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FACT SHEET

Economic and Environmental Impact Assessment of Forest Policy: Western Washington

In the last decade many policy changes have resulted in large forest reserves to protect critical habitat. While much of the habitat protection was directed toward public lands, the economic impacts have been profound. An assessment of the economic and environmental impacts from past and prospective forest management alternatives is essential to judge their effectiveness.

Background: The decade of the 90's witnessed frequent forest management policy changes differentially affecting federal, state and private lands with the intent of protecting, first the northern spotted owl, then the marbled murrelet and, prospectively salmon and bull trout. Efforts to protect the owl and murrelet, which have been mostly dependent upon old forest structures, focused first on federal and then state and private lands. The impacts on private lands were considerably smaller given their limited inventory of old forest structures. Harvest levels were reduced by 80% on federal forests and by roughly 40% on state lands, such that today, private lands account for about 85% of the harvest on 60% of the unreserved forestland.

Large additions to old forest upland reserves and enlarged no-harvest zones around streams have attempted to protect critical habitat. The economic impacts from these changes have been large, resulting in rural job losses and an increasing disparity between timber rural and urban incomes. The expectation is that future changes driven by salmon protection may be even more severe --with much of the impact falling on private forest landowners.

Policymakers have generally opted to endorse a management strategy that largely depends on the reservation of certain land types and habitats from active management, following the strategy first adopted on federal lands. Active management alternatives to improve environmental and habitat conditions have recently received attention by researchers; and they may be both more effective at protecting habitat and less costly than reserve strategies. Forest stands are dynamic and ultimately change in structure through growth, natural disturbances, human interventions and/or management. An assessment of the cumulative effectiveness of past and proposed policies to meet biodiversity and habitat conservation goals can provide a yardstick to measure the environmental and economic impacts under different policy and management approaches.

Simulation of forest management alternatives for riparian protection: Simulations provide one method to assess the impacts of policy change and have been prepared for a range of regulatory and management alternatives affecting western Washington for the next 200 years. Assessments of critical habitats, biodiversity, harvest levels and economic impacts demonstrate the environmental/economic tradeoffs between alternatives. For the impacts of riparian management on private lands, current practices are first simulated as a baseline (Case 1). The practical consequences of current regulations result in essentially no-management buffers of 85ft along fish bearing class 1-3 streams with the buffers covering about 2-3% of the forestland. Possible alternatives to increase salmon habitat include enlarged riparian management zones (RMZs) covering both fish bearing and non-fish bearing streams, with either no-management (Case 2) or active biodiversity management within the RMZ (Case 3) to restore riparian functions that existed in pre-European settlement times. The RMZ widths for Cases 2 and 3 shown in Table 1 are 150ft on class 1-3 (larger fish bearing) streams, 100 ft on class 4 streams and 50ft on class 5 (generally intermittent and non-fish bearing) streams.

The economic losses associated with the no-management RMZ are substantial. Impacts are shown for: (1) harvest losses which directly affect mill activity, (2) both short term and long term rural jobs which are most important to community economic activity, (3) net present value (NPV), the measure of economic importance to forestland owners, (4) tax receipts of interest to the government and (5) old forest (late seral) structures as an aggregate proxy for environmental affects valued by society. Harvest losses over the first 20 years from no-management within the RMZ (Case 2 compared to Case 1), measured in percentage change, exceed the percentage of total acres in the RMZ, a typical effect of harvest scheduling problems when there is a reduction in mature forests of harvestable age. The first twenty year job and harvest losses in rural communities average

Center for International Trade in Forest Products
College of Forest Resources, Box 35200, University of Washington, Seattle, WA 98195 Phone: (206) 543-8684 Fax: 685-0790

23% -- 16,500 job losses and 840 million board ft. per year. The number of jobs in the long term increases because more intensive management in the early years increases the available harvest and jobs over time. The long term job losses under Case 2 are 10% or 7,500.

Harvest losses are reduced under active management using biodiversity thinnings within the RMZ (Case 3 vs. Case 1), hence the first 20 year job losses are cut to 10,800. In the long term, jobs increase rather than decrease as a consequence of the labor intensive thinning to enhance biodiversity, which also produces larger trees with higher quality wood supporting increased value added processing.

Table 1. Economic and environmental impacts from riparian management alternatives on private lands in Western Washington (5,712,000 private acres, assuming no owl and murrelet protection).

