Willamette National Forest Pilot Road Analysis

Appendix G

Forest Products Process Paper

October 1998

Introduction

Roads are essential to the management of the Forest Products Program on the Willamette National Forest. For the purposes of this analysis, the Forest Products Program is meant to include both the Timber Program and the Special Forest Products Program.

Roads provide access to the forest for planning, designing and implementing a wide range of timber harvest activities. These same roads provide access for equipment that can perform the logging and harvesting activities. They also provide access to the people and equipment that complete subsequent vegetation management treatments. The roads also provide access to individuals that gather special forest products such as Christmas trees, floral greenery, mushrooms, fence posts and firewood. Without the existing network of roads on the Willamette National Forest, many of the forest products activities we now take for granted would not be possible.

Process description/documentation

To begin to understand the importance of roads to management of the Forest Products Program, a list of questions were developed.

1. ***How do roads provide for the management of forest products in Matrix and Adaptive Management Areas (AMA)?***

The structure of this question further refined the area of analysis for the Forest Products Section of the report to only Matrix and AMA land allocations. This is appropriate on the Willamette National Forest as the focus of harvest activities for both the timber and special forest products program is in the Matrix and AMA allocations. Programmed Sale Quantities are planned from AMA and Matrix land allocations.

Roads allow for access to forest products. All timber and most non-timber forest products come from within 2,000 feet of a road. Most timber comes from within 1,500 feet of a road. Non-timber products such as firewood and fence posts come primarily from within 100 feet of a road. These products are relatively heavy and most of their value is added in processing. More portable non-timber products such as Christmas trees, boughs, mushrooms, floral greenery and cones come from varying distances from the road, but their utility to the collector drops rapidly with increasing distance from roads.

Key Questions

- *How much of the area that is suited and available for timber management is accessed by the existing road system and can be logged using conventional yarding systems? Forest and watershed scale?*

To answer this question at the forest scale, a GIS analysis using existing data was performed. This analysis compared the existing system road layer with the forested lands in the Matrix and AMA land allocations. The analysis was done using the assumption that any land that was within 2,000' of an existing system road could be logged with conventional logging equipment such as yarders and tractors. Two caveats are worth discussing. The efficiency of cable logging systems falls off rapidly at yarding distances greater than 1,500 feet. Logging is

usually feasible at up to 2,000 feet, but not in all circumstances. Second, harvest and transport of special forest products is facilitated by proximity to roads. Watershed and project level analysis is needed to further refine the accuracy of the forest scale analysis. It is also expected that site specific analysis will identify areas where alternative harvest methods (ie helicopter) will be needed.

There are 444,577 of suitable and available matrix lands that are within 2,000 feet of a road.

- *Which suited and available acres are not accessed by the existing road system?* Forest and watershed scale

Using the same analysis described in question “A”, the watersheds on the forest were ranked as to their accessibility. In addition, the map generated in question "A" spatially located those areas that were more than 2,000 feet from a road.

There are 15,734 acres of suitable and available matrix lands that are not within 2,000 feet of a road.

- *How does road spacing and location affect logging system feasibility?* Watershed scale

If areas that are more than 2000 feet from a road are known, project teams can assess project feasibility when they move to watershed or project level analysis. Any watershed or project area that has a significant percent of the area further than 2,000 feet from a road will need to include either road construction or alternative (helicopter or other aerial systems) logging systems in project design.

The amount of logging spur road and the spacing of spur roads is related to cutting unit size and shape. This relationship has undergone a major change with the implementation of the Northwest Forest Plan. Streams are linear features, flowing across contours (downhill) in a dendritic pattern. Under the Northwest Forest Plan, streams are surrounded by buffers of up to 680 feet, where no timber harvest is allowed. This tends to constrain timber harvest to narrow slices of land between stream buffers, usually oriented between ridge and valley bottom. Roads built to access particular timber stands for logging are by necessity constructed along ridges or across the slope of a ridge (with the contour), commonly at right angles to stream buffers. Thus, under the Forest Plan, more miles of road must be constructed to reach the ‘slices’ of land available for harvest.

- *How does existing road access affect commercial and personal collection of special (non-timber) forest products?* Watershed and project scale.

Proximity to a road increases the value of products, from the perspective of customers who gather special forest products. The heavier the product, the less valuable it is at increasing distances from open roads. Firewood may only have value at less than 100 feet from a road. Mushrooms may retain some value at 2000 feet from a road.

Results

Results from analysis showed that the majority of the Matrix and AMA land allocations in the Willamette National Forest are accessed by existing system roads.

If Matrix and AMA lands within 2,000 feet of a road are considered accessible, more than 96 percent of the forest is accessible.

Access by watershed is shown in table 1. Table 2 describes the location and size of each watershed. Figure 1 shows the location of each watershed.

Table 1

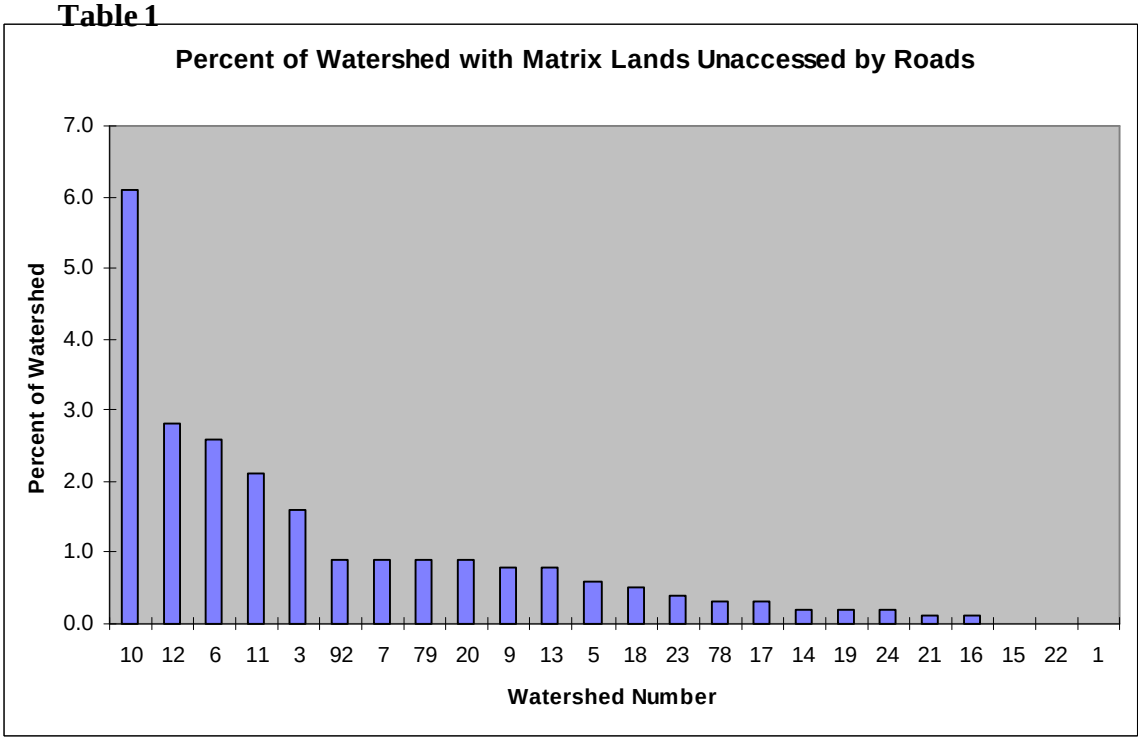

Table 2

Watershed Number	Watershed Name	Watershed Acres
1	Little North Santiam	40137.8
3	N Santiam, Downstream Tribs	39349.8
4	Quartzville Creek	39233.8
5	Middle Santiam	56038.6
6	South Santiam	92355.9
7	McKenzie	230925.5
9	Calapooia	6657.2
10	Blue River	59077.9
11	McKenzie, Minor Tribs	43525.2

Watershed Number	Watershed Name	Watershed Acres
12	Quartz Creek	27068.1
13	McKenzie, South Fork	137545.6
14	Horse Creek	101537.5
15	Fall Creek	87616.1
16	Winberry Creek	22637.3
17	Willamette, Lower NFk MFk	88427.1
18	Salmon Creek	82431.8
19	Willamette, Lookout Res	49352.4
20	Salt Creek	71769.3
21	Willamette, Mdl Fk Downstream Tribs	109916.1
22	Hills Creek	38456.5
23	Willamette, Upper Mdl Fk	113384.3
24	Willamette, Upper NFk MFk	69843.4
78	N Santiam, Blowout-Woodpecker	83122.6
79	N Santiam, Upstream Tribs	99388.3
87	Thomas Creek	546.2
91	Whitewater River	488.1
92	Breitenbush	61150.3
99	Molalla	588.7

Matrix lands that may need the development of more system roads to provide for use of conventional logging systems are quite limited on the forest. Those matrix lands appear to coincide with areas that are identified as "roadless”. Generally, it would seem to be prudent to design logging systems that do not require the construction of more roads. Of course, the specific needs of a particular project must be further analyzed at the project scale.

Process Critique

1. The short amount of time for the process required that we use existing GIS data for analysis. In some cases this data was inaccurate. Because of the short time frame the data was not ground-verified. For future projects it would be more efficient to have this GIS data ready before analysis and synthesis started.
2. Our process allows only minimal public involvement.
3. The transferability of the specifics about what a conventional logging system may not be transferable to other parts of the country where the availability of logging equipment and the topography of the ground may be significantly different.

References

Toupin, Rick. 1998. Personal communication. Region 6, Logging Systems, Engineer.

Willamette National Forest Pilot Road Analysis

Appendix H

Recreation Process Paper

October 1998

Recreation

The first section pertains to the following Key Questions in the “Recreation” part of the analysis:

1. ***Is there now or will there be excess supply or excess demand for unroaded recreation opportunity now or in the future?***
2. ***Does road access contribute to use in excess of the capacity of Wild and Scenic Rivers?***
3. ***Does road access (number of roads and road condition) contribute to overcrowding and/or resource damage at popular back-country destinations (Wild and Scenic Rivers)?***
4. ***What is the level and condition of access to Special Interest Areas and Old Growth Groves?***

The second section will deal with the questions in the context of Dispersed Recreation, Scenic Byways and Developed Recreation.

The final section will address the same questions in the context of Trails and Wilderness.

Background

Citing the Willamette NF LRMP/EIS, the Forest offers a diversity of recreation settings ranging from developed recreation to Wilderness. The primary purpose of managing recreation resources is to provide a range of opportunities from which National Forest users can obtain satisfying recreation experience. We seek to identify recreation settings of varying characteristics that range from large, remote undeveloped areas to small, easily accessed highly developed sites.

Maintaining a viable road system is the key to our ability to provide the diverse recreation settings necessary to meet our desired condition. At the same time, the existence of roads and/or the condition of roads may contribute to overuse, and ultimately a diminishment of visitors' recreation experiences. Public needs may change over time, and we should be willing to adjust and make needed changes.

Process Description/Documentation

1. ***Is there now or will there be excess supply or excess demand for unroaded recreation opportunities?***

According the Forest LRMP/EIS (III-105): "Uses which depend upon a semiprimitive setting face a decreasing supply of opportunities as lands are converted from an unroaded state. Unroaded areas which undergo intensive timer harvesting and accompanying road construction will lose those attributes that provide the solitude and undisturbed environment associated with semiprimitive recreation experiences".

"Semiprimitive non-motorized" settings are characterized by a high probability of solitude, natural appearance, low interaction between users, evidence of vegetation modification is low.

The Forest Plan goes on to predict that recreation use in the semiprimitive unroaded segment of the Forest will exceed the practical capacity for that setting sometime between 2010 and 2040.

