

PRELIMINARY ECONOMIC ANALYSIS
Forest Practices Rulemaking
Affecting Northern Spotted Owl Conservation
By Donald Krug, Department of Natural Resources Economist
October 2007

OBJECTIVES

On June 6, 2007 the Forest Practices Board adopted an emergency rule to continue a moratorium on decertifying Northern Spotted Owl site centers that has been in effect from November 30, 2005 to June 30, 2007. The Board is now considering whether to adopt a rule that continues the moratorium until December 31, 2008.

The objective of this analysis is to estimate the benefits and the costs of a moratorium on Northern Spotted Owl site center decertification from April 1, 2008, which is the approximate effective date of a new permanent rule, to December 31, 2008. For a base it uses the data and methodology of a previous analysis produced for the Board's 2006 permanent rulemaking that instituted the initial 19-month moratorium, hereinafter referred to as the 2006 Economic Analysis.¹

Agencies are required to conduct economic analyses to aide in determining whether to adopt rules. The Administrative Procedure Act (RCW 34.05)² requires completion of a cost-benefit analysis to determine whether the probable benefits of a proposed rule exceed its probable costs. A small business economic impact statement is required by the Regulatory Fairness Act (RCW 19.85)³ to consider the impacts on small businesses. It compares the costs of compliance for small businesses with the cost of compliance for the ten percent of businesses that are the largest businesses required to comply with the proposed rules. This document combines the cost-benefit analysis and the small business economic impact statement.

CONTEXT

The Forest Practices Board is made up of representatives of state natural resource agencies and general public members including representatives of both the small and large industrial forest land ownership groups. The Board adopts rules to establish minimum standards for forest practices. In 1990, the Board responded to the federal Endangered Species Act listing of the Northern Spotted Owl by adopting a series of emergency rules to protect spotted owl habitat, and ultimately adopted permanent rules on May 22, 1996. These rules:

- Identify "critical wildlife habitat" (state) for the Northern Spotted Owl. Forest practices applications within these areas that involve suitable spotted owl habitat are Class IV-Special, and require additional environmental review under SEPA (State Environmental Policy Act). The rules do not prohibit harvesting.
- Provide SEPA guidance to DNR for threatened and endangered species, and specific SEPA guidance for the Northern Spotted Owl.

¹ Economic Analysis, August 2006. See <http://www.dnr.wa.gov/forestpractices/rules/activity/archive.html>.

² For CBA requirements, see [Chapter 34.05.328 RCW - The Washington State Legislature](#).

³ For SBEIS requirements, see [Chapter 19.85.040 RCW - The Washington State Legislature](#).

- Delineate 10 “spotted owl special emphasis areas” (SOSEAs) where critical wildlife habitat (state) is designated within circles around owl site centers (owl circles). Habitat goals (functions) are identified on maps for each SOSEA.
- Require SEPA review for 70 acres of habitat around owl site centers outside SOSEAs. This applies only during the nesting season, from March 1 to August 31.
- Provide a small parcel exemption from SEPA for landowners who own less than 500 acres in a SOSEA, if the proposed forest practice is not within 0.7 mile of a site center.
- Include two landscape planning processes: A Landowner Option Plan for landowners currently impacted by spotted owls, and a Cooperative Habitat Enhancement Agreement for those not currently impacted by spotted owls.
- Identify certain restrictions against disturbance around owl site centers inside SOSEAs during the nesting season.

In the fall of 2005 the Board recognized that Washington’s Northern Spotted Owl population and habitat had declined since the 1996 rules were adopted. In November 2005 the Board adopted an emergency rule and started permanent rulemaking to 1) discontinue the practice of counting habitat that has actually been harvested, when calculating the amount of habitat remaining within a median home range circle, and 2) place a temporary moratorium with a specified end date of June 30, 2007, on the practice of “decertifying” status 1, 2 and 3 Northern Spotted Owl site centers documented by the state Department of Fish and Wildlife.⁴ The Board adopted the permanent rule on August 9, 2006.

The goal of the 2006 rule was to maintain habitat and regulatory options until the U.S. Fish and Wildlife Service completed a draft Northern Spotted Owl recovery plan, an effort that was originally scheduled for September 2006 completion. The Board intended to consider the outcome of the draft plan when considering modifying the state rules. However, production of the draft plan took longer than anticipated; the draft plan was not available until April 2007.

On June 6, 2007 the Board approved an emergency rule to extend the sunset date of the moratorium on site center decertification past June 30, 2007. The emergency rule expires on October 28, 2007. On July 25, 2007, the Board approved the initiation of permanent rulemaking that would sunset the moratorium on December 31, 2008 with the objective of ensuring no loss of habitat while determining whether and how to modify the state rules to conserve habitat. The Board may adopt another emergency rule to extend the moratorium past October 25, 2007 to ensure not loss of habitat while the Board decides whether to adopt the permanent rule proposal. This analysis, however, does not include the costs and benefits of any emergency rule timeframes.

INTRODUCTORY INFORMATION

The rule-complying community affected by the proposal is businesses that own or control the cutting rights on forestland or those with the right to dispose of the timber. For small forest

⁴ The decertification process follows the survey protocol endorsed by the U.S. Fish and Wildlife Service for spotted owl sites that are no longer occupied. The protocol states that “if no responses have been obtained from an historical site after three years of survey (using established guidelines), the site may be considered unoccupied, barring other evidence to the contrary.” Unoccupied sites are changed to “status 5” and are not subject to forest practices rules pertaining to Northern Spotted Owls.

landowners owning less than 500 acres in a SOSEA, the effects of the proposed rules are limited to habitat within the inner 0.7-mile circle. The Regulatory Fairness Act defines a “small business” as one with 50 or fewer employees. Ownership acreage is generally a more appropriate metric for characterizing small businesses in the timber industry. In this analysis, small businesses are identified as those subject to the small parcel exemption in WAC 222-16-080(h)(iv) which states: “Forest practices proposed on the lands owned or controlled by a landowner whose forest land ownership within the SOSEA is less than or equal to 500 acres and where the forest practice is not within 0.7 mile of a northern spotted owl site center shall not be considered to be on lands designated as critical habitat (state) for northern spotted owls.” All other private landowners are categorized as “large businesses” for purposes of this analysis.

The forestland affected by the moratorium is: 1) habitat within owl site centers (circles) and within SOSEA boundaries, excluding forestland that is in an HCP, owned by the federal government, or covered by a landowner option plan; and 2) habitat within a designated 70-acre area around site centers outside SOSEAs. However, for purposes of this analysis, the latter category of forestland was not considered to be affected by the moratorium because landowners can carry out forest practices within these areas outside the owl's breeding season. Portions of a given circle that also fall within one or more other status 1, 2 or 3 circles are not considered decertified.

Costs and benefits are calculated on a per-acre basis for comparison purposes and are limited to direct costs and benefits. The costs of the rule change are measured as the potential loss of timber revenue, based on an estimate of the habitat acreage affected by the rule proposal, for the period of time covered by the rule currently proposed by the Board, i.e., 18 months. Benefits are defined as the value of protecting the habitat based on the findings of a 1993 study done in Oregon that estimated the value to state residents of protecting Northern Spotted Owl habitat. This was the best information available to us, and we use it with the caveat that there are uncertainties regarding its application to this analysis. Methods are further discussed below.

METHODS OF ANALYSIS

We determined costs by estimating the volume and stumpage value of timber affected by the proposed rule and calculating the cost of withholding this timber from harvest during the period covered by the proposed rule - from April 1, 2008, which is the approximate effective date of the proposed rule, to December 31, 2008.

In the 2006 Economic Analysis, we estimated timber harvest revenue in a six-step process:

- Step 1. Identify owl circles potentially affected by the rule change.
- Step 2. Analyze spotted owl circles identified in Step 1.
- Step 3. Determine forest acreage affected by the rule change.
- Step 4. Estimate habitat acreage.
- Step 5. Estimate habitat that would have been harvested without the rule change.
- Step 6. Determine costs associated with a moratorium on decertification.

For this analysis we added an additional step:

- Step 7. Update the findings of the 2006 Economic Analysis to accommodate an additional nine-month moratorium.

We estimated benefits by applying the findings of the 1996 study by Loomis et al. that estimated the value of reducing fire hazards to old-growth forests in the Pacific Northwest⁵. The estimates are based on willingness to pay for protecting Northern Spotted Owl habitat.

The effects on small businesses are highlighted where appropriate.

ANALYSIS

Determining costs associated with a moratorium on decertification.

Step 1 – Identify owl circles potentially affected by the rule change.

The Washington Department of Fish and Wildlife provided a list of the spotted owl circles in which surveys were in progress or completed in anticipation of decertification. Five spotted owl circles were identified as potentially affected: Three in the I-90 East SOSEA located east of the Cascade Range Crest, and two in the Mineral Block SOSEA located on the west side. (An additional spotted owl circle in the process of decertification is not in a SOSEA, so is not affected by this proposal.)

Step 2 – Analyze spotted owl circles identified in Step 1.

Circles that are entirely or partially within SOSEAs were analyzed using GIS to identify ownership (federal, state, industry, non-industrial private), whether land parcels making up the circle were covered by a habitat conservation plan (HCP) or similar arrangement that exempted the area from forest practices rules pertaining to the spotted owl, and each parcel's seral stage(s). SOSEA boundaries and transecting status 1, 2 and 3 spotted owl circles were also delineated, because the proposed rule does not affect the portion of circles outside of SOSEAs, or portions of decertified circles within SOSEAs that are also part of other status 1, 2 or 3 circles.

Step 3 – Determine forest acreage affected by the rule change.

Affected forest acreage was determined based on the GIS analysis. Forest acreage affected by the moratorium on decertification is limited to habitat within owl site circles within SOSEA boundaries, except acreage that is in an HCP, owned by the federal government, covered by a landowner option plan, or within one or more other status 1, 2 or 3 circles. As previously explained, the effects on small forest landowners are limited to habitat within the inner 0.7-mile circle. If the circle includes more than 40 percent habitat, excess habitat is available for harvest.

Table 1 summarizes the amount of privately-owned forest acreage that is affected by the moratorium for the three owl circles on the east side and the two on the west side, as well as an estimate of the affected habitat acreage (discussed in Step 4 below). There are 14,407 acres potentially affected within the five owl circles included in the analysis; all but 152 acres are industrial forestland. These 152 acres are owned by landowners subject to the small parcel exemption provision.

⁵ Available at <http://www.fs.fed.us/psw/publications/documents/rp-229/>

Table 1
Forest and Habitat Acreage Affected by the Moratorium
 (data collected for the 2006 Economic Analysis)

	Industrial Acreage		
	Forest	Habitat	% Habitat
East	8123	2624	32.3
West	6132	369	6.0
Total	14255	2993	21.0

	Small Landowner Acreage		
	Forest	Habitat	% Habitat
East	152	26	17.1
West	0	0	0.0
Total	152	26	17.1

	Total Acreage		
	Forest	Habitat	% Habitat
East	8275	2650	32.0
West	6132	369	6.0
Total	14407	3019	21.0

Step 4 – Estimate habitat acreage.

We estimated habitat acreage affected by the rule proposal based on information from Pierce et al.'s 2005 Washington State Spotted Owl Habitat Assessment Report⁶. For each of the five owl circles included in the analysis, we estimated the amount of habitat by multiplying affected forest acreage in the circle by the average habitat proportion--by seral stage--estimated by Pierce et al. (Table 2). The three owl circles located in the I-90 East SOSEA are within the East Cascades zone, and the two circles within the Mineral Block SOSEA are in the South Cascades zone.

Table 2
Estimated Percentages of Northern Spotted Owl Habitat within
Different Forest Seral Stages in the East and South Cascades Zones

ZONE	OTHER SERAL	EARLY SERAL	MID SERAL	LATE SERAL
East Cascades	2.1	12.5	58.8	65.7
South Cascades	2.1	0.4	45.0	60.9

From Pierce et al. (2005) Table 15, p. 51.

⁶ Available at http://wdfw.wa.gov/wlm/research/papers/spotted_owl/

Habitat is defined differently on the west and east sides of the Cascade Range Crest, reflecting differences in Northern Spotted Owl behavior. This is apparent in the habitat acreage estimates in Table 1. The proportion of habitat is much higher in the east (32.0%) than in the west (6.0%). We estimate there is a total of 3,019 acres of habitat affected by the rule proposal; that is, 3,019 acres of habitat that could have been harvested if the five owl circles were decertified. Only 26 acres of this acreage is in the small landowner category, leading us to conclude that the rulemaking does not have a disproportionate effect on small businesses.

Step 5 – Estimate habitat that would have been harvested without the rule change.

While conducting the 2006 Economic Analysis, DNR field staff estimated that without the decertification moratorium, approximately 75 percent of the affected habitat would have been harvested. This amounts to 2,264 acres of forestland that could not be harvested because of the moratorium.

Step 6 – Determine costs associated with a moratorium on decertification.

We calculated timber value by multiplying lost harvest acreage by average per-acre timber harvest revenue for Western and Eastern Washington. We estimated the stumpage revenue potential, assuming harvest of 75 percent of the habitat subject to the rule proposal in the five spotted owl circles. This calculation required that we make assumptions regarding the volume per acre and price. Stand quality and species composition are implicitly factored into these assumptions. For the 2006 Economic Analysis, the high-end estimate assumed volume of 50,000 board feet (50 MBF) per acre at a price of \$400 per MBF, and the low-end estimate assumed volume of 40 MBF per acre at a price of \$350 per MBF. Per-acre stumpage value was \$20,000 and \$14,000, respectively.

Step 7 – Update the findings of the 2006 Economic Analysis to accommodate an additional nine-month moratorium.

The 2006 Economic Analysis limited the effects of the moratorium to those owl circles that had been surveyed at least once in anticipation of later decertification. The implied assumption was that the moratorium was temporary and thus did not affect other owl circles.

The first moratorium was in place from November 30, 2005 until June 30, 2007, a period of 19 months. The proposed rule effectively extends this moratorium through December 31, 2008, a period of 18 months, approximately the same length of time, though we are limiting our estimates of costs and benefits to the period covered by the proposed permanent rule which this analysis supports (April 1 through December 31, 2008). We are assuming that the pace of decertification activity would be about the same. The proposed moratorium extension thus affects the timber volume identified in the previous economic analysis, as well as additional timber volume approximately equal to that previously identified, thus doubling the affected acreage to 4,528 acres.

Determining benefits associated with a moratorium on decertification.

The benefits of the moratorium are difficult to estimate. The intended purpose of the rule proposal is to help arrest the decline in Northern Spotted Owl populations in Washington by providing additional habitat protection. Few studies have estimated values of protecting Northern Spotted Owls or their habitat (Hagen et al 1992; Rubin et al 1991; Loomis et al 1996). These studies use the contingent valuation method (CV) to measure the willingness to pay (WTP) for protecting the Northern Spotted Owl and old growth forests. This approach is widely accepted among federal agencies for benefit-cost analysis that measure the benefits of non-market goods such as an endangered species. While all three studies use a CV approach to measure benefits and costs of protecting the Northern Spotted Owl, the study by Loomis et al. provides the preferred approach for our purpose, as it estimates benefits of an incremental change in protected habitat of a specified number of acres. The report on the findings is available at the U.S. Forest Service Pacific Southwest Research Service website at <http://www.fs.fed.us/psw/publications/documents/rp-229/>.

The Loomis et al. study surveyed residents of the State of Oregon in 1993 on their WTP for protecting old growth Northern Spotted Owl habitat from fire in the Pacific Northwest. Following is a discussion of the methodology used in the study, the WTP results, and the limitations that may apply in terms of the transferability of these results to Washington. We use these results to evaluate the probable benefits of protecting Northern Spotted Owl habitat in Washington State, adjusting the results as necessary.

Survey participants were asked to evaluate a scenario whereby approximately 3,500 acres of old-growth Northern Spotted Owl habitat was saved from fire. The median WTP of survey respondents was \$77 per household per year, which corresponded to \$24,170 per acre for Oregon's 1.1 million residents in 1993. Assuming that non-respondents (about half of those sent surveys) had a WTP of \$0 provides a minimum value of \$45 per household per year.

We adjusted these findings to account for inflation and the number of households in Washington. WTP of protecting 3,500 acres of habitat in Washington is estimated to be \$104 per household per year, with a minimum value of \$61. The benefit to the state's 2.5 million households amounts to an average of between \$74,286 and \$43,571 per acre. (Although these estimates are on a per-year basis, we have assumed they are a one-time payment to mitigate for the uncertainties with using this benefit valuation approach.)

Although this study was the most applicable to our analysis, there are a number of factors that might have an effect on its transferability, with the potential for over- or under-estimation. These include:

- The base study was limited to Oregon residents. Attitudes towards protecting the Northern Spotted Owl may differ between the states. Higher average incomes in Washington suggest that WTP may be higher in Washington.
- We extrapolated the Loomis et al. study results to Washington residents only; WTP for nonresidents was ignored, though it may be considerable.
- The base study valued protecting old growth forests from fire. The rule changes under consideration protect all levels of habitat from general loss. Washington residents

likely value less mature forests lower than old growth. Other benefits accruing from avoidance of fire would not be applicable to this analysis, possibly overstating benefits.

- Attitudes towards protecting Northern Spotted Owls and their habitat may have changed since 1993.
- Placing a value on non-market goods such as habitat protection is difficult for some people.

CONCLUSIONS

Costs and Benefits

This economic analysis estimates ranges of costs and benefits of instituting a moratorium on Northern Spotted Owl site center decertification for a period of nine months. Costs are estimated as the opportunity loss of the timber harvest revenue that could have been accrued if the moratorium was not in place. Estimated benefits are based on a study of willingness to pay for protecting spotted owl habitat published in 1996.

The estimated stumpage value of 4,528 acres of timber range from \$63.4 million to \$90.6 million, and the value of protecting this habitat ranges from \$196 million to \$336 million. On a per-acre basis, stumpage value ranges from \$14,000 to \$20,000 per acre, and habitat value ranges from \$43,571 to \$74,286 per acre.

This analysis estimates costs and benefits of the proposed rule for the time period beginning April 1, 2008 and ending at the sunset date of the current proposed rule, December 31, 2008. In essence, this is the costs of foregoing harvest until 2009, assuming that harvest would have taken place at the beginning of the period (April 1, 2008) in the absence of a moratorium⁷. We assumed that the timber would continue to grow (appreciate) at a rate of 1% per year, and used a discount rate of 5% to represent the time value of money, resulting in a net discount rate of 4%. At this rate, the cost of withholding timber from harvest from April 1, 2008 until December 31, 2008 is approximately 3% of its value. The cost of the proposed rule is thus 2.84% of estimated stumpage value of affected acreage (4,528 acres), or between \$1.8 and \$2.6 million. Applying the same rate to estimated habitat value results in benefits of between \$5.6 and \$9.6 million.

Table 3
Estimated Costs and Benefits of the Proposal

	Total Cost	Cost Per Acre	Total Benefit	Benefit Per Acre
High Estimate	\$2.6 million	\$1,140	\$9.6 million	\$4,234
Low Estimate	\$1.8 million	\$798	\$5.6 million	\$2,484

Per-acre cost estimates are dependent on price, stand quality and species composition assumptions. In addition, this analysis assumes that the pace and scope of decertification requests during the period of time covered by this proposed rule would have been similar to that covered by the 2006 Economic Analysis. Costs may be lower if a landowner chooses to develop a landowner option plan, which exempts the landowner from these rules.

⁷ It is unknown when harvest would have taken place following decertification.

Benefit estimates are more uncertain due to the lack of market price signals for environmental amenities. Although survey respondents may have implicitly valued other amenities that accrue from protecting Northern Spotted Owl habitat (such as habitat for other species, open space, and water quality), some of the ancillary benefits of protecting habitat may not have been captured by this analysis.

In spite of these uncertainties, estimated benefits are sufficiently greater than costs to provide a reasonable degree of certainty that the benefits of this rulemaking exceed the costs. It is worth noting, however, that this economic analysis estimates overall benefits and costs, not the distribution of costs and benefits (with the exception of impacts on small businesses, which in this case are minimal). The benefits of Northern Spotted Owl habitat protection identified in this analysis will accrue to state residents in general, whereas the costs will primarily be borne by industrial forest landowners.

Small Business Impacts

The effects of the proposal on small forest landowners are limited to habitat within the inner 0.7-mile circle of spotted owl site centers within SOSEAs. We estimate that 52 acres of small forest landowner habitat are affected by the decertification provision of the proposed rules; this is less than one percent of the potentially affected habitat acreage⁸. There may be specific instances where individual small forest landowners are disproportionately affected, but small businesses are not affected disproportionately when compared to Washington timber industry businesses overall, and the number of small business jobs lost statewide as a result of this proposal would be negligible.

REFERENCES

- Hagen, D., Vincent, J. and Welle, P., 1992. **Benefits of preserving old-growth forest and the spotted owl**. *Contemp. Policy Issues*, 10: 13-25.
- Loomis, John B.; González-Cabán, Armando; Gregory, Robin. 1996. **A contingent valuation study of the value of reducing fire hazards to old-growth forests in the Pacific Northwest**. Res. Paper PSW-RP-229-Web. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 24 p.
- Pierce, D.J., J. B. Buchanan, B. L. Cosentino, and S. Snyder. 2005. **An assessment of Spotted Owl habitat on non-federal lands in Washington between 1996 and 2004**. Final Report. Washington Department of Fish and Wildlife, Olympia, Washington, USA. 187 p.
- Rubin, J.; Helfand, G., and Loomis, J. **A benefit-cost analysis of the northern spotted owl: Results from a contingent valuation survey**. *Journal of Forestry*. 1991; 89(12):25-30.

⁸ See Table 1 for the results of the 2006 Economic Analysis. We assume that the SFL proportion of affected acreage is the same in the additionally constrained acreage, thus doubling the findings of the 2006 Economic Analysis.