

Appendix B: Ecological, Social, and Economic Considerations

Recreation Access Assessment

The Mt. Baker-Snoqualmie National Forest is one of the most visited recreation areas in the nation. Continued access to high value recreation opportunities and settings is forefront in the mission of the forest. With over seven million people in the Puget Sound area, many people depend on the road system to access eight Wilderness Areas, over fifty campgrounds or picnic areas, and approximately 1,500 miles of trail.

Road segments were rated against a wide variety of recreation criteria. Roads that provide access to developed sites or the trail system or are heavily used by the public will be rated as the most important roads in this process. Roads will be ranked using information from the recently completed Recreational Facilities Analysis (RFA), which identified the recreation infrastructure that could be sustained with the resources currently available. In the RFA analysis, all developed recreation sites were ranked in priority order from most important to least important. Sites were evaluated and ranked based on conformance to the forest niche and amount of recreation use (35%), financial efficiency (35%) and environmental and community sustainability. Initially roads accessing high value developed site were ranked as High, and those leading to low value sites will be rated low. The Districts then reviewed the results of the ranking and made site-specific changes to the ranking based on local knowledge and concerns.

Vegetation Management Access Analysis

How Vegetation Management Access Needs Affect Road Maintenance Decisions

Purpose of road access for Vegetation Management

Vegetation management silvicultural activities are an important means of accomplishing Forest goals and objectives. The Forest uses silvicultural activities to accomplish wildlife habitat objectives, including late successional habitat, elk forage, and riparian habitat treatments and to attain timber harvest goals. Silvicultural activities are commonly accomplished through timber sale and stewardship contracts, which require road access for equipment and vehicle access.

Short term and long term road access needs differ by management area allocations. Three separate management allocation categories are relevant to the road maintenance decisions to be made:

Late successional reserves (LSR) are allocations designed to serve as habitat for late-successional and old-growth related species including the northern spotted owl. (USDA and USDI, 1994). In general, treatments may occur in LSR stands up until age 80 years for the purpose of creating or maintaining late-successional forest conditions. Silvicultural treatments are generally not appropriate after age 80. Therefore, roads will normally not be needed for silvicultural treatments if they do not provide access to stands younger than 80 years.

Matrix stands are those where most timber harvest and other silvicultural activities are expected occur. Silvicultural treatments are expected to occur periodically over the long term and periodic road access will be required more or less permanently in Matrix allocations to accomplish the treatments.

Management Area 8E, Greenwater Special Area (MA 8E) is an allocation emphasizing the creation and maintenance of elk forage habitat. (USDA, 2001). Roads are generally needed to access a single treatment entry. Subsequent access may be needed to maintain forage units.

Timeframe of road access needs for Vegetation Management

Timber sale and stewardship contracts used to accomplish vegetation management goals typically last for about 3 to 5 years. After a contract is completed, the roads used might not be needed again until 10 to 30 years later. Some roads, particularly in LSR and MA 8E, might not be needed at all after the initial treatment entry. During the life of the timber sale or stewardship contract, the purchaser or contractor will complete road maintenance activities commensurate with the level of their operations.

Vegetation Management considerations for road maintenance decisions

The management allocation for a given area will affect the decision regarding road management and road maintenance.

Matrix

- Roads that access young stands in Matrix land allocations will likely be needed over the long term for vegetation management activities, although the use might be intermittent. If a road is needed for reasons other than vegetation management, for example, high use recreation or administrative access, the access need will likely dictate the long term need for the road.
- If the road is not needed over the long term for other uses, consider placing the road in storage or in maintenance level 2 during periods of non-use by timber sale or stewardship contracts.

LSR

- Roads that access stands up to age 80 years might be needed until all stands along the road reach 80 years. Under current management direction, silvicultural activities will probably not occur after that.
- If a road is needed for reasons other than vegetation management, for example, high use recreation or administrative access, the access need will likely dictate the long term need for the road.
- If a road provides access to stands of varying ages, e.g., 20 to 80 years, the road might be needed intermittently for several decades. Consider placing the road in storage or in maintenance level 2 during periods of non-use by timber sale or stewardship contracts.
- When a road is no longer needed for access to stands less than 80 years of age, consider the road for decommissioning.
- Consider relative values of treatments compared to risks associated with the road and consider decommissioning if risks outweigh treatment benefits.

Management Area 8E

- Access will generally be needed for one harvest entry to create forage openings.
- Consider decommissioning the road following harvest entry.

- Some roads will be needed for maintenance of openings. Consider the type of access needed to maintain the openings. For example, maintaining the openings along a road require fire equipment access, high clearance vehicle access, all-terrain vehicle access, foot travel, or a combination of any of those. Manage and maintain the road in accordance with the type of access needed.
- Some roads within MA 8E will be needed for access to areas outside MA 8E and those access needs will likely dictate the long term management of the roads.

Cultural/Heritage Access Assessment

There is a need to identify specific road segments that contribute to the Forest’s ability to address its inventory, nomination, protection and preservation responsibilities for federally-owned historic properties. In a small number of cases, this management responsibility benefits from road access.

Highly valuable roads access identified priority sites and contribute to the Forest’s ability to meet its protection, preservation, and public access responsibilities. Moderately valuable roads are important for the Forest to efficiently meet responsibilities to inventory, and evaluate the National Register eligibility of field-verified sites. A rating of Low indicates that access is desirable in the short term to inventory areas that have a high potential for sites (sites that are mapped in GIS, but have not been field verified). A “zero” rating indicates no known need for the purpose of administering the Forest’s Heritage Program.

Rights-of-Way and Route Authorization Data Procedures Assessment

Introduction

Many forest users rely on the roads and trail systems to reach destinations or operate their businesses or hobbies, and many of these uses need authorization for the construction, reconstruction, use, and maintenance of roads, trails, and highways across National Forest System (NFS) lands.

