain silvicultural practices such as precommercial thinning as a result of higher bid prices for “walk-in” units. Such issues can theoretically be dealt with by opening the road during periods when such administrative use is necessary, but as a practical matter funding and equipment availability or the capability of locally available equipment often results in roads being left closed during these administrative activities (except in the case of merchantable timber harvest, when capable equipment for opening and reclosing roads is readily available).

Minerals Management (MM)

MM(1): How does the road system affect access to locatable, leasable, and salable minerals?

There is virtually no activity in the area of locatable, leasable, and salable minerals within the analysis area. One active minerals source, a cinder pit, is located on National Forest land on the south side of Muttonchop Butte; a privately owned commercial rock pit that historically provided crushed aggregate products is found on private land near County Road 61. The Muttonchop cinder pit is a little-used source for which open road access is provided by Road 5830750. Road 6125, which has alternating jurisdiction between Crown Pacific and USDA Forest Service, provides arterial access for the private source; a road use permit to the pit owner grants commercial use permission those road segments under Forest Service jurisdiction.

Special Forest Products (SP)

SP(1): How does the road system affect access for collecting special forest products??

Road access is a key element in the collection of special forest products. The most commonly sought-after products within the analysis area are firewood, fence posts and poles, and matsutake mushrooms. In all three cases, but especially in the instance of wood products, immediate access to the material source controls the collection of these materials. The presence or absence of road access to the immediate vicinity of firewood/post and pole areas dictates whether these can be collected due to the physical necessity of getting the hauling vehicle to within feet of the material supply. To a somewhat lesser degree, the collection of mushrooms is also controlled by the availability of roads, although mushroom harvesters tend to travel on foot farther away from roads in search of mushroom patches.

The existing road system, absent consideration of maintenance levels, provides access to most areas where these special forest products can be collected. When maintenance levels and consequent road closures are considered, there can be some diminution in the available access to special forest products.

The most effective closure method in the terrain typically found in the analysis area is to physically barricade a road entrance and tear up the road surface for the visible distance back from that barricade to discourage efforts to defeat the barricade. While this sort of closure method can be removed with locally available equipment for the duration of a planned entry for firewood or post/pole collection, it would be much less practical and much more expensive (to the point of being prohibitive) to employ the same strategy for annual entry by mushroom harvesters. As a practical matter, therefore, non-administrative road closures implemented for general resource protection purposes do not necessarily preclude access to firewood or post/pole harvest areas; they do to some degree, however, limit access to those interested in mushroom collection.

Special-Use Permits (SU)

SU(1): How does the road system affect managing special-use permit sites (concessionaires, communications sites, utility corridors, and so on)?

The existence of open road access to the various special uses areas in the analysis are vital to the management of these areas. Road 5815500 provides access to a communications site on Odell Butte, as well as to a Forest Service lookout. This access is important in providing the various operators at the site with access for maintenance and repair of their communications facilities. Since such access can be a two-edged sword by providing access for those bent on vandalism, access on this road is controlled by a gate.

Various roads provide access to power lines owned by Midstate Electric Cooperative; these power lines provide electricity to various subdivisions on the western side of the District, as well as to residences and resorts in the Crescent Lake and Odell Lake areas and to the Willamette Pass ski area. Since power outages that can occur at any time of the year are capable of creating hardships for any number of area residences and businesses, access by the existing road system to any location along the powerline corridor is important for repair crews seeking to expedite repairs.

Another subset of roads provides access to two railroad corridors, one being the western north-south Union Pacific mainline and the other belonging to Klamath Northern Railroad, a small local transporter that primarily moves lumber shipments from the Gilchrist Crown Pacific facility to the Gilchrist Junction siding on the Union Pacific Mainline northeast of Two Rivers. The existing road system provides primary access for track maintenance on these two lines, especially for Union Pacific Railroad, which plows snow on several access roads under the terms of a road use/snowplowing permit issued by Crescent Ranger District.

General Public Transportation (GT)

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

Three subdivisions comprised of a mix of recreational and year-round residences are found within the watershed, along with the communities of Gilchrist and Crescent and other small collections of houses. Roads 5825 and 5830 provide the Two Rivers subdivision with direct access to Highway 58. Tall Timbers, a developing subdivision, and Schoonover Estates, a sprawling collection of residences and lots, are primarily served by Road 6125, which has segments under Crown Pacific jurisdiction without easements granted to the U.S. Government. Road 9770, which has segments under Crown Pacific jurisdiction with easements to the U.S., provides access to the eastern side of Schoonover Estates. Road 5825800 also provides access to a small collection of lots.

GT(2): How does the road system connect large blocks of land in other ownership to public roads (ad hoc communities, subdivisions, inholdings and so on)?

The primary large block of land in other ownership belongs to Crown Pacific. The company has its own extensively developed independent transportation system; the Forest Service transportation system only provides minor seldom-used secondary access to their land.

GT(3): How does the road system affect managing roads with shared ownership or with limited jurisdiction? (RS 2477, cost-share, prescriptive rights, FLPMA easements, FRTA easements, DOT easements)

There are no applicable roads in the analysis area to be addressed by this analysis.

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

The roads being addressed in the analysis area are native-surface single-lane roads constructed to a low standards with no particular attention paid to user comfort or convenience. They are low-speed roads with few turnouts and – during the primary designed use for log haul – are intended to be single-user facilities. Traffic control devices are virtually nonexistent, except in the presence of relatively extraordinary circumstances, such as cattleguard installations or railroad crossings. These roads were not constructed for and are not maintained for passenger car use; these roads are intended for use by knowledgeable drivers with a certain amount of experience operating vehicles with appropriate consideration for conditions.

Administrative Use (AU)

AU(1): How does the road system affect access needed for research, inventory, and monitoring?

Vegetation projects and potential projects are located throughout the watershed. The road system is presently adequate to provide access for inventory and monitoring. No research projects are located in the watershed. Also see response to *EC(1).*

AU(2): How does the road system affect investigative or enforcement activities?

The road system allows for both present and future opportunities for illegal activities such as trash disposal on Forest lands, poaching, unauthorized motorized activities, and unauthorized removal of forest resources. Road closures or decommissioning would decrease opportunities for these activities. There are presently very limited numbers of law enforcement officials for monitoring and providing effective enforcement of illegal public activities throughout the Forest. The Upper Little Deschutes watershed is not a highly visible area and is not, therefore, a high priority for enforcement activities.

Protection (PT)

PT(1): How does the road system affect fuels management?

The relationship between the road system and the fuels program is related to the ease of getting to a unit to perform fuels treatments, the type of equipment we can use, and the type of treatment that can be accomplished. A closed road makes more work for fuels in getting resources to the unit for mechanical treatment and limits the types of resources the Forest Service can get to an

underburn, increasing our chances of escapes and raises the complexity of burns. Higher qualified people and more resources are needed to accomplish burns where access by roads is limited. This will increase cost per acre, reduce accomplishment, and in some areas may reduce the possibility of reintroduction of fire to the forest.

PT(2): How does the road system affect the capacity of the Forest Service and cooperators to suppress wildfires; and PT(3): How does the road system affect risk to firefighters and to public safety?

The more roads we close, the more time, effort, and resources it will take to control a wildfire. The inability to get an engine to the scene and the longer hike into the fire by crews will cause fires to grow larger and be more difficult to fight. There will be a greater risk of fires growing larger and causing greater resource damage.

Along with using roads to get to fires they are a great control line and can speed up the containment of a wildfire, reduce fatigue of firefighters, and increase safety when used as escape routes and/or holding lines. In areas of wildland urban interface, the risk of fires is significantly higher. The loss of forest resources, habitat, human life, and homes could increase significantly with the reduction of roads near these areas.

PT(4): How does the road system contribute to airborne dust emissions resulting in reduced visibility and human health concerns?

The roads in the analysis area are generally far removed from population centers and on the whole receive little daily traffic. While traffic on individual roads can generate dust that creates short-term roadside visibility issues, the actual quantity of airborne dust coupled with generally fast dispersion rates results in negligible concerns for visibility or health. The visibility concerns are temporary and can be mitigated with slow driving and watering roads. Timber sale-related traffic is the activity that would generate the highest traffic volumes and presumably create the highest risk for airborne dust emissions, but dust abatement requirements during log haul mitigates this to a great degree.

Recreation

Unroaded Recreation (RR)

UR(1): Is there now or will there be in the future excess supply or excess demand for unroaded recreation opportunities?

Wilderness and unroaded areas of Oregon Cascades Recreation Area provide a supply of unroaded recreation opportunities that will eventually not meet the demand. The Big Marsh and Odell Watershed analyses have identified a trend of increasing human use, including increasing emphasis on access to primitive and semi-primitive settings. Supply is expected to be limited in these areas.

UR(2): 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 recreation opportunities?

None of these activities are expected to cause change in the characteristics for unroaded recreation opportunities. They may possibly invite more use.

UR(3): What are the adverse effects of noise and other disturbances caused by developing, using, and maintaining roads, on the quantity, quality, and type of unroaded recreation opportunities?

The periodic noise and other disturbances caused by road development, use and maintenance is not known to affect unroaded recreation opportunities in this area at this time.

UR(4): Who participates in unroaded recreation in the areas affected by constructing, maintaining, and decommissioning roads?

Recreationists that mainly partake in dispersed activities such as camping, hunting, fishing, hiking, birding and other wildlife observation, horseback riding, cross-country skiing, are those that are affected.

UR(5): What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available?

Recreationists in this analysis area are residents in and arount it, and/or seasonal users. Attachment and feelings for the unroaded recreation opportunities are expected to be strong. Alternative opportunities and locations may exist over smaller, contiguous acreages. However, whether this would divert use away from the popular areas of concern within this analysis area its not known.

UR(6): How is developing new roads into unroaded areas affecting the Scenic Integrity Objective, SIO(s)? Note: Some forests are still using the Visual Management System (VMS). If that is the case, substitute Visual Quality Objective (VQO) for SIO. (Region 2 added this question. There is no corresponding National direction).

Development of new roads into the designated unroaded areas is not expected.

Road-Related Recreation (RR)

RR(1): Is there or will there be in the future excess supply or excess demand for roaded recreation opportunities?

Demand is high and is expected to increase for roaded recreation opportunities as growth and popularity of the area continues. There are no developed sites in the analysis area except for Crescent Creek campground. Numerous dispersed sites exist throughout the analysis area, with the bulk located along the Little Deschutes River corridor. There is evidence of significant OHV use impacts along the river adjacent to the Two Rivers North subdivision. Camping, hunting, fishing, snowmobiling and unregulated off-road vehicle use are expected to be the most prevalent activities.

RR(2): Is developing new roads into unroaded areas, decommissioning of existing roads, or changing maintenance of existing roads causing substantial changes in the quantity, quality, or type of roaded recreation opportunities?

Decommissioning of existing roads has the most substantial affect to roaded recreation opportunities, most notably to the sportsman who may wish to hunt, fish or camp in locales found in the area which may no longer be accessible except on foot or by stock. Changing maintenance levels on existing roads to a lower standard may impact the recreationist, causing inconveniences and vehicle wear and tear. The development of a new road into an area not roaded may cause a negative impact by inviting recreational activities that may not be desired.

RR(3): What are the adverse effects of noise and other disturbances caused by constructing, using, and maintaining roads on the quantity, quality, or type of roaded recreation opportunities?

Roaded recreation generally consists of motorized recreation opportunities. This type of user is typically used to and accepting of other road related types of activities. Inconvenience may be the biggest impact.

RR(4): Who participates in roaded recreation in the areas affected by road constructing, changes in road maintenance, or road decommissioning?

Motorized recreational activities typically include sightseeing, birding and wildlife observation, camping, hunting, and fishing. These types of users are those that could be affected the most by road related activities and are generally knowledgeable about such activities occurring in the area.

RR(5): What are these participants' attachments to the area, how strong are their feelings, and are alternative opportunities and locations available?

Recreationists in this analysis area are residents in and around it, and/or seasonal users. Attachment and feelings for the roaded recreation opportunities are expected to be very strong. Alternative opportunities and locations may exist for roaded recreation and may be necessary to provide for in the future as growth and popularity of the area continues.

Passive-Use Value (PV)

PV(1): Do areas planned for road constructing, closure, or decommissioning have unique physical or biological characteristics, such as unique features and threatened or endangered species?

The affects on passive use values may vary significantly between individuals and between user groups. Road closures might have a positive affect on mountain bike riding, horseback riding, hiking, wildlife viewing, hunting, and those seeking a general sense of solitude. Decommissioning and closing roads could adversely affect access to traditional hunting camps and stands, and collection of special forest products.

Also see response to TW(1) for a discussion of the areas where road closures are recommended.

PV(2): Do areas planned for road construction, closure, or decommissioning have unique cultural, traditional, symbolic, sacred, spiritual, or religious significance?

Until the areas planned for such activities are clearly identified, this question can not be answered by the Heritage Program. It is assumed that, in general, SOME AREAS where roads currently exist and where other roads are proposed WOULD have unique significance.

PV(3): What, if any, groups of people (ethnic groups, subcultures, and so on) hold cultural, symbolic, spiritual, sacred, traditional, or religious values for areas planned for road entry or road closure?

Portions of the area are within the boundaries of land claimed by the Klamath Indians under the Treaty of October 14, 1864 (16 Stat., 707). Based on analysis of archaeological materials from nearby, there is the suggestion that other groups also used the area on an occasional or even regular basis. These would be the Molalla peoples of the western slopes of the central Cascades and the Paiute peoples of the northern Great Basin to the east.

PV(4): Will constructing, closing, or decommissioning roads substantially affect passive-use value?

The affects on passive use values may vary significantly between individuals and between user groups. Road closures might have a positive affect on mountain bike riding, horseback riding, hiking, wildlife viewing, hunting, and those seeking a general sense of solitude. Decommissioning and closing roads could adversely affect access to traditional hunting camps and stands, and collection of special forest products. Possibly, yes. Until such areas are clearly identified, however, this question cannot be adequately addressed. In general, it is presumed that loss of access would affect such values, in that a person would learn that in the future, they would have to find another way to access a particular area.

Social Issues (SI)

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

Public input during preparation of a management plan for the wild and scenic portion of the Little Deschutes River revealed a desire, on the part of some of the public, to have unrestricted motorized access to National Forest System (NFS) Lands. Other facets of the public see roads as a problem for the ecosystem and that the number of roads on NFS Lands should be reduced.

People who provided input to this Roads Analysis, expressed their opinions on the benefits of the road system and access to NFS Lands. Numerous activities are undertaken by the public that benefit from roaded access such as matsutake mushroom harvesting, recreation, and emergency medical response.

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

In many instances roads give good access to such sites. In others, access is less direct. And in other cases, access is too good, leading to site vandalism and damage.

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?

Presently, there is little information available with which to address this question. It is presumed that for those American Indians who exercise their treaty rights, the road system likely facilitates such practices as much as it hinders these same practices. This is because the better the access to hunting grounds or places were special plants are found, the better the ability of these persons to reach and make use of them. The flip side of this ready access is that non-Indians have an equal level of access to the same places.