We have no better data than this to help with the Roads Analysis. Year-to-year data from wilderness permits, trailhead registers, automatic road counters, would all contribute to our understanding of trends of use. We have no integrated methodology to do a comprehensive analysis of use trends.

2. Does road access contribute to use in excess of the capacity of Wild and Scenic Rivers?

The Forest has two congressionally designated Wild and Scenic Rivers: North Fork of the Middle Fork Willamette, and Upper McKenzie. The Forest also has one congressional Study River: South Fork McKenzie. In the Forest LRMP, we identified nine river segments that have river-related values that meet criteria to be eligible for Wild and Scenic River status: Little North Santiam, Opal Creek, Breitenbush, South Fork Breitenbush, North Santiam, Quartzville Creek, Middle Santiam, South Santiam, and Middle Fork Willamette.

For the streams that have classifications of "Recreation", roads and other developments are permitted. Most of the streams listed above have an arterial or collector road within the corridor boundary. Those roads are likely to be considered essential for recreation.

In order to answer this question, a Limits of Acceptable Change (LAC) process would have to be used to determine the current level of use for each of the streams, develop thresholds for levels of use, and ultimately develop standards for what constitutes acceptable change over time. None of the eligible or designated rivers have undertaken an LAC process for road-related recreation use. Initiation of such a process would best be done at a District level.

3. Does road access (number of roads and road condition) contribute to overcrowding and/or resource damage on Wild and Scenic Rivers.

This question is similar to #1 in that most of the designated or eligible rivers are served by arterials or collector roads. Recreation use, especially during the summer will be moderate to high in river corridors.

Local roads that disperse use into river corridors may have an effect on vegetation, soil, and may ultimately contribute to erosion. River Management Plans for the two designated Wild and Scenic Rivers identified the need to close certain local roads, and both Districts have followed through on that direction. For the eligible rivers, some local roads or non-system roads have been closed over time.

This question is best answered by Districts through Watershed Analyses or through a LAC process to determine thresholds and standards for change.

4. What is the level and condition of access to Special Interest Areas and Old Growth Groves?

The Forest identified 44 new Special Interest Areas in the Forest LRMP/EIS to preserve special cultural, historic, geologic, zoologic, botanic and scenic qualities of the Forest. Management actions are to focus on protection of the important historic, cultural and natural aspects, and where appropriate, foster public use, study and enjoyment of designated lands.

Use will be managed to the extent necessary to protect the unusual features of individual sites. Area Management Guides are to be prepared for each area.

In addition to the aforementioned SIAs, 34 Old Growth Groves were designated in the LRMP for education, use and enjoyment of the public. Area guides are to be prepared for each Grove.

Many of the SIAs and Groves are served by arterials or collectors; some are not accessed by roads at all.

There are no known use or access issues at the Forest level. The evaluation of this question is best done at the District level during the Area Plan or Watershed Analysis processes.

Results and Interpretation

In general for the questions I answered (Wild and Scenic Rivers, SIAs and Old Growth Groves), there are no "hot spots" that should be addressed at the Forest level during this analysis. There may be opportunities, however, to look at the number of local roads within Wild and Scenic River corridors and/or leading to SIAs or Old Growth Groves if they are concurrently identified as contributors to the decline of other resources (fish, wildlife, water quality, etc).

Dispersed Recreation/Scenic Byways/Developed Recreation

Process Description/Documentation

2. What is the level and condition of access to developed recreation sites?

3. How and where does the existing road system influence recreation areas?

The majority of the developed recreation sites on the Willamette National Forest are accessible via double lane asphalt paved roads. Several sites are located on double lane all weather gravel roads. Access to developed sites is not difficult. All of the Developed Recreation Sites have water and require a fee to camp. Most sites have a ROS (Recreation Opportunity Spectrum) classification of "Roaded Modified", two are classified as "Roaded Natural"., and non are classified as "Semi-Primitive Motorized. A mix of a few more sites in Roaded Natural and Semi-Primitive Natural would provide a greater breadth of recreation experiences for the public. The ROS classification is determined in a great part by the difficulty of vehicular access to the recreation site. The existing road system provides very adequate access to all recreation areas, developed and dispersed.

- ***Key Question:*** *Does road access contribute to use in excess of the capacity of recreation facilities?:*

Detroit Ranger District is located just south of Portland, Oregon, and east of Salem, Oregon. Because of the proximity of a large body of water to the greater portion of the population of the state, Detroit Reservoir is the second highest used reservoir in the State of Oregon. On summer weekends and holidays, recreationists flock to the Detroit Reservoir area, occupying all recreation sites available. When the developed campgrounds become full, use of most or all dispersed recreation sites occurs. Detroit Reservoir is located on State Highway 22, which is a major east west travel route. It is debatable as to whether the road system contributes to overuse of this area or if it is the closeness to the metropolitan population of the state that contributes the most to overuse. It is probably a combination of both.

Overuse is not a constant issue on the rest of the forest, although it does occur at some sites on major holidays and weekends. Labor Day weekend in the McKenzie River drainage, along Fall Creek, and in the Sweethome district, at Big Lake, and at Waldo Lake usually begins with recreationist arriving as early as the prior Tuesday. The road system does provide easy access to all of these areas, but does not contribute adversely to exceeded capacity.

4. How do roads contribute to the use of dispersed recreation sites?

Dispersed Recreation Sites are directly related to road access. People using dispersed recreation sites in the summer are recreationists, and in the fall are hunters. Usually the recreationists and hunters do not use the same sites. Many dispersed sites are located on user made roads or jeep trails, which on the Willamaette are usually less than 1.000 feet. Access to the user made roads is by both asphalt and gravel roads.

5. ***How and where does the current road system meet motorized, driving for pleasure recreation demands?***

- ***Key Question:*** *Where are Scenic Byways, Back Country Byways, and other designated recreation-related travel routes?*

Driving for pleasure is the primary uses of the main forest road system on the Willamette National Forest. Driving for pleasure also occurs on the US Highways , and the State of Oregon Highways, but is not necessarily the main use.

A National (Federal Highway Designated) Scenic Byway exists. The Mckenzie Pass-Santiam Pass Scenic Byway goes From the town of McKenzie Bridge, Oregon, to Sisters, Oregon following the historic State Route 242, and returns via US highway 20, and State Highway 126. Some visitor facilities, ie. restrooms, interpretive signs, parking, and trails have been added to this scenic byway. Since it's designation as a scenic byway , use has increased steadily. Some improvements as mentioned above are being constructed presently.

The West Cascades Scenic Byway, a State of Oregon designated scenic byway begins in Estacada, Oregon, near Portland, and terminates in Oakridge, Oregon. This scenic byway is located on US Highways, State Highways, and Forest Highways on the west slopes of the Cascade Mountain Range.. It provides an alternate route to Interstate 5 for recreationists. Because of the more recent designation of this Byway, a very few number of improvements have been constructed. Plans are underway for five portals to be constructed and interpretive planning documents are being prepared.

Diamond Drive follows forest road 21 from the city of Oakridge south along the Middle Fork of the Willamette River and on to Lomolo Lake and the Rogue River-Umpqua Scenic Byway. Diamond drive was intended to be a part of the West Cascades Scenic Byway, but a 16 mile portion of the road is not asphalt paved, and therefore not eligible for inclusion in the State of Oregon Scenic Byway System. If and when the 16 miles had double lanes and is paved it could be added to the state system. Then there would be a scenic byway system from Portland, Oregon to Medford, Oregon.

A BLM / US Forest Service Back Country Drive begins at State Highway 20 and the Quartsville Road at the east end of Foster Reservoir. It ends at State Highway 22 and the Straight Creek road intersection. Kiosks have been constructed near both ends of the Back Country Drive.

Trails and Wilderness

Background

As with Recreation sites, the maintenance of a viable road system is a key to providing the diverse opportunities available on the Willamette National Forest, where there are 236 trailheads servicing 1779 miles of both non wilderness and wilderness trail.

Process Description/Documentation

1. ***What is the level and condition of access to trailheads? Does road access contribute to use in excess of the capacity of recreation facilities?***

   There is a similar situation here as with other recreation sites, roading is adequate for the current needs of the public demand for access, but during the next 40 years demand will exceed ability to respond with additional miles of trail and related trailheads.

2. ***Does the number of roads and/or their condition influence use patterns and quantities to backcountry destinations: Does access contribute to overcrowding and/or resource damage at popular backcountry trailheads?***

   Use patterns and numbers of users to backcountry destinations tend to be more dispersed by increased numbers of trailheads as well as miles of trails. This will, however, have an adverse effect on wildlife and increased cost to maintain road access to the trailheads.

3. ***How and where does the existing road system influence trailheads?***

   Trailheads are for the most part served by collector roads, with a few being on main arterials and a few on secondary roads.

4. ***How and where does the current road system meet motorized, driving for pleasure recreation demands? What opportunities exist for converting closed roads to ATV trails?***

   Opportunities such as this have not been explored at this time. As this process is ongoing, all opportunities for these conversions will be reviewed .

Results and Interpretation

This process brings to point the lack of data available on use figures for trailheads, and types and needs of users. A forest wide trailhead map was generated on GIS, several trailheads fell into areas that are considered hotspots in regards to other resources. Focus should be placed on these trailhead first for analysis as to whether or not they are in the best location for visitor needs with emphasis on resource protection. A list of these trailheads, by INFRA number are as follows:

6th Field Subwatershed Number	INFRA Trailhead Number
In/or access thru **236** & **234**	72109-72110, 72118-72122, 72127-72129
In **221**	72103
In **213**	72105-72107
In **191**	72551, 72548, 72557, 72560-564 72566, 72570, 72573, 72574, 72576, 72579, 72582, 72585

Trailheads affected by other concerns to a lesser degree are:

6th Field Subwatershed Number	INFRA Trailhead Number
In **073**	72688 and 72687
In **061**	73907, 73921, 73916, 73927
In **067**	73908
In **054**	73910, 73906 and 73904

Willamette National Forest Pilot Road Analysis

Appendix I

Heritage Resources Process Paper

October 1998

Background

*Heritage Resources*by definition include many forms of archaeological, historical, and cultural properties. Such resources are found throughout Willamette National Forest lands and have been identified primarily through project level inventories conducted in compliance with the National Historic Preservation Act (NHPA). These resources are fragile and non-renewable connections to past lifeways (or extant traditional practices of native inhabitants) and human endeavors, and as such are offered a high level of protection under current federal legislation.

*Archaeological sites*typically exist in the form of buried deposits of stone tools and debris resulting from tool manufacture, usually these represent the remains of the native inhabitants of the area, and as such can be quite ancient. These are commonly known as lithic scatter sites due to the dominance of stone artifacts in the assemblage. Because of the inherently poor preservation qualities of the temperate forest environment, organic cultural remains are generally rare in these assemblages. Some historic era archaeological sites are also found on the forest. These represent more recent endeavors of non-native, Euro-American settlers and explorers. Archaeological sites are usually difficult to identify without intensive field surveys, except when exposed by ground disturbing activities. Road construction, maintenance, road use, and associated erosion can destroy or damage the integrity of archaeological deposits.

*Historic sites,*in contrast, exhibit a broader range of artifact types, materials, and features in their assemblages. They often include structures as a dominant component, though an archaeological component may also exists. However, they are more readily identified than their archaeological counterparts. Historic properties also include engineering features and travel corridors, such as early roads, trails, railroad routes, monuments, dams, bridges, etc. Often modern roads were developed over historic transportation routes.