This document describes the process used to compile and record Right-of-Way (ROW) information for use in the Mt. Baker-Snoqualmie National Forest’s Sustainable Roads System (SRS) analysis. All of the compiled data was placed back into INFRA or the SRS Access database for use in the SRS efforts. The information was used to strategize future road maintenance priorities in concert with the other data from members of the internal SRS Interdisciplinary Team (IDT). Table 1 defines types of ROW that are described in this document, all of which were used in the SRS process.

Table 1. Proposed Rights-of-Way identified in SRS for the Mt. Baker Snoqualmie National Forest.

Types	Description	Notes
Cost Share Easements	Easements exchanged between cooperators and the Forest Service for a shared, jointly owned road system serving the lands of both parties.	Cost share roads are jointly owned with cost-share cooperators and road MLs are determined jointly. Most of these easements include cost-share agreements, but some no longer have a corresponding agreement.

Types		Description	Notes
Forest Road Special Use Authorizations	Forest Road Easements and Special Use Permits	Authorizations granted to others to use roads that are part of the FDR system.	FS authorizations normally require all users to pay a proportionate share of road maintenance; which may be completed by performance of work or payment. Some authorizations require users to also pay a proportionate share of capital construction of the road.
	Road Use Permits	Permits granted to others authorizing use of existing NFS roads for purposes of commercial hauling.	
Other Special Use Authorizations		Permits granted to others to use an area of the forest. Road use is ancillary to the primary purpose of the permit.	Special use permits may authorize construction of roads or grant rights of use on existing roads for purpose of accessing non-NFS lands.
Acquired Easements		Easements acquired by the FS to cross non-NFS lands.	The FS is normally the road manager for all acquired easements. Most landowners reserved access rights in the easement deed they granted to the USA. Need to read the easement for specific rights and obligations.
Inholder Access		These NFS roads access private property. The landowners do not currently hold a special use authorization.	The USFS is required to provide adequate access for the reasonable use and enjoyment of inholdings. If the roads are not needed for NFS purposes, a special use authorization may be required for continued inholder access.
Private Road Special Use Authorizations		Easements or permits granted to others for roads that are not on the FDR system.	The holder is considered the road manager. Roads must include features to protect NFSL within and adjacent to the ROW. These easements are often for driveways on NFS land. The roads are not under FS jurisdiction, but they must meet terms and conditions of the authorizations.
Road Maintenance Agreements		Agreements established with cooperators to document the sharing of road maintenance responsibilities.	The cooperator is responsible for some or all of the road maintenance.
Mineral Access	Quarries	Roads need for access to quarries.	The FS may issue mineral material permits for quarry material.
	Mineral Leases	Roads needed for access to Mineral Leases	All mineral leases on the Forest are geothermal leases. - Construction of temporary or long-term roads within a mineral lease is authorized by approval a Plan of Operations.
	Mining Claims	Roads needed for access to Mining Claims	Claimants may be authorized to perform road maintenance or construction in their Plan of Operations.

Types		Description	Notes
	Outstanding Minerals	Roads needed to access Non-Federally owned mineral resources.	No authorizations are currently associated with accessing these minerals.

Cost Share Easements

Description: Easements exchanged between cooperators and the Forest Service for a shared, jointly owned road system serving the lands of both parties. The FS and cooperator share maintenance responsibilities for roads in the cost share road system. Changes in ML must be agreed to by both parties.

This type of easement is located in both lands and engineering files. The team gathered current existing cost-share agreements including Long View Fiber, Plum Creek and WA DNR, and gathered data from other cost share arrangements where cost share easements have been granted, but we are not currently in a cost-share agreement, e.g. Hancock.

All of this data was entered into INFRA.

Road Use Permits

Permits granted to others authorizing use of existing NFS roads for purposes of commercial hauling, where use is not covered by contract, authorization, or agreement, including applicable traffic rules and use restrictions. Road use permits may authorize use of a road that is otherwise closed to access non-federal property; road use that is otherwise restricted by a road use order or a regulation; or motor vehicle use on NFS roads that are not designated for that use on a motor vehicle use map. Permittee's must pay or perform maintenance commensurate with use, and pay capital road construction cost recovery fees.

This data is in the SRS database.

Forest Road Special Use Authorizations

Description: Forest Road Easements and Forest Road Special Use Permits granted to others to use roads that are part of the FDR system. Authorizations granted to others to use roads that are part of the FDR system. During commercial haul, users must pay a proportionate share of road maintenance; which may be completed by performance of work or payment. Some authorizations require users to also pay a proportionate share of capital construction of the road during commercial haul.

The FS can change the ML on these roads, but consultation with the holders is required to ensure their access needs would be adequately met.

This data is in INFRA.

Other Special Use Authorizations

Special use authorizations are generally permits, leases, or memorandums of understanding (MOUs) that have been granted or are planned to be granted to third parties (individuals, private companies, non-profit organizations, and public agencies) to use areas of the forest for recreational use, or specific facilities or linear rights-of-way for industrial uses. Use of NFS roads is typically needed for access to support the primary purpose of the operations, construction, and or maintenance, as authorized in the permits and operating plans.

Special use authorizations don't necessarily list roads on the permits, but the FS has provided access for the activities or infrastructure via the Forest road network. If a permit holder is the sole user of a road, then they are or would become responsible for the maintenance. The FS can change the ML on these roads, but consultation with the permit holders is required to ensure their access needs would be adequately met.

The Forest special uses team reviewed special uses database reports and District permit files for all special use authorizations on the Forest: current permits, pending permits, and permits that have expired but are planned to be reissued. Using transportation maps, the team verified the locations of the special use authorizations and identified the Forest road systems currently used by the permit holders. The names of the special use permit holders, types of uses, and road numbers & mileages were entered on a data table for display and analysis.