SI(5): How are roads that constitute historic sites affected by road management?

Historic roads are affected in various ways by road management, depending on whether the new routes make use of the old routes, or whether the new routes cross over old ones only in a few spots. Effects on historic roads depend on what the actual road management activity entails. In most cases where the modern route is in the same corridor as the earlier routes, there is little original physical integrity remaining with which to evaluate the changes. Many times the only evidence of an historic route lies not on the ground, but in the historic record and on old maps. In other cases, however, where there is an intersection of the two routes, damage to the historic route is less severe. It could be argued in these latter cases that, even though the old route was compromised by a modern route crossing it, the rest of the earlier route remains intact from disturbance by the modern route.

SI(6): How are community social and economic health affected by road management (for example, lifestyles, businesses, tourism industry, infrastructure maintenance)?

The local communities of Crescent, Gilchrist, and Crescent Lake have been dependent in part on the National Forest for their economic well being. Forest products, including timber, firewood, wild mushrooms, as well as tourism, contribute to the local and regional economy.

The Upper Little Deschutes watershed is not a major destination area for recreation users. The recreational opportunities vary from hunting and camping to OHV use. The watershed provides local residents with an area of traditional dispersed uses that is readily accessible.

A letter was sent to 45 local addressees and other parties affected by or possibly interested in the transportation system. Feedback was received from 3 individuals, one of which lives in a local community. They indicated that all roads are important for a multitude of things ranging from emergency vehicle access to mushroom harvesting, hunting and other recreation opportunities to ranching and logging.

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

The portion of the Mt. Thielsen Wilderness that is within the Upper Little Deschutes watershed is accessed by only one trailhead, which is undeveloped. The road system currently has little or no effect on wilderness attributes. Development of new roads or upgrading of existing roads outside the wilderness may alter existing wilderness use patterns, which corresponds to the wilderness integrity, natural appearance, opportunities for solitude and primitive recreation. Any road management activities must be considered to include mitigation measures for any adverse impacts to wilderness values.

SI(9): What are traditional uses of animal and plant species in the area of analysis?

Presently, there is inadequate information available with which to answer this question. It is presumed, based on the archaeological and historic record, that traditional uses include hunting large and small game animals and gathering economic plant species that would supplement a protein diet. Prehistoric archaeological evidence in the area suggests that early inhabitants hunted with bow and arrow, using mainly volcanic glass (obsidian) arrowheads. In limited cases there is evidence of an earlier projectile system that was also used, namely spears or darts hafted to long shafts and propelled with an atlatl, or spear thrower.

Traditional historic uses of animals is presumed to be the same, for food, as well as for their furs in some cases. Plant species were much more systematically exploited in the early historic period and continuing to the present. This is mainly the harvest of coniferous tree species for lumber, pulp, or other such uses. Some areas may have been exploited for grazing sheep and cattle as well, although not for the past decade or so.

Civil Rights and Environmental Justice (CR)

CR(1): How does the road system, or its management, affect certain groups of people (minority, ethnic, cultural, racial, disabled, and low-income groups)?

Executive Order 12898, Environmental Justice, directs agencies to assess whether projects will have a disproportionately higher and adverse effect on minority and low-income groups.

A primary purpose of road management is to provide for the health and safety in road use for all members of the public. The road system is available for use by the general population and any management activities would affect all populations.

Most of the various uses of the watershed cannot be attributed to any particular subset of the population. For example, hunting is a popular activity in the area. Local people of various income levels, as well as people from out of the area, come to hunt big game. There are activities however, that may involve minority groups at a larger proportion. For example, a large proportion of matsutake harvesters are recent immigrants from Cambodia, Laos, Thailand, and Vietnam. Many of these people have limited job prospects because of language barriers, and mushroom harvesting gives families a way to support themselves. (Pilz 1999)

The road system allows mushroom harvesters to more easily access picking areas. Road closures may affect harvesters by making them walk farther to reach picking areas, although there is no specific data on where important picking areas may be. Information currently being gathered about matsutake habitat and growth will help address this issue.

Road closures decisions should factor in the importance of an area to fuelwood gatherers.

During project planning, it is recommended that ID teams follow the *CEQ Guidance for Environmental Justice under NEPA* (December 10, 1997). When analyzing effects of alternatives, include an analysis of the extent to which minority and/or low income populations might be disproportionately affected. The analysis should include potential impacts to subsistence consumption and human health, as well as the related economic and social effects of each alternative.

Recommendations

In Step 5 of the process, the team identified options for modifying the road system to respond to the issues, benefits, problems, or risks that arose through the previous steps. This analysis provides information for project teams and line officers the ability to reach road management decisions in a more informed manner. Arterial and collector roads (two and four-digit roads) were reviewed in the Forest-Wide Roads Analysis. No recommendations for these types of roads are made in this document.

This analysis did not include lands recently acquired in a land exchange from Crown Pacific. Suffice it to say, though, that intensive management of these lands has resulted in a high road density and large blocks of early seral habitat. Restoration work for the land will requires access, then work towards reducing road densities.

Recommendations take the form of an objective maintenance level. This is identified in the Recommendations Table of Appendix C. These maintenance level recommendations are shown on Figure 6.

One of the following management strategies was applied to each road:

A. Maintain As Is: Existing maintenance efforts are generally in balance with access needs, no resource impacts are identified that would warrant a change in maintenance levels.

This category represents 91 miles at maintenance level 1 and 78 miles at maintenance level 2.

B. Increase Maintenance Level: Access needs identified exceed existing maintenance efforts and/or resource impacts have been identified that indicate a need to perform maintenance at a higher level.

Approximately 38 miles were identified for an increase in maintenance from level 1 to level 2.

C. Decrease Maintenance Level: Access needs identified do not support maintaining road at current level. Resource impacts are low and do not require maintenance to continue at present level.

Slightly more than 1 mile is recommended for moving from maintenance level 2 to level 1.

D. Implement Seasonal Travel Restrictions: Access is generally needed during the snow free season, but resource concerns indicate a need for travel restrictions to be implemented to mitigate negative impacts.

E. Close Year Around: Access needs are low and only necessary for administrative or project use. Road can be closed between projects. Resource concerns or maintenance budget limitations indicate a need to close road between project activities.

No roads in the analysis area are recommended for this management strategy.

F. Decommission or Convert to Other Uses: Full-sized vehicle access is no longer needed, road can be removed from the transportation inventory. Road can either be stabilized and returned to resource production or converted to other uses such as a motorized or non-motorized trail.

Approximately 1 mile is recommended for decommissioning. This includes the 5800-092 (0.5 miles); 5835-231 (0.3 miles); and 6125-912 (0.2 miles)

Table 5. Miles of road opportunities by Management strategy and work required. For-digit roads on National Forest Land only.

Management Strategy	Recommended Maintenance Level	Total (miles)
A – maintain as is	1	91
A – maintain as is	2	78
B – increase maint. level	1	1
B – increase maint. level	2	38
C – decrease maint. level	1	1
D – seasonal restrictions	N/A	0
E – close year round	N/A	0
F - decommission	N/A	1
	Total	210

The total of 210 miles of roads on National Forest land does not include roads that were acquired in the land exchange with Crown Pacific. These roads are yet to be classified.

Of the approximately 208 miles of classified local roads within National Forest Land in the watershed, the recommendation would leave 44 % of them in maintenance level 1, not open to vehicular traffic.

The following are the descriptions of the categories of work required for the road system. This item is included in the recommendations table Appendix C.

1. **Maintain on Regular "annual" maintenance cycle:** Some maintenance items may be done once or more per year and some may be done every other year. The key is that maintenance items are done on a regular recurring cycle.

2. **Maintain on "as needed" basis:** These roads are maintained "as needed" to correct safety issues related to project use and environmental deficiencies. They will generally only receive a review of maintenance needs once every 5 to 10 years and generally receive maintenance work as project needs require.

3. **Requires major improvement or deferred maintenance project work:** Work may include items such as surfacing, realignment, relocation, installing bridges or major culverts, etc.

4. **Requires minor improvement or deferred maintenance project work:** Work may include items such as brushing, blading, spot rocking, adding or enhancing drainage structures like drivable dips, water bars, ditches, ditch relief culverts, etc.)

5. **No maintenance required:** Road has been placed in a state of self-maintenance and entrances are closed to eliminate full-sized vehicles.

INSERT RECOMMENDATIONS MAP

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Appendix A
Current Management Direction

Current Forest Plan Direction

Including Amendments

	Management Area	Resource	Topic	Subtopic	Number	Standard
NWFP						
	Any	Riparian Reserves	Roads Management		RF-1	Cooperate with Federal, Tribal, State, and county agencies, and cost-share partners to achieve consistency in road design, operation, and maintenance necessary to attain Riparian Management Objectives.
	Any	Riparian Reserves	Roads Management		RF-2	For each existing or planned road, meet Aquatic Conservation Strategy Objectives by…
	Any	Riparian Reserves	Roads Management		RF-2a	minimizing road and landing locations in Riparian Reserves.
	Any	Riparian Reserves	Roads Management		RF-2b	completing watershed analyses (including appropriate geotechnical analyses) prior to construction of new roads or landings in Riparian
	Any	Riparian Reserves	Roads Management		RF-2c	preparing road design criteria, elements, and standards that govern construction and reconstruction.
	Any	Riparian Reserves	Roads Management		RF-2d	preparing operation and maintenance criteria that govern road operation, maintenance, and management.
	Any	Riparian Reserves	Roads Management		RF-2e	minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.
	Any	Riparian Reserves	Roads Management		RF-2f	restricting sidecasting as necessary to prevent the introduction of sediment to streams.
	Any	Riparian Reserves	Roads Management		RF-2g	avoiding wetlands entirely when constructing new roads.
	Any	Riparian Reserves	Roads Management		RF-3	Determine the influence of each road on the ACS objectives through watershed analysis. Meet ACSO by:
	Any	Riparian Reserves	Roads Management		RF-3a	reconstructing roads and associated drainage features that pose a substantial risk.
	Any	Riparian Reserves	Roads Management		RF-3b	prioritizing reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected.

	Management Area	Resource	Topic	Subtopic	Number	Standard
	Any	Riparian Reserves	Roads Management		RF-3c	closing and stabilizing or obliterating and stabilizing roads based on the ongoing and potential effects to ACS objectives and considering short-term and long-term transportation needs.
	Any	Riparian Reserves	Roads Management		RF-4	New culverts, bridges, and other stream crossings shall be constructed, and existing culverts, bridges, and other stream crosings determined to pose a substantial risk to riparian condition will be improved to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.
	Any	Riparian Reserves	Roads Management		RF-5	Minimize sediment delivery to streams from roads. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills,
	Any	Riparian Reserves	Roads Management		RF-6	Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.
	Any	Riparian Reserves	Roads Management		RF-7	Develop and implement a Road Management Plan or a Transportation Management Plan that will meet the Aquatic Conservation Strategy Objectives. As a minimum, this plan shall include provisions for the following activities: inspections and maintenance during and after storm events; road operations and maintenance, giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources; traffic regulation during wet periods to prevent damage to riparian resources; establish the purpose of each road by developing the Road Management Objective.
	Any	Riparian Reserves	Roads Management		RF-7a	inspections and maintenance during storm events.
	Any	Riparian Reserves	Roads Management		RF-7b	inspections and maintenance after storm events
LRMP						
	Forest-Wide	Hemlock Cr. Key-Elk Area	Road Management		WL-46	Open road densities should not exceed an overall average between 0.5 - 1.5 miles per square mile, unless impacts on elk can be avoided or the proposed project would result in a net benefit to elk habitat. Where public use is heavy, the low end of the range should be the objective. Where public use is light, the high end of the density range would satisfy habitat effectiveness goals. ….The final judgement on open road density will be based on the further evaluation rather than the density guideline.

Management Area	Resource	Topic	Subtopic	Number	Standard
Forest-Wide	Mule Deer Summer Range	Road Management		WL-53	Target open road densities are 2.5 miles per square mile to achieve deer summer range habitat effectiveness targets unless impacts on deer can be avoided or the proposed project would result in a net benefit to deer habitat. The density will be applied as an average for a implementation unit and will be used as a threshold requiring a further evaluation.
Forest-Wide	Recreation	OHVs		TR-19	In areas of the Forest where there are extensive motor vehicle closures, a better public service will be provided by designating trails or areas where OHVs can operate legally. Each District will identify such opportunities
Forest-Wide	Recreation	OHVs		TR-20	The Forest will work with the State All-Terrain Vehicle committee on the planning and construction of Off Highway Vehicle trails and facilities.
Forest-Wide	Recreation	OHVs		TR-21	In addition to winter use of OHVs, the Forest will provide additional opportunities for summer use of OHVs and other OHVs such as motorcycles. Part of the Forest Service road system that is not involved in logging operations may be opened for this use. Closures will be coordinated with
Forest-Wide	Riparian Areas/Wetlands	Transportation	Design & Constructio	RP-18	Roads will not be constructed through the length of a riparian area. The length of roads crossing a riparian area will be minimized to avoid impacts to vegetative, soil, and water characteristics above and below the roads.
Forest-Wide	Riparian Areas/Wetlands	Transportation	Design & Constructio	RP-19	Road drainage shall be designed to eliminate any influx of sediment from road runoff that is inhibiting achievement of riparian dependent resources
Forest-Wide	Riparian Areas/Wetlands	Transportation	Design & Constructio	RP-20	Heavy equipment may be used in the riparian ecosystem if their use would maintain or improve riparian dependent resources. The use of heavy equipment may be allowed in the transition ecosystems if achievement of vegetative, soil, and water objectives are met. New timber landings will not be placed in riparian areas and exisitng landings which are impacting or could impact vegetation, soils, or water quality shall be restored.
Forest-Wide	Riparian Areas/Wetlands	Transportation	Design & Constructio	RP-21	Culverts will be removed from roads which will be closed for long periods if failure of the culvert would result in sediment additions to the stream that would be harmful to riparian dependent resources.
Forest-Wide	Riparian Areas/Wetlands	Transportation	Maintenance	RP-22	Road and trail maintenance shall be performed on a frequency necessary to maintain drainage efficiency at all rnoff control and drainage structures (dips and culverts).
Forest-Wide	Riparian Areas/Wetlands	Transportation	Maintenance	RP-23	Road management objectives shall include direction to minimize soil erosion in accordance.
Forest-Wide	Riparian Areas/Wetlands	Transportation	Maintenance	RP-24	Opportunities to relocate, close, or obliterate existing roads in riparian areas shall be pursued.

