Economic Analysis of Critical Habitat Designation for the Northern Spotted Owl

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$/mbf - dollars per thousand board feet ($/mbf)

A

Act - Endangered Species Act

AFRC - American Forest Resource Council

AMA - Adaptive Management Areas

AMR - Adaptive Management Reserves

AW - Administratively Withdrawn

B

BLM - Bureau of Land Management

C

Caltrans - California Department of Transportation

CHD - Critical Habitat Designation

CPI - Consumer Price Index

CR - Congressionally Reserved area

D

Draft Recovery Plan - 2007 Draft Recovery Plan for the Northern Spotted Owl

Draft SEIS - Draft Supplementary Environmental Impact Statement

F

FHWA - Federal Highway Authority

Final SEIS - Final Supplementary Environmental Impact Statement

FTEs - full-time equivalents

H

HCP - Habitat Conservation Plan

L

LA - land allocation

LRMP - Land and Resource Management Plan

LSMA - Late Successional Management Area

LSR - Late Successional Reserve

LUA - Land Use Allocation

M

mbf - thousand board feet

MLSA - Managed Late Successional Area

mmbf - million board feet

N

NAA - No Action Alternative

NAICS - North American Industry Classification System

NEPA - National Environmental Policy Act

NF - National Forest

NFMA - National Forest Management Act

NGO - non-governmental organization

NLCS - National Land Conservation System

NPS - National Park Service

NSO - northern spotted owl

NWFP - Northwest Forest Plan

O

O&C Act - California Railroad and Coos Bay Wagon Road Grant Land Acts of 1937

O&C - Oregon and California Railroad Company

OLP - Oregon LNG Pipeline

ODOT - Oregon Department of Transportation

OMB - U.S. Office of Management and Budget

P

PA - Preferred Alternative

PCGP - Pacific Connector Gas Pipeline

PG&E - Pacific Gas and Electric Corp.

PGT - Palomar Gas Transmission

PSQ - Probable Sale Quantity

R

RFA - Regulatory Flexibility Act

RMP - Resource Management Plan

ROD - Record of Decision

RR - Riparian Reserves

S

SBREFA - Small Business Regulatory Enforcement Fairness Act

Secretary - Secretary of the Interior

Service - U.S. Fish and Wildlife Service

SIC - Standard Industrial Classification

T

TCMA - Tribal Cooperative Management Area

TMA - Timber Management Area

U

USFS - U.S. Forest Service

USGS - U.S. Geological Survey

W

WFLHD - Western Federal Lands Highway Division

WOPR - Western Oregon Plan Revision

WSDOT - Washington State Department of Transportation

The purpose of this report is to identify and analyze the potential economic impacts associated with the *proposed revised* critical habitat designation for the Federally-listed *Strix occidentalis caurina* (northern spotted owl) (hereinafter, "NSO" or "species"), and its habitat.

The NSO was Federally-listed as threatened under the Endangered Species Act (Act) on June 26, 1990,[1] and the *current* critical habitat for the species was designated on January 15, 1992.[2] On April 21, 2003, the U.S. Fish and Wildlife Service (Service) published a notice in the Federal Register initiating a five-year review of NSO, which was undertaken to gauge the status of the species based on the best scientific information available at the time of the review.[3] The Service's review of NSO in November, 2004 concluded that NSO should remain listed as a threatened species. In June 2007, the Service proposed a *revised* critical habitat designation for NSO.[4] Unless otherwise stated, all references to the critical habitat designation in this executive summary are related to the *proposed revised* critical habitat designation.

The proposed designation encompasses 5,337,839 acres of Federal lands as critical habitat for NSO compared to 6,887,000 acres under the current designation.[5] In addition, while the current designation comprises 190 units, the proposed designation is organized into 29 larger critical habitat units spread over three states: Washington, Oregon, and California. The proposed critical habitat is located solely on Federal lands managed by the U.S. Forest Service (USFS) and Bureau of Land Management (BLM). More than 86 percent of the proposed designation is located on USFS-administered land compared to 14 percent on BLM lands. In total, the proposed designation spans across 17 national forests administered by the USFS and nine BLM districts or field offices. Appendix C provides maps of the analysis areas in each state.