*Cultural properties*are considered to be locations of traditional cultural activities of indigenous people and their descendants, and may not manifest themselves with distinguishable physical remains. Locations may only be known to the specific practitioners or traditional members of the tribe, and information kept in confidence. These places will be most reliably identified through consultation with local tribes and traditional practitioners in the community. Federally recognized Indian tribes retain sovereign status and special consideration in accordance with that status. Furthermore, some tribes have reserved certain rights (e.g., for hunting, fishing, gathering , water, etc.) which must be recognized and access accommodated in land management decisions.

Currently the Willamette National Forest works with four federally recognized tribes who have ancestral ties to the land we manage. These are the Confederated Tribes of Grand Ronde Community of Oregon, the Confederated Tribes of the Siletz Indians of Oregon, the Confederated Tribes of the Warm Springs Indians, and the Klamath Tribe. Of these, only the Warm Springs and Grand Ronde assert their claims to ceded lands within the forest's bounds: The Warm Springs in the Mt. Jefferson wilderness, near their reservation, and the Grand Ronde consider their ceded lands to include all of the Willamette Valley from the crest of the Cascades to the crest of the coast range, including the whole of the Willamette National Forest.

Process Description/Documentation:

Just as the nature of heritage resources as physical and cultural manifestations is varied, so are the potential effects of the forest roads and road system. For the purpose of this analysis, several questions have been identified which can be used to address issues related to heritage resources and the forest's roads policy. For example***How and where does road access affect archaeological sites and historic properties?***The answer to this question is complex and requires the assimilation of a vast database. This issue is best examined by more specific key questions, as follows.

- ***Are archaeological sites and historic properties adversely affected by the existing road system?***

It is commonly known that many archaeological sites on the forest have been directly impacted by the initial road construction, continued road maintenance and erosion, which unmitigated results in irretrievable data loss. Through continued monitoring numerous sites have been identified throughout the forest which would benefit from road closures and or rehabilitation (See annual Forest Monitoring and Evaluation Reports, 1991-1997). Remnant deposits of sites could be preserved by stabilizing eroding surfaces such as road cuts. Archaeological sites such as those found on the forest are typically not amenable to on-site interpretation that might favor public access because of their fragile nature and discreet properties.

In order to analyze the effects of the current road system on archaeological sites and historic properties it would be necessary to correlate the locations of each and examine site specific information for evidence of impacts. There have been over 2,000 archaeological sites documented on the forest. Documentation exists primarily in the form of paper records (site records and maps) and an ORACLE data base, though two districts (Detroit and Sweet Home) have site location data on GIS. The ORACLE data base, created in 1991, has been maintained at the district level to varying degrees. The database can be used to produce reports in tabular form, listing sites with documented road impacts. This is only as reliable and current as the data input, and would likely produce only a cursory indication of the actual conditions.

Using existing data to conduct an analysis of the effects of the road system on archaeological sites would require the comparison of site locations obtained from these records with the current road system. A cumbersome and time consuming process, analysis would best be accomplished at a district or watershed scale, where more site specific information is available. Assessment at a forest scale is not feasible at this time.

- ***How does the existing road system contribute to the efficiency and costs of maintaining historic properties, especially structures?***

Historic sites, especially structures, on the other hand, are more conducive to adaptive uses such as interpretation, and in some cases recreation rental opportunities, so access for interpretation as well as maintenance may be more desirable in some cases. Some historic structures are currently used as administrative facilities (e.g., fire lookouts), requiring other access considerations. Other historic structures are not being utilized or maintained by the

forest, but may receive visitor use. Access is desirable for sites of this type from both the maintenance and public use perspectives.

There are 74 historic structures currently listed on the forest inventory. Records and information about these properties exist in the same form as detailed above for archaeological sites. Comprehensive specific data on maintenance efficiency and costs are not readily available, but may be obtained through records search and interviews, primarily at the district level where most maintenance and management is undertaken. The process for analysis would be similar but somewhat simpler in light of the smaller numbers of properties involved.

As a general rule, properties with road access have been more often utilized and more efficiently maintained. In exception to this are properties which are accessible by road (or roads and short trails) but are located some distance from the ranger station. Often these properties are the target of public abuse/vandalism. Costs associated with maintaining these properties is relatively high. Additionally, the kinds of archaeological sites found on this forest would not typically require maintenance unless the site has been impacted by other management or public activities. Then there would be less occurrence of such damages in areas where access is limited.

- ***How does the existing road system contribute to interpretation and public use of historic sites or other cultural resources?***

This analysis is closely related to that of the previous question in that the same sorts of properties are utilized by the public and for interpretation. *(In fact, perhaps the two questions could be combined, and addressed as one.)* Generally, such uses are associated with recreation and could be addressed as such. Interpretive efforts are generally focused in areas of high*(er)* public use. Interpretive panels are currently found along many main travel routes (e.g., Scenic Byways, Aufderheide) and in recreation sites (e.g., Bedrock, Box Canyon, Clark Creek, Clear Lake, Delta, Sacandaga, Waldo). Interpretation of more fragile archaeological sites takes the form of off-site interpretation, such as brochures or displays. (See the Region 6 publication, "Windows on the Past," for heritage interpretation locations.) Some additions have been made since its publication.

- ***Which roads are historic transportation routes? Where have historic transportation routes been identified and how does maintenance to historic levels affect other resources?***

Many historic transportation routes, such as old wagon roads, trails, and railroad routes, have been adversely affected by road development. As transportation systems evolved over time, modern roads often followed existing historic routes. In some areas this resulted in obliteration or fragmentation; however, in some places pristine segments have survived. In some cases, current roads could be closed and routes rehabilitated to a historic character. Some could be converted into interpretive trail routes.

The process for conducting the analysis of this class of heritage resources is similar to those above in that it relies on review of existing heritage resource records. Many of these routes are fairly well documented in the archives; many have been field verified and recorded. Some have evaluations and management plans in place.

When road decommissioning or other road management activities are being considered, an archaeologist should be consulted in order to assess the potential historic values of the road system under consideration. Again, historic records and maps should be consulted to identify others previously unrecognized, perhaps minor routes. The watershed or district scale is an appropriate level of analysis for the minor routes.

- ***How and where do roads provide access for traditional cultural practices for Native Americans?***

The extent to which forest lands are currently utilized by Native Americans for traditional cultural practices is not well-known to forest managers. Recently increased consultation and interactions with local tribes and native practitioners indicates that there is considerable interest in using at least some areas of the forest for cultural activities. Some areas of interest have also been identified through tribal involvement in the watershed analysis process over the last few years. Understanding of these interests and needs will be facilitated by continued interaction and relationship building with the tribes.

For the purposes of this analysis, an informational letter was sent under the Forest Supervisor's signature to the tribal chairpersons and the cultural resource coordinators for each of the four local tribes listed above (Grand Ronde, Siletz, Warm Springs, and Klamath). The letter contained an overview of the pilot roads analysis and provided names of individuals to contact for additional information: I.D. Team leader, Forest Engineer, Forest Native American Program leader, and Forest Heritage Specialist. The letters were followed by phone calls. It is important to note that in order to be successful communications of this nature require a considerable investment of time. As the relationships between the forest and the tribes become better established, information exchange will improve.

Results and Interpretation:

Results of the Heritage portion of the analysis may seem limited or general. Because of the vast body of data available, and lack of manageable data systems, more time and resources are needed to assimilate the appropriate information. GIS has not been utilized to the extent it has for many other resources on the forest. The ORACLE data base has limitations, partially based on the current conversion to IBM, as well as inconsistent data upkeep on the district. Decisions around roads should give more specific consideration to heritage resources in determining effects of specific or programmatic undertakings, as per National Historic Preservation Act requirements. Below are the preliminary results of the analysis, arranged by Issues and Key Questions, as above. Additionally “hot spots” identified by other resource area specialists could be assessed for potential heritage resource concerns or compatible opportunities.

- ***How and where does road access affect archaeological sites and historic properties?***
- ***Are archaeological sites and historic properties adversely affected by the existing road system?***

The short answer for this is "yes". However, in order to identify specific roads and sites would require more time, and should be focused at a finer scale, as described above. In the interest of testing the available data for application to this analysis, GIS and ORACLE were

used to derive data about the frequencies of sites associated with roads, including records which indicate road related impacts.

One map was created from GIS (cr1) which shows the interface of roads and heritage sites on the Detroit and Sweet Home districts. (None of the data was verified, or checked for consistency.) This map displays sites as shaded polygons for one district, and "bull's eyes" for the other. According to end of year reporting for FY 97, the total number of recorded sites for Detroit is 450, and for Sweet Home is 390. Though no frequency counts were produced by GIS, one district exhibits nearly one hundred such polygons, while the other show only about a dozen "bull's eye" sites. That is, about 22% of Detroit's sites, and 3% of Sweet Home's sites, have been impacted by road related activities, according to these data sources. The road systems nor site distributions of these two adjacent districts are not so different that it would account for such a difference in the GIS representation.

Another attempt at assimilating data was made using the ORACLE (cr_site) data base. Two standard queries were run using the forest links to the data base. The queries asked for listings of sites that had documented impacts from (1) road or bridge construction, or (2) road maintenance. Originally, this data base had been created in 1991 inputting data from the 7 districts. The queries reported data from not more that four districts. These four districts that are represented by the data have a site count of approximately 1355 (FY97 year end report).

Results:

- Impacts from Road Maintenance: 86 sites (3 districts represented)
- Impacts from Road or Bridge Construction: 312 sites (4 districts represented)

A very simple analysis of these results tells us that about 29% of the sites on these districts have recorded impacts from roads. None of these data were closely scrutinized for this analysis, so it should be viewed with considerable caution.

Review of monitoring reports from 1991-1997 indicate a commonly reported cause of (continuing) impacts to sites is road maintenance or road use (97) and off-road vehicle use (95). We have had 2 important sites damaged by road maintenance activities in the past few years.

As per NHPA, eventual decisions regarding road closures, obliteration or continued use and maintenance will require the determination of effects of specific actions on known significant sites. In some cases, road closure may be adequate to ameliorate the existing effects of road use, while other sites may require some level of rehabilitation or stabilization to prevent further damage through erosion. Effects of road obliteration must be addressed at the site-specific level. Roads analysis on a more local or watershed scale should also identify adverse effects of continued use and maintenance of some roads on archaeological sites, allowing for the design of protective measures (i.e., mitigation).

- ***How does the existing road system contribute to the efficiency and costs of maintaining historic properties?***

Again, this question needs more focused analysis. “Efficiency and cost” were not addressed as such, but clearly access is an important aspect of this. The road system contributes to the use and enjoyment of many historic structures on the forest. Typically the structures that are

used are better maintained. Decisions regarding continued use and access to historic structures should take into consideration other management options, such as recreation and administrative uses, as well as historic values. Usually the preservation needs can best be met by adaptive use, which is sensitive to historic values.

- ***How does the existing road system contribute to interpretation and public use of historic sites or other cultural resources?***

Recreation is probably the most common "adaptive use" of historic structures on this forest. For the purposes of this road analysis, access will be addressed through the recreations section. Often in conjunction with recreation sites, interpretation of historic sites is also common on the forest. Interpretation is an national priority for the Heritage program. At the Regional scale, we have "Windows on the Past" as the Heritage interpretive program. A publication, *Windows on the Past: Guide to Pacific Northwest Historical Sites* (1990), currently lists six visitor sites on the Willamette, though certainly more could be added. It would be desirable to maintain access to interpreted heritage sites, though not necessarily strictly road access. Trails also can provide adequate access in many cases.

Windows on the Past Site	**Access Road(s)**
Klovdahl Headgate & Tunnel	Forest Rd. 24, 2421, trail 3551
Oregon central Military Wagon Road	Forest Road 21
Slick Creek Cave	County Route 6220, Forest Road 18, trail out of Bedrock Campground
Fish Lake Remount Depot	Hwy 126
Dee Wright Observatory	Hwy 242
Sand Mountain Lookout	Forest Road 2690, -810

Similarly, public use through the Recreation Rental program is another important priority for the heritage program. Maintaining adequate access to existing and proposed or potential rentals is also desired.

Current Recreation Rentals	**Access Road(s)**
Indian Ridge Lookout (BR)	Hwy 126, Rd. 19, 1980, -247, -248
Box Canyon Guard Station (BR)	Aufderheide Road (19)
Fish Lake Guard Station (MC)	Hwy 126
Proposed or Potential Rentals	**Access Road(s)**
Gold Butte Lookout (DE)	Rd 46, 4697
Pearl Creek Guard Station (DE)	FS 2209
Little Cowhorn Lookout (LO)	Rd. 18, 1817, -388

Several more historic structures on the Forest are under Administrative use. They also have interpretive potential because of their historic values. Many of these, as well as the historic recreation facilities, are listed in the INFRA data base. Fire lookouts, guard stations and residences, are common examples. Access to these should be considered in road analysis as well.

- ***Which roads are historic transportation routes?***

A review of historic maps and references such as the Forest's Annual Reports, indicates that trails, rails and roads have long existed on the forest. Earliest evidence would be in the documentation of "Indian trails" on GLO plats and notes from before the turn of the century. Over time these were replaced by and large with wagon roads and other transportation routes. Suffice it to say that transportation routes have evolved over time, on this forest as in other areas. Some modern roads overlay portions of historic roads. Some portions of the historic roads have been obliterated in the process of modern road development, yet some retain intact segments near the new route. These are the focus of historic preservation efforts on the forest. Some of the forest's most significant historic transportation routes have management plans in place to protect, and in some cases to restore, their historic character; several have associated interpretation. These include but are not limited to the list below.

Historic Transportation Route	Associated Modern Roads
Hogg Railroad (DE/MC)	Hwys 22/126, multiple forest roads
Santiam Wagon Road (SH/MC)	Multiple roads along Hwy 22: 2032, -302, -024, -048, -060, -065,-066, 2672-305, -810, 2690, -811, and possibly others
Gold Hill Road (BR/SH)	Forest Road 1510
Clear Lake Road (MC)	Near Hwy 126, between Scott Creek and Fish Lake
Old McKenzie Highway (MC)	Hwy 242
Oregon Central Military Wagon Road (MF)	On, along and near Road 21
Box Canyon Road (MF)	Along and adjacent to Forest Road 19, 1934, 1934-747, and others, (High Prairie to Box Canyon GS)
North Fork Railroad Logging system	Various along North Fork Willamette

- ***How and where do roads provide access for traditional cultural practices for Native Americans?***

Limited specific information is available at this time. Consultation should continue throughout the analysis and decision-making process, in keeping with federal trust responsibilities to the Native American tribes. We have learned through on-going consultations that our tribal neighbors have interests in forest lands for reasons of resource procurement *such as* cedar,

huckleberries and medicinal plants. There are interests in some areas for other cultural reasons, such as personal or spiritual.

In addition to the letters sent, person-to-person contact was made with representative individuals of three tribes. In summary, each expressed an interest in the roads analysis subject and process and concern over their abilities to respond in a meaningful way to project of such scope in a short time frame.

The representative of the Klamath indicated they would be interested mostly in the Oakridge area, southern area of the Forest; would like us to send maps.

The Grand Ronde representative thought it best to deal with individual projects early in the planning process, such as when we begin to look as roads by watershed, etc. Also, we agreed it we could discuss it further when we met next for our Memorandum of Understanding in progress with the CTGR.

The Siletz had a few areas of specific concern, but also thought it best to deal with local land managers and participate in a more localized scale of analysis.

There was an interest expressed in reviewing the product of this pilot road analysis so they might have an opportuntity to provide more detailed input or comment to the process as a whole.

References

McAlister, Jeff. 1993. Oracle Cultural Resource Database: User Manual. Internal publication, on file at Willamette National Forest Supervisor's Office, Eugene, Oregon.

Minor, Rick, et al. 1987. Cultural Resource Overview of the Willamette National Forest, A 10-Year Update. Heritage Resource Associates Report 60. Eugene, Oregon.

Rakestraw, Lawrence and Mary. 1991.*History of the Willamette National Forest*

USDA Forest Service. 1998. Desk Guide to Tribal Government Relations, Second Edition. Pacific Northwest Region. Portland Oregon.

USDA Forest Service, Willamette National Forest. 1991-1997. Willamette National Forest Monitoring and Evaluation Report.

USDA Forest Service. 1998. Desk Guide to Tribal Government Relations, Second Edition. Pacific Northwest Region. Portland Oregon.

USDA Forest Service. 1990. Windows on the Past: Guide to Pacific Northwest Historical Sites (R6-REC-055-90). Oregon and Washington

Willamette National Forest Pilot Road Analysis

Appendix J

Social Issues Process Paper

October 1998

Background

When authors Lawrence and Mary Rakestraw titled the last chapter of *History of the Willamette National Forest* (USDA, 1991), "Era of Conflict and Confrontation, 1970-1988," it is unlikely that they imagined what might unfold in the next decade. From the 1990 ROD for the Land and Resource Management Plan through the 1994 ROD for and implementation of what is commonly called the Northwest Forest Plan, the Willamette National Forest has remained a lightening rod for controversy. In September, 1995, protestors began an 11 month occupation of Forest Road 2408 in opposition to the Warner Creek 14 acre salvage sale. During this occupation, a local activist set up a tent in the courtyard of the Federal Building in downtown Eugene, Oregon, and embarked on a hunger strike that would last for several months and generate national attention which ultimately resulted in the Administration's call to cancel the sale. Flood events in 1996 added ammunition to allegations concerning forest management practices and the forest transportation system. (See *Oregon Watersheds, General Accounting Office Report to Congressional Requesters*, July 1998). In October 1996, vandals set fire to and destroyed a fleet truck at the Detroit Ranger Station. They also painted graffiti on the exterior walls of district buildings. Several days later, the Oakridge Ranger Station was destroyed by arson. The so-called Salvage Rider produced a series of protests and demonstrations that galvanized the militant activist community. Tree-sitters have been occupying a number of old-growth Douglas fir in the Clark Timber Sale since late April of this year.

It is important to acknowledge that, at the national level as well, the Forest Service has come under attack for a wide variety of reasons. Whether this has merit is beyond the ken of this analysis. However, the *context* in which we examine social issues is extremely important. Further social context is examined in "Survey of Forestry Issues in Lane and Linn Counties," (Steel, List, Shindler and Smith, May 1994). See also "What Do We Need to Know About Roads," (Reid, Ziemer and Furniss, 1994), especially p. 13.

It must be noted as well that, while the natural and heritage resources managed by the Agency are generally well studied and inventoried, those attributes of forest management that fall into the realm of values and culture are less well known and are not easily accessible for the purpose of this analysis. Fortunately there are a myriad of methodologies and a wealth of social scientists available to help this Forest develop a database that would better inform local analyses when decisions are ripe at the appropriate scale.

Process Description and Documentation

Much material exists to address some of the following issues and key questions. Some issues require further inquiry, and it is strongly recommended that the Forest commit to and pursue gathering data that would lend itself to a better understanding of the social landscape. Citations of extant material are included along with suggestions for filling in the information gaps.

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1. ***How might changes in road management affect people's dependence on, need for, and desire for roads and access? (SI 1&2)***

Key Questions

- ***How and where does the road system connect to other public roads and provide the primary access to communities, rural residences and businesses?*** Forest scale

  See *Willamette National Forest Access and Travel Management Guide*, 1995.

- ***What "personal use'" activities are commonly associated with which forest development roads (e.g. firewood gathering, berry picking, Xmas tree cutting, etc.)?*** Forest and district scale

  Data is not available. Collection of this information could be achieved through several techniques. Where permits are issued, specific sites are or could be identified. Through a "Sense of Place" assessment, these areas might also be located. See *Sense of Place Protocol*, Region 1, December, 1997

- ***How and where would people's sense of place (and favorite places) be affected?*** **(SI 11)** Aggregate from the community level to the Forest level

  Data is not available. See *Sense of Place Protocol*, Region 1.

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2. ***How can we communicate about road management in a manner that is experienced as open, honest and reliable. (SI 6)***

Key Questions

- ***What forms of communication are viewed as most effective?***

  Not enough time available. This information should be available for forest-wide scale. Just need the time to do the research. Suggested resources would include: The Cascade Center for Ecosystem Management; Bruce Shindler, Oregon State Iniversity; David Povey, University of Oregon; Kevin Preister, Social Ecology Associates, Ashland, Oregon.

- ***What media do most people feel comfortable with?***

  Not enough time. Same as above.

- ***What public participation efforts have been effective?*** Forest scale

  See *An Evaluation of the Delta Showcase Projects Public Participation Process: an experiment in natural resource planning* (Dinne, 1993). Other materials are surely available.

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3. ***What are effective ways to solicit, elicit and gather information from interested and/or affected publics?***

Key Questions

- ***What collaborative processes have taken place that facilitated decision-making? At what scale?***

Not enough time. Watershed Councils and Province Advisory Committees represent broad interagency and public constituencies. The Forest has also employed outside facilitators to support collaborative decision-making. *See Mckenzie Discovery Process, Social Ecology Associates* (Contract #53-04R4-7-1630, Fall 1997) and *Exploring and Resolving the Hot Springs Situation*, Consensus Associates (April 1998).

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4. ***How and where would changes in the road system, or management thereof, affect certain groups of people (ex. minorities, ethnic, cultural, racial groups, persons with disabilities, low income groups)?*** (CR 1)

Key Questions

- ***What are the usage patterns of potentially affected groups?***
- ***What opportunities exist to improve or better facilitate use by potentially affected groups?***
- ***Has the Executive Order on Environmental Justice been considered in the decision?***

For all key questions: data does not exist on a local scale. I believe that there are processes underway and resources available that could inform us to an extent, but an integrated approach needs to be taken. This is certainly a set of questions that must be addressed during *Forest Plan revision* efforts.

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5. ***How would overall community (of place) economic health be affected by changes in forest development roads?*** (SI 7) Community scale

Key Questions

- ***What is the economic composition of community?***

  See *County Portraits of Oregon and northern California* (PNW-GTR-377, Sep 1996) and *Research and Learning Assessment for the Central Cascades Adaptive Management Area* (Cissel, 1995).

- ***To what extent is community dependent on extractive, commodity forest resources (timber, mining, grazing, etc)?***

  See *County Portraits of Oregon and northern California* (PNW-GTR-377, Sep 1996).

- ***To what extent is community dependent on amenity forest resources (recreation, tourism, etc)?***

  Not enough time. Contact North Santiam Canyon Economic Development Corporation; Sweet Home Economic Development Group; Blue River Community Development Corporation; McKenzie River Chamber of Commerce; Convention and Visitors Association of Lane County (CVALCO); Mike Alvage, City of Oakridge; Mike Hibbard, University of Oregon, Public Policy, Planning and Management; Bruce Shindler, Oregon State University, Forest Resources; Cascade Center for Ecosystem Management.

- ***What role do roads play in the changing economics of rural communities?*** (SI 17)

Data not available. Recommended contact: Brad Leavitt, "Jobs In the Woods" coordinator. He would likely have other resources to recommend as well.

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6. ***How might overall community (of place) satisfaction be affected by changes to the forest development road system?*** (SI 13) Community scale

Key Questions:

- ***How cohesive is the community? What lifestyles are represented in the community?***
- ***How resilient is the community? How does the community respond to change?***

Data not available. Recommend completion of a "well-being" assessment of communities in conjunction with Forest Plan revision efforts. See *Well-being Assessment of Communities in the Klamath Region*, (Contract 43-91W8-6-7077, Forest Community Research, 1997).