Management Area	Resource	Topic	Subtopic	Number	Standard
Forest-Wide	Riparian Areas/Wetlands	Transportation	Roads & Trails	RP-17	Roads and trails will be at the lowest density which meets long term resource needs. Where existing roads or trails are inhibiting the achievement of fisheries or water quality objectives, measures shall be taken
Forest-Wide	Riparian Areas/Wetlands	Transportation	Stream Crossings	RP-25	The transportation system will be designed and constructed to mininize the number of stream crossings.
Forest-Wide	Riparian Areas/Wetlands	Transportation	Stream Crossings	RP-26	Stream crossings and the approach alignment will be located to minimize stream damage.
Forest-Wide	Riparian Areas/Wetlands	Transportation	Stream Crossings	RP-27	Bridge approach fills will be riparap and/or protected by wing walls, as needed, to minimize erosion.
Forest-Wide	Riparian Areas/Wetlands	Transportation	Stream Crossings	RP-28	The size and type of crossing structures will be adequate to accommodate anticipated high stream flows and to allow fish passage, where needed.
Forest-Wide	Riparian Areas/Wetlands	Transportation	Stream Crossings	RP-29	Stream crossing construction will be scheduled during low stream flow and/or outside fish spawning periods.
Forest-Wide	Transportation System			TS-1	Adequate access to and within the Forest will be provided and will include travel by foot, horse, aircraft, watercraft, and motorized vehicles of all types. A process for access and travel management is defined in the Forest Service Handbook on transportation planning. The process will utilize an interdisciplinary approach which considers the standards/guidelines of all resource areas, will involve Forest visitors and interest groups, and will focus on thepositive aspects and opportunities provided by access and travel management. The partnership will demonstrate that both resources and people are better accomodated through a spectrum of carefully planned and implemented strategies.
Forest-Wide	Transportation System			TS-2	The transportation system will be planned to serve long-term multiple resource needs rather than individual project proposals. In addition, the planning for primary routes will be consistent with Regional direction to ensure uniformity with the transportation systems of adjacent Forests and
Forest-Wide	Transportation System	Open Road Density		TS-11	To achieve the Forest's wildlife objectives, open road density must be managed. Density guidelines are not intended to be objectives in themselves, but are means to accomplish wildlife resource objectives. Therefore, open road densities will be evaluated in relation to the needs and sensitivity of site specific wildlife habitats and populations.
Forest-Wide	Transportation System	Open Road Density		TS-12	Some management areas include open road density guidelines. If not included in the management area direction, the deer summer range guideline is 2.5 miles per square mile, as an average over the entire implementation unit, is assumed. Guideline densities will be used as thresholds for a further evaluation and will not serve as the basis for assessing conformance

Management Area	Resource	Topic	Subtopic	Number	Standard
Forest-Wide	Transportation System	Open Road Density		TS-13	If a preferred project alternative would exceed these guidelines, a detailed further evaluation by a wildlife biologist would be required. The evaluation would include the biologist's best professional judgement on the effects of proposed projects open road density on wildlife habitat use, site-specific factors upporting this judgement, and possible mitigation measures. If the evaluation concludes that the net effect of the project is compatible with Forest Plan wildlife objectives as proposed or with mitigation measures, or significantly enhances the conformance of the implementation unit with wildlife objectives, the project will be considered compatible with forest Plan direction.
Forest-Wide	Transportation System	Open Road Density		TS-14	The biologist's evaluation would be used by the project ID Team and line officer in deciding on a plan which best satisfies multiresource needs, and inpreparing the NEPA document and Decision. The line officer may select an open-road densitythat exceeds the biolgist's evaluation. Selection of project alternatives, which the further evaluation finds are not compatible with Forest Plan wildlife objectives or will not significantly enhance conformance of the Implementation Unit with wildlife objectives, will
Forest-Wide	Transportation System	Rd Constr. & Reconstr		TS-3	Transportation planning decisions will be developed from the Forest Plan implementation process in which all resource needs will be concurrently assessed and will be consistent with the prescriptions for each management area. The area analysis will consider alternatives for road access based on resource impacts and the long-term economics of the investment.
Forest-Wide	Transportation System	Rd Constr. & Reconstr		TS-4	New roads will be located and designed to the lowest standard necessary to meet resource objectives. Long-term economics will be considered during the selection of the standard to mini
Forest-Wide	Transportation System	Rd Constr. & Reconstr		TS-5	Non-systems (temporary) roads may be constructed for short-term use where the risk for resource impact is low, or can be mitigated, and where analysis has shown they are cost effective. Temporary roads may be obliterated when their intended use no longer exists and must be revegetated within 10 years of the completion of the contract, lease, or permit through which they were
Forest-Wide	Transportation System	Road Management		TS-10	All commercial users of Forest roads will be financially responsible for maintenance activities resulting from their use of the Forest road system. Commercial users having products from private lands may be responsible for cost recovery on the road investment as well as maintenance.
Forest-Wide	Transportation System	Road Management		TS-6	The road system will be managed to meet the stated goal. When conflict occurs between safety, impact on resources, investment protection, administrative access, or public access, the trafic restrictions will be
Forest-Wide	Transportation System	Road Management		TS-7	Operation will be use one or more of the following road management strategies for use to accmplish the management objectives for the area: Encourage, Accept, Discourage, Eliminate, and Prohibit.

Management Area	Resource	Topic	Subtopic	Number	Standard
Forest-Wide	Transportation System	Road Management		TS-8	Roads will be closed through themost economical that is effective in meeting the management objectives for the area. These include seasonal administrative closures, sign restrictions, barriers, gates, and road obliteration. The preferred method of closing roads will be by obscuring the road entrance to discourage vehicle access. When formal (legal) closures are needed, the orders will be consistent with the Code of Federal
Forest-Wide	Transportation System	Road Management		TS-9	The road maintenenance activities will be planned on a priority basis and will be consistent with the management objectives for each road. The method of accomplishment may vary depending on specific prescriptions particular to a management area. The priority for maintenance work is as follows: (1) Safety, (2) Resource and investment protection and wildfire access, (3) Developed recreation and administrative access, and (4)
General Forest	Recreation	OHV		M8-4	Generally, off-highway vehicle use is allowed. Closures and restrictions will be established where off road vehicle use will threaten or damage other resource values, such as plantations, soils, and wildlife. Over-the-snow vehicles may be permitted when the depth of continuous snow cover is adequate to protect other resources from adverse impacts. Some roads, trails, or areas may be designated for nonmotorized winter activities such as cross country skiing to the exclusion of over the snow vehicles and other
General Forest	Recreation	ROS Category		M8-5	Roaded-Natural or Roaded Modified
General Forest	Transportation			M8-20	Roads constructed within this Management area will generally be planned to serve a larger timber volume than in other areas.
General Forest	Transportation			M8-21	Long-term local roads for timber access will be planned, constructed, maintained and operated to be economically efficient. During commercial hauling activities, public access will be discouraged or prohibited on some roads through appropriate signing. High clearance vehicles may be accepted during post sale activities.
OCRA	Recreation	ROS Category		M14-6	Semi-primitive Motorized
OCRA	Recreation	Vehicle Use		M14-1	Local and low standard roads needed to support the winter recreation activities and vegetation management will be located to serve as winter travel routes. Some roads may be closed for resource protection.
OCRA	Transportation			M14-17	Trails and roads will be designed, constructed, and maintained to the minimum standard needed to achieve objectives and goals of the Recreation Area. A limited number of helispots may be constructed where natural openings are unavailable.

Management Area	Resource	Topic	Subtopic	Number	Standard
OCRA Zone 4		Recreation Mangement			Semi-Primitive motorized. Use of motorized vehicles will be restricted to designated roads and trails. Over-the-snow vehicles will be allowed when the depth of continuous snow cover is adequate to protect other resources from adverse impacts.
Old Growth		Transportation		M15-14	Access by road or trail will be limited to the minimum standard and density that meets the objectives of this Management Area. Roads no longer needed will be closed and allowed to revegetate naturally. Helispots and transmission corridors will not be allowed.
Scenic Views		Transportation		M9-86	New roads will be located and designed to meet the Visual Quality Objectives for the area. Routes likely to be popular with Forest visitors will be designed and maintained to enhance the Forest's scenic qualities.
Scenic Views		Transportation		M9-87	Road alignments should fit the Forest landscape with a minimum of landform modifications and should present a cross-section of the area's landscape character. Road alignments should capitalize on opportunities that will create pleasant visual experiences.
Scenic Views		Transportation		M9-88	Signs should only be used where necessary for the user's safety and enjoyment of the Forest. They should be located and designed to blend with the elements found in the characteristic landscape whereever possible.
Wild & Scenic River		Road Construction		M17-5	Paralleling roads or railroads could be constructed on one or both river banks. There can be several bridge crossings and numerous river access
Wilderness					No cars allowed!
INFISH					
Any	RHCA	Roads Management		RF-2a	completing watershed analyses prior to construction of new roads or landings in Riparian Habitat Conservation Areas within priority
Any	RHCA	Roads Management		RF-2b	minimizing road andlanding locations in RHCAs.
Any	RHCA	Roads management		RF-2c	initiating development and implementation of a Road Management Plan or a Transportation Management Plan addressing: road design criteria, elements, and standards that govern construction and reconstruction; road management objectives; criteria that govern road operation, maintenance, and management; requirements for pre-, during-, and post-storm inspections and maintenance; regulation of traffic during wet periods tominimize erosion and sediment delivery and accomplish other objectives; implementation and effectiveness monitoring plans for road stability, drainage, and erosion control; mitigaiton plans for road failure.

Management Area	Resource	Topic	Subtopic	Number	Standard
Any	RHCA	Roads Management		RF-2d	avoiding sediment delivery to streams from the road surface.
Any	RHCA	Roads Management		RF-2e	avoiding disruption of natural hydrologic flow paths.
Any	Riparian Habitat Conservation Areas	Roads Management		RF-1	Cooperate with Federal, Tribal, state, and county agencies, and cost-share partners to achieve consistency in road design, operation, and maintenance necessary to attain Riparian Management Objectives.
Any	Riparian Habitat Conservation Areas	Roads Management		RF-2	For each existing or planned road, meet the Riparian Management Objectives and avoid adverse effects to inland native fish by...
Any	Riparian Habitat Conservation Areas	Roads Management		RF-3	Determine the influence of each road on the Riparian Management Objectives. Meet Riparian Management Objectives and avoid adverse effects on inland native fish by a) reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or that have been shows to be less effective than designed for controlling sediment delivery, or that retard attainment of Riparian Management Objectives, or do not protect priority watersheds from increased sedimentation. b) prioritizing reconstruction based on the current and potential damage to inland native fish and their priority watersheds, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road reloaction out of Riparian Habitat Conservation Areas. c) closing and stabilizing or obliterating, and stabilizing roads not needed for future management activities. Prioritize these actions based on the current and potential damage to inland native fish in priority watersheds, and the ecological value of the riparian
Any	Riparian Habitat Conservation Areas	Roads Management		RF-4	Construct new, and improve existing, culverts, bridge, and other stream crossings to accommodate a 100-year flood, including asosciated bedload and debris, where those improvements would/do pose a substantial risk to riparian conditions. Substantial risk improvements include those that do not meet design and operation maintenance criteria, or that have been shown to be less effective than designed for controlling erosion, or that retard attainment of Riparian Management Objectives, or that do not protect priority watersheds from increased sedimentation. Base priority for upgrading on risks in priority watersheds and the ecological value of the riparian resources affected. Construct and maintain crossings to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.
Any	Riparian Habitat Conservation Areas	Roads Management		RF-5	Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams (Inland Native Fish Strategy)

Appendix B
Risk and Benefit Rating Factors

ROAD RATING FACTORS

As part of the roads analysis process, the team examined the major uses and effects of the road system. Road related factors for each resource area (botany, wildlife, aquatic, and human uses) were used to evaluate the risks and benefits of each road and to help answer the key analysis questions.

Aquatic

The objective of the Aquatic Assessment is to characterize how the transportation system may be influencing watershed processes and aquatic habitat at the watershed scale. For analysis of local roads at the subwatershed or project level, the segment scale will be different and watershed conditions are based upon the condition of the subwatershed. The segment ratings are based upon stream survey data, road logs, culvert surveys, and local knowledge. Aquatic factors were developed to capture key processes associated with roads as they link to aquatic environments.

The list of factors includes: geologic hazard; road related sediment; floodplain off-channel habitat riparian reserve function; flow effects; at risk fish populations; and wetlands. The term "at risk fish" in this document refers to fish listed as Threatened or Endangered or Sensitive. Numbers following each section are associated with the Key Questions.

Aquatic Rating Factors

Factor: Geologic hazard (AQ-2, 9, 10, 11): This factor was developed to incorporate the natural risk of mass wasting as an effect on roads or potential for roads to accelerate mass movement events. Three forms of mass movement were identified: debris flows (shallow rapid landslides); earth slumps (fairly deep land slides); and deep-seated landslides.

The interpretation of mass wasting was taken from the Oregon State Geology Map and 1985 resource photo interpretation. These interpretations were based upon observations of landslide features, the Ochoco Soil Resource Inventory (SRI), literature references, geomorphic mapping, bedrock weathering properties, geologic structural features, slope gradient, drainage characteristics and patterns, and regolith features.

On the Deschutes national Forest, debris flows are associated with extreme rain-on-snow weather events in the Metolius River drainage. They are most likely to occur on steep slopes of glacial valleys and on the steeper slopes of Green Ridge.

Geologic hazard was considered a highly important factor relating to aquatic conditions. Each road segment will receive a rating for Geologic Hazard. Listed below is a summary of hazard rating:

Geologic Hazard Risk Rating

- **0 = NO RISK –** There is no risk of landslides along the road.

1 = LOW RISK – The terrain that the road corridor crosses has 1 to 2 of the site features associated with landslide probability. Little evidence of natural landslides have been observed and if present are localized and small. Delivery of fine sediment from natural landslides is considered low. Risk assessment indicates slope stability has a low

probability of occurrence (<25%) with normal (proper) road design measures. Normally the degree of site limitation is minor and can be overcome. Generally, off-site sediment generation from road caused failures is low.

2 = MODERATE RISK– The terrain that the road corridor crosses has 2 or more site features associated with landslide probability. Evidence of natural landslides has been observed locally but the landslide risk is not common throughout the area. Delivery of fine sediment from natural landsides is considered moderate within a few hundred feet of perennial streams. Risk assessment indicates that slope failure has a moderate probability of occurrence (25-50%) with normal (proper) road design. Special planning, design, or maintenance can usually overcome the degree of limitation. However, occasionally landslides have been triggered within the road corridor delivering moderate levels off-site sediment.

3 = HIGH TO VERY HIGH RISK – The terrain that the road corridor crosses has most or all of the site features associated with landslide probability. Natural landslides have been observed and occur over much to most of the area. Delivery of fine sediment from natural landslides is considered high to very high. Risk assessment indicates that significant slope failure has a high to very high probability of occurrence (50-75% or >75%) with normal (proper) road design measures. The degree of limitation may not be completely overcome with special design or maintenance measures. Large and/or small scale landslides have been triggered within road corridors delivering high levels of off-site sediment.