Figure ES-1 summarizes key findings of the economic analysis. Results are presented in greater detail later in this summary.

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1 55 FR 26114

2 57 FR 1796

3 68 FR 19569

4 Endangered and Threatened Wildlife and Plants; Proposed Revised Designation of Critical Habitat for the Northern Spotted Owl (*Strix occidentalis caurina*); Proposed Rule, *Federal Register*, Vol. 72, No. 152, June 12, 2007.

5 Of the revised acreage proposed, 4,468,200 acres are identical to the 1992 designation, an additional 869,639 acres of Federal land not previously designated are now proposed, and 2,399,490 acres of land previously designated are no longer proposed for designation.

Figure ES-1
Key Findings

Pre-designation impacts: The pre-designation (1990-2007) impacts associated with species conservation activities in areas proposed for designation range between $9.601 and $9.603 billion, and are related to timber management, survey and monitoring efforts, barred owl management, and Section 7 consultations. Annualizing the equivalent present value of this amount over the pre-designation time period yields an annualized value of approximately $563 million and $600 million at discount rates of three and seven percent, respectively.

Incremental impacts: The draft economic analysis forecasts incremental impacts associated with the proposed rulemaking to be approximately $1.40 to $2.15 million ($132,000 to $202,000 annualized) over the next 20 years in present value terms applying a seven percent discount rate, and approximately $1.87 to $2.89 million, using a three percent discount rate ($122,000 to $195,000 annualized).

Activities most impacted: The administrative costs of actions taken under Section 7 of the Endangered Species Act associated with the geographic area proposed as critical habitat for NSO comprise all of the quantified incremental impacts in the proposed designation. In summary:

- Section 7 Consultations: Post-designation incremental and baseline administrative impacts are *collectively* expected to consist of 23 individual, four batched, and one programmatic consultation between the Service and relevant entities/agencies annually during the post-designation period. Of the individual consultations, it is anticipated that 13 will be informal, six will be formal, and four will be technical assistances. Additionally, each national forest and BLM district is expected to revise and consult and/or reinitiate consultation on their land and resource management plans.

Unit impacts: Due to the uncertainty regarding the number of estimated post-designation consultations for activities within a given unit, almost 81 percent and 84 percent of the upper-bound incremental impacts are unallocated using seven and three percent discount rates, respectively. Of the remaining costs, units 12, 17, and 24 are each anticipated to bear over one percent of these impacts applying both discount rates, while units 19 and 29 are added to this list when a seven percent discount rate is used.

Distribution of impacts: The USFS is expected to bear approximately 60 percent of the total anticipated upper-bound incremental impacts using both discount rates of seven and three percent, while about 31 percent and over 30 percent of these impacts will accrue to the Service at seven and three percent discount rates, respectively. The remaining incremental impacts (about 10 percent applying both seven and three percent discount rates) are anticipated to be borne by BLM.

Baseline impacts: The present value baseline impact applying a seven percent discount rate is $6.37 to $6.38 billion or $8.95 to $8.96 billion applying a three percent discount rate. In annualized terms, potential baseline impacts are expected to range from $601.80 to $602.21 million (annualized at seven percent) and $601.77 to $602.15 million (annualized at three percent). These impacts are estimated based on the species conservation costs associated with timber management, Section 7 consultation process, survey and monitoring, and barred owl management, in order of magnitude.

Activities most impacted: Impacts associated with timber management comprise almost all the quantified baseline impacts in the areas proposed for designation using both discount rates. In summary:

