Appendix G

Financial Analysis

Mt. Baker-Snoqualmie National Forest
Forest-wide Sustainable Roads Report

Introduction

Steps 4 and 5 of the Forest-wide Sustainable Roads Report document, part of the 2005 Travel Management Rule, at 36 CFR 212.5(b)(1), requires each national forest to identify the minimum road system, herein referred to as the Sustainable Road System (SRS), that is needed to:

1. Meet resource and other management objectives adopted in the relevant land and resource management plan;
2. Meet applicable statutory and regulatory requirements;
3. Reflect long-term funding expectations;
4. Ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.

The purpose of the Financial Analysis section of this report is to address bullet number 3 above, and identify opportunities for how the road system could be managed in the future to better reflect long-term funding expectations. This information will be used by the Responsible Official, along with other information regarding the risks and benefits of the road system, to strike the best balance between the four items above. The official decision and "identification" of what will constitute that future road system will be made following subsequent NEPA analyses at various scales.

Background

Forest Service road budgets have been steadily declining for the past 20 plus years. Region-wide, the amount of funding for road work including both appropriated funding and work contributed by commercial users is less than 20 percent of what it was 20 years ago. Appropriated road funds to the Pacific Northwest Region (Region 6) have been reduced 40% in the past 5 years alone. The Mt. Baker-Snoqualmie National Forest (MBS) used road maintenance budget forecasts to determine the affordability or size of the overall sustainable road system. The data will come from past road maintenance budgets in the Workplan program and other sources. Some assumptions about the future trends will need to be made, such as the road maintenance allocation model, fixed costs, continuation of sequestration and the availability of other funding sources. There may be a range of budget levels and the selection of the appropriate level would be based on the risk acceptance level. Current levels of funding for road work on the MBS are shown in figure 1 below.

Figure 1: 5 year average road funding (fiscal years 2008 to 2012)

Fund (Budget Line Item)	Average Annual Road Main. Budget
Roads (CMRD)	$603,307
Legacy Roads and Trails (CMLG)	$35,583
Cooperative Work (CWF2)	$12,788
Secure Rural Schools - Title II RAC	$24,912
Cost Share Maintenance	$43,038
Timber Purchaser Maintenance	$91,044
Total	**$810,672**

5 Year Average Road Main. Budget from all Funding Sources	Range - or +	
	-20%	+20%
$810,672	**$648,538**	**$972,807**

With funds being far below what is necessary to keep the road system properly maintained, many roads do not get the maintenance treatments they need on schedule and are falling into a severe state of disrepair.

> Deferred Maintenance is defined as "maintenance that was not performed when it should have been or when it was scheduled and which, therefore, was put off or delayed for a future period. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and decrease in asset value", (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998).
>
> Annual Maintenance is defined as "work performed to maintain serviceability, or repair failures during the year in which they occur. Includes preventive and/or cyclic maintenance performed in the year in which it is scheduled to occur", (Financial Health - Common Definitions for Maintenance and Construction Terms, July 22, 1998).

Since 1999, the Forest Service has been tracking the amount of the deferred maintenance backlog. Figure 2 shows what the accumulated totals are for deferred maintenance (DM) and the annual maintenance (AM) needs that would be required to keep the road system fully maintained to standard.

Figure 2: R6 Annual and Deferred Maintenance Needs

National Forest	Road Miles	Total Maintenance Need[1]	
		DM	AM
Deschutes	8,109	$80,566,681	$7,526,877
Fremont-Winema	12,548	$133,971,908	$13,642,507
Gifford Pinchot	4,103	$53,330,891	$5,312,486
Malheur	9,628	$56,025,932	$6,153,833
Mt. Baker-Snoqualmie	2,453	$81,915,920	$9,660,568
Mount Hood	2,881	$51,813,990	$4,896,610
Ochoco	3,253	$33,260,537	$3,313,734
Olympic	2,026	$42,680,614	$4,467,995
Rogue River-Siskiyou	5,288	$111,614,953	$11,581,995
Siuslaw	2,128	$26,115,387	$2,777,636
Umatilla	4,624	$65,211,612	$6,647,168
Umpqua	4,776	$73,669,140	$7,148,103
Wallowa-Whitman	9,150	$64,279,905	$6,808,709
Okanogan-Wenatchee	8,163	$158,111,026	$17,050,400
Willamette	6,542	$90,942,456	$8,838,067
Colville	4,309	$37,336,065	$4,306,765
Columbia River Gorge	99	$1,454,584	$121,557
	90,078	$1,162,301,600	$120,255,010