	Case 1	*Case 2*	*Case 3*
(Land Base)	**Current Base**	**No-mgt. RMZ**	**Bio-mgt. RMZ**
Acres Impacted	2.5%	14%	14%
		Change from the Base (Case 1)	
(Mill Impacts)			
Harvest 1-20 years average (mmbf)	3,640	-23%	-17%
Long-term sustained	4,077	-15%	+9%
(Community Impacts)			
Rural Jobs 1-20 years	72,000	-23%	-15%
Long-term sustained	76,500	-10%	+27%
(Landowner Impacts)			
NPV @ 5% $ billions	28.8	-20%	-11%
(Government Impacts)			
State & Local Tax Receipts 1-20 years ($ millions)	821	-23%	-15%
(Societal Environmental Impacts)			
Late Seral Habitat in RMZ (%)		Percent of Riparian Land Base	
Current	1%	1%	1%
By 5th decade	1%	6%	53%
By 10th decade	11%	57%	67%

The NPV loss to private owners for Case 2 is $5.6 billion or 20% (slightly less than the harvest loss), but is reduced to $3.2 billion or 11% under Case 3. Tax receipts are proportional to the economic activity, with losses of $185 million per year under Case 2 and $117 million under Case 3.

The environmental improvements in Case 2 are very modest until the10th decade, whereas more active management to replicate old forest functionality under Case 3 achieves similar levels by the 5th decade. The 5% increase in riparian acres with late seral structures by the 5th decade under Case 2 costs $1,100 million for each additional 1.0% of late seral riparian acres and under Case 3, $61 million. Using this ratio as a measure of economic efficiency, active management to increase old forest functionality within the RMZ results in an eighteen fold improvement.

The simulation suggests near term job losses and NPV reductions in the range of 20% if active management is not allowed Case 2); but may only suggest a lower bound since the simulation leaves out many important affects that could substantially increase the costs even more. The RMZ width could be as wide as in the Northwest Forest Plan on federal lands, twice as wide as the illustrated RMZ, a potential doubling of the impact. Unstable slopes could also add another 5-10% of all acres to those in the RMZ, for a 50% increase in economic impact. The addition of protection on unstable slopes and secondary streams results in disconnected harvest units that may not be economically accessible--a substantial increase in management costs. And, there are increased costs associated with road, bridge and culvert improvements. The simulation therefore provides at best only a lower bound on the cost estimate to satisfy regulatory requirements or an environmental restoration goal. Also, since the simulation only estimates the average affect across owners, there will also be a substantial disproportionality. Some small owners will feel no impact and some will feel almost 100% loss of their economic potential if their lands fall almost entirely in the affected RMZ. Active management within the RMZ offers the potential to grow large trees faster for stream recruitment while maintaining a more diverse understory resulting in a faster restoration of pre-European environmental conditions at a substantially lower cost than no-management zones.

Simulation of forest management alternatives across all forestlands: It is instructive to apply these same active management principles to all owner groups and upland as well as riparian acres to create at least as much restoration of old forest conditions for upland species as will result under current or proposed regulations. Case 4 provides a low harvest constraint base case for comparison across all owners and acres, with the same RMZ protection as Case 1. Case 5 provides a characterization of proposed regulations based on a reserve strategy. It includes the impact of minimum regulations to protect the owl and murrelet; the proposed no-management RMZ along streams for state and private owners (as was shown in Case 2 for private lands); and the Northwest Forest Plan on federal lands. Case 6 simulates active biodiversity management by the state and private owners in the uplands and is like Case 3 in the riparian zones. Case 7 allows active management on 1/3 of the federal lands, an aggressive adaptive management approach.

For proposed regulations, (Case 5 compared to Case 4), jobs for the first 20 years are down 40% but only 22% in the long term. These losses include the affects of proposed riparian no-management RMZs that were estimated in Case 2 and hence are cumulative effects of prior uplands protection and proposed riparian protection. NPV losses are heavily weighted to federal lands as a consequence of the Forest Plan. The 22% impact on state lands includes protection of habitat within circles around owl sites as well the no-management RMZ. On private lands the impacts are larger because unlike state lands, they do not have a surplus of mature acres to harvest as an offset to the exclusion of mature acres for habitat protection

Table 2: Economic and environmental impacts from riparian and upland management alternatives in Western Washington (9,429,000 acres across all owners).

	Case 4	*Case 5*	*Case 6*	*Case 7*
	Commodity Base mgt all owners	**Proposed Regs** w/ FEMAT	**Bio-mgt** on non-fed	**Bio-**
(Mill Impacts)		Change from Base (Case 4)		
Harvest 1-20 yr. ave. (mmbf)	5,831	-31%	-20%	-4%
Long term sustained	6,478	-24%	-10%	-6%
(Community Impacts)				
Rural jobs 1-20 years	134,000	-40%	-29%	-13%
Long term sustained	127,000	-22%	+3%	+11%
(Landowner Impacts)				
NPV @5% $ billions	48.4	-42%	-23%	-11%
Private	27.7	-27%	-11%	-13%
State	11.1	-22%	0%	-1%
Federal	9.6	-82%	-82%	-18%
(Government Impacts)				
Tax Receipts 1-20 years ($ millions)	1,485	-38%	-26%	-10%
(Societal Environmental Impacts)				
Late Seral Habitat (%)		Percent of Total Acres in Late Seral		
Current	11	11	11	11
By 5th decade	3	18	22	21
By 10th decade	11	33	60	61

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The economic losses under the active biodiversity management alternative (Case 6) are significantly lower than Case 5 while the late seral habitat measures are better. As a result, both upland and riparian environmental measures are achieved at lower cost. Over the long term, the impact on jobs is positive rather than negative, because the higher quality wood from that portion of the acres being managed to produce larger trees and habitat supports additional processing and jobs, as does more intensive forest management. These economic benefits are however primarily in the long term. The tax receipts in the first 20 years are off 26% or $386 million; compared to 38% and $558 million for the proposed regulations (Case 5).

The environmental benefits of Case 6 show a substantial improvement in late seral structures by both the 5th decade and even more so by the 10th decade. The economic efficiency for an additional 1.0 percent of the acres in late seral structures by the 10th decade improves from a $927 million cost under Case 5 to $227 million under Case 6, a four fold improvement.

If one-third of the federal ownership now under reserve management is opened to active habitat treatments (Case 7), all of the costs are reduced substantially while sustaining the same habitat protection. The rural job losses are reduced to only 13%, a gain of 36,000 rural jobs from proposed regulations. The economic efficiency to restore habitat across all owners is doubled over Case 6, for a nine fold improvement over proposed regulations.

Economic sensitivity to increasing levels of habitat protection: Sensitivity analysis by simulations that increase the amount of habitat in the future show that the cost increase to provide additional late seral acres in 100 years is relatively low, about $80 per additional acre or $8 million for a 1% increase in late seral structures (Figure 1). However it is not possible to increase habitat substantially in less than 50 years (Figure 2) and the cost increases as the target year is reduced below 100 years.

Figure 1: NPV with increasing Old Forest Habitat

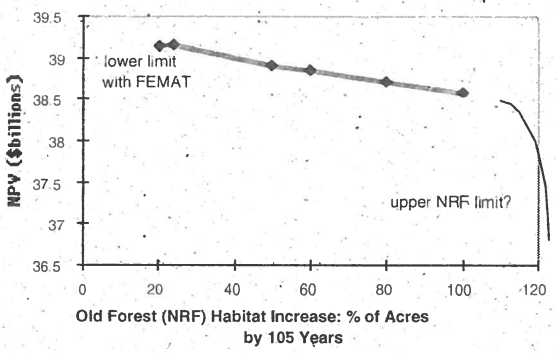
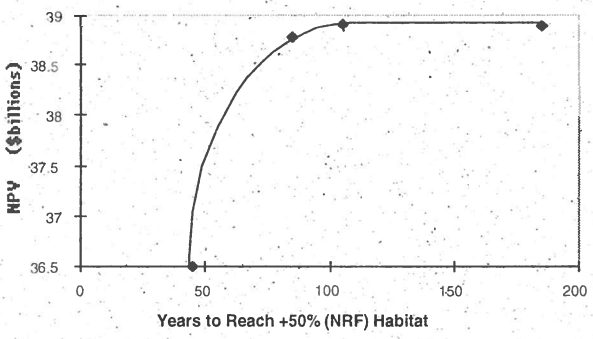


Figure 2: NPV as a Function of Years to Increase Old Forest Habitat by 50%



More active management on federal lands (Case 7) would increase tax receipts by another $237 million excluding federal timber revenues (when compared to Case 6) while further reducing the loses in rural communities. Case studies would likely show higher costs than are reflected in these simulations, but the directional implications of illustrated strategies would not change.

For more information contact B. Lippke or B. Bruce Bare at the College of Forest Resources, University of Washington. More complete information is available in a paper that has been submitted for publication.

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Center for International Trade in Forest Products
College of Forest Resources, Box 35200, University of Washington, Seattle, WA 98195 Phone: (206) 543-8684 Fax: 685-0790