- Timber Management: Impacts associated with timber management make up the largest proportion of post-designation baseline impacts, accounting for 99.84 percent of forecast baseline impacts applying both discount rates. These impacts are estimated at $6.37 billion using a seven percent discount rate, and $8.94 billion when a three percent discount rate is applied. Post-designation baseline timber management-related conservation impacts are based on the estimated changes in timber harvests and revenues (or values) that occur in response to conservation efforts for NSO.
- Section 7 Consultations: Administrative costs associated with Section 7 consultations account for 0.09 percent of forecast baseline impacts using both discount rates. These impacts are estimated at $5.54 million and $7.72 million applying seven and three percent discount rates, respectively.
- Survey and Monitoring Efforts: Costs of survey and monitoring efforts make up 0.06 percent of expected baseline impacts applying both discount rates, amounting to $4.10 million and $5.05 million using seven and three percent discount rates, respectively. These impacts stem from the total estimated cost of implementing the 1999 Northern Spotted Owl Effectiveness Monitoring Plan for the Northwest Forest Plan in the future.
- Barred Owl Management: Costs associated with barred owl management account for the final 0.01 percent of forecast baseline impacts at both discount rates, and are estimated at $0.88 million and $1.21 million applying seven and three percent discount rates, respectively. The amounts are driven by the total estimated costs of implementing the range of the relevant recovery actions listed in the 2007 Draft Recovery Plan for the Northern Spotted Owl.

Unit impacts: Most of the baseline impacts are allocated proportionately among the 29 units, while 0.01 percent is unallocated. Unit 5 is anticipated to bear the highest impact with over nine percent of baseline impacts applying both discount rates, followed by units 12 and 2 at approximately eight percent of impacts each.

Distribution of impacts: The USFS is expected to account for almost 86 percent of the total anticipated upper-bound baseline impacts using both discount rates, while BLM is forecast to bear approximately 14 percent of these impacts. The remaining (less than one percent) baseline impacts will accrue to the Service.

This analysis employs "without critical habitat" and "with critical habitat" scenarios. The "without critical habitat" scenario represents the baseline for the analysis, considering protections already accorded the species; for example, under the Federal listing and other Federal, state, and local regulations. The "with critical habitat" scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts are those not expected to occur absent the designation of critical habitat for the species. In other words, the incremental costs are those attributable solely to the designation of critical habitat above and beyond the baseline costs. The analysis looks retrospectively at baseline impacts incurred since the species was listed, and forecasts both baseline and incremental impacts likely to occur after the proposed critical habitat is finalized.

ES.1 RESULTS OF THE ANALYSIS

All the potential incremental impacts of the proposed designation are attributed to administrative costs related to the Section 7 consultation process. The potential baseline impacts are separated according to activity into four impact categories: impacts to timber management; impacts to survey and monitoring activities; impacts to barred owl management; and costs related to the Section 7 consultations. The proposed rule also identified fuel load management, natural disturbances (e.g., wildfires and wind storms), and to a lesser extent, linear projects as potential threats to the species. Additionally, a review of the consultation history for NSO revealed that about 30 percent of the Section 7 consultations between 1990 and 2007 were related to linear projects (such as pipelines, powerlines, and roads), restoration activities, and recreation. However, discussions with relevant Service biologists and USFS and BLM land managers confirmed that the anticipated impacts of the proposed designation on these activities range from minimal to none. The research conducted on all these sectors is presented in the relevant chapters. Table ES-1 provides detailed post-designation impact information for all affected activities. Post-designation impacts are provided in present value and annualized terms using seven and three percent discount rates.

As discussed in the preceding paragraph, administrative costs account for 100 percent of incremental impacts at both seven and three percent discount rates. In terms of baseline impacts, timber management costs make up 99.84 percent of the expected impacts at both the discount rates. The remaining baseline impacts stem from administrative costs (0.09 percent), survey and monitoring activities (0.06 percent), and barred owl management (0.01 percent).

Tables E-1 and E-2, located at the beginning of Appendix E, provide detailed total pre- and post-designation impact information on a unit-by-unit basis, respectively, while Tables E-3 to E-6 in the Appendix present the information on post-designation impacts for each activity. All post-designation impacts presented in this executive summary are based on upper-bound conservation impacts calculated at discount rates of seven and three percent. In the remainder of the report, results are presented using upper-bound impacts and discounted at seven percent. Discounted results using a three percent discount rate are also provided in the body of the report in footnotes.