This table shows that it would take approximately $1.2 billion dollars to bring the entire road system in Region 6 back up to standard (all roads in a like new condition), and then it would take approximately $120 million dollars per year to keep all roads perfectly maintained to standard. For the MBS, it would take approximately $82 million to maintain the entire road system to standard, and about $9.7 million per year to keep it that way. Please note that the unit costs used to arrive at the figures above are made up of national averages to restore and maintain the road system in a like new condition. They also include the cyclical items necessary to replace gravel surfacing, pavement overlays, bridges/structures, and major culverts on schedule.

Using national unit costs, and without the burden rate, a more conservative estimate for annual maintenance needs to keep the existing MBS road system fully maintained to standard would be about $5.8 million dollars per year. Figure 1 shows that, on average, the MBS only receives about $810 thousand dollars from all funding sources per year that can be applied toward road maintenance work, that is only about 14%

[1] These costs are derived from average National Unit Costs and include a burden rate of approximately 40% to cover planning, contracting, and all other overhead costs associated with returning the road system components to an original "like new" condition.

of the funding necessary to address the estimated annual maintenance needs to fully maintain the road system.

Financial Analysis Process

The goal of the financial analysis step in the overall SRS is to identify opportunities to help move the road system to a more affordable state.

Based on the figures in the previous section, if the MBS were to focus their average available appropriated funds on a given set of roads to fully maintain to standard, they would only be able to maintain approximately 73 miles of roads if they were paved and about 107 miles of roads if they were gravel surfaced for a total of only 180 miles. That size of road system would not meet the needs of the forest or the public, and does not meet the requirements of the first two bullets in the opening paragraph of this section regarding the requirements of a minimum road system as it would not allow the forest to meet resource management objectives in the Forest Plan and would not allow the forest to meet statutory and regulatory requirements.

Given the enormous gap between available appropriated funding for road work and the cost to maintain the road system fully to standard, the Region recognized that it would not be possible to balance the size of the road system with the cost of maintaining all roads fully to standard and still be able to meet resource management needs or the needs of the public. Since the requirement to "reflect long-term funding expectations" was not defined in regulation or policy, Region 6 defined it in the *R6 Guidance for Preparing a Travel Analysis Report* document to mean that "average annual funding" is reasonably in balance with the "average annual cost of routine road maintenance", where:

> Average annual funding is defined as the average amount of funding available for each NFS unit for routine annual maintenance from appropriations, collection accounts, commercial users, cooperators, timber sale purchaser work and other partners during the 2008-2012 timeframe, plus or minus 20%. It does not include funding from the American Recovery and Reinvestment Act (ARRA) or the Capital Improvement Program (CIP). Only the modest amounts specified for "routine maintenance" in Legacy Roads and Trails funding allocations are included.
>
> Average annual cost of routine road maintenance is defined as the average yearly need for basic road maintenance. This includes log out, drainage maintenance, erosion control, blading, brushing, traffic signs, etc. It does not include cyclical replacement costs (such as bridge replacement every 50 years, asphalt overlays, etc.), which are covered by funding beyond the individual NFS unit budgets (e.g., Regional Capital Investment Program).

The MBS utilized the *Region 6 Financial Analysis Template*, which is based on the definitions above, to perform the financial analysis. This template is an excel spreadsheet workbook that allows users to input budget information and calculate unit costs for a variety of road maintenance work activities for different maintenance intensities on different standards of road. This allows the user to compare the cost of maintaining the current system of roads with a variety of scenarios for different potential future road systems. The user is able to alter the overall size of the road system, the composition of different maintenance standards, and the intensity or frequency of maintenance work on different types of roads.

Financial Analysis Steps:

1. Estimate 5 year average funding available for road maintenance work
2. Identify local Unit Rates
3. used for routine annual road maintenance work
4. Use work item unit rates to build unit rates for different road standards and maintenance intensities
5. Calculate cost to maintain current road system at current maintenance intensity
6. Develop different scenarios for future road systems that show what size and composition of road networks can be maintained within range of average annual funds.

Results

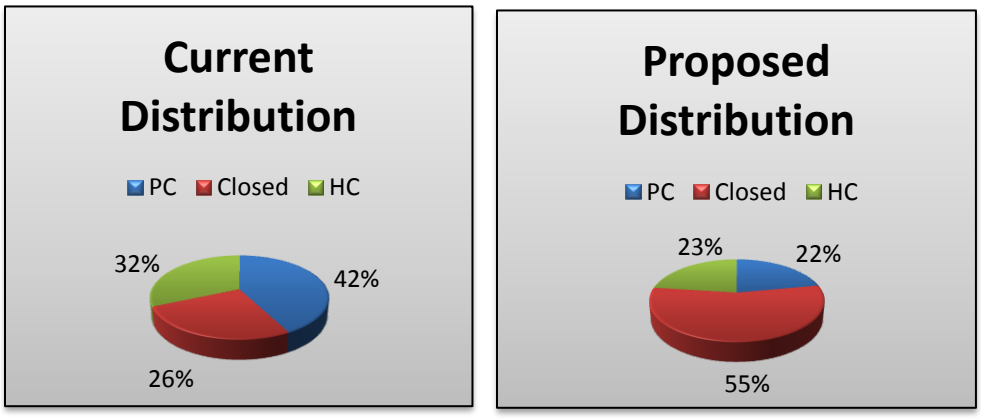
One scenario that reflects the opportunities for change identified in Step 4 of the MBS Travel Analysis Report is shown in Figures 3 and 4 below. Maintenance Level (ML) 5 is the highest level of maintenance for our roads, while ML 1 is minimal maintenance. For the purposes of this cost analysis, the number of miles in ML 3, 4 and 5 was assumed not to change. Further Engineering analysis and management direction is needed to determine the minimum maintenance levels needed for these roads.

Figure 3: Comparison of existing and proposed annual maintenance needs

Summary of Current vs. Proposed Road Distribution Maintenance Costs

ML	Current				Proposed		
	Miles	% of sys	Cost		Miles	% of sys	Cost
5	44	2%	$261,253		44	2%	$261,253
4	76	3%	$252,958		76	3%	$252,958
3	912	37%	$1,294,368		378	17%	$536,482
2	769	32%	$487,124		520	23%	$329,395
1	639	26%	$17,764		1,245	55%	$34,611
	2,440	**100%**	**$2,313,468**		**2,263**	**100%**	**$1,414,699**

Figure 4: Existing vs Proposed distribution of maintenance levels



2 PC or Passenger Car roads include ML 3, 4 and 5 roads. HC or High Clearance Roads include ML 2 roads. Closed roads include ML 1 roads that are for intermittent use.

This scenario shows that by using the MBS's current road maintenance costs for routine annual maintenance items, (which does not include things like replacing gravel surfacing, replacing pavement, or replacing bridges and structures), the current cost of keeping up the existing road system would be about $2.3 million dollars per year. By making some adjustments to the current road system in terms of reducing the total miles of roads on the system (decommissioning), closing some roads that are currently open, and changing the maintenance intensities on other roads, the overall cost can be reduced to somewhere around $1.4 million dollars per year. This amount is not yet within the 20% range of the 5 year average annual amount available as shown in Figure 1, but is moving towards this end goal.

A quick summary of what the changes in this scenario would look like are shown in Figure 5:

Figure 5: Potential changes to road system based on Financial Analysis Scenario

Category	Road Miles		
	Before	After	Diff
Roads Maintained for Passenger Cars (ML 3-5)	1,032	498	-534
Roads Maintained for High Clearance Vehicles only (ML2)	769	520	-249
Overall Open Road System (ML 2-5)	1,801	1018	-783
Closed Intermittent Service Project Roads (ML1)	639	1245	606
Overall size of transportation system (open and closed roads)	2,440	2263	177
Roads to be further considered for Decommissioning		177	177

This would result in a road system that is 177 miles smaller, overall, than the existing road system. The amount of roads maintained for passenger car traffic would be reduced by 534 miles. The amount of roads maintained for high clearance vehicles would be reduced by 249 miles. Approximately 1,245 miles of project roads used intermittently (ML 1), would remain on the official transportation system. The remaining 177 miles would be considered for decommissioning or conversion to other uses such as trails.

The results of this scenario show one example of a future road system that reflects long-term funding expectations according to Region 6 guidelines. Many other scenarios are possible by adjusting road mileages across maintenance levels and adjusting maintenance intensities within maintenance levels.

Capital Investments

The section above only considers road maintenance needs and costs, but there are also costs associated with any proposed road decommissioning, road closures, and road improvements necessary to address risks and environmental concerns that are identified in the SRS report. These costs are not included in the balancing of road maintenance funds because funding for these activities is not appropriated along with the normal road maintenance funds used in the calculations. Funding for this type of work generally comes though other programs such as capital investment programs, Legacy Roads and Trails funding, Federal Highway programs, partnerships with outside groups and agencies, etc. But the scale of the need for these types of funds certainly needs to be addressed here. The estimated costs from the example above are:

Figure 6: Estimate decommissioning and storage work costs

Category	Miles	Cost / Mile	Total Cost
Estimated Cost to decommission roads	177	$39,000	$6,903,000
Estimated Cost to place roads in storage	606	$12,000	$7,272,000
			$14,175,000

In the example above, the cost to decommission 177 miles of road would be about $6.9 million and the cost to complete the road storage would be about $7.3 million. The total for all such work is estimated at $14.2 million. MBS decommissioning costs span a range from a low of $8,700/mile on up to $144,650 per mile with an average of $39,000 from 2008 to 2014. MBS storage costs span from a low of $7,750 per mile on up to $16,000 per mile with an average of $12,000 from 2008 to 2014.

Guidelines for Mitigating Road Risks

The general guidelines for mitigating the risks discussed in the previous section are listed below. These guidelines should be used for existing roads or when a road needs to be relocated due to unacceptable resource risks.

Road Management:

- close or seasonally restrict road use to minimize adverse impacts to wildlife species that require solitude or tolerate only minimal disturbance
- control road use over perennial streams
- continue inventory efforts to evaluate the extent of noxious weed and invasive plant species of concern
- incorporate non-native invasive species prevention and control into road maintenance
- treat non-native invasive species before roads are decommissioned; follow-up based on initial inspection and documentation
- close or seasonally restrict road use when the roads are impassable due to wet conditions to minimize adverse resource damage

Conclusions

The results of the Financial Analysis show that the opportunities identified from the risk/benefit section of the MBS Travel Analysis Report are moving to be in line with the R6 guidelines for identifying a future system of roads where “average annual funding” is reasonably in balance with the “average annual cost of routine road maintenance”.

This balance addresses routine annual maintenance work needed to keep roads open and safe for use, and addresses critical resource concerns such as maintaining ditches and culverts for proper drainage. This work is accomplished by both the Forest Service, using appropriated road funds, and through commercial users who are required to maintain roads commensurate with their project uses.

Given the current trend in reduced funding for road maintenance work, and the enormous gap between current funding and need, it does not appear possible to identify a future road system where the entire cost of annual maintenance work necessary to fully maintain the roads to standard would be in balance with available funding, (i.e., to include annual maintenance items and cyclic capital costs for replacement of

gravel surfacing, pavements, structures, bridges, etc.). In the Pacific Northwest Region, the size of road system to meet that requirement would be less than 100 miles per National Forest and would not allow forests to meet resource management objectives in their Forest Plans or to meet statutory and regulatory requirements. Because we will not have enough funding available to keep all road surfacing materials and structures replaced on schedule, we can expect the deferred maintenance backlog to continue to grow, and we will continue to see a decline in the overall serviceability of our road system.

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

Recommendations

By utilizing the priorities identified in Step 4 of the SRS report, the forest can focus limited road maintenance resources, and any potential capital funds, to the most important roads necessary for management and enjoyment of the National Forest, and to the roads with the highest need for mitigation work associated with environmental risks. The Forest should consider the following:

- Focus available maintenance funding and resources on the highest priority roads identified in the SRS report, (address issues related to user safety first, then on repair/prevention of resource issues)

- Focus any available capital funds toward improvement work on high use roads with high environmental risks identified in the SRS report

- Prioritize funding for roads to be closed or decommissioned based on those with the highest environmental risks identified in the SRS report

- Ensure that timber sale purchasers or commercial users perform, or deposit funds, for road maintenance work commensurate with their use

- Seek additional funding for road maintenance through regular appropriations

- Seek new and additional funding sources for road maintenance and improvements through any available funding programs such as Capital Investment Programs, Legacy Roads and Trails, Forest Highway Programs, etc.

- Seek partnership, cooperator, and volunteer opportunities to help leverage funds with outside sources

- Seek opportunities to transfer jurisdiction of FS roads to other agencies

- Continue to look for ways to reduce maintenance costs, and overhead costs related to Forest Service road programs, so as to direct more funds directly to road maintenance and improvement work