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7. ***What is the perceived economic dependency of a community on a roadless area versus the value of that roadless area for its intrinsic existence and/or symbolic value(s). (SI 8) Community scale.***

Key Questions:

- ***What are the significant existence and/or symbolic values of the community?***
- ***What is the community lifestyle?***
- ***What values are being asserted from outside the community?***

Local **data not available**. Recommend including with the previous key question. See *Proposed Rulemaking on Administration of the Forest Development Transportation System, Analysis of Public Comments: Final Scoping Report.*

Analysis and Interpretation

The Issues and Key Questions identified for this aspect of the analysis suggest information crucial to informed decision-making. However, attempting to address them at this level, in this timeframe, when decisions are not ripe and citizens are not involved, is both frustrating and fruitless.

The Team has been able to bring natural resource data to the exercise to describe physical conditions across the landscape. Unfortunately, our GIS system contains no equivalent in terms of social conditions.

So, it is not the research that I have done in the last 5 weeks that I bring to my summation. It is more than 35 years residency in Oregon, most in the Willamette Valley, and my more than 10 years tenure on this forest, as a public affairs specialist. In other words: experience and intuition.

A careful review of *Analysis of Public Comments: Final Scoping Report (Proposed Rulemaking o Administration of the Forest Development Transportation System)* revealed five common and important themes which have resonance locally:

- Good decisions can only come from the local level with strong involvement by the public.

  "Road closures must be addressed on an individual road basis by residents in the area. (Letter 25962, Saint Anthony ID)

  "Feeling frustrated and isolated from the Forest Service's own collaborative stewardship process, many people angrily expressed their resentment of federal decisions that they perceive are being made without and at the expense of small communities." *(p.88)*

  "...many individuals, groups, and government officials involved in intensive forest planning processes feel strongly that local problem solving and decision-making are better than what they see as "one-size-fits-all" type solutions. The perceive the proposed Forest Transportation Rule as effectively discarding years of forest and local collaborative efforts through administrative action." *(p. 50)*

- The Agency is subject to too much external influence. (What that influence was perceived to be varied widely.)

  "We do not like the way these new policies are seemingly being developed from the top down. Negotiations are in progress locally trying to develop forest policies as well as trying to make the Clinton Forest Plan work. We hope that a short term political agenda is not shaping long term forest policy." (Letter 2018. Wilsonville OR.)

- "Wilderness" areas and "roadless" areas are one and the same in the minds of many. And these are perceived to be very, very special places.

  "Being in the wild roadless areas enlarges the human spirit, can deepen the bonds between family members and encourage independence in children." (Letter 4575, Houston TX)

  "Our wilderness heritage is not just interesting, not just fascinating, not just awesome. It is all of these and much more: It is happier families, better mental health for future generations, better spiritual health, fewer broken homes, fewer hate groups, fewer cults, fewer suicides less violence, less crime, and a much richer life for those who come after us. (Letter 753, Kaysville UT)

  "Roadless areas are more valuable as wilderness than many people feel can be measured with numbers and economic comparisons. Opportunities for spiritual and emotional renewal are two values they fear are jeopardized by road construction in remaining roadless areas." (p.82)

- There is substantial opposition to closing roads (for a variety of reasons), especially the "ghost" roads.

> "Old and unused roads, even if they are in the wrong place, do not need expensive obliteration for ecological reasons if they are not used by vehicles." (Letter 12286, Chewelah WA)
>
> "If the public created these ghost roads, then what clearer indication do you need that we want them there? They are the main reason we come to the National Forest in the first place." (Letter 24695, Grapevine TX)
>
> "Closing these primitive roads is a disservice to all." (Letter #41531, Springdale, AR)
>
> "In discussing the 60,000 miles of uninventoried roads, no mention is made of the possibility of historically significant routes along these roads. A road may be a historical artifact and, if so, it must be preserved. Historical roads are of great interest for many Americans who treasure our history and the westward progress made on paths, trails and roads. Do not deny them the use of this important part of Americana." (Letter #12299, Sandia Park NM)
>
> "These lands in question are the people's lands and the people paid for the construction of these roads, therefore the people have the right to use these roads for access to their lands. Only some bureaucrat with an agenda to deny people access to their lands would propose to destroy these roads which said people already paid millions of dollars to build." (Letter #30658, Roseburg OR)

- For any given opinion or belief expressed by anyone, there will be an opinion or belief expressed that represents the exact opposite.

  No citations are given for this...

My final assessment is that, given our ability to identify environmental "hotspots," it is unlikely that a strong argument opposing decommissioning, obliterating, stabilizing, closing or "putting to bed" any road(s) that jeopardize water, fisheries, wildlife or public safety would be surfaced. When site-specific decisions need to be made because of potential environmental impacts, early and extensive involvement of communities of both place and interest will not only inform the decision making, but can be used to ferret out more information that was unavailable to this analysis.

Process Critique

- **Data:** Consistent and integrated data was often unavailable. Data sets didn't match well with the scale of the analysis (i.e., county data sets do not overlay forest boundaries.) Time limits constrained the amount of data that could be gathered and interpreted.

- **Lack of public inclusion:** While a public "involvement" process (i.e. NEPA) wasn't necessary and might not have informed the analysis directly, I believe that we missed an opportunity to begin gathering some of the missing information and to bring folks along with our endeavor. As someone who works with the media on a routine basis, I felt constrained about sharing what we were doing because of a potential for misunderstanding that might be created in the public arena. The lack of including the public also leaves us vulnerable to condemnation of the project and of the product.

- **Process:** Because of the tight timeline it was easy to accept questions offered in the Appendix. And, from the perspective of Social Issues, those identified as Issues and Key Questions are certainly significant questions and the answers would provide a rich resource base for a Forest Plan revision or would surely inform district-level decision-making processes. However, standing back from the analysis, it seems that the most important question to be asked is "Which roads are being used, for what purpose, and by whom." The rest of the questions would offer little of substance with which to address forest-wide road analysis.

References

Chadwick, R. 1998. *Exploring and Resolving the Hot Springs Situation.* Proceedings from Beyond Conflict to Consensus Workshop. 103 p.

Cissel, J. 1995. *Research and Learning Assessment for the Central Cascades Adaptive Management Area.* Prepared for the CCAMA Steering Team. 65 p.

Dinne, J.J. 1993. *An Evaluation of the Delta Showcase Project's Public Participation Process: An Experiment in Natural Resource Planning. M.S. Thesis. University of Oregon, Environmental Studies, Eugene.* 97 p.

Doak, S.C. and J. Kusel. 1997. *Well-Being Assessment of Communities in the Klamath Region.* Prepared for the USDA Forest Service, Klamath National Forest (43-91W8-6-7077). 86 p.

McGinnis, W.J., R.H. Phillips and K.P. Connaughton. 1996. *County Portraits of Oregon and Northern California.* USDA Forest Service PNW R6 GTR-377.

Northern Region Human Dimensions Peer Group, USDA Forest Service. 1997. *"Sense of Place Protocol."*

Priester, K. 1997. *McKenzie Discovery Process.* Prepared for the USDA Forest Service, Willamette National Forest (53-04R4-7-1630).

Rakestraw, Lawrence and Mary. 1991. *History Of The Willamette National Forest.* USDA Forest Service. 272 p.

Reid, L.M., R.R.Ziemer and M.J. Furniss. 1994. *"What do we need to know about roads?"* Paper presented at Humboldt Interagency Watershed Analysis Center workshop, USDA Forest Service.

Steel, B.S., P.List, B.Shindler and C.Smith. 1994. *"Survey of Forestry Issues in Lane and Linn Counties: Frequency Distributions."*

USDA Forest Service, 1995. Willamette National Forest Acess and Travel Management Guide.

USDA Forest Service, 1998. *Proposed Rulemaking on Administration of the Forest Development Transportation System. Analysis of Public Comments: Final Scoping Report.* USDA Forest Service Content Analysis Enterprise Team. 144 p.

Willamette National Forest Pilot Road Analysis

Appendix K

Lands Process Paper

October 1998

Background

The Willamette National Forest is heavily impacted by private inholdings, both large blocks of single owner "checkerboard" land ownership patterns (a legacy of the old railroad grant lands), and smaller, scattered ownerships of a residential or small woodlot nature. Over time, there have been 12 major transportation system cost-sharing areas of some kind on the Detroit, Sweet Home, Blue River, McKenzie, and former Rigdon Ranger Districts. Of these, eight areas are still in operation:

Sweet Home Ranger District

- Quartzville Road, with the Bureau of Land Management
- Lava Lake, with Timber Service Company
- Harter Mountain-Squaw Creek, with Timber Service Company
- Moose Mountain, with Timber Service Company
- Canyon Creek, with Timber Service Company and Willamette Valley Lumber Co.
- Mid-Santiam, with Timber Service Company and Giustina Resources
- Calapooia Road, with Weyerhaeuser Co.

McKenzie Ranger District

- McKenzie, with Giustina Resources

Although the cost-sharing mechanism for the remaining four areas have terminated, the reciprocally granted, perpetual easements are still in place. The Forest does not have an exact count of these easements but would *roughly* estimate 200.

Issues

Management of the Willamette's transportation system requires an understanding of and attention to the legal rights and obligations of both private parties and the United States in that system.

1. ***What is the level of road access to private inholdings (cost-share roads) and what are the physical, biological and social impacts? Which inholdings are likely to require or be the source of requests for future access? Are there alternative routes or options for access to private inholdings where current access is creating adverse impacts?***
2. ***What is the level of road access to lands managed by other federal agencies or the state.***
3. ***What is the level or road access to easements/special use permits, recreation summer homes, mining claims, administrative sites (ex. grave), etc.?***

A detailed response to these questions cannot be prepared without additional data management and interaction with the Forest's neighboring private landowners and other governmental bodies. A visual display of the eight major cost-sharing areas is being prepared. Although the source documents for right-of-way grants to private parties are kept in the

Forest's files, no compilation of these documents has been undertaken (either by computerized database or mapping). Compilation of this information could be completed at the Forest level, given adequate staffing and funding, and would be beneficial to the management of its transportation system.

Unilateral action by the Forest Service on roads in which other parties have rights is rare. In cost share areas, it requires Washington Office oversight. In almost all cases, easements granted to private parties have some sort of due process provision for the private party included in the termination clause. Consequently, closing a road under easement or terminating that easement, and thereby terminating the private party's legal rights in the road, is complicated. The same would be true for relocation or reconstruction of roads under easement. An additional factor for shared roads is the cost the private party has assumed for construction of those roads.

Willamette National Forest Pilot Road Analysis

Appendix L

Roadless Values Process Paper

October 1998

Background

Roadless areas are those places on the Forest that are undeveloped lands within which there are no improved roads. Areas in an unroaded condition have been inventoried on the Forest at least three times; as part of the national Roadless Area Review and Evaluation (1973), the second, national Roadless Area Review and Evaluation (1979) and during the National Forest Management Act, Forest Plan development (1984 - 1989). In these progressive roadless inventories unroaded areas of the Forest were identified and mapped according to certain criteria based on size and adjacency to existing wilderness. In the RARE II inventory in 1984, 210,207 acres were identified as roadless and with potential for inclusion in the National Wilderness Preservation System. By the time the Forest Plan analysis was completed in 1989, 172,007 acres remained in this inventory.

Two wilderness designations by Congress since the RARE I inventory have also affected the amount of roadless lands on the Forest. The Oregon Wilderness Act in 1984 added approximately 84,930 acres to the Forest wilderness. The Opal Creek Wilderness and Scenic Recreation Act in 1996 will add approximately 12,800 acres to the Forest wilderness when all the procedural actions are finalized.

In recent years, the issue of unroaded lands on the National Forests has taken on different views and aspects than just the potential for inclusion in the National Wilderness Preservation System. In the broad sense, there is still a diversity of values regarding roadless areas and these values often are conflicting. The values associated with roadless can be associated with recreation, symbolism of people's value for wild places, the lifestyle of a community and a variety of ecological values. Many of these values can be met in roadless areas that do not meet the minimum size criteria (5,000 acres) of the RARE I and RARE II inventories. As the total amount of roadless area, not included in the wilderness system continues to decline on the Forest, there is increased interest on the values of smaller unroaded areas.

Key Questions and Process Description

The primary issue of the unroaded areas in this Forest Roads Analysis is the amount and location of unroaded areas on the Forest stratified by size of area and Forest Plan land allocation. The key question is, where are there significant aquatic, terrestrial wildlife or ecological values associated with unroaded areas?

The analysis process to address this issue was:

Inventoried roadless areas (RARE II and exclusions since 1984) were digitized. This map was overlaid with current Forest Plan land allocations to determine the amount of inventoried roadless in land allocations with a emphasis on the land in allocations that allowed timber harvest and allocations that precluded timber harvest.

To address the issue of other unroaded areas that might not have been identified in the RARE I or RARE II inventories because they were less than 5,000 acres (or not adjacent to existing wilderness), a moving windows analysis was done using the Forest transportation layer. The analysis identified those areas on the Forest where the existing road density is zero. This is similar to the analysis done to determine road density with one notable difference. The size of

the "window" used to determine road density was one mile which means that the road density for any single spot was based on roads within a one mile radius. For the unroaded analysis, the size of the "window" was reduced to .25 mile. The effect this has on the analysis is that the areas of zero road density in the unroaded analysis were significantly larger than those in the road density analysis. The rationale behind the .25 mile window was that the both the ecological values and the social values associated with roadless are impacted minimally once the distance from a road is over .25 mile. This is a generalization of course, but it supported by the wildlife analysis of how interior forest is impacted by road openings and the determination of different management levels within designated wilderness.

The unroaded map resulting from the procedure described above was further screen using information from the Forest vegetation data base (VEGIS). Stands with information indicating they had been harvested within the past 40 years were also excluded from the unroaded areas. In the majority of cases, these stands are old clear cuts and regeneration harvest units with roads and/or landings along one edge. Although these areas might recover over time to the point where they could provide social and ecological values similar to those in unroaded and unharvested areas, at the current time, the recent harvest activity is the dominant characteristic of these areas.

The last step was screening the resulting unroaded polygons by size. The original intent was to not simply screen, but to stratify the unroaded polygons by size (1,000 acre increments) beginning at 1,000 and proceeding upward until all areas were accounted for. Due to time limitations for the analysis, however, the screening was simplified to just identifying all areas greater than 1,000 acres. One thousand was selected as the minimum size based on a subjective assessment of public comments on roadless areas from a variety of sources and general wildlife input. Another screen that was considered, but not done due to a lack of time was the size to perimeter ratio of each area. This would potentially eliminate narrow areas between parallel roads.

The question about significant ecological values in the inventoried roadless areas and in the unroaded areas was not directly addressed in this analysis. An indirect answer to this question is the determination of how many acres of roadless or unroaded are within land allocations that preclude timber harvest. The assumption being that the issue is not a high priority to address in those areas where current direction or policy preclude any further road access. For the areas that are roadless or unroaded and do remain in land allocations that allow timber harvest and presumably road construction, this question was addressed based on a qualitative evaluation of the areas. It should be noted that inventoried roadless areas in Key Watersheds can not be roaded under current Forest Plan direction.

Results and Interpretation

(Note - The following results and acreages do not include designated wilderness on the Forest.)

Inventoried Roadless Areas - As previously mentioned the inventoried roadless areas mapped in in 1984 total 210,509 acres (this figure is about 300 acres greater than previously reported in RARE II and the Forest Plan FEIS due to differences in mapping systems used to calculate the area). The area that is still roadless in these areas as of 1998 is 112,166 acres.

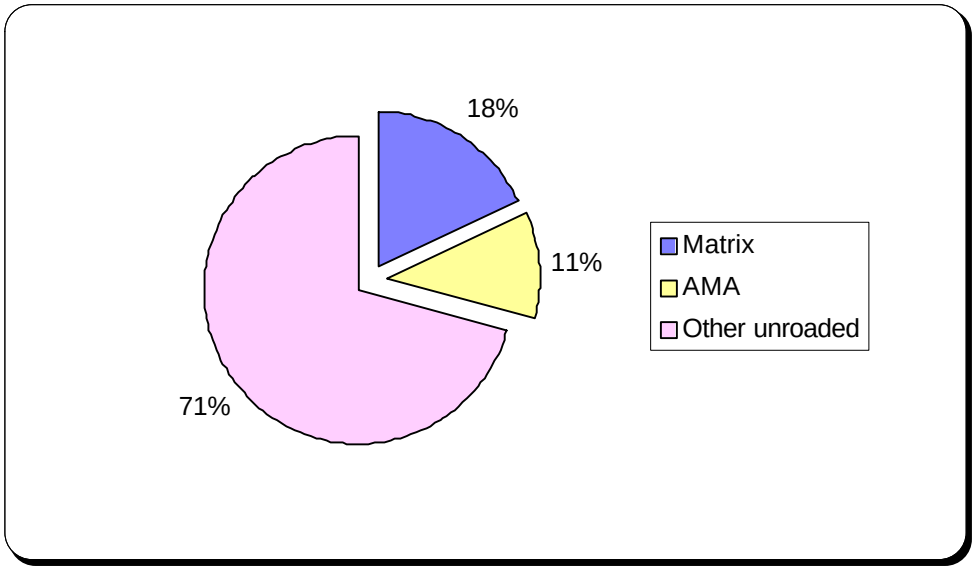
When the original area of 210,509 acres was overlaid with current Forest Plan land allocations, 45,164 acres or about 21% were in land allocations that allowed timber harvest (matrix and adaptive management area categories). The remaining 165,345 acres or about 79% are in land allocations that do not allow programmed timber harvest (late successional reserves, administratively withdrawn categories). Based on recent experience with site-specific riparian reserve mapping, it is likely that the 45,164 acres would be reduced further once all riparian reserves are identified.

Unroaded Areas - The moving window analysis of the unroaded areas resulted in a total of 303,579 acres that were identified as unroaded and not harvested within the past 40 years and were greater than 1,000 acres. A visual evaluation of the unroaded polygons shows that there are several of the polygons have elongated, narrow necks and peninsulas that might have limited ecological value (connectivity) but would probably not satisfy many other ecological or social roadless values that are generally associated with blocks of land where road influences are less noticeable in the interior.

Of the total acres of unroaded after the screening, 55,062 acres or about 18% are in the matrix category of land allocations or those that allow timber harvest (see Figure 1). When Adaptive Management Area acres are considered, the total acres of unroaded increases to 88,299 or about 29% of the total unroaded. The AMA land allocation does allow for timber, however, several of the large unroaded blocks are in the HJ Andrews Research Forest where limited harvesting is anticipated. The remaining unroaded areas greater than 1,000 acres, totals 215,280 acres or 71% of the total and is in land allocations that preclude programmed timber harvest and where there is no identified future needs for additional road access.

. Total Unroaded Lands on the Forest

Figure 1



The most immediate issue for both the inventoried roadless areas and the unroaded areas identified through the GIS analysis are for the 45,164 acres and 88,299 acres in allocations

where road access is currently allowed under current Forest Plan direction. A quick check of the larger blocks that are identified revealed that many of the areas have large areas of younger aged stands or noncommercial stands and/or are on landforms that are very difficult to road (steep ground, areas with slumps, etc.). A notable exception is the Moose Creek area in the South Santiam watershed.

Our recommendation is that the unroaded map continue to be refined and used at the watershed level, to identify areas of significant ecological values and where they overlap with the unroaded areas.

References

Rakestraw, Lawrence and Mary. 1991. *History of the Willamette National Forest.*

USDA Forest Service. 1990. *Land and Resource Management Plan, Willamette National Forest.*

Willamette National Forest Pilot Road Analysis

Appendix M

Current Road Status Process Paper

October 1998

Current Road Status

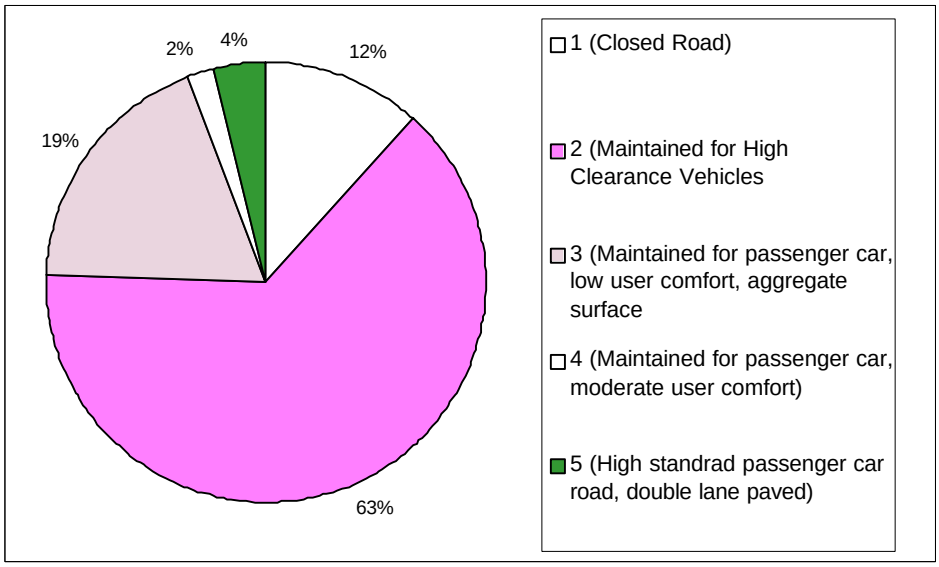
Miles by Maintenance Level

There are 6,364 miles of Forest Development Roads (FDR) in the Willamette National Forest transportation inventory. Twenty five percent (25%) of the road system is in the Maintenance Level 3, 4, and 5 categories (maintained for standard passenger cars). The Maintenance Level 2 category (maintained for high clearance vehicles) accounts for 64%, and 11% are intermittent use roads closed to vehicular traffic.

Table 3. Miles of Forest Development Roads by Maintenance Level

Maintenance Level	Miles	Error (+ or -)
1 Closed Road	736	15%
2 Maintained for High Clearance Vehicles	4067	10%
3 Maintained for passenger car, low user comfort, aggregate surfa	1191	5%
4 Maintained for passenger car, moderate user comfort	124	2%
5 High standard passenger car road, double lane paved	246	2%
Total	**6364**	

Figure 2



. Miles of Road by Maintenance Level

Unclassified Roads

There are 360 miles of unclassified wheel tracks documented as GIS line segments on the TRAN Layer. It is thought that the actual miles of undocumented wheel tracks on the forest are probably double that amount. In general, it is thought that unclassified roads have a low impact in terms of erosion and sedimentation. A recent road survey of Coffeepot Head BGEA supports this assumption *(see Table 4 and Table 5)*.

Unclassified roads typically result from low-standard temporary roads built within the scope of timber sale contracts. Temporary roads are not recorded or mapped in the Forest database. After intended use, such roads are typically decommissioned but are often visible as primitive wheel tracks or show up as features in aerial photos. Unclassified roads also result from unauthorized off-road vehicle use to access dispersed recreation sites.

Table 4. Summary of Coffeepot Head BGEA Road Inventory

Location	Miles FDR	Miles of Unclassified Roads *(Ghost)*	Total Miles of Road	Percent increase in road miles
Coffeepot Head BGEA	85.19	5.91	91.11	+6.9%
Mean Length of Unclassified Road: 0.145 mile			Total area covered: 15,200 acres	

Table 5. Condition of Unclassified Roads in Coffeepot Head BGEA

Unclassified Road	Length	Closure Priority	Comments
2118-479/ O.S.	0.043	low	no culverts
2118-479/ O.S.	0.08	low	no culverts/ old cross trenches
2118-479/ O.S.	0.048	medium	no culverts/ landing is failing/stream crossing problem
2118-479/ O.S.	0.066	medium	no culverts/tension cracks present/sag near jct with 479
2118-479/ O.S.	0.151	low	no culverts/ no berm
2118-481/ O.S.	0.161	low	no culverts/ ridge road /landing stable
2118-478/ O.S.	0.114	low	no culverts
2119-O.S.	0.057	low	no culverts
2119-O.S.	0.095	low	no culverts/ entrance being used as a waste area
2119-O.S.	0.092	low	no culverts/ used as waste area/650ft O.S. found on road
2119-O.S.	0.114	low	no culverts
2119-O.S.	0.142	low	no culverts
2119-452/462/O.S.	0.165	low	no culverts/passes quarry
2119-452/466/O.S.	0.104	low	no culverts/ crossed bermed

Unclassified Road	Length	Closure Priority	Comments
2119-452/O.S	0.066	low	no culverts
2119-452/O.S.	0.095	low	no culverts/ripped
2119-452/O.S.	0.18	low	no culverts
2119-452/O.S.	0.047	low	no culverts/ bermed entrance
2119-452/O.S.	0.152	low	no culverts/ bermed entrance/ roadcut sloughing
2119-478/O.S.	0.246	low	no culverts/ trenched/
2119-478/O.S	0.088	low	no culverts/road closed
2119-478/O.S.	0.138	low	no culverts/road closed
2119-478/O.S.	0.15	low	no culverts
2119-478/O.S.	0.208	low	no culverts/entrance bermed/ripped & cross trenched
2307-O.S.	0.019	low	no culverts/ old road
2307-O.S.	0.068	low	no culvert/ road recovering
2307-O.S.	0.057	low	no culverts/ road recovering
2307-O.S.	0.114	low	no culverts/ road recovering
2307-O.S.	0.455	medium	culvert stream crossing removed at .379 miles.Check i
2307-O.S.	0.157	low	no culverts/ road recovering
2307-475/ O.S.	0.038	low	no culverts/ road recovering
2307-475/ O.S.	0.131	medium	no culverts/ road goes to old quarry/ stone mountain
2307-484/ O.S.	0.044	low	no culverts/ campfire ring
2307-484/ O.S.	0.19	low	no culverts
2307-484/ O.S.	0.25	low	no culverts
2307-483/ O.S.	0.131	low	no culverts/ large bare soil area needs machine fert
2307-473/ O.S.	0.115	low	no culverts
2307-476/ O.S.	0.063	low	no culverts/ steep road cut

Data Accuracy

Numerous corrections and revisions have been made to the Transportation database since 1992. However, mapping and database errors do exist. Table 3 gives an estimate of the current status of errors in transportation data (i.e. where GIS map locations, mile totals, open or closed status, or road existence differs from actual field conditions).

About 100 miles of road in the transportation database (TMS) do not have corresponding line segments on the GIS transportation map. Many of these roads are no longer apparent on the ground.

Key Forest Travel Routes

The primary/secondary road system was identified in a Forest-wide Access and Travel Management analysis in 1995. These consist of 2,130 miles providing the key travel-routes needed for long-term management of the National Forest. They provide vital linkages to local communities, State and County Highways, private land ownerships as well as furnishing inter-forest connections to trailheads and major recreation sites.

Table 6. Forest ATM Route Designation

ATM Designation	Miles
Primary (High standard through-routes, arterial linkages, Scenic Byways)	430
Secondary (Key inter-forest connections to interior recreation, forest management, fire response)	1,700
Local (Candidates for reduction of maintenance standards, decommissioning or obliteration)	4,234

The remaining roads not designated as primary/secondary (4,234 miles) are generally local routes whose long-term status will be analyzed at the watershed or project scale. These routes are considered candidates for reduction of maintenance standards, decommissioning or obliteration.

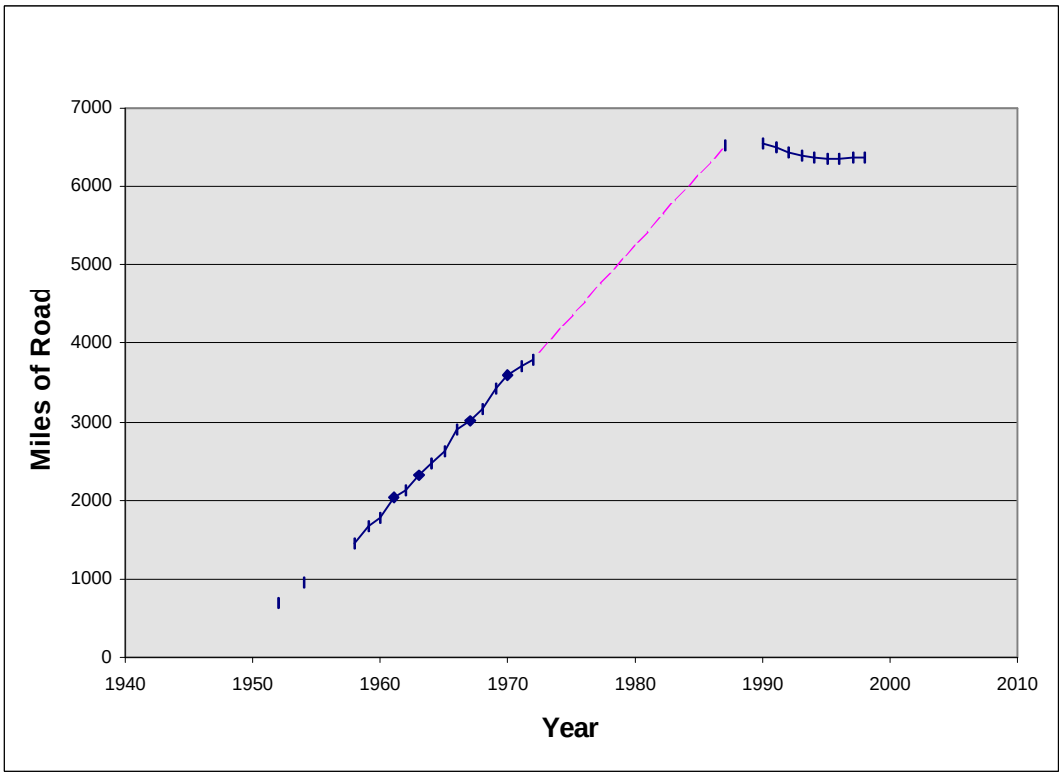
Economic Situation

Economics Question # 3.*What are the maintenance costs of the existing road system? How does that compare to recent forest road budgets and projections of future forest road budgets?*

Direct costs for roads such as maintenance, repair, closing, etc. are given in large ranges because actual costs are directly dependent on unique characteristics of that road or road system such as topography and soil type.

Background

Figure 3 shows the road building trend on the Willamette National Forest from 1953 to 1998.



New road construction averaged over 100 miles per year between 1953 and 1989. These roads were primarily constructed for the accomplishment of the timber related land management objectives prior to the 1990 Willamette Forest Plan as amended by the NW Forest Plan. Each mile of constructed road is dependent on the performance of annual maintenance to keep the road safe, to keep environmental risks to an acceptable level, and to protect the investment in the road. These roads were constructed with the idea that the timber based land allocations would generate funding for annual road maintenance on a long term basis. However lands suitable for timber harvest declined by 75% when the 1990 Willamette Forest Plan was amended by the NW Forest Plan. As a result, along with the timber program, the road maintenance budget declined substantially within a short time frame. Figure 4 shows funding declined from $7.25MM in 1989 to $3.25MM in 1992, or $4MM in three years. This was largely due to the rapid decline of the CWFS trust fund which was funded by deposits generated from log haul. Even though traffic volumes related to log haul have decreased substantially, non traffic generated road maintenance associated with erosion, sedimentation, brushing, and public safety still remain.

Figure 3. Miles of Forest Development Road from 1953 to 1998

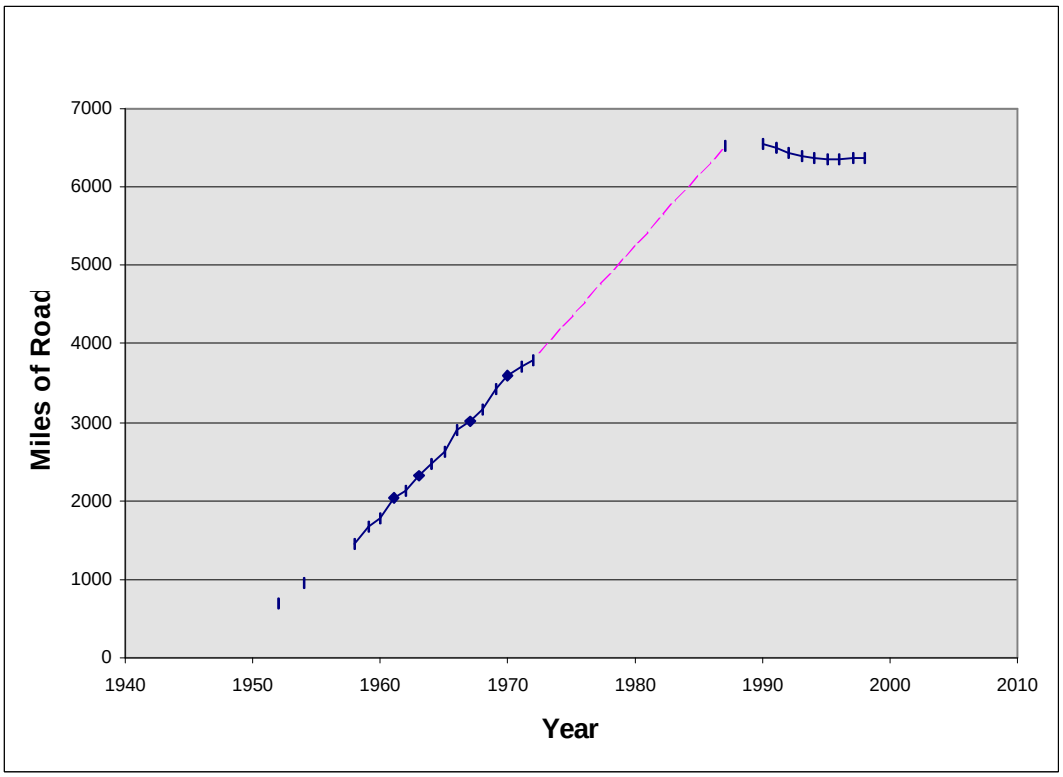
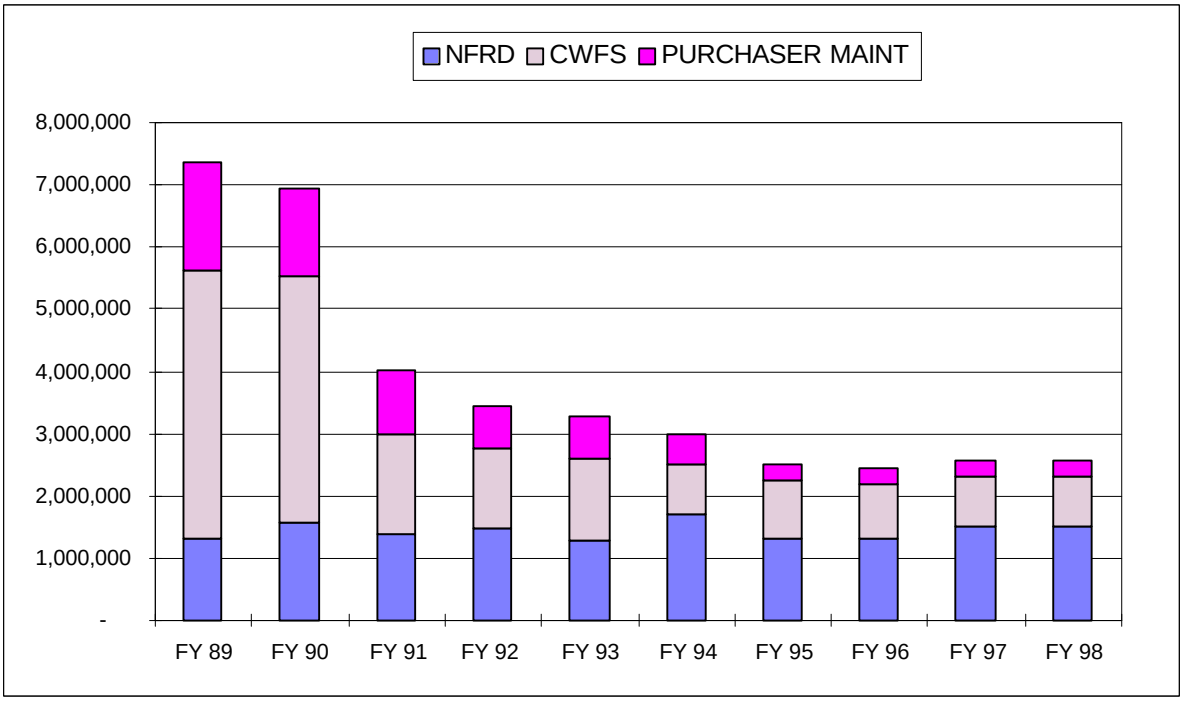


Figure 4. Road Maintenance Funding Levels


NFRD
CWFS
PURCHASER MAINT
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
-
FY 89
FY 90
FY 91
FY 92
FY 93
FY 94
FY 95
FY 96
FY 97
FY 98

The current annual road maintenance budget is about $2.4MM in *Figure 4*. The $2.4MM budget amount is reduced by a near 40% for overhead costs. Thus $1.4MM is available to perform annual road maintenance. .

Estimated Annual Maintenance Costs to Maintain Existing Road System to Programed Maintenance Levels

Because of the substantial costs associated with downsizing the Forest road system, the miles of Forest Development Roads have not decreased significantly since 1989 (*See*

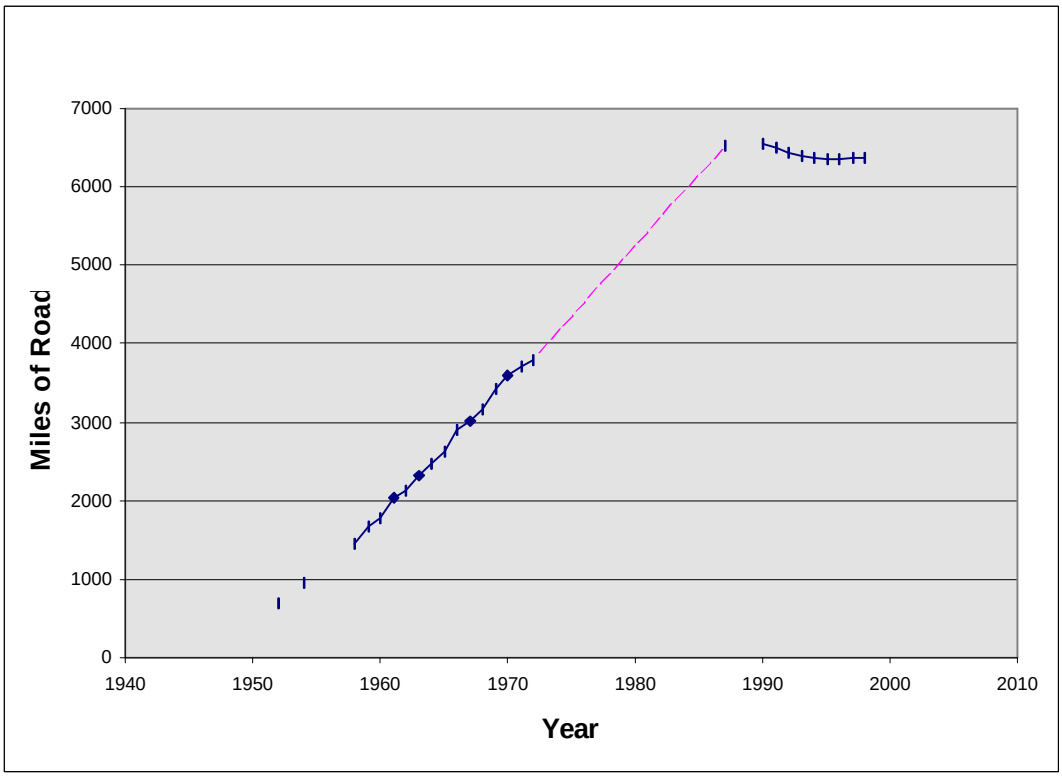


Figure 3). With the decline of the maintenance budget (but not a corresponding reduction of miles of roads needing annual maintenance) today there are insufficient funds to maintained the road system in a safe and environmentally sound condition.

Table 7 shows that an estimated $3.4MM per year is needed "on the ground" to perform the necessary annual maintenance. The total funding to the Districts is $1.4MM per year. There is thus an estimated "on-the-ground" budget shortfall of $2MM per year.

Table 7. Estimated Annual Maintenance Costs for Road Maintenance to Standard

Maintenance Level	Low Cost/mile	High Cost/mile	Average Cost/mile	Total Funding Needs	Total Funding to Districts	Funding Shortfall

1 (736 miles)	$25	$75	$50	$36,800	$1,400,000 to perform maintenance for all roads	Distribution to Districts
2 (4,067 miles)	$100	$400	$250	$1,016,750		
3 (1,191 miles)	$500	$1,500	$1,000	$1,191,000		
4 (124 miles)	$800	$3,000	$1,900	$235,600		
5 (246 miles)	$2,500	$5,000	$3,750	$922,500		
Total Annual Maintenance Costs				**$3,402,650/yr**	**$1,400,000/yr**	**-$2,000,000/yr**

The estimated funding to fully maintain the Primary/Secondary road network (those key travel routes the

Forest identified to remain open for the long term) is $2.4MM. The network of key travel routes is thus underfunded by $1.0 million if no funding was directed towards the remaining roads.

(Note: Note that this estimate does not include overhead costs, deferred maintenance or capital improvement needs. It is based on current contract costs and district force account costs for annual maintenance.)

Road Decommissioning Costs Scenario

Preliminary estimates indicate that the Forest is under-funded by more than 50% to maintain the road network to full standard. Over 3,000 miles of the Forest road network would have to be reduced to a near self-maintaining condition (or zero maintenance cost) to be in line with current funding levels. Typical costs for decommissioning (based on contract estimates) for the average road range from $5,000 to $15,000 per mile. Thus on-the-ground costs to decommission 3,000miles of forest development roads could be in the $30,000,000 range. This cost does not include planning, public involvement, or NEPA related analysis.

Appendix

Back-up Costs

A. Decommissioning Unit Costs :

Environmental Risk	Type of decommissioning	Cost per mile
Low Risk	ML 1 or 2 roads, flat slope, waterbars, no live stream culvert removal, no large fills	$2,000/mile to $5,000/mi
Moderate Risk	Removal of some small culverts, minor to moderate live stream channel restoration, waterbars, some moderate fill restoration	$5,000 to $15,000/mi
Severe Risk	large fills, Large culvert removal, some sidecast pullback, major stream channel restoration	$15,000 to $30,000 mile

Note: Site specific conditions can lead to decommissioning costs much higher than indicated above.

B. New Road Construction and Reconstruction Unit Costs

Estimated Unit Road Construction Costs *(on-the-ground contract costs, does not include FS planning, contract prep. administration)*

Type of Road	Cost per mile
Unsurfaced single lane, minimum standard road built on abandoned spur or skid trail, flat to gentle slope	$9,000/mile

Single lane maintenance level 2, Traffic Service Level D, turnout spacing 1,000 feet	
✧ Flat to gentle slope, no drill and shoot,	$15,000 to $20,000/mi
✧ Moderate slope, generally balanced section	$25,000 to $40,000/mi (rocky ground)
✧ Full Bench, rocky ground, some drill and shoot	$100,000/mi *Add $10,000/mile for crushed rock surfacing*

C. Road Construction, Reconstruction, and Decommissioning Trends 1991 - 1996

New road construction has averaged about 7 miles per year and road reconstruction 123 miles for the past 3 years. Planned activities levels in Forest Plan were 40 miles of new construction and 174 miles of reconstruction per year.

Table 1. Road Construction, Reconstruction, Decommissioning.

Year	**Constructed**	**Reconstructed**	**Decommissioned**(obliterated)
1997	7.0	203.4	18.9(non-system)
1996	6.9	95.7	2.7
1995	7.7	69.6	4.5
1994	0.2	2.7	44
1993	8.9	37.6	40
1992	2.3	20.7	52
1991	23.1	101.8	51.8
Totals	56.10	531.5	213.9

References

USDA Forest Service, Forest Service Handbook 7709. 1991a. Transportation Systems Operations Handbook, Travel Management. 7709.59-91-1.

USDA Forest Service, Forest Service Handbook 7709. 1988. Transportation Handbook, Process for Access Management, 7709.55.

USDA Forest Service, Forest Service Handbook 7709. 1992. Transportation System Maintenance Handbook, Maintenance Level Descriptions, Maintenance Activities and Maintenance Standards, and Maintenance Sharing. WO Amendment 7709.58-92-1.

USDA Forest Service, Forest Service Manual 7700. 1994a. Transportation System. WO Amendment 7700-92-6.

Willamette National Forest Pilot Road Analysis

Appendix N

Time and Cost Estimate

October 1998

Time and Cost Estimate

The first Pilot Roads Analysis meeting took place on August 12, 1998. The first meeting with the majority of resource specialists that would form the Roads Analysis Team occurred on August 25, 1998. The Roads Analysis Report was published on October 30, 1998. Approximately ten weeks of Roads Analysis Team time was spent performing the required analyses and documenting them in the published report.

A total of 16 people were identified as core and consultation team members in the Project Initiation letter. In addition, two to three additional people not identified in the Project Initiation letter helped during the course of the analysis.

Team members were asked at the first team meeting to keep track of the amount of time spent on the analysis. The team members (plus others) (18 total) reported spending a total of approximately 307 days on the pilot roads analysis or an average of about 17 days per person. The actual time spend by each person varied greatly, however from a high of 50 days to a low of 5 days. It should be noted that the most time spent on the project was by the persons doing the basic GIS analysis and queries and the writer-editor indicating that even though the average time spent on the analysis was significantly less than ten weeks, the critical path of the project from a resource scheduling and utilization standpoint was a full ten weeks.

The average pay schedule grade of team was about GS-11. Using a approximate cost to government of $220/day, the approximate personnel cost for the roads analysis was $67,540. Miscellaneous costs for supplies (map plotting materials) and reproducing and mailing copies of the report are estimated at $150. Total cost estimate is $67,690.