Table ES-1
Summary of Post-Designation Conservation Impacts, by Activity ($1,000s of $2007)

Activity	Post-Designation (Total) (2008-2027)		Post-Designation (Annualized)	
	3%	7%	3%	7%
INCREMENTAL IMPACT				
Administrative	$1,865 – $2,894	$1,396 – $2,145	$122 – $195	$132 – $202
Total	**$1,865 – $2,894**	**$1,396 – $2,145**	**$122 – $195**	**$132 – $202**
BASELINE IMPACT				
Timber Management	$8,944,543	$6,369,266	$601,212	$601,212
Survey & Monitoring	$2,336 – $5,048	$1,944 – $4,095	$155 – $338	$181 – $387
Barred Owl Management	$1,207	$880	$82	$84
Administrative	$4,787 – $7,722	$3,442 – $5,536	$320 – $518	$324 – $522
Total	**$8,952,873 – $8,958,520**	**$6,375,532 – $6,379,777**	**$601,769 – $602,150**	**$601,801 – $602,205**

Note: Results are shown in $1,000s. Numbers may not sum due to rounding.

ES.1.1 Timber Management

According to the proposed rule, timber harvest has contributed to the habitat loss, degradation, and fragmentation for the NSO, and was the basis for the original listing of the species. The economic impacts associated with timber resources in the proposed critical habitat are based on the estimated changes in timber harvests and revenues (or values) that occur in response to conservation efforts for NSO. The effect on timber values are based on a comparison of timber values before and after NSO was Federally-listed in 1990. Timber harvests and values prior to 1990 represent base conditions against which subsequent changes in timber production are measured. For this analysis, the base condition covers the period between 1980 and 1989, which is intended to capture the natural market fluctuations in the timber industry before the effects of NSO were realized.

Since the listing of NSO, continued implementation of the Northwest Forest Plan (NWFP) was expected to greatly reduce the potential for conflicts between NSO critical habitat and timber harvests, and the incremental effect attributed to critical habitat is expected to be negligible. As such, the economic effects attributed to decreases in timber harvests and values are considered baseline impacts since the proposed designation would eliminate critical habitat from the matrix.

The baseline timber management impacts are estimated at $6.37 billion using seven percent discount rate and $8.94 billion at three percent discount rate. These impacts are allocated proportionally to critical habitat units based on their size and NWFP land use allocations (LUAs), with the largest impact expected in Unit 5 (over nine percent) and the smallest impact in Unit 18 applying both the discount rates. The USFS and BLM would incur almost all of the timber impacts, bearing 86 percent and 14 percent of these, respectively, at both the discount rates.

The baseline economic impacts associated with timber resources in the proposed critical habitat estimated in this analysis are based on the estimated changes in timber harvests and revenues. It is important to note that Federal timber-based revenues are shared with the counties where the timber is harvested, with approximately 25 percent of the gross timber revenues from USFS timberlands and BLM public domain timberlands and 50 percent of the gross timber revenues from USFS and BLM O&C (Oregon and California Railroad Company) timberlands being shared with the counties. These revenue-sharing dollars are used by the counties to fund county services and schools. A portion of the baseline timber impacts estimated in this analysis will translate to lost timber revenue sharing dollars to affected counties. However, the actual impact to county revenues depends on whether the Federal government continues to offset lost timber-based revenues in the future. In the past, Federal programs were adopted to minimize the disruption to local government finances associated with declining harvest levels, such as the "Safety Net" program in 1991 and the "Secure Rural Schools and Community Self-Determination Act" in 2000. These programs provided the affected counties with hundreds of millions of dollars annually to counter some of the declining revenue sharing payments. However, the Safety Net program only provided the counties with guaranteed funding for ten years, the Secure Rural Schools bill was only funded through 2007, and the future funding of Federal programs to offset the lost timber-based revenues is uncertain.

ES.1.2 Survey and Monitoring Efforts

The NSO has been subject to intensive survey efforts and monitoring activities prior to and in response to listing of the species, as well as implementation of the NWFP. In fact, the Northern Spotted Owl Effectiveness Monitoring Plan for the Northwest Forest Plan (Monitoring Plan) was developed in 1999 to establish formal guidelines related to monitoring activities for NSO. The purpose of the existing Monitoring Plan is to assess trends in NSO populations and habitat. The document also presents a summary of the annual funding estimate associated with monitoring activities for the period 1996 to 2005. Future costs of implementing the NWFP monitoring program are uncertain as the program is currently undergoing review. It is likely that the program will be extended for at least another five and possibly up to 10 years. Beyond that point, it would be speculative to forecast whether the program would continue, what form it would take, and at what cost; therefore, for this analysis, it is assumed that there would be no future monitoring costs beyond the next 10 years.