Eventually long term permits should be put into INFRA. Special use authorizations with long term item access needs include:

- Private roads leading to inholdings or industrial forest lands,
- Electric or fiber optic lines buried in roads,
- Power lines are typically permitted for 30-50 years,
- Communication sites are authorized through 20 year leases,
- FS repeaters that are located on someone else's tower,
- BPA power lines are under an MOU and perpetual,
- Recreation residences, terrestrial and river outfitter guides, organization club buildings

This data is in the SRS database.

Acquired Easements

Description: Easements acquired by the FS to cross non-NFS lands. The FS is normally the road manager for all acquired easements. Most landowners reserved access rights in the easement deed they granted to the USA. Commercial use by the landowner requires maintenance proportionate to use. Some acquired easements require the landowner to pay capital costs during commercial use. Read each easement deed to determine landowner responsibilities.

This data is in INFRA.

Inholder Access

Description: These NFS roads access private property. The landowners do not currently hold a special use authorization.

There is a need to insure private inholders have adequate access to reasonably enjoy their property. These roads were identified in GIS and then cross-referenced with the Master Title Plat. Road segments needed to access the various in-holdings were identified using FS road layers in GIS, with mileposts also taken from the FS road layer.

This data is in the SRS database.

Private Road Special Use Authorizations

Description: Easements or permits granted to others for roads that are not on the FDR system. The grantee is considered the road manager when it is an easement. Roads must include features to protect NFSL within and adjacent to the ROW. These easements are often for driveways on our land. The holder is considered the road manager.

This data is in the SRS database.

Road Maintenance Agreements

Current and pending Road Maintenance Agreements with cooperators were identified using Forest records, to document the sharing of road maintenance responsibilities.

Examples of current and pending road maintenance agreements are:

- Beckler Road 65, with Snohomish County (which is only temporary),
- Middle Fork Snoqualmie, with King County (also only temporary),
- Segelsen Road 18, with the Skaglund Quarry ,
- Harlan Creek Roads 6522 and 6525, with Tulalip Tribes,
- Sauk River Road 22 with Snohomish County,
- Jackman Creek Road 14, with Weyerhaeuser (formerly Longview),
- Cascade River Road 15, with Skagit County
- Middle Fork Nooksack Road 38, with Olivine and Longview Fiber
- Cost Share Cooperative Road Maintenance Agreements with DNR, Weyerhaeuser Columbia Timberlands and Plum Creek.

This data is in the SRS Database. Agreements longer than five years are also in INFRA.

Quarries

Forest Service quarries were identified in GIS using a FS quarry database and then cross-referenced with the Forest records. Road segments needed to access the various quarries were identified using FS road layers in GIS, mileposts were also taken from the FS road layer.

This data is in the SRS database.

Mineral Leases

All mineral leases on the Forest are geothermal leases. This analysis includes existing and pending leases, but does not differentiate between the two. It is assumed that the entire length of all existing roads inside the lease boundaries would be needed. Lease parcels were identified using the BLM's LR2000 database and then cross-referenced with Forest records. Road segments needed to access the various leases were identified using FS road layers in GIS, mileposts were also taken from the FS road layer.

This data is in the SRS database.

Mining Claims

Active mining claims were identified using the Forest's active mining claim GIS database, which was then cross-referenced with LR2000. Road segments needed to access the various claims were identified using FS road layers in GIS, with mileposts also taken from the FS road layer.

This data is in the SRS database.

Outstanding Minerals

Outstanding mineral rights were identified using Forest records and BLM's Master Title Plat database. Road segments needed to access split estates were identified using FS road layers in GIS, with mileposts also taken from the FS road layer.

This data is in the SRS database.

Forest Service Administrative Access Assessment

Forest Service administrative access needs will be tracked to ensure we retain sites that are necessary for the Forest Service to function, like routes to our repeater sites, etc. The pertinent administrative designations that expect to be tracked include:

Types of Forest Service Access that will be included in the SRS process.

<i>Administrative Designation</i>	<i>Types of access included</i>
Office access	Access roads and parking for Ranger Stations, work centers, visitor information centers, residences, and other admin sites.
Recreation site	Access roads and parking for trailheads, viewpoints, boat ramps/launches, picnic sites, and hot springs.
Campground	Roads accessing campgrounds and the campground roads and parking
Parking lot	Parking lot

Pit access	Rock pit, rock quarry, pit access, pit roads
Airstrip	Airstrip roads and parking
Electronic Site	Radio repeaters and RAWS (weather stations)
Lookout	Lookout
ATV	Jeep trails, OHV, ORV

Strategic concerns from Fire Management

- Increasing the amount of Forest roads to Level 2 or 1 maintenance will result in
 - Reduced initial attack effectiveness (increased risk)
 - Increased non-wilderness acres burned
 - Transfer of ground based firefighter risk to aerially delivered suppression resources and aviation personnel (increased risk)
- Need to maintain service access (level 2 min.) to 5 Remote Automated Weather Stations (RAWS) and numerous communication equipment sights (repeaters, etc.)
 - Reduced access will transfer risk to aerially delivered maintenance and aviation personnel (increased risk)
 - Delay repairs to Forest communication system and reduce radio communication quantity and quality (increased risk)
 - Degrade quality of National Fire Danger Rating System (NFDRS) outputs and archived Wx database
 - Increase personnel time and cost to manage and maintain radio and Wx systems

Assigning a Risk Rating

Risk levels assigned to each sight are based on the assumption that Forest road access is removed. Given this, sights that would require aerial delivery or long arduous pack in of personnel and equipment were given a high risk rating due to aviation hazards and high exposure time of cross country pack-in associated with these operations. Risk to Wx and Radio system integrity, as well as cost to manage would increase for all these sights but risk to personnel supersedes these risks and a high rating was given. Moderate rating is reduction of system integrity and increased cost. Low rating is increased cost only.

Remote Automated Weather Stations (RAWS)

MBS RAWS listed are included in the NFDRS network of weather stations and, other than Lester, all rely exclusively on FS road access for vegetation and weather equipment maintenance, as well as relatively frequent on sight trouble shooting/repairs. Reducing road access to RAWS sights would increase risk to the integrity of the National Fire Danger Rating System (NFDRS) and all the interagency NFDRS users. Alternate methods of RAWS access would result in increased risk to Forest personnel and contracted resources such as aviation equipment and associated personnel. Haul in/out of equipment would

require external helicopter loading (sling loads) which is considered a high risk aviation activity. Cost to maintain the 5 RAWs accessed by Forest roads would increase due to longer personnel ingress/egress as well as costs associated with aviation resources.

The following risk ratings are based on the loss of Forest road access to the listed RAWs locations:

<u>RAWs locations and associated access road(s)</u>	<u>Risk</u>
○ Kidney Creek RAWs – MBRD, FS road 3124	High
○ Finney Creek RAWs – MBRD, FS road 1735	High
○ Gold Hill RAWs – DRD, FS road 2420-020	High
○ Johnson Ridge RAWs – SRD, FS road 6520-110	High
○ Lester RAWs – SNRD, FS road 54	Low

Communication Equipment

The sights listed below represent the portion of the Forest’s communication equipment that is accessible, or nearly accessible (trailhead access), by Forest roads. Reducing road access to these sights will result in longer equipment down time when repairs are needed. This will increase risk to Forest personnel and neighboring agencies that use our radio network as backup or supplement for their systems. Heavier reliance on aviation resources to maintain sight access will increase risk to Forest and aviation personnel. Haul in/out of equipment would require external helicopter loading (sling loads) which is considered a high risk aviation activity. Cost to maintain the communication system, currently accessed by Forest roads, would increase due to longer personnel ingress/egress times as well as costs associated with aviation resources.

The following risk ratings are based on the loss of Forest road access to the listed equipment locations:

<u>Forest radio equipment and associated access road(s)</u>	<u>Risk</u>
○ West Church – MBRD, FS road 3124	High
○ Glacier – MBRD, FS road 31	High
○ Lookout Mt. – MBRD, trail access via FS road 15	High
○ Leonard’s Ridge – MBRD, FS road 1709	High
○ North Mt. – DRD, FS road 2810	High
○ Round Lake – DRD, trail access via FS road 49	High
○ Kennedy Hot Springs, DRD, trail access via FS road 23	High
○ Green Mt. – DRD, FS road 4110	High
○ North Fork – DRD, FS road 4096	High
○ Sobieskie Mt. – SRD, FS road 68	High
○ Granite Mt. – SNRD, trail access via FS road 9035	High
○ Suntop Lookout – SNRD, FS road 7315	High
○ Tolmie Peak – SNRD, FS road 7930-519	High
○ Bessemer – SNRD, FS road 5640	High

- Kelly Butte – SNRD, FS road 70 to FS road 7030 to trail 1031 High

Aquatic Resource Risk Assessment – Sustainable Road System Analysis

Overview

Aquatic resources features or attributes examined in the Mt Baker Snoqualmie National Forest Sustainable Road System analysis included aquatic resource risk factors and aquatic resource values. Forest roads can alter or modify water (flow) delivery and transport, as well as sediment / bedload delivery, transport, and deposition. Roads can alter aquatic organisms' habitat by affecting habitat access, for example, fish passage. Roads can also influence water quality indicators such as turbidity.

The following nine aquatic risk factors were assessed:

- a) The presence of a Washington State rain-on-snow zone – location of a road segment and contributing upslope area
- b) Percent of the road segment found on unstable soils, highly eroded glacial, alluvial fan, or recessional outwash deposits and highly fractured and unstable geology
- c) History of road associated failures from sources which have not been corrected
- d) Presence of major channel crossings – number of large (>36" diameter) or deep (>3' fill over inlet) culverts
- e) Number of channel crossings per 500 feet of road
- f) Method of construction – generally done before 1970, assume sidecast excavation, post 1970 construction, assume layer placement excavation
- g) Average side slope of road – an indicator of potential failure
- h) Vegetative cover – percent of area above the road having a stand age of > 35 years
- i) Degree of road stacking – upslope from the road segment

The following six aquatic resource values were assessed:

- (1) fish passage needs
- (2) key watershed designation
- (3) proximity to riparian reserves
- (4) watershed analysis and watershed restoration status
- (5) existing water quality value and 303(d) listed water body status of watershed
- (6) location within a municipal watershed

Assessment of the nine aquatic resource risk factors was applied to each road segment as identified in the Forest's INFRA database. For the aquatic resource values, only fish passage was assessed for each road segment; the five other aquatic values were assessed at the watershed scale and applied to all road segments located in a particular watershed.

Only existing data and information were used for this aquatic assessment, no new data were collected for the assessment.

Data and Information Sources

There were two general sources of data / information available, from Forest-level efforts and Northwest Forest Plan type information. A Forest interdisciplinary team developed and employed a road - aquatic resource risk assessment matrix. The matrix was to be used for broad level road decommissioning and closure treatment priority setting. It was to be used before project design, as a basis for decisions on whether or not to treat a road segment. Site specific hazards for a given road segment were developed from follow-up field reviews. This field information assisted in the prescribing the appropriate level and type of treatment for each road segment. This matrix was not intended to be data intensive, only readily available information and field knowledge of team members was used. Team members included road engineers, watershed specialists, botanists, fish and wildlife biologists. The matrix intentionally omitted social/political factors based on the objective of the assessing the risk of roads on aquatic resources. It was also acknowledged that final road treatment priorities would also be influenced by other public interest factors such as fish species at risk, key watersheds designations, and potential partners.

The Northwest Forest Plan GIS layers were used to obtain watershed scale information such as key watershed designation, and riparian reserve widths. Also, the completion of watershed analysis and the implementation of road restoration treatments within all Forest watersheds were recorded. Information regarding the presence of municipal water supplies and the existence of water quality problems was obtained from existing Forest GIS databases. The presence of fish passage problems for each road segment were obtained by an intensive, regionally funded, Forest-wide fish passage survey conducted over a three-year period (1999-2001) and continually updated.

Aquatic Resource Assessment Methods and Procedures

1. Aquatic Resource Potential Risk Factors Assessment

The roads - aquatic resource risk factors rated for each road segment, were the following factors of potential failure:

- a) location of road segment in Washington State rain-on-snow zone and type of contributing upslope area
 - 2 = rain-on-snow (1500' – 3500' zone)*
 - 1 = rain or snow dominated (rain: 500'-1500'; snow: 3500'-5500')*
 - 0 = lowland or highland (lowland: <500'; highland: >5500')*
- b) percent of area occupied by road on unstable soils, highly eroded glacial, alluvial fan, or recessional outwash deposits and highly fractured / unstable base geology
 - 5 = over 50 percent*
 - 3 = 31-50 percent*
 - 2 = 10-30 percent*
 - 0 = < 10 percent*
- c) history of road associated failures from sources which have not been corrected includes replace-in-kind that have not been sized larger or replaced by a bridge; culvert spacing is too far for amount of runoff; large debris load existing up the channel
 - 2 = repeated*
 - 1 = some*
 - 0 = no history*

- d) number of large channel crossing culverts (>36" diameter or with >3' of fill)
 - 2 = more than one*
 - 1 = one*
 - 0 = none*
- e) number of channel crossings per 500 feet of road (using GIS stream and road layers)
 - 2 = 3 or more crossings*
 - 1 = 2 crossings*
 - 0 = no crossings*
- f) method of construction: if constructed before 1970, assume sidecast excavation, if constructed after 1970, assume layer placement excavation
 - 2 = sidecast*
 - 1 = layer placement*
 - 0 = full bench*
- g) average side slope of road
 - 3 = > 60 percent*
 - 2 = 40-60 percent*
 - 0 = < 40 percent*
- h) vegetative cover: percent of area above road segment having stand age of >35 years (use either stand year of origin or young stands 0-5, 6-30, 31+ years GIS data layers; if no GIS available, use aerial photos)
 - 3 = <20 percent*
 - 2 = 20-49 percent*
 - 1 = 50-70 percent*
 - 0 = > 70 percent*
- i) road stacking upslope from the road segment; if the road segment is a mid-slope road, rate as 1 even if there is not a road segment upslope. If the road segment upslope is a ridge-top road, rate as 1 rather than a 2)
 - 3 = two or more segments above*
 - 2 = one segments above*
 - 1 = road segment is a ridge top segment*

In addition to these potential risk factors, the following “consequence of failure” factors were identified and rated according to a 1 – 4 scoring key:

a. a bench, terrace, or floodplain of enough size to trap potential failure debris (organic and inorganic) is present between the road and any channel, wetland, infrastructure, or other valuable natural resource 1

no bench, terrace or floodplain of enough size to trap potential failure debris (organic and inorganic) is present between the road and any channel, wetland, infrastructure, or other valuable natural resource go to b

b. average side slope below the road segment is < 20 percent; channels, wetlands, infrastructure, or other valuable natural resource > 50 feet from the road..... 1

perennial channels, wetlands, infrastructure, or other valuable natural resource

< 50 feet from the road2

average side slope below the road is > 20 percent go to c

c. average side slope below the road is > 20 percent and < 40 percent; channels, wetlands, infrastructure, or other valuable natural resource > 1000 feet from the road 1

channels, wetlands, infrastructure, or other valuable natural resource > 500 feet but <1000 feet from the road 2

perennial channels, wetlands, infrastructure, or other valuable natural resource < 500 feet from the road 3

average side slope below the road is > 40 percent go to d

d. average side slope below the road > 40 percent and intermittent channels >1500 feet from the road and no wetlands, infrastructure, or other valuable natural resource below the road 1

perennial channels, wetlands, infrastructure, or other natural resource > 1500 feet from the road 2

intermittent channels, wetlands, infrastructure, or other natural resource > 500 feet but < 1500 feet from road 2

perennial channels, wetlands, infrastructure, or other natural resource >500 feet but < 1500 feet from road 3

intermittent channels, wetlands, infrastructure, or other natural resource < 500 feet from road 3

perennial channels, wetlands, infrastructure, or other natural resource < 500 feet from the road 4

The overall risk rating was obtained by multiplying the sum of the potential for failure scores (J) by the consequence of failure score (K), placing more emphasis of the effects of potential failure rather than just the probability of failure. The following table depicts this overall aquatic risk factor rating procedure:

Road Segment #	Potential for Failure Factors Scores									Sum of A – I Failure Scores (J)	Consequence of Failure Score (K)	Overall Risk Rating Score (J x K)
	A	B	C	D	E	F	G	H	I			
2560-120	1	2	0	1	1	0	0	0	0	6	2	12
2250-155	2	3	1	1	1	1	3	0	1	13	2	26

2620-100	2 1 1 0 1 1 1 2 3	14	3	42
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2. Aquatic Resource Values Assessment

The six aquatic resource values were rated by the following High, Medium, Low procedure.

(1) Fish Passage Needs (Risk)

High = presence of both anadromous and resident fish with ¼ mile or more of habitat could be made accessible

Medium = presence of only resident fish with ¼ mile or more of habitat could be made accessible

Low = less than ¼ mile of habitat made accessible or presence of no fish passage problem

(2) Key Watershed Designation (Value or Use)

High = yes, contains Chinook salmon, steelhead and / or bull trout

Medium = no, but contains Chinook salmon, steelhead or bull trout

Low = no, and does not contain Chinook salmon, steelhead or bull trout

(3) Proximity to Riparian Reserves (Value or Use)

High = within riparian reserves having fish bearing channels

Medium = within riparian reserves but not having fish bearing channels

Low = no within a riparian reserve

(4) Watershed Analysis (WA) & Watershed Restoration (WR) Status (Value or Use)

High = road restoration work recommended in WA, opportunities existing for WR

Medium = no road restoration work recommended in WA, but information exist about potential for WR

Low = no road restoration recommended, and no restoration potential known; no WA done

(5) Water Quality Value (Clean Water Act 303(d) Listed Water Body (Value or Use)

High = road or road segment is within contributing area to water body listed for a water quality/quantity parameter or characteristic considered to be directly sensitive to road management (fine sediment, turbidity, etc.)

Medium = road or road segment is within contributing area to water body listed for a water quality/quantity parameter or characteristic considered to be

indirectly sensitive to road management (temperature, dissolved oxygen, fish habitat)

Low = road or road segment does not contribute to a listed water body, or the water body is listed for a water quality/quantity parameter not sensitive to road management

(6) Municipal Watershed (Value or Use)

High = road or road segment lies within contributing area of a large municipal watershed (city of Bellingham, Everett, Tacoma, etc.)

Medium = road or road segment lies within contributing area of a small municipal watershed (Verlot, Maple Falls, Glacier, etc.)

Low = road or road segment does not lie within contributing area of an municipal watershed

As stated before all these aquatic resource values, except for fish passage were assigned these ratings at the fifth-field watershed scale. Fish Passage ratings were applied to each road segment.

3. Combining the Aquatic Potential Risk Factors and Aquatic Resource Values

With both the aquatic risk rating and the aquatic value rating, the next step was to combine these two procedures in order to provide the overall road analysis process one aquatic resource assessment rating to be consistent with other resources of concern (vegetation, wildlife, and heritage resources). This was obtained using the matrix below.

Matrix for Rating Aquatic Resources (Risk Factors + Values)

Factor or Value	High	Medium	Low
Composite Risk Factor Rating (A)	Composite score of 27 or greater	Composite score between 15 – 26	Composite score of 14 or less
Fish Passage Needs (B)	Anadromous & resident fish present, ¼ mile or more habitat	Only resident fish present with ¼ mile or more of habitat	Less than ¼ mile habitat or no fish present
Key Watershed Status(1)	Yes, contains listed ESA listed fish	No, but contains ESA listed fish	No, and does not contain ESA listed fish
Proximity to Riparian Reserves (2)	Within riparian reserves having fish bearing channels	With riparian reserves but does not have fish bearing channels	Not within an riparian reserve
WA and WR Status (3)	Road restoration recommended in WA and opportunities exist for WR	No road restoration recommended in WA, but opportunities exist for WR	No road restoration recommended and no opportunities
Water Quality	Within an area with impaired water body	Within an area with impaired water body	Not within an area with impaired water body or WQ

Status(4)	directly affecting a WQ parameter	indirectly affecting a WQ parameter	parameter not affected
Municipal Watershed Status(5)	Within an area of large municipal watershed	Within an area of a small municipal watershed	Not within a municipal watershed

In rating both aquatic risk factors and aquatic values, more importance was assigned to the composite risk factor rating (A) and the aquatic value of fish passage (B). The overall aquatic resource rating for each road segment was obtained by following scoring scheme:

If both (A) and (B) is rated High, regardless of the ratings for (1), (2), (3), (4), (5) then overall rating is High

If either (A) or (B) is rated High, and 3 of (1), (2), (3), (4), or (5) is rated High, then overall rating is High

If either (A) or (B) is rated High, and 2 of (1), (2), (3), (4), or (5) is rated High, then overall rating is Medium

If either (A) or (B) is rated High, and just 1 of (1), (2), (3), (4), or (5) is rated High, then overall rating is Low

If (A) or (B) is rated Medium, and 4 or 5 of (1), (2), (3), (4), or (5) is rated High, then overall rating is High

If (A) or (B) is rated Medium, and 3 of (1), (2), (3), (4), or (5) is rated High, then overall rating is Medium

If (A) or (B) is rated Medium, and 1 or 2 of (1), (2), (3), (4), or (5) is rated High, then overall rating is Low

If (A) and (B) is rated low, regardless of the ratings for (1), (2), (3), (4), or (5), then overall rating is Low

Wildlife Resource Risk Assessment

Data Sources

Various GIS layers of historical wildlife habitat areas and sightings on the Forest were used in conjunction with the road segment matrix database. Road segments from the GIS layer built from the INFRA database were used. All road segments on the Forest were examined and rated based on the need or opportunity to minimize impacts to various wildlife species.

Roads were rated based on potential impacts to grizzly bear security habitat, modeled mountain goat habitat or mountain goat use areas, and historical T&ES species nest sites (i.e. spotted owl marbled murrelet). Potential impacts to riparian species are indirectly considered in the aquatic assessment.

Assessment was based on existing information, no new data were collected.

Limitations include:

1. Any problems with the road layer will be reflected in the assessment for wildlife concerns;
2. No field verification was done, so the actual miles of roads/specific road segments considered open or closed in regards to grizzly bear core habitat may change during a site specific assessment;
3. Locations of nest sites for northern spotted owl, marbled murrelet, and goshawk are historical and are used to estimate most likely area of occupancy. Future surveys may create the need to update information of individual road segments.
4. Locations of mountain goat use are based on historical sightings. Reliability of sightings may be variable.

Ratings

All road segments were rated based on the need or opportunity for management of wildlife to minimize impacts. High road segment ratings have greater potential for impact to wildlife than low road segment ratings. The following criteria or rating system was used:

For All Areas:

Blank Road segment is not applicable for wildlife management or not currently rated.

For Grizzly Bear Management Units (BMU):

Bear Management Units were rated based on the preliminary analysis of the Grizzly Bear Technical Committee’s desired and existing conditions for core area and preferred seasonal habitats in core area of Westside BMUs. BMUs only occur north of Interstate 90 within the North Cascades Grizzly Bear Recovery Area.

	<i>Total Core Area</i>	<p>Preferred Habitats in Core Area (federal lands only)</p> <p>Early Season Evaluation Range 6,717-17,557 acres</p> <p>Late Season Evaluation Range 12,621-24,275 acres</p>	
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BMU	Early Season Core (%)	Late Season Core (%)
Nooksack	57.4	53
Upper Chilliwack	94.7	87.3
Beaver	96.5	90.6
Baker-Goodell	93.1	90.6
Baker	62.2	57
Welker	67.5/82.2	64.8/79.4
Thunder	94.1	91.6
Sisters	46.3	37.9
Finney	28.7	28.2
Illabot	70.0/92.6	62.6/81.9
Prairie	34.6	31.7
Green Mountain	92.4	83.1
Suiattle	92.4	75.2
Boulder	56.3	53
Monte Cristo	85.6	71.9
Pilchuck	49.6	48
Index	45.2	45.2
Baekler	63.3	58.8
Tolt	73.7	71.8
Foss	72.1	60.2
Snoqualmie	63	56.8

Early Season Current Condition (acres)	Late Season Current Condition (acres)	Road Analysis Rating
5547	16086	M
4563	19704	M
10171	28171	L
10985	26881	L
7086	12728	M
9979	19339	L
5364	30273	M
3863	5914	H
6475	6023	H
5595	22468	M
3173	5325	H
2740	22107	M
1867	14101	M
11916	18710	L
4852	19862	M
3176	9256	H
6254	10576	H
8018	19979	M
2929	10886	H
958	7630	H
4338	13371	M

Bold font indicates conditions with low likelihood of successful occupancy by grizzly bears.

Each road segment within the North Cascades grizzly recovery area was rated based on the condition of the grizzly BMU as follows:

- High** Roads accessing grizzly bear management units with <50% core habitat **and/or** low preferred core habitat, where both early and late core habitat size is below minimum on federal land (<6717 acres early preferred; <12621 acres late preferred).
- Moderate** Roads accessing grizzly bear management units with 50% to 70% core habitat **and/or** low preferred core habitat, where either early or late core habitat size is below minimum on federal land.
- Low** Roads accessing grizzly bear management units with >70% core habitat and where preferred early or late core habitat are above the minimum size on federal land. Roads accessing high use administrative facilities, campgrounds, etc. are rated low even if they fail to meet criteria on core habitat and level of preferred habitat.

For modeled mountain goat habitat or historical use areas:

Mountain goat analysis was separated by using modeled mountain goat habitat north of Interstate 90 and by using historical mountain goat sightings to the south.

Data location: Database: T:\FS\NFS\MtBakerSnoqualmie\Program\Wildlife-2600\GIS\Dons_stuff\covers\wildlife\Wildlife.gdb
 Feature Class: goatrange_new_polygon

Only polygons greater than 5 acres were used.

Each road segment on the Forest was rated as follows:

High Road segment accesses < 0.125 mile of modeled goat habitat or known mountain goat use.

Moderate NO MODERATE

Low Road segment accesses areas >0.125 mile of modeled goat habitat or known mountain goat use.

For spotted owl, marbled murrelet, goshawk nests:

Each road segment on the Forest was rated as follows:

High Road segment accesses areas < 0.25 mile of historically known nest areas.

Moderate No moderate rating used.

Low Road segment accesses areas > 0.25 mile of known nest areas.

Combined Resource Concern Rating for Mountain Goat and TES Nest Sites:

Goats	Goshawk	Murrelet	Owl	Resource Concern Rating
H	L	L	L	M
H	H	L	L	H
H	H or L	H	L	H
H	H or L	H or L	H	H
L	L	L	L	L
L	One or two of these H			M
L	H	H	H	H
NO MODERATE				

Overall Road Analysis Wildlife Rating:

Grizzly Bear Rating*	Goat and TES Nest Resource Concern Rating	Overall Wildlife Rating
H	H	H
H	M	H
H	L	M
M	H	M
M	M	M
M	L	M
L	H	M
L	M	M
L	L	L

*All area south of I-90 was considered to have a Low Grizzly Bear Rating.

*Wenatchee NF side near Snoqualmie Pass considered Low Grizzly Rating.

*Wenatchee NF side near Stevens Pass considered Moderate Grizzly Rating.

Botany/Invasive Plants Risk Assessment

Roads serve as a primary vector for the introduction and spread of invasive plants. Roads with large infestations, high priority invasive plant species and those species most difficult to control pose the greatest risk. Decommissioning of roads would limit the continued disturbance under which invasive plants thrive as well as stop the route of entry into new areas previously un-infested. Additionally, invasive plants can increase road maintenance and project costs by limiting access, compromising road integrity and safety and requiring complicated contract specifications related to invasive plant prevention and treatment standards.

Based on current data and information we have of known invasive plant sites, roads were evaluated based on the level and type of invasive plant infestation to determine what roads would be considered highly infested and thus pose the greatest risk to other resources. Items included in evaluation were size and percent cover of infestation, proximity to sensitive/important botanical areas or other susceptible resources and consideration of the invasive plant species and its management concerns.

Cultural/Heritage Resource Concerns Assessment

Both desirable and undesirable effects may result from roads accessing cultural and heritage sites. For some sites, the interpretation opportunities may drive a need to maintain access to the site. For others, an over-riding desire to protect the site from physical damage or vandalism shifts the concern to one of limiting access. Road segments will be analyzed using two different heritage criteria to capture these distinct issues.

The MBS has over 1,000 cultural resources including archaeological and historical districts, objects, structures, buildings, and sites. Examples of various cultural resources are historic roads and railroad grades, towns, logging and mining camps and equipment, dams, mines, Forest Service administrative buildings, recreation cabins and other facilities, culturally modified trees, prehistoric flaked stone scatters, and traditional cultural properties. Roads will be ranked on

their potential to impact cultural resources. Impacts may be from mechanical activities, such as road maintenance, or because the road provides access to sensitive resources and contributes to vandalism concerns.

Using current data, the greatest risk would be to those sites that are eligible for or are currently listed on the National Register of Historic Places or have the potential to be eligible but have not been evaluated for National Register eligibility. A rating of Medium will indicate roads that create a moderate potential of risk, because a suspected site (mapped, but not field-verified, or when the boundaries of the site have not been delineated) may be impacted. A rating of Low will indicate no known impact or risk of damage to a site caused by the continued use or maintenance of the road segment. Impacts could be lessened or alleviated by reducing maintenance activities or closing roads.

Joint Ownership/Use Risk Assessment

Existing rights-of-way could affect the forest’s ability to change road maintenance levels. In other cases, the forest can determine the road maintenance level necessary for NFS land management purposes independent of needs for landowner access to private property. The MBS will identify and track road right-of-way status so that we can identify where changes to road maintenance levels would require additional discussions with cost share cooperators, permittees, easement holders, and landowners prior to making any changes. This information provides clear limitations on whether or not we can unilaterally change road maintenance levels, as well as providing an inventory of road authorizations that may allow the forest to collect funds or share in the cost of maintaining roads for access. Road segments will be identified by existing data on road right-of-way acquisitions and grants. The following table highlights general categories of rights-of-way, easements, and road authorizations that will be included in the Joint Ownership field in the infrastructure database (Infra). The Forest Service uses Infra to manage information on national resources, such as buildings, trails, roads, wilderness areas, and water systems.

Types of Right of Way Access that will be included in the SRS process.

Right of Way Type	Description
Cost Share Easements	Easements exchanged between cooperators and the Forest Service for a shared, jointly owned road system.
Forest Road Special Use Authorizations	Easements or permits granted to others to use roads that are part of the Forest Development Road (FDR) system.
Acquired Easements	Easements acquired by the Forest Service to cross non-National Forest System lands, such as private property.
Inholder Access	These roads access private property. The landowners do not currently hold a special use authorization.
Non Cost Share Easements	Easements granted to cooperators for roads that are not on the FDR system.
Private Road Special Use Authorizations	Easements or permits granted to others for roads that are not on the FDR system.

Other	Reserved, outstanding, or statutory rights held by others for roads on National Forest System lands.
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Economic Impacts to Communities Assessment

If maintenance budgets continue to decrease, there is a risk that road safety deficiencies will increase over time. If these roads deteriorate over time, local communities and businesses that depend on these roads for access may suffer.

Public Engagement

There were three components to the public engagement process. Public meetings were held in communities near the MBS national forest. An online questionnaire provided another opportunity for input. People provided comments on the blog-site or sent letters describing their views about the forest road system. A report summarizes information collected from community meetings and the online questionnaire (McLain et.al. 2014). The Sustainable Roads public engagement process had three primary goals:

- Inform people about the Sustainable Roads Strategy and the Travel Management Rule of 2005.
- Provide an opportunity for people to talk about their uses and priorities for forest roads.
- Generate spatial information about public uses and priorities to inform the Sustainable Roads Strategy.

The Forest conducted an extensive public engagement process as part of the development of the sustainable roads strategy. Public meetings were held in communities near the MBS National Forest to inform participants on the Travel Management Rule of 2005.

A “Sustainable Roads Cadre” was developed to help craft this effort. The cadre represents a wide array of forest user groups ranging from environmental, hunting, hiking, off-road vehicles drivers to the timber industry. The Cadre helped to schedule and manage meetings and to lend their voices to the dialogue. An ongoing two-way dialogue process was developed by the Forest Service’s Pacific Northwest Research Station and Portland State University to understand how people use and value landscapes and resources as well as to identify areas of high impact or conflict.

At a series of nine meetings, the public was asked to tell the Forest what forest roads mattered most to them. In addition, an online questionnaire provided an opportunity for input. Members of the public also submitted comments via the Sustainable Roads blog-site describing their views about the forest road system. The data gathered was then shared with the community in a series of four public meetings. The data gathered by the public engagement process was then used to generate geospatial information about public uses and priorities to inform the sustainable roads strategy.

Continued public engagement has included a Forest Roads 101 field trip to highlight the primary aspects of forest road management. The Forest is currently developing an educational video on forest road management that will be posted to the Forest website for all users to view.

The Forest will share the Sustainable Roads Report in late 2015 with members of the cadre and the general public via the website, press releases and social media.

Tribal Engagement

Initially tribes were informed by letter about the sustainable roads analysis process. Two tribes responded, generally supporting the need for open roads to provide access for various activities. As part of

government-to government consultation, another letter will be sent to the tribes during the summer of 2015 seeking input on the SRS methodology and draft data. In addition, there will be tribal scoping with affected tribes during ongoing and future watershed/project level analysis.