Factor: Road Related Fine Sediment (AQ-1, 2, 5, 8, 10, 15, 18)

Surface erosion occurs on wildland roads due to erosion of the road surface, cutslopes and fillslopes and accelerated mass failures. Surface erosion of the road is sensitive to road design, road maintenance and geologic hazard. Road surface, design and maintenance of drainage structures can influence the amount of road surface erosion. Insufficient drainage structures, culverts, including ditch-relief culverts can also be sources of sediment. Roads crossing areas of high geologic hazard or with unstable fill slopes may contribute to accelerated mass wasting initiated by the failure of the fill slope. Culverts at stream crossings can be a sediment source if the culvert is under-sized and the hydraulic capacity is exceeded, or the culvert inlet is plugged causing streamflow to overtop the road. Large amounts of sediment or mass wasting can also be generated if the plugged culvert results in failure of the crossing resulting in a debris flow, or if the culvert is overrun resulting in the stream flowing down the road surface eroding the surface and fill. Ditch relief culverts that erode fill material directly into streams are another sediment source. The increase in sediments can cause streams that do not meet water quality standards to be listed as impaired under section 303(d) of the Clean Water Act.

Fine Sediment Risk Rating – (AQ-1, 2, 5, 8, 10, 15, 17, 18) –

0 = NO RISK - Road segment has a paved surface, crossings are bridged or sufficient to pass the 100 year flood and associated debris. Cut and fill slopes are vegetated and are not eroding. Crossings are not impacting channel morphology downstream.

1 = LOW RISK - Road segment is native surfaced, or graveled but has no visible erosion. Ditch relief culverts are not causing erosion of fill into streams, crossings are perpendicular to the stream and sufficient to pass the 100 year flood, or designed so that if failure occurs, only the prism at the crossing fails. Crossings are not impacting channel

morphology downstream or causing downstream bank erosion. There is no evidence of accelerated mass wasting due to the road segment. The stream is on the 303d list for sediments.

2 = MODERATE RISK - Road segment is not meeting above criteria to some degree. Potential impacts to at risk fish habitat appear to be minor due to amount of erosion. Potential for sediment delivery if a crossing failure or fill slope failure were to occur is minor. Change to channel morphology due to a crossing is confined to the site or does not alter the channel type. The stream is on the 303d list for sediments.

3 = HIGH RISK/VERY HIGH RISK - Road segment has high potential impacts to at risk fish habitat. Road surface and/or fill slopes exhibit erosion into streams, visible ditch erosion, or cut slope erosion into ditches. Sediment directly enters fish-bearing stream from ditch. Fill slopes are beginning to fail, and there is evidence of accelerated mass wasting due to the sediment and/or crossings with high potential for failure where failure of the prism will result in a large amount of sediment delivered into at risk fish habitat. If culverts are over-topped it is probable that the stream will travel down the road and deliver sediment to at risk fish habitat. Crossings are altering stream channel type downstream and/or causing downstream bank erosion. The stream is on the 303d list for sediments.

Factor: Floodplain Function, Off-Channel Habitat and Riparian Reserves (AQ-1, 3, 5, 6, 8, 12, 16)

This factor addresses how the road segment has altered the function of a stream's floodplain and/or off-channel habitat. Floodplains are important regulators of streamflow and water quality. They absorb overbank floodwaters, allowing water to soak through the vegetation/organic mat and into the ground where it is stored and released more slowly into streams. In doing so, functioning floodplains can provide more water in late summer and reduce peak floods in winter and spring.

Roads can affect floodplains by limiting the frequency of overbank flows thereby concentrating greater volumes of water within stream banks, and by interfering with the ability of the stream to migrate across its floodplain. In addition, roads can prevent hillslope runoff from recharging floodplain aquifers, intercept runoff and flood waters thereby eroding and degrading water quality, and indirectly degrade floodplain function by encouraging off-road motorized access from roads onto floodplains. Indicators of direct and indirect floodplain or riparian reserve degradation include soil compaction, noxious weed introduction, evidence of soil erosion or mass wasting of road fill during peak runoff, water quality changes, artificial confinement of streams, stream bank erosion, interruption of hillslope delivery of water onto floodplain, and loss of downed or standing woody debris which is both an energy dissipater and a habitat component. Similar impacts occur if roads are within or provide vehicle access to the portion of a riparian reserve which affects aquatic habitat; loss of bank vegetation with associated loss in cover and accelerated bank erosion, reduction in large wood from the channel or potential large wood due to wood cutting or hazard tree removal, soil compaction and accelerated surface erosion. Off-road access, provided by roads onto floodplains or riparian reserves, is influenced by factors which include: proximity of road to floodplain, slope of ground leading from road onto floodplain, and desirability of floodplain determined by its width and demands for dispersed use. With more alteration, the likelihood increases that stream systems will not be functioning properly and those road segments within the floodplain will be at higher risk of damage.

Off-channel habitats provide important rearing habitat and refuge habitat during high flows. Roads in the floodplain may isolate these off-channel areas so they are no longer accessible to fish or completely fill them. A road system may not isolate or fill an off- channel area but by providing access to vehicles result in loss of vegetation, bank stability, large wood input, cover and a loss of overall habitat quality.

Floodplain Function Rating – (AQ-1, 3, 5, 6, 8, 12, 16)

0 = NO RISK – Road segment is not located in valley bottom or is located on toe slope in confined valley bottom outside the 100 year floodplain and not interfering with floodplain functions and does not provide for dispersed recreation access.

1 = LOW RISK– Road segment located on slightly confined valley or unconfined bottoms with localized areas of road encroachment on stream channel or off channel habitats. Road location may be providing limited motorized off-road access onto floodplain or within riparian reserves such that floodplain or riparian habitat conditions which affect aquatic habitat could start degrading in localized areas within a few years with continued use (see indicators above).

2 = MODERATE RISK– Road segment located on moderately confined valley or unconfined bottoms with localized areas of road encroachment on stream channel. Road location may be providing motorized off-road access onto floodplain or within riparian reserve such that floodplain or riparian habitat conditions which affect aquatic habitat showing signs of degrading in localized areas (see indicators above).

3 = HIGH RISK/VERY HIGH RISK = Road segment is located on unconfined valley bottom which frequently or continuously restricts channel migration and off-channel habitat. Road segment is affecting riparian habitat conditions affecting vegetation, altering movement of water, accelerating erosion processes, and interfering with recruitment of large woody debris. Road segment is providing access for motorized off-road dispersed use within the floodplain or riparian reserve to the point riparian habitat conditions affecting riparian habitat are being degraded or channel changes from a class B to a class C type stream, or there is a greater width to depth ratio. Stream is 303(d) listed for temperature, lack of shade contributes to elevated temperatures.

Factor: Flow effects (AQ-1, 3, 4, 5, 12, 19):

This factor addresses road segments that, 1) intercept surface runoff and near surface ground water along cut slopes and ditchlines, converting subsurface flows to surface flows, and 2) increase delivery efficiency of these flows by diverting them directly to streams. Where these combined flows are continuous between roads and stream systems there is hydrologic connectivity. Hydrologic connectively is defined as any road segment that during runoff has a continuous surface flow between any part of the road prism and a natural stream channel. Water moves from hillslopes to valley bottom via surface and subsurface paths. Roads affect flow when they cut across hillslopes and/or require fill material through depressions that interrupt these natural paths. Road cutslopes or ditches intercept surface runoff and groundwater, accelerating their movement toward stream crossings. This action frequently increases soil erosion risks and routing efficiencies, which deliver road derived sediments and contaminants to streams and can alter peak flows and channel characteristics downstream. Precipitation/runoff mechanisms including rain-on-snow, spring snowmelt and convectional storms should be considered when evaluating a road segment's hydrologic connectivity. Indicators of these effects include water

interception on road surfaces and ditchlines, absences of ditchline relief culverts or crossdrains, or interruption and detention of flows by road fill.

Flow Effects Rating - (AQ- AQ-1, 3, 4, 5, 12, 19)

0 = NO RISK – Road segment is not intercepting concentrating runoff or groundwater in ditchlines. Runoff is cross-drained through a vegetative filter prior to reaching stream channels. Natural flow paths are maintained uninterrupted.

1 = LOW RISK– Road segment is occasionally intercepting runoff (<25% of length), esp. during peak events but generally not groundwater. Delivery efficiencies are low due to combination of landform slope and weakly developed stream networks (usually greater than 300 feet from the stream. Some additional ditch relief is necessary for routing surface runoff through vegetative filter. Downstream stream reaches may be susceptible to damage from increase peak flows. Road densities are 2-3 miles per square mile (only use during 6th field analysis).

2 = MODERATE RISK– Road segment frequently intercepts both surface runoff and/or groundwater (25-50% of the length of the segment) in sufficient volumes to influence flow downstream and moderately delivering waters directly to streams. Landform slopes are moderately steep and drainage densities moderate, providing increased delivery efficiency to stream channels (usually 150-300 feet from the stream channel). Downstream stream channels have occasional unstable reaches and are susceptible to damage from increased peak flows. Road prisms may be interrupting and detaining water preventing it from recharging floodplain aquifers. Road has moderately hydrologic connectivity to the stream system. Road densities are 4-5 miles per square mile (only use during 6th field analysis).

3 = HIGH RISK/VERY HIGH RISK - Road segment frequently intercepts both surface runoff and/or groundwater (>50% of segment length) in sufficient volumes to influence flow downstream and delivers waters directly to streams. Steep slopes and high drainage densities provide increased delivery efficiency to stream channels (usually less than 150 feet from stream channels). Downstream stream channels are unstable and susceptible to damage from increased peak flows. Road prisms may be interrupting and detaining water preventing it from recharging floodplain aquifers. Road has high hydrologic connectivity to the stream system. Road densities are 6 miles per square mile or greater (only use during 6th field analysis).

Factor: At Risk Fish Populations (AQ-2, 6, 7, 13, 14):

This factor addresses whether fish listed for protection under the Endangered Species Act or on the Regional Foresters Sensitive Species List or Essential Fish Habitat, are present in the watershed and the relative importance to recovery within the subbasin. The term "significant" here is used to denote important spawning and/or rearing habitat that is key to populations' persistence. This factor addresses the relative importance of a subwatershed to the conservation and recovery of at risk fish and to help weight the potential for adverse impacts to at risk fish or their habitat. Besides the potential impacts to aquatic habitat, roads can increase the potential for poaching or introduction of exotic species.

At Risk Fish Populations Rating – (AQ-2, 6, 7, 13, 14)

0 = NO RISK – Road segment with the following set of conditions: road segments located in a watershed with no listed fish species; stream crossings are not migration barriers (any life stage) for other fish species.

1 = LOW RISK – Road segment is in a subwatershed with at risk fish but is not a significant subwatershed for At Risk species. Stream crossings are not barriers to at risk fish but may be to other species. Or at risk fish are not present and some stream crossings are barriers to some life stages of other species.

2 = MODERATE RISK– Road segment is in a subwatershed with at risk fish but is not a significant subwatershed for an At Risk species. One or more crossings are a barrier to at risk fish at some life stage; or road segment is in a significant subwatershed for an at risk species, no road crossings are barriers to any life stage of an at risk species, poaching is not a major concern.

3 = HIGH RISK/VERY HIGH RISK - Road segment is in a significant subwatershed for an at risk species and no road crossings are barriers to any life stage of an at risk species, but poaching due to access from the road segment is a concern though not necessarily documented. The road segment is or has potential, based upon the previous factors, to have serious adverse impacts to at risk fish habitat; and/or there are road crossing barriers to some life stage of an at risk species and/or there is known poaching of at risk fish occurring.

Factor: Wetlands and Wet Meadows (AQ-3, 5, 6):

This factor addresses whether wetlands are present along road systems and do road segments interfere with their condition and function, ground water movement or wetland vegetation. The wetlands also include seeps, springs and sag ponds related to landslide terrain.

A road segment's influence on the condition and function of adjacent wetlands is a result of either a direct impact, such as a road location relative to the wetland, or indirect impacts related to the road's effect on the wetland's supporting hydrology, vegetative community and soil characteristics. The most notable effects include converting productive wetlands to compacted road surfaces, providing motorized off-road access into these areas, constraining and diverting both surface and subsurface flows that support the water table, intercepting runoff which can accelerate erosion and lower water tables, increasing sediment loading and delivery of toxic pollutants, conversion of plant species composition by introducing noxious weeds, reducing base flows and increasing peak flow and flood frequencies and degrading water quality. Of these effects, those that affect the areas ability to receive, store and move water will likely have the greatest impact on the wetland's condition and function.

Wetlands and Wet Meadows Rating (AQ-3, 5, 6):

0 = NO RISK – Road segment is either not near or adjacent to wetlands/wet meadows, or road design characteristics are providing for the uninterrupted movement of surface and groundwater necessary to support the wetland's vegetation and soil characteristics.

1 = LOW RISK– Road segment is adjacent to, or crosses small localized wetlands or wet meadows (<5 acre in size). Road design characteristics, particularly crossings of surface and near surface water paths are limiting the available water necessary to inundate and saturate the landform and support the wetland's vegetation and soil characteristics. Initiation of wetland degradation including noxious weed establishment, increased sediment loading, and decreased area of saturation is occurring.

2 = MODERATE RISK– Road segment is adjacent to, or crosses large scale wetlands or wet meadows (6-50 acres in size). The road's location and design have displaced or degraded the wetland's size and function. Runoff is being delivered directly to the wetland during high flow events, increasing sediment and contaminant loadings.

Crossings of surface and near surface water paths have somewhat limited the volume, timing and distribution of water necessary to saturate the landform and support the wetland's vegetation and soil characteristics. Road segment could, or is starting to provide motorized off-road vehicles access into the area, further contributing to its degradation**.**

3 = HIGH RISK – Road segment is adjacent to, or crosses landscape scale wetlands or wet meadows (greater than 50 acres). The road's location and design have displaced or degraded the wetland's size and function. Runoff is being delivered directly to the wetland, increasing sediment and contaminant loadings. Crossings of surface and near surface water paths have severely limited the volume, timing and distribution of water necessary to saturate the landform and support the wetland's vegetation and soil characteristics. Road segment is providing motorized off-road vehicles access into the area, further contributing to its degradation**.**

Botany

The objective of the Botany Assessment is to assess benefits, problems, and risks to botanical resources that are associated with the transportation system. The following risk factors were used to evaluate and compare different road segments and how they may be influencing native plant species and habitats.

Factor: Effects on Plant Habitats (A1) The presence, type, and location of roads may affect special plant habitats.

Examples of potential impacts: Impact to plant species within special habitats and the overall condition of the plant communities that occur in special habitats is often directly related to many of the same physical attributes that will be evaluated in the aquatic risk rating. For example, wetland habitats may be impacted by increased sedimentation and changes in hydrologic function and water quality. A road may alter the function of a stream's floodplain and/or off-channel habitat by changing drainage patterns. Roads may intercept runoff, which can accelerate erosion and lower water tables, increase sediment loading and delivery of toxic pollutants, change plant species composition by introducing noxious weeds, and degrade water quality. A culvert that is not functioning properly (for e.g., the culvert is under-sized and the hydraulic capacity is exceeded) may increase sediment into wetlands and streams. In some areas, productive wetlands have been converted to compacted road surfaces. Many of these habitats have had fill placed on top of existing habitat as roads are built through them. Road failures in landslide terrain can impact special habitats. The resulting changes in drainage patterns, soil composition, and introduction of noxious weeds from roadside shoulders may cumulatively result in significant alteration of the existing plant communities. Of these effects, those that affect the areas ability to receive, store and move water will likely have the greatest impact on a wetland's condition and function.

As with special habitats, the impacts to riparian plant communities often tie directly to the criteria that are used in the aquatic risk ratings. If the road segment has a high aquatic risk rating, the riparian plant community is likely to be impacted by the same factors, resulting in a high botany risk rating. Roads often intersect riparian areas and can cause changes in hydrologic function and water quality. Roads intercept runoff that can accelerate erosion and lower water tables. Bank erosion can cause an associated loss of bank vegetation. A road segment may alter the function of a stream's floodplain and/or off-channel habitat, therefore impacting riparian and floodplain-related plant communities. Roads may constrain and divert both surface and subsurface flows that support the water table, potentially causing changes in species composition or altered vigor of riparian plants. Roads facilitate the establishment and spread of noxious weeds, resulting in changes in plant species composition.

Other impacts could occur due to increased public access. There may be increased collecting of unique plant species that occur within special habitats. Roads may facilitate the use of off-highway vehicles into adjacent special habitats. High-use recreation areas, both dispersed and developed sites, may impact special habitats, such as wetlands and riparian areas. Recreation use also affects riparian plant communities. Therefore, the Recreation Risk Rating might also be used to evaluate potential impacts to riparian habitats. Roads may provide access for off-highway vehicles into riparian habitats. Dispersed and develop recreation can impact the health and vigor of riparian plants, depending on the level of reaction use.

Roads facilitate the establishment and spread of noxious weeds, which impact native plant communities. Areas scheduled for road reconstruction, as well as on-going maintenance

activities, have a high risk of introducing and spreading noxious weeds, which can alter species composition and associated wildlife use within habitats such as meadows.

Analysis Procedure

Special habitats considered in this analysis are defined as **wetlands** (i.e., ponds, bogs, swamps), **wet, moist and dry meadows, aspen stands, cottonwood bottomlands, and scablands**.

Plant associations for both the Deschutes and Ochoco National Forests were reviewed, and those plant associations that fit the above definition of special habitat were selected. Originally, the electronic data summary did not include scablands; these areas were added with hindsight because they are extremely fragile, with shallow clay soils, and have extremely diverse vegetation. Any road built in these areas becomes a permanent road due to impacts. The scablands also are very important because roads built across these areas can cause sediment loading into riparian areas.

Plant association GIS layers and associated data tables were queried for both the Deschutes and Ochoco National Forests, and a wetland GIS layer was queried for the Deschutes National Forest. Any of the desired plant associations that occurred within 200 feet of roads within this analysis area were identified in the analysis and buffered by 200 feet to determine relative miles of road that intersect these special habitats. The resulting data table provided information on the number of miles of special habitat that the road segment passes through. Unfortunately, many special habitats were not mapped and the analysis relied heavily upon knowledge of district botanists and ecologists.

Assumptions

Many small special habitats are not mapped and information will be lacking for these areas.

Effects on Plant Habitat Rating

0 = NO RISK -- There are no special habitats found along the road segment.

1 = LOW RISK -- One or more special habitats occur(s) along the road segment, but it occupies a relatively small area along the road and/or the special habitat is not considered at risk because of one or a combination of the following factors:

- The special habitat is unique **but relatively common** in the watershed so that concern about road effects is reduced.
- **Noxious weeds** are currently not present, therefore, risk to the special habitat is low. The road segment is far enough away from high density weed infestations to reduce the risk of noxious weed spread and establishment.
- The **special habitat occupies a small area** relative to overall road length. The habitat may have some impacts, but these impacts are relatively localized and small in scope.
- The **road segment crosses through or near a very small portion** of the special habitat.
- **The risk rating for aquatics is low.** For wetland habitats, road design characteristics are providing for the uninterrupted movement of surface and groundwater necessary to support the wetland's vegetation and soil characteristics. Potential landslides and road failures, which can greatly increase sediment loading into adjacent habitats, are not expected to occur.

- **The risk rating for recreation is low.** Dispersed and developed recreation use is low or non-existent.

2 = <u>MODERATE RISK</u> -- One or more special habitats occur along the road segment and there is a slightly elevated concern about the future of this (these) habitats because of a combination of factors:

- **Noxious weeds** are not known to occur within the special habitat, but occur either along the road segment OR occur along roads feeding into this road. Therefore, there is an elevated concern that the special habitat may be at risk from noxious weeds.
- **The risk rating for aquatics is moderate.** For wetland habitats, there is increased sediment loading, which is likely decreasing the saturation of wetlands and moist meadows. Delivery of fine sediment from natural landslides is considered moderate within a few hundred feet of perennial streams. Slope failure has a moderate probability of occurrence (25-50%) with normal (proper) road design.
- **The risk rating for recreation is moderate.** Dispersed and developed recreation use is occurring, and it is of some concern. However, it is rated moderate relative to other areas where concerns are greater.
- The **special habitat occupies a relatively large area** along the road segment.
- The road segment contains a **diversity of special habitats** (e.g., moist meadow, aspen, scablands). The concern is elevated due to this increased diversity.
- Road segment travels through a **relatively significant portion** of the special habitat.

3 = <u>HIGH RISK</u> -- One or more special habitats occur along the road segment and there is a elevated concern about the future of this (these) habitats because of one or a combination of the following factors:

- The **special habitat is rare** (i.e., rarely occurs in central Oregon); and, therefore, should be maintained for overall biodiversity and ecosystem health.
- **Noxious weeds** are present along the road segment that crosses or parallels the special habitat. Noxious weeds are known to exist within the special habitat and are considered "high risk" species (therefore, the Noxious Weed Risk Rating is High).
- **The risk rating for aquatics is high.** For wetland habitats, the road impacts the movement of surface and groundwater necessary to support the wetland's vegetation and soil characteristics. The road's location and design have displaced or degraded the wetland's size and function. Runoff is being delivered directly to the wetland, increasing sediment and contaminant loadings. Crossings of surface and near surface water paths have severely limited the volume, timing and distribution of water necessary to saturate the landform and support the wetland's vegetation and soil characteristics. Potential landslides and road failures, which can greatly increase sediment loading into adjacent habitats, are at high risk.
- **The risk rating for recreation is high.** The area receives an abundance of dispersed and/or developed recreation use to the point at which habitat degradation is likely to be occurring or is known to occur. Dispersed and developed recreational use of the special habitat is high and causing habitat degradation, such as soil compaction and vegetation trampling.
- The road segment travels through a **relatively significant portion** of the special habitat. The road may parallel the special habitat or travel through it to the point where it is likely that road impacts may be occurring.

- There are or may be **cumulative impacts** to the special habitat due to a variety of different recreational uses (e.g., the area is used by bicyclists, off-highway vehicles, horses, hikers, campers, etc.).

Factor: TES Plant Species (B1): The presence, type, and location of roads may affect threatened, endangered, or sensitive plant species and other plant species of concern.

Examples of potential impacts

Threatened, Endangered, and Sensitive plant habitats often occur in special habitats, such as moist or wet meadows, wetlands, or riparian habitats. Roads can impact these types of habitats by the same factors discussed above (see Examples of potential impacts for Special Habitats).

Other impacts could occur due to increased public access and recreational use. There may be increased collecting of sensitive plant species that occur within sensitive plant habitats (e.g., flower picking is a threat for the Newberry gentian, *Gentiana newberryi*, in popular campsites). Roads may facilitate the use of off-highway vehicles into sensitive plant habitats. High-use recreation areas, both dispersed and developed sites, may impact sensitive plant habitats, by trampling vegetation, compacting soils, and introducing noxious weeds. Some sensitive plant species, such as the green-tinged paintbrush (*Castilleja chlorotica*) depend on a host plant; if high recreation use impacts the host plant, then indirect impacts can occur to the sensitive plant.

Analysis Procedure

The sensitive plant GIS layer was overlain with the roads evaluated in this analysis. Sensitive plant populations were buffered by 200 feet; any roads that intersect the resulting polygon were identified. If a sensitive plant occurs within a special habitat (e.g., wetland), then the Aquatic Risk Rating for wetlands would also be considered in the analysis. Potential habitat is not addressed in this analysis because it is not mapped.

Assumptions

TES plant populations are not always in the exact same locations. Individuals increase, decrease, and colonize new areas. Therefore, locations of TES plants in this analysis may change in the future.

TES Plant Species Rating (B1)

0 = NO RISK -- There are no TES plant populations along the road segment.

1 = LOW RISK -- One or more TES plant populations occurs along the road segment, but there is a low concern for the population because of one or a combination of the following factors:

- The **population occupies a relatively small area** along the road and individuals and their associated habitat are considered to be in good condition and not at risk
- The **majority of known populations in other locations are protected** and, therefore, there are no long-term viability concerns for the species.
- The **TES plant habitat is not being degraded or directly impacted by the road** and its associated use and maintenance (i.e., the Aquatic Risk Rating for wetlands is Low).
- **Low recreation use** occurs along the road segment.

- The area has not been surveyed for TES plants and there is some possibility and low-level concern that **TES plant populations may occur** along the road segment.
- **Noxious weeds** either do not occur along the road or low-risk species (e.g. bull thistle) occur; therefore, there is a low risk to the TES plant population(s) from noxious weeds.

2 = <u>MODERATE RISK</u> -- One or more TES plant populations occurs along the road segment and there is a slightly elevated concern about the future of the population(s) because of a one or a combination of following factors:

- **The TES plant population occurs in a wetland habitat and the Aquatic Risk Rating is moderate**. For example, The Aquatic Risk Rating for the road segment indicates that fine sediment loading may be occurring or the floodplain is not functioning properly.
- The **TES plant population is a "protected" population** in a Conservation Strategy and/or the population is considered important genetically for maintaining long-term viability of the species. However, the road is not necessarily degrading the habitat. There is a higher concern than low because it is an important population, but not enough to warrant a high risk rating.
- The TES plant population occurs in a **special habitat that received a moderate Aquatic Risk Rating**. For example, there may be a TES plant population in a riparian area below a road, but the design of the road is such that a timbered buffer exists between the road and the riparian area that filters sediments and reduces the risk.
- The **Recreation Risk Rating is Low or Moderate**. There is a slightly elevated concern about an existing TES plant population, but either the design of the road limits recreation use (e.g., steep slope between the road and creek where TES plants occur) so that the risk rating is not high **<u>OR</u>** the road is allowing access to the plant population or it's habitat only to a moderate degree.
- **Noxious Weed Risk Rating is Moderate**.
- Some level of **habitat degradation** is occurring that can be attributed to the road, but not enough to be considered at high risk.

3 = <u>HIGH RISK</u> -- One or more TES plant populations occurs within 200 feet of the road segment and there is an elevated concern about the future of the population(s) because of one or a combination of the following factors:

- **Each TES plant population is considered important** to maintain the long-term viability of the species. There may be several factors that contribute to this determination. For example, there may be a low number of known populations for the species, or the majority of known sites are at risk.
- The TES plant population occurs in a special habitat, such as a wetland, that is at high risk due to the road (i.e., the **Risk Rating for Aquatics is High**).
- The **Recreation Risk Rating is High**. High recreation use occurs. There are or may be **cumulative impacts** to the TES plant habitat due to a variety of different recreational uses (e.g., the area is used by bicyclists, off-highway vehicles, horses, hikers, campers, etc.)
- The TES plant population is a "**protected" population** in a Conservation Strategy and/or the population is considered important genetically for maintaining long-term

viability of the species, and there are impacts occurring or likely to occur due to the road.

- **High risk noxious weed species** exist along the road segment or close enough to be of high concern.
- The **TES plant populations are small, fragmented, and vulnerable to habitat loss** that may be occurring due to a combination of factors that can be linked to roads, such as noxious weeds, high recreation use, high road density, etc**.**

Factor: Noxious Weeds (C1): Roads facilitate the establishment and spread of noxious weeds and non-native invasive plant species.

Examples of potential impacts

Noxious weeds can reduce ecological values by displacing native vegetation, increasing soil erosion, reducing forage for wildlife and livestock, and degrading recreational values. Road maintenance has the ability to increase the establishment and spread of noxious weeds by moving the seed and/or propagules along the road prism, introducing infected aggregate or providing a vector for infected vehicles/equipment to transport seed.

- roads directly encourage and cause the establishment and spread of noxious weeds.

- effects may be measured as a relative comparison of risk of introducing or spreading weeds; risk it to the native plant communities adjacent to the road segment.

- Weed Prevention Practices (BMPs) can reduce the risk.

- all road segments are at risk of being invaded by noxious weeds, particularly spotted and diffuse knapweeds and St. John's wort.

- doesn't matter if it's 1 or 2 miles from a weed population – seeds can be spread even by low or intermittent use of a road.

- the risk is alleviated by annual inventories (sophisticated search & destroy), and BMPs.

- describe prevention measures (BMPs, annual inventory & treatment, ….) in this section and refer below simply as "prevention measures".

- volume of traffic and proximity to large weed population centers can elevate the risk.

Analysis Procedure

The noxious weed GIS layer was overlain with the roads evaluated in this analysis. Noxious weed mapped sites were buffered by 200 feet; any roads that intersect the resulting polygon were identified.

Assumptions

- All roads have a high risk of facilitating the spread and establishment of noxious weeds.
- Due to limited budgets, inventory and mapping of noxious weeds is limited and not keeping up with the rapid rate of spread of noxious weeds. As a result, existing noxious weed sites were missing in the electronic analysis; therefore, the noxious weed analysis relied heavily upon the knowledge of district botanists and ecologists.
- Noxious Weed Risk can be reduced by:

- Annual inventory and treatment (i.e., early detection and treatment).
- Following Best Management Practices for road maintenance and projects that occur along or near roads.

Noxious Weeds Rating

0 = NO RISK -- All roads in this scale/level of analysis are at risk of being invaded by noxious weeds. Therefore, there is never a "no risk" situation.

1 = LOW RISK -- The risk is determined relatively low due to one or a combination of the following factors:

- The road segment is **relatively far away from large infestation areas** (e.g., cities of Bend, Sisters, Redmond, LaPine; Highway 97, etc.).
- The **species** along the road segment or closest to the road segment is of relatively **low risk** (e.g., bull thistle).
- **Recreation use and overall traffic is low or limited seasonally** (e.g. spring chanterelle mushroom hunting) such that there is a relatively lower risk of weeds spreading and becoming established.
- A **relatively small noxious weed infestation** occurs along the road and it is **fairly stable and contained**, and not expected to spread (assuming that yearly treatment continues).
- There exists l**ow or limited potential habitat** for the noxious weed species; therefore the population is not expected to expand it's size and range along the road segment.

2 = MODERATE RISK -- The risk is determined to be moderate due to one or a combination of the following factors:

- Weeds occur along the road segment, but the **population is reduced and considered contained** due to years of treatment. (However, this road segment could become a high risk if a year of treatment is skipped due to lack of funding and personnel).
- **Medium traffic flow** occurs along the road segment.
- **Weeds do not occur along the road segment, but high risk species** are established on road(s) feeding into this road.
- The area has not been surveyed and the risk is not known. However, the area has received a **high amount of ground disturbance** and contains private lands which have not been surveyed and are assumed to be uncontrolled or it is known that the **private land noxious weed populations are not being treated**. There is moderate concern that noxious weeds exist in the area and will spread along the road system.

3 = HIGH RISK -- The risk is determined to be high due to one or a combination of the following factors:

- **High risk noxious weed species** occur along the road segment. Examples include spotted and diffuse knapweeds, Canada thistle, leafy spurge, yellow star thistle, medusahead, and houndstongue.
- Road segment may not have weeds, but is located **relatively close to high infestation** areas; therefore it is likely that weeds will spread into this road segment.
- **Recreation use is high**.
- **High traffic flow**. The road is a major arterial road that has a higher risk of spreading weeds.

- The road segment travels through an area that has a **high fire risk in combination with a high risk weed problem**. If the area does burn, weeds will spread rapidly along the roads.
- **Existing populations, use, and previous disturbance.**
- The area has not been surveyed and the risk is not known. However, the area has received a **high amount of ground disturbance** and contains private lands which have not been surveyed and are assumed to be uncontrolled or it is known that the **private land noxious weed populations are not being treated,** and contains **high risk noxious weed species**. There is high concern that noxious weeds exist in the area and will spread along the road system.

Human Use Factors

Public and Tribal Access

Community/public roads:

How does the road system connect public roads and access to communities?

As defined here a community is at a minimum: yearlong occupancy of at least 10 permanent households. Other situations will be captured under the ownership category. Should community size be a factor?

0 – Does not provide any access to or between communities and no connection to public roads .

1 - Road segment is secondary and low use (less than 25% of total ingress/egress) access to communities and/or provides only cursory access to the Forest).

2 - Road segment is secondary and moderate use (more than 25%, less than 50% of total ingress/egress) access to communities and/or provides secondary access to the Forest).

3 - Road segment is primary access route and receives high use (more than 50% of total ingress/egress) access to communities and/or is a "portal" (provides primary access to the Forest).

Special Forest Products:

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

How does the road system affect managing special use permits?

0 -Road does not access special forest product or special use permit areas.

1 - Low - Road provides secondary access to special forest product area and special use permit areas and short-term (one time event) special use permit areas.

2 - Moderate - Road provides primary access to special forest product area and short-term (one time event) special use permit areas.

3 - High - Road provides primary access to special forest product areas and long-term (multiple year) special use permit areas.

Developed Sites:

Where are the caves for protection/recreation with respect to the road system?

Is there adequate road access to all existing and planned developed sites: campgrounds, trailheads, day use areas, viewpoints, interpretive sites, etc. Are access roads maintained at a level commensurate with the type and amount of use? There are many short spur roads that access developed campgrounds included in this analysis. This factor includes sites on the individual road being considered and the access it provides to other developed sites. Should size (PAOT, etc.) be a factor?

0 – Road does not lead to any existing or planned developed sites.

1 - Road leads to one or more low use developed sites (little to no week-day use, less than 25% of capacity on all but holiday weekends).

Road leads to one or more trailheads that access low use wilderness/unroaded area (<5 people per day).

2 - Road leads to one or more moderate use developed sites (moderate {10-25%} week-day use, less than 50% of capacity on all but holiday weekends).

3 - Road leads to one or more trailheads that access moderate use wilderness/unroaded area (5 20 people per day)**.**

Road leads to one or more high use developed sites (moderate to high {>25%} week-day use, more than 50% of capacity on weekends).

Road leads to one or more trail-heads that access high use wilderness/unroaded area. (>20 people per day)

Dispersed Sites:

Is there road access to dispersed use sites?

This factor only considers sites on the segment being considered. The access to other sites will be captured under the dispersed use factor.

0 – Road leads to no dispersed recreation sites.

1 - Road provides access to low number of dispersed sites with low usage (little to no week-day use, occupied less than 25% of summer weekends). Primary use is only during big game hunting season.

2 - Road provides access to moderate number of dispersed sites with moderate use (some week-day use, occupied 25% to 50% of summer weekends).

3 - Road provides access to high number of dispersed sites with high use (some week-day use, occupied > 50% of summer weekends).

Dispersed Use:

Is there an adequate amount of roads available for driving for pleasure and other dispersed recreation needs such as hunting, fishing, sight seeing, forest products collection and caving?

0 – Road leads to no dispersed recreation opportunities.

1 - Road provides access to low level of use and types of dispersed opportunities. Primary use is only during big game hunting season.

2 - Road provides access to moderate level of use and types of dispersed opportunities. Primary use is summer-fall.

3 - Road provides access to high level of use and types of dispersed opportunities. Primary use is summer-fall. Roads that may only have a moderate amount of use but also provide access to winter recreation use are included here**.**

Private Access

This factor includes access needs for private or other legal obligations such as providing access to private land ownership through right-of-way easements, cost-share agreements, road use permits, or other special use permit sites like rock pits, communication sites, etc.

The private access factor is categorized into the following two groups according to the related key questions:

Ownership:

- How does the road system connect large blocks of land in other ownership to public roads?
- How does the road system affect managing roads with shared ownership or with limited jurisdiction?

Special uses:

- How does the road system affect operating water diversions and impoundments?
- How does the road system affect access for collecting special forest products?
- How does the road system affect managing special use permits?

0 = Road segment does not include any private use, right-of-way, cost-share, or other special use permit access.

1= Road segment has short-term commitments through road use or other special use permits.

2 = Road segment provides long-term access to private land or other special use permit areas. Alternative routes are available to provide reasonable access to the land owner or permittee.

3 = Road segment provides long-term, primary access (alternative routes are not available) to private land or other special use permit areas. Access is required by law.

Administrative

This factor addresses the importance of the road system for administration, management, or protection of forest resources. The forest manager has flexibility to analyze options and select the one that provides the best balance of resource, social and economic needs.

Administrative Human Use Factor is related to the following sub-factors and key questions.

Timber (T):

- How does the road system affect access needed for administrative use?
- How does the road system affect managing the timber base and other lands?

Rating System: Will the segment of road be needed for access for administrative use (timber sales), and managing the timber base (Silviculture)? Does the road segment provide primary (main route) or secondary (more than one access route) for timber management.

0 - Road segment does not affect access needs for timber management and administration.

1 - Road segment will not be needed for 10 or more years for timber management and administration.

2 - Road segment is the secondary route and will be used in the next 5 years, or road will not be needed for 5 to 10 years for timber management and administration.

3 - Road segment is the primary route and will be used in next 5 years for timber management and administration.

Fire (F):

- Does the road system provide necessary (based on risk) access for firefighting resources, water sources, fire camp locations, and other improvements?
- Does the road system provide necessary access for fuels treatment including personnel, contract administration, equipment, water sources?
- What impact does the road system have on the current fire organization with respect to budget, and effectiveness?
- How does the road system affect access to water sources for road reconstruction/fire/range needs (water wells, pump chances, tanks, etc.)?

Rating System: Does the road segment provide primary (main route) or secondary (more than one access route) for fire management (suppression, fuel treatment).

0 - Road segment is not needed for access for fire management.

1 - Road segment provides secondary access for fire management.

2 - Road segment provides primary access for fire management.

3 - Road segment provides primary access for fire management and provides access to one or more of the following: water source, fire camp, other improvement, and escape route for subdivision.

Lands/Minerals (LM):

- What is the likely transportation system needed for future needs (geothermal, mining claims, mineral material sources, etc)?

- How does the road system affect access to rock-hounding areas?
- Where are the caves for protection with respect to the road system?

Rating System (LM) Will the road segment be needed for access for Lands and Minerals, (rock-hounding, geothermal). Primary access is the main route and secondary access has more than one route into the area..

0 - Road segment does not provide access needs for Lands and Minerals. (geothermal, mining claims, mineral material sources, etc)

1 - Road segment provides secondary access to one area. (geothermal, mining claims, mineral material sources, etc)

2 - Road segment provides secondary access to 2 or more areas. (geothermal, mining claims, mineral material sources, etc)

3 - Road segment provides primary access to one or more areas. (geothermal, mining claims, mineral material sources, etc)

Heritage (H):

- How and where do roads provide access for traditional cultural practices sites for Native Americans?
- How and where does road access affect archeological sites and historic properties?
- How do historic transportation routes intersect with road system?

Rating System (H) Will the road segment be needed for access Heritage (cultural practices) and does the road segment affect archeological sites or historic transportation routes?

0 = Road segment does not provide access or affect Heritage.

1 - Road segment provides secondary access to one site and does not affect any archeological sites or historic properties.

2 - Road segment provides secondary access to 2 or more sites and does not affect any archeological sites or historic properties.

3 - Road segment provides primary access to one or more sites and has an affect on archeological sites or historic properties.

Administrative Human Use Factor numeric value used for each road segment is based on the sub-factors. The sub factors are all treated equal in the overall Administrative Human Use Factor as Timber (T), Range (R), Fire (F), Lands/Minerals (LM), Heritage (H).

Rating System Does the road segment provide access for administrative use? Does the road segment provide primary (main route) or secondary (more than one access route) for administrative use?

0 - Road segment does not provide administrative access.

1 - or 0-15 Road segment provides a minor amount of long-term administrative access. Generally these road segments provide secondary access to small area.

2 - or 16-30 Road segment provides a moderate amount of long-term administrative access. These road segments generally provide primary or secondary access to a large area.

3 - or 31-45 Road segment provides a high amount of long-term administrative access. These road segments generally provide primary to a small or large area.

Wildlife Risk Rating

Rating Factors

Factor: Migration (TW1, TW2)- Does the road system intersect areas important to wildlife movement (dispersal, migration, etc.) thus precluding or altering wildlife movement and increasing the chance of mortality due to collision?

Measures/Analysis Needed
Over-all Rating

3 High: Road segment is contributing to changing direction and ease of flow, concentration of flow, and/or increasing the potential for mortality for animals migrating or dispersing due to road interactions or increased exposure to predation. This road segment may also have high secondary effects by facilitating human use in the area.

2 Medium: Road segment is impacting migration or dispersal in similar ways as described above; however impacts may be due to more localized and specific to one causal agent. Additional impact to associated factors in surrounding habitats could move this segment into the high category. Consider limiting factors that would increase the score or implementing one or more of the above listed options.

1 Low: Road segment is having minimal impact on migration or dispersal. If other roads in the watershed are scoring in the high category this road segment may become more critical due to focused migration in this area. Maintain current management strategy considering this road in the context of the surrounding watershed parameters.

Factor: Critical (TW1, TW2)- Does the road system allow public access to areas used by wildlife during critical periods (reproduction, rearing, wintering, etc.) or are rare or unique (caves, wetlands, etc)?

Measures/Analysis Needed
Over-all Rating

3 High: Road segment is affecting one or more critical habitats within the watershed to a point where species use may be limited due to road influence at a level that may impact local populations.

2 Medium: Road segment has potential to be limiting use of critical habitat areas. Decreased availability of habitats will increase potential effects of other habitat factors.

1 Low: Road segment is currently having little impact to critical habitats. Maintain current management strategy considering this road in the context of the surrounding watershed parameters.

Factor: Fragmentation (TW)- Where is road induced fragmentation and habitat loss causing negative edge effects?

Measures/Analysis Needed
Over-all Rating

- **3 - High** Road segment is contributing to fragmentation directly by impacting large amounts of core habitat and/or subsequently facilitating traffic to secondary roads and human associated activities within core habitats or roadless areas. Roads in this category exist in already highly fragmented habitats or provide primary access into an otherwise unfragmented area.
- **2 - Medium** Road segment is contributing to the total fragmentation in the watershed. It may not be the dominant cause based on a Medium rating; however the watershed could still have excessive fragmentation. Road related fragmentation my be due to it's location or the number of subsequent roads that come off of it.
- **1 - Low** Road segment is contributing to the fragmentation of some habitats but not significantly. Maintain current management strategy considering this road in the context of the surrounding watershed parameters.

Factor: TES (TW1, TW2) - Do the impacts of the road system contribute to a decline in the ecological conditions necessary to maintain species viability?

Measures/Analysis Needed
Over-all Rating

- **3 - High** Road segment is reducing the ecological condition of surrounding wildlife habitats to a point where it may be reducing use of these habitats or effecting sensitive habitats that are in limited quantities.
- **2 - Medium** Road segment is reducing the ecological condition of surrounding wildlife habitats enough to reduce use seasonally or to the extent the habitat has the potential to be used.
- **1 - Low** Road segment is having a minimal impact on the ability of wildlife to utilize the surrounding habitat. The quality of the surrounding habitat and lack of additional roads may be the mitigating factor keeping this road in the low category. Continue current management practices considering this road in the context of other watershed factors.

Appendix C
Road Rating Spreadsheets

route	LEN	JUR	SURF	HUM USE	PUBLIC	PUBLIC	PRIVATE	PRIVATE	ADMIN	ADMIN	WILD LIFE	AQ	BOT	HERIT	Mgmt Strategy	current work	proposed work	Current m/l	Proposed m/l	REMARKS
5800017	1.31	FS	NAT	1.2	0.4	L	2.0	M	1.3	M	2.0	0.0	0.7	0.0	A	2	2	2	2	
5800090	1.43	FS	NAT	1.4	0.6	L	1.5	M	2.0	M	3.0	0.3	1.0	1.5	B	2	2	1	2	
5800092	0.52	FS	NAT	0.8	0.6	L	0.0	0	1.7	M	3.0	0.3	1.0	1.5	F	5	N/A	1	<0>	Decommission
5800100	3.63	FS	NAT	2.0	1.4	M	3.0	H	1.7	M	3.0	0.0	0.7	1.5	A	2	2	2	2	
5800105	0.13	FS	NAT	0.3	0.0	0	0.5	L	0.3	L	2.0	0.0	0.7	0.0	A	5	5	1	1	
5814100	0.18	FS	NAT	1.9	0.8	L	3.0	H	2.0	M	1.0	0.0	0.3	0.0	A	2	2	2	2	
5814200	0.01	FS	NAT	0.7	0.8	L	0.0	0	1.3	M	1.8	0.0	0.3	0.0	B	2	2	1	2	
5814300	0.63	FS	NAT	0.6	0.6	L	0.0	0	1.3	M	2.0	0.0	0.3	0.0	B	2	2	1	2	
5815050	0.59	FS	NAT	0.4	0.2	L	0.0	0	1.0	L	1.5	0.0	0.3	0.0	A	5	5	1	1	
5815052	0.33	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	1.5	0.0	0.3	0.0	A	5	5	1	1	
5815100	1.96	FS	NAT	0.8	0.2	L	0.5	L	1.7	M	2.5	0.2	0.3	0.0	B	5	2	1	2	
5815110	0.60	FS	NAT	0.5	0.0	0	0.5	L	1.0	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5815120	1.02	FS	NAT	0.3	0.2	L	0.0	0	0.7	L	2.5	0.0	0.3	0.0	A	5	5	1	1	
5815190	0.45	FS	NAT	0.4	0.0	0	0.0	0	1.3	M	2.0	0.0	0.3	0.0	A	5	5	1	1	
5815200	1.03	FS	NAT	0.5	0.2	L	0.0	0	1.3	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5815250	1.23	FS	NAT	0.8	0.2	L	0.5	L	1.7	M	1.3	0.2	0.3	0.0	A	2	2	2	2	
5815253	0.64	FS	NAT	0.6	0.2	L	0.5	L	1.0	L	1.3	0.2	0.3	0.0	A	5	5	1	1	
5815255	0.23	FS	NAT	0.3	0.2	L	0.0	0	0.7	L	1.3	0.0	0.3	0.0	A	5	5	1	1	
5815300	1.25	FS	NAT	0.6	0.2	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5815310	0.94	FS	NAT	0.5	0.2	L	0.0	0	1.3	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5815350	1.19	FS	NAT	0.6	0.2	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5815400	0.14	FS	NAT	0.7	0.4	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	2	2	2	2	
5815410	1.26	FS	NAT	0.7	0.4	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5815470	0.25	FS	NAT	0.5	0.4	L	0.0	0	1.0	L	1.5	0.0	0.3	0.0	A	5	5	1	1	
5815480	0.04	FS	NAT	0.2	0.4	L	0.0	0	0.3	L	1.5	0.0	0.3	0.0	A	5	5	1	1	
5815500	2.00	FS	AGG	1.4	1.0	L	1.5	M	1.7	M	1.0	0.0	0.3	0.0	B	5	5	1	2	
5815510	0.14	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	1.3	0.0	0.3	0.0	A	5	5	1	1	
5815560	0.82	FS	NAT	0.6	0.0	0	0.0	0	1.7	M	1.3	0.0	0.3	0.0	A	5	5	1	1	
5815570	0.44	FS	NAT	0.6	0.0	0	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5820070	0.37	FS	NAT	0.3	0.2	L	0.0	0	0.7	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5820078	0.22	FS	NAT	0.2	0.2	L	0.0	0	0.3	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5820090	0.56	FS	NAT	0.4	0.2	L	0.0	0	1.0	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5820091	0.06	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	2.0	0.0	0.3	0.0	A	5	5	1	1	
5820093	0.47	FS	NAT	0.3	0.0	0	0.0	0	1.0	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5820095	0.52	FS	NAT	0.4	0.0	0	0.0	0	1.3	M	2.0	0.0	0.3	0.0	A	5	5	1	1	
5825010	0.83	FS	NAT	0.6	0.6	L	0.0	0	1.3	M	1.3	0.3	0.7	0.0	A	2	2	2	2	
5825020	1.72	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	1.5	0.5	0.7	0.0	B	5	2	1	2<>1	Close @ 040 and 070 jct's and 070 -Hwy
5825030	1.27	FS	NAT	0.4	0.6	L	0.0	0	0.7	L	1.5	0.0	0.3	0.0	A	5	5	1	1	
5825040	4.49	FS	NAT	1.4	1.0	L	1.5	M	1.7	M	1.5	0.0	0.7	1.5	B	5	2	1	2	
5825070	3.19	FS	NAT	1.0	1.2	M	0.0	0	1.7	M	1.5	0.7	0.7	0.0	B	5	2	1	2	Close access to Hwy 58
5825072	0.15	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	1.5	0.0	0.7	0.0	A	5	5	1	1	
5825080	3.57	FS	NAT	1.3	0.6	L	1.5	M	1.7	M	1.8	0.5	1.0	1.0	A	2	2	2	2	
5825085	0.19	FS	NAT	0.2	0.0	0	0.5	L	0.0	0	1.3	0.0	0.3	0.0	A	2	2	2	2	
5825100	1.90	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	1.8	0.7	1.3	0.0	B	5	2	1	2	
5825150	2.48	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	1.5	0.0	0.7	0.0	B	5	2	1	2	
5825160	0.93	FS	NAT	0.5	0.4	L	0.0	0	1.0	L	1.8	0.5	0.7	0.0	B	5	5	1	1	
5825163	0.70	FS	NAT	0.8	0.4	L	0.0	0	2.0	M	1.8	0.0	0.7	0.0	A	5	5	1	1	
5825170	0.35	FS	NAT	0.1	0.0	0	0.0	0	0.3	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5825180	0.29	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	1.8	0.0	0.3	0.0	A	2	2	2	2	
5825200	1.40	FS	NAT	1.4	1.0	L	1.5	M	1.7	M	1.8	0.0	0.7	1.5	B	5	5	1	2	
5825210	0.29	FS	NAT	0.6	0.2	L	0.5	L	1.0	L	1.8	0.0	0.7	0.0	A	2	5	2	1	
5825232	0.73	FS	NAT	0.6	0.2	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5825300	2.41	FS	NAT	1.6	1.4	M	1.5	M	2.0	M	1.8	2.2	1.0	0.0	A	2	2	2	2	
5825310	1.94	FS	NAT	0.8	0.4	L	0.0	0	2.0	M	1.8	0.0	0.7	0.0	B	5	2	1	2	
5825317	0.45	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	1.8	0.0	0.3	0.0	A	5	5	1	1	
5825320	0.07	FS	NAT	1.0	0.6	L	1.5	M	1.0	L	1.8	0.0	0.3	0.0	A	5	5	1	1	

route	LEN	JUR	SURF	HUM USE	PUBLIC	PUBLIC	PRIVATE	PRIVATE	ADMIN	ADMIN	WILD LIFE	AQ	BOT	HERIT	Mgmt Strategy	current work	proposed work	Current m/l	Proposed m/l	REMARKS
5825323	1.04	FS	NAT	1.4	0.6	L	1.5	M	2.0	M	1.8	0.0	0.3	0.0	A	2	2	2	2	
5825340	0.27	FS	NAT	1.0	0.6	L	0.5	L	2.0	M	1.5	0.0	1.0	0.0	A	2	2	2	2	
5825350	0.28	FS	NAT	0.4	0.0	0	0.0	0	1.3	M	0.0	0.0	0.3	0.0	A	5	5	1	1	
5825360	0.52	FS	NAT	0.3	0.0	0	0.0	0	1.0	L	1.5	0.5	1.0	0.0	A	5	5	1	1	
5825370	1.22	FS	NAT	1.5	1.0	L	1.5	M	2.0	M	1.8	0.5	1.0	0.0	A	2	2	2	2	
5825400	2.61	FS	NAT	1.0	1.0	L	0.0	0	2.0	M	1.5	0.0	0.3	1.5	A	2	2	2	2	
5825430	3.26	FS	NAT	1.0	1.0	L	0.0	0	2.0	M	2.3	0.0	0.3	0.0	A	5	5	1	1	
5825436	0.48	FS	NAT	0.8	0.6	L	0.0	0	1.7	M	2.3	0.0	0.3	0.0	A	5	5	1	1	
5825437	0.10	FS	NAT	0.8	0.6	L	0.0	0	1.7	M	2.3	0.0	0.3	0.0	A	5	5	1	1	
5825450	0.41	FS	NAT	0.5	0.6	L	0.0	0	1.0	L	1.0	0.0	0.7	0.0	A	5	5	1	1	
5825460	1.33	FS	NAT	0.8	0.6	L	0.0	0	1.7	M	2.3	0.0	0.3	0.0	A	5	5	1	1	
5825465	0.44	FS	NAT	0.4	0.6	L	0.0	0	0.7	L	2.3	0.0	0.3	0.0	A	5	5	1	1	
5825467	0.56	FS	NAT	0.4	0.6	L	0.0	0	0.7	L	2.3	0.0	0.3	0.0	A	5	5	1	1	
5825470	1.06	FS	NAT	0.5	0.6	L	0.0	0	1.0	L	1.8	0.0	0.7	0.0	A	5	5	1	1	
5825480	1.16	FS	NAT	0.9	1.4	M	0.0	0	1.3	M	1.8	0.0	0.3	0.0	A	2	2	2	2	
5825490	0.02	FS	NAT	0.4	0.2	L	0.0	0	1.0	L	2.0	0.0	0.3	0.0	A	2	5	2	1	
5825500	0.07	FS	NAT	0.6	0.2	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5825520	0.15	FS	NAT	0.5	0.6	L	0.0	0	1.0	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5825600	0.99	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	1.5	0.0	0.3	0.0	A	5	5	1	1	
5825690	2.40	FS	NAT	0.8	1.0	L	0.0	0	1.3	M	1.5	0.0	0.3	0.0	A	2	2	2	2	
5825695	0.38	FS	NAT	0.5	0.6	L	0.0	0	1.0	L	1.5	0.0	0.3	0.0	A	5	5	1	1	
5825696	1.08	FS	NAT	0.6	0.0	0	0.0	0	1.7	M	1.5	0.0	0.7	0.0	A	5	5	1	1	
5825700	1.52	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	1.3	0.0	0.3	0.0	A	2	2	2	2	
5825720	0.54	FS	NAT	0.6	0.6	L	0.0	0	1.3	M	1.5	0.0	0.3	0.0	A	5	2	1	1	
5825740	0.14	FS	NAT	0.5	0.6	L	0.0	0	1.0	L	1.0	0.0	0.3	0.0	A	5	5	1	1	
5825747	0.67	FS	NAT	0.3	0.2	L	0.0	0	0.7	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5825749	0.58	FS	NAT	0.3	0.2	L	0.0	0	0.7	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5825750	0.90	FS	NAT	1.0	0.2	L	1.5	M	1.3	M	1.8	0.0	0.3	0.0	A	2	2	2	2	
5825754	0.09	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	1.3	0.0	0.3	0.0	A	2	2	2	2	
5825800	3.63	FS	NAT	1.7	1.6	M	1.5	M	2.0	M	1.5	0.3	0.3	1.5	A	2	2	2	2	
5825801	0.42	FS	NAT	0.9	0.0	0	1.5	M	1.3	M	1.3	0.0	0.7	1.5	A	2	2	2	2	
5825820	1.89	FS	NAT	0.8	0.6	L	0.0	0	1.7	M	1.5	0.0	0.7	1.5	B	5	2	1	2	
5825825	0.34	FS	NAT	0.5	0.2	L	0.0	0	1.3	M	1.0	0.0	0.3	0.0	A	5	5	1	1	
5825827	0.30	FS	NAT	0.4	0.0	0	0.0	0	1.3	M	1.0	0.0	0.3	0.0	A	5	5	1	1	
5825830	0.91	FS	NAT	1.1	0.4	L	1.5	M	1.3	M	1.8	0.0	0.7	1.5	A	5	5	1	1	
5825840	1.35	FS	AGG	0.6	0.0	0	0.0	0	1.7	M	2.0	0.0	0.7	1.5	A	2	2	2	2	
5828300	1.13	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	1.8	0.3	0.3	0.5	B	5	2	1	2	
5828400	0.81	FS	NAT	0.8	0.6	L	0.0	0	1.7	M	1.5	0.3	0.3	0.0	A	5	5	1	1	
5828410	0.39	FS	NAT	0.6	0.6	L	0.0	0	1.3	M	1.5	0.0	0.3	0.0	A	5	5	1	1	
5828600	0.62	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	1.5	0.0	0.3	0.0	A	2	2	2	2	
5830020	2.10	FS	NAT	1.0	0.2	L	1.5	M	1.3	M	2.0	0.0	0.3	1.5	A	2	2	2	2	
5830027	0.08	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	2.0	0.0	0.7	1.5	A	5	5	1	1	
5830100	3.42	FS	NAT	0.6	0.0	0	0.0	0	1.7	M	2.5	0.5	0.7	0.0	A	2	2	2	2	
5830101	0.31	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	2.5	0.0	0.7	0.0	A	5	5	1	1	
5830110	0.38	FS	NAT	0.6	0.0	0	0.0	0	1.7	M	2.5	0.0	0.3	0.0	A	5	5	1	1	
5830113	0.30	FS	NAT	0.4	0.0	0	0.0	0	1.3	M	2.5	0.0	0.3	0.0	A	5	5	1	1	
5830115	0.29	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	2.5	0.0	0.3	0.0	A	5	5	1	1	
5830120	0.23	FS	NAT	0.4	0.0	0	0.0	0	1.3	M	2.5	0.0	0.3	0.0	A	5	5	1	1	
5830125	0.22	FS	NAT	0.6	0.0	0	0.0	0	1.7	M	2.5	0.0	0.3	0.0	A	5	5	1	1	
5830200	1.48	FS	NAT	1.0	1.4	M	0.0	0	1.7	M	2.3	0.0	0.3	0.0	A	5	5	1	1	
5830210	0.15	FS	NAT	0.7	1.0	L	0.0	0	1.0	L	2.3	0.0	0.3	0.0	A	5	5	1	1	
5830280	0.28	FS	NAT	0.6	0.6	L	0.0	0	1.3	M	2.3	0.0	0.3	0.0	A	5	5	1	1	
5830300	5.69	FS	NAT	1.1	1.4	M	0.0	0	2.0	M	2.5	0.8	0.7	3.0	A	2	2	2	2	
5830400	1.21	FS	NAT	0.6	0.6	L	0.0	0	1.3	M	1.5	0.0	0.3	0.0	A	5	5	1	1	
5830440	0.73	FS	NAT	0.3	0.6	L	0.0	0	0.3	L	1.5	0.0	0.3	0.0	A	5	5	1	1	
5830500	3.31	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	2.3	0.0	0.3	0.0	B	5	2	1	2	

route	LEN	JUR	SURF	HUM USE	PUBLIC	PUBLIC	PRIVATE	PRIVATE	ADMIN	ADMIN	WILD LIFE	AQ	BOT	HERIT	Mgmt Strategy	current work	proposed work	Current m/l	Proposed m/l	REMARKS
5830510	0.69	FS	NAT	0.1	0.0	0	0.0	0	0.3	L	1.5	0.0	0.3	0.0	A	5	5	1	1	
5830520	2.54	FS	NAT	0.8	0.6	L	0.0	0	1.7	M	2.3	0.5	0.3	0.0	A	5	5	1	1	
5830540	0.91	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	1.8	0.0	0.7	0.0	A	5	5	1	1	
5830570	1.11	FS	NAT	0.3	0.6	L	0.0	0	0.3	L	2.0	0.0	0.7	0.0	A	5	5	1	1	
5830590	0.32	FS	NAT	0.1	0.0	0	0.0	0	0.3	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5830600	2.55	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	2.5	0.8	0.3	0.0	A	2	2	2	2	
5830601	0.60	FS	NAT	0.6	0.6	L	0.0	0	1.3	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5830610	1.05	FS	NAT	0.8	1.0	L	0.0	0	1.3	M	2.3	1.0	0.7	1.0	A	5	5	1	1	
5830640	2.74	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	2.5	0.5	0.3	0.0	A	2	2	2	2	
5830641	0.84	FS	NAT	0.4	0.4	L	0.0	0	0.7	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5830650	0.53	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	2.3	0.0	0.3	0.0	A	5	5	1	1	
5830700	1.24	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	2.0	0.0	0.3	0.0	A	5	5	1	1	
5830710	0.34	FS	NAT	0.8	1.0	L	0.0	0	1.3	M	2.0	0.0	0.3	0.0	A	5	5	1	1	
5830720	0.30	FS	NAT	0.7	1.0	L	0.0	0	1.0	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5830730	0.19	FS	NAT	0.2	0.2	L	0.0	0	0.3	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5830790	1.34	FS	NAT	0.6	1.0	L	0.0	0	0.7	L	2.3	0.8	0.7	0.0	A	5	5	1	1	
5830800	1.64	FS	NAT	0.8	1.0	L	0.0	0	1.3	M	2.3	0.0	0.7	0.0	A	5	5	1	1	
5830810	1.02	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	2.3	0.5	0.7	0.0	A	5	5	1	1	
5830830	2.33	FS	NAT	0.8	1.0	L	0.0	0	1.3	M	2.3	0.5	0.3	0.0	A	2	2	2	2	
5830832	1.50	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	2.3	0.0	0.3	0.0	A	5	5	1	1	
5830835	0.38	FS	NAT	0.2	0.4	L	0.0	0	0.3	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5830840	3.43	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	1.8	0.5	0.7	0.0	A	2	2	2	2	
5830841	0.19	FS	NAT	0.5	0.6	L	0.0	0	1.0	L	1.8	0.3	0.7	0.0	A	5	5	1	1	
5830844	0.53	FS	NAT	0.1	0.0	0	0.0	0	0.3	L	2.0	0.8	0.7	0.0	A	5	5	1	1	
5830845	0.46	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	2.3	0.0	0.7	0.0	A	5	5	1	1	
5830847	0.15	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	1.8	0.0	0.3	0.0	A	5	5	1	1	
5830850	0.53	FS	NAT	0.3	0.0	0	0.0	0	1.0	L	1.5	0.0	0.3	0.0	A	5	5	1	1	
5830853	0.31	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5830870	1.04	FS	NAT	1.0	1.2	M	0.5	L	1.3	M	2.3	0.3	0.7	0.0	A	2	2	2	2<>1	Close @ Pvt. Rd. Jct.
5830873	0.76	FS	NAT	0.6	1.0	L	0.0	0	0.7	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5834010	1.84	FS	NAT	1.3	0.6	L	1.5	M	1.7	M	1.8	0.0	1.0	1.5	B	5	2	1	2	
5834050	0.88	FS	NAT	0.6	0.6	L	0.0	0	1.3	M	1.5	0.0	0.7	1.5	A	5	5	1	1	
5834055	0.08	FS	NAT	0.9	0.6	L	1.0	L	1.0	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5834060	1.19	FS	NAT	0.8	0.6	L	0.0	0	1.7	M	1.5	0.0	0.7	0.0	A	2	2	2	2	
5834075	1.30	FS	NAT	0.9	0.6	L	0.0	0	2.0	M	1.5	0.0	0.3	0.0	A	5	5	1	1	
5834080	0.18	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	1.8	0.0	0.3	0.0	A	5	5	1	1	
5834300	1.32	FS	NAT	1.3	0.6	L	1.5	M	1.7	M	1.8	0.0	0.7	1.5	B	5	2	1	2	
5834550	0.55	FS	NAT	0.7	0.4	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5834600	0.66	FS	NAT	0.9	0.6	L	0.0	0	2.0	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5834610	0.35	FS	NAT	0.1	0.0	0	0.0	0	0.3	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5834658	0.61	FS	NAT	1.2	0.2	L	1.5	M	2.0	M	1.8	0.0	0.3	0.0	A	5	2	1	2	
5834700	1.51	FS	NAT	1.0	1.0	L	0.0	0	2.0	M	1.8	0.0	0.3	0.0	A	2	2	2	2	
5834720	0.95	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	2.0	0.0	0.7	0.0	A	5	5	1	1	
5834725	0.56	FS	NAT	0.8	0.6	L	0.0	0	1.7	M	2.0	0.0	0.7	1.5	A	5	5	1	1	
5835080	1.63	FS	NAT	0.6	0.2	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5835100	0.51	FS	NAT	0.6	0.2	L	0.0	0	1.7	M	2.0	0.7	0.7	0.0	B	5	2	1	2	
5835110	0.79	FS	NAT	0.6	0.2	L	0.0	0	1.7	M	2.0	0.3	0.7	0.0	A	5	5	1	1	
5835115	0.14	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5835120	0.38	FS	NAT	0.1	0.0	0	0.0	0	0.3	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5835125	1.16	FS	NAT	0.6	0.2	L	0.0	0	1.7	M	2.0	0.0	0.3	0.0	A	5	5	1	1	
5835127	0.15	FS	NAT	0.1	0.0	0	0.0	0	0.3	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5835200	1.52	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	2.0	0.3	0.3	0.5	A	2	2	2	2	
5835220	0.63	FS	NAT	0.6	0.4	L	0.0	0	1.3	M	2.0	0.2	0.3	0.0	A	5	5	1	1	
5835230	0.48	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5835231	0.30	FS	NAT	0.1	0.0	0	0.0	0	0.3	L	2.0	0.0	0.3	0.0	F	5	N/A	1	<0>	Decommission
5835300	3.47	FS	NAT	1.1	1.4	M	0.0	0	2.0	M	1.8	0.0	0.3	0.0	B	5	2	1	2	

route	LEN	JUR	SURF	HUM USE	PUBLIC	PUBLIC	PRIVATE	PRIVATE	ADMIN	ADMIN	WILD LIFE	AQ	BOT	HERIT	Mgmt Strategy	current work	proposed work	Current m/l	Proposed m/l	REMARKS
5835304	0.75	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	2.0	0.0	0.3	0.0	A	5	5	1	1	
5835310	1.00	FS	NAT	0.9	1.0	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5835320	1.15	FS	NAT	0.3	0.2	L	0.0	0	0.7	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
5835330	2.05	FS	NAT	0.6	0.2	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5835400	1.17	FS	NAT	1.0	1.0	L	0.0	0	2.0	M	2.0	0.0	0.3	0.0	A	2	2	2	2	
5835440	0.55	FS	NAT	0.8	0.6	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
5840160	0.70	FS	NAT	0.8	1.0	L	0.0	0	1.3	M	1.0	0.0	0.3	0.0	A	5	5	1	1	
5852050	0.13	FS	NAT	0.5	0.4	L	0.0	0	1.0	L	1.5	0.0	0.3	0.0	A	5	5	1	1	
5852150	1.23	FS	NAT	1.3	0.6	L	1.5	M	1.7	M	1.5	0.0	0.3	0.0	A	2	2	2	2	
5852153	0.25	FS	NAT	0.3	0.0	0	0.0	0	1.0	L	1.5	0.0	0.3	0.0	A	5	5	1	1	
5852170	0.26	FS	NAT	0.6	0.2	L	0.0	0	1.7	M	1.5	0.0	0.3	0.0	B	5	2	1	2	
5852180	0.89	FS	NAT	1.2	0.2	L	1.5	M	2.0	M	1.8	0.3	0.7	0.0	A	2	2	2	2	
6020390	1.09	FS	NAT	0.6	0.8	L	0.0	0	1.0	L	2.0	0.5	0.7	0.0	A	5	5	1	1	
6020393	0.34	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	2.0	0.0	0.7	0.0	A	5	5	1	1	
6020500	1.15	FS	NAT	0.8	0.8	L	0.0	0	1.7	M	1.8	0.0	0.3	0.0	A	2	2	2	2	
6020510	0.33	FS	NAT	0.6	0.4	L	0.0	0	1.3	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
6020520	0.53	FS	NAT	0.6	0.4	L	0.0	0	1.3	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
6020600	0.68	FS	NAT	0.5	0.4	L	0.0	0	1.0	L	1.5	0.0	0.3	0.0	A	5	5	1	1	
6020700	1.16	FS	NAT	0.9	0.6	L	0.0	0	2.0	M	1.5	0.0	0.3	0.0	A	5	5	1	1	
6020750	1.24	FS	NAT	0.8	0.4	L	0.0	0	2.0	M	1.5	0.0	0.3	0.0	A	2	2	2	2	
6100000	6.24	FS	AC	0.0	0.0	0	0.0	0	0.0	0	2.5	0.0	0.0	0.0						
6100100	3.91	FS	NAT	1.5	1.0	L	1.5	M	2.0	M	2.0	0.2	0.3	0.5	A	2	2	2	2	
6100120	0.52	FS	NAT	0.1	0.0	0	0.0	0	0.3	L	2.3	0.0	0.3	0.0	C	2	5	2	1	
6100130	2.06	FS	NAT	0.9	1.0	L	0.5	L	1.3	M	2.5	0.3	0.7	1.5	B	5	2	1	2<>1	Close East End (Past PVT)
6100132	0.63	FS	NAT	0.3	0.2	L	0.5	L	0.3	L	2.5	0.3	0.7	0.0	A	5	5	1	1	
6100135	0.83	FS	NAT	0.4	0.4	L	0.5	L	0.3	L	2.5	0.0	0.3	0.0	A	2	2	2	2	
6100140	0.23	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	2.3	0.0	0.3	0.0	A	5	5	1	1	
6100160	0.61	FS	NAT	0.4	0.0	0	0.0	0	1.3	M	2.3	0.0	0.7	0.0	A	5	5	1	1	
6100190	1.55	FS	NAT	0.8	0.6	L	1.5	M	0.3	L	2.0	0.7	1.0	0.0	A	2	2	2	2	
6125000	6.02	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	2.0	0.3	0.0	1.5						
6125880	0.13	FS	NAT	1.5	0.4	L	3.0	H	1.0	L	2.0	0.0	0.7	1.5	A	5	2	2	2	
6125890	1.20	FS	NAT	1.4	0.8	L	1.5	M	2.0	M	1.8	0.0	0.7	0.0	B	2	2	1	2	
6125892	1.50	FS	NAT	0.7	0.4	L	0.5	L	1.3	M	1.8	0.0	0.3	0.0	A	5	5	1	1	
6125893	0.24	FS	NAT	0.1	0.0	0	0.0	0	0.3	L	1.8	0.0	0.3	0.0	A	5	5	1	1	
6125910	1.28	FS	NAT	1.2	0.8	L	1.5	M	1.3	M	2.3	0.8	0.7	1.5	B	2	2	1	2	
6125912	0.21	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	2.3	0.0	0.3	0.0	F	5	N/A	1	<0>	Decommission
6125915	0.46	FS	NAT	0.1	0.0	0	0.0	0	0.3	L	2.3	0.0	0.3	0.0	A	5	5	1	1	
6125940	0.18	FS	NAT	0.7	0.6	L	1.5	M	0.0	0	2.3	0.3	0.3	0.0	A	5	5	1	1	
6125960	0.04	FS	NAT	0.8	1.0	L	1.5	M	0.0	0	2.3	0.7	0.7	0.0	A	5	5	1	1	
6125980	0.19	FS	NAT	0.8	1.0	L	1.5	M	0.0	0	2.3	0.7	0.7	1.0	A	5	5	1	1	
9758400	0.97	FS	NAT	0.8	0.4	L	0.0	0	2.0	M	2.3	0.0	0.7	0.0	A	2	2	2	2	
9758450	1.57	FS	NAT	0.8	0.4	L	0.0	0	2.0	M	2.3	0.0	0.7	0.0	A	5	5	1	1	
9758457	0.23	FS	NAT	0.0	0.0	0	0.0	0	0.0	0	2.0	0.0	0.7	0.0	A	5	5	1	1	
9758500	1.36	FS	NAT	0.9	0.6	L	0.0	0	2.0	M	2.3	0.0	0.7	0.0	A	5	5	1	1	
9758600	1.28	FS	NAT	1.2	1.0	L	1.0	L	1.7	M	2.0	0.0	0.3	0.0	A	2	2	2	2	
9758615	1.15	FS	NAT	0.7	0.0	0	0.0	0	2.0	M	2.3	0.5	0.7	0.0	A	5	5	1	1	
9758620	0.36	FS	NAT	0.6	0.6	L	0.0	0	1.3	M	2.3	0.0	0.3	0.0	B	5	2	1	2	
9758630	0.26	FS	NAT	0.4	0.0	0	0.0	0	1.3	M	2.0	0.0	0.3	0.0	A	5	5	1	1	
9758700	1.27	FS	NAT	0.6	0.2	L	0.0	0	1.7	M	2.0	0.0	0.3	0.0	A	5	5	1	1	
9758730	0.64	FS	NAT	0.6	0.6	L	0.0	0	1.3	M	2.0	0.0	0.3	0.0	A	5	5	1	1	
9758800	0.26	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	2.3	0.0	0.3	0.0	A	5	5	1	1	
9768020	1.04	FS	NAT	1.5	0.6	L	3.0	H	1.0	L	1.8	0.0	0.3	0.0	A	2	2	2	2	
9770450	0.47	FS	NAT	0.6	0.0	0	0.0	0	1.7	M	2.3	0.0	0.3	0.0	A	2	2	2	2	
9770451	0.10	FS	NAT	0.3	0.0	0	0.0	0	1.0	L	2.3	0.0	0.3	0.0	C	2	5	2	1	
9770500	1.17	FS	NAT	1.0	0.4	L	1.0	L	1.7	M	2.3	0.5	0.7	0.0	A	2	2	2	2	
9770510	0.29	FS	NAT	0.5	0.0	0	0.5	L	1.0	L	2.0	0.0	0.3	0.0	C	2	5	2	1	

route	LEN	JUR	SURF	HUM USE	PUBLIC	PUBLIC	PRIVATE	PRIVATE	ADMIN	ADMIN	WILD LIFE	AQ	BOT	HERIT	Mgmt Strategy	current work	proposed work	Current m/l	Proposed m/l	REMARKS
9770596	0.32	FS	NAT	0.2	0.0	0	0.0	0	0.7	L	2.3	0.3	0.7	0.0	A	5	5	1	1	
9770600	1.71	FS	NAT	0.8	0.4	L	0.0	0	2.0	M	2.3	0.3	0.7	0.5	A	2	2	2	2	
9770700	1.22	FS	NAT	0.3	0.0	0	0.0	0	1.0	L	2.3	0.5	0.7	0.0	A	2	2	2	2	