There are no incremental post-designation economic impacts associated with surveying and monitoring activities related to NSO as none of the ongoing/projected monitoring activities anticipated under the NWFP are designed and/or implemented to address conditions in the proposed critical habitat area and no additional monitoring is planned in areas of proposed critical habitat. The post-designation baseline economic impacts associated with surveying and monitoring activities related to NSO consist of the total estimated cost of implementing the NWFP monitoring plan in the future. This analysis is based on a per-acre cost for NWFP monitoring activities.

The baseline impacts due to NSO monitoring amount to approximately $4.10 million at seven percent discount rate and $5.05 million using three percent discount rate. These impacts are expected to occur proportionately across all critical habitat units and would be incurred by Federal land management

agencies, primarily USFS (86 percent using both discount rates) and BLM (14 percent at both discount rates), who have monitoring responsibilities under the NWFP.

ES.1.3 Barred Owl Management

The 2007 Draft Recovery Plan for the Northern Spotted Owl (Draft Recovery Plan) identifies competition from the barred owl (*Strix varia*) as one of the most significant threats currently facing NSO. The Draft Recovery Plan identifies a comprehensive suite of future actions recommended by the multi-agency Recovery Team to address the barred owl threat, which represent the Federal agencies' current approach related to barred owl management. Also, included in the Draft Recovery Plan are estimated costs of implementing these recovery actions over the Draft Recovery Plan's 30-year planning period, which extends from year 2007 to year 2036. The expected future costs of barred owl control and management estimated in this analysis are based directly on the costs of applicable recovery actions reported in the Draft Recovery Plan.

There are no incremental post-designation economic impacts associated with barred owl management and control activities since none of the future recovery actions related to barred owl management and control have been developed specifically due to the proposed critical habitat designation, but instead would be implemented for the long-term conservation of NSO. Further, barred owl management efforts are expected to occur across the entire range of NSO and would not be focused within the proposed critical habitat designation. The post-designation baseline economic impact associated with barred owl control and management for the benefit of NSO consist of the total estimated costs of implementing the range of the relevant recovery actions listed in the Draft Recovery Plan.

The baseline impacts associated with barred owl management amount to approximately $0.88 million and $1.21 million at seven and three percent discount rates, respectively. These impacts are expected to occur proportionately across all critical habitat units with the largest impact anticipated Unit 5 and the smallest impact in Unit 18. The impacts would be incurred by Federal land management and regulatory agencies, including USFS (86 percent at both discount rates) and BLM (14 percent using both discount rates).

ES.1.4 Section 7 Consultations

Based on available data and some adjustments made to these, the analysis estimates that 3,615 NSO-related Section 7 consultations have occurred since the species was listed in 1990, through 2007; 550 occurred within the boundaries of the proposed designation and 3,065 occurred outside the boundaries of the proposed designation, respectively.

The analysis of forecast consultations by type (technical assistance, informal, formal, batched, and programmatic) is based on a review of historical consultations and information received from the Service, BLM, and USFS regarding future consultations on USFS Land Management Plans (LMPs) and BLM Resource Management Plans (RMPs). The number of estimated post-designation consultations for activities within a given unit is highly uncertain. Specific information on the geographic distribution of

past consultations is not readily available, and the exact location of specific future projects is speculative. As a result, administrative consultation costs are quantified in an "unallocated" line item of the cost model for areas proposed for critical habitat and are included in the total impact estimates.

This analysis estimates that 28 consultations will occur annually within the boundaries of the proposed designation during the post-designation period. Approximately 82 percent of the annual consultation activity (23 consultations) are expected to involve individual informal, formal, and technical assistance efforts, with informal consultations accounting for 57 percent (13 consultations) of the individual consultation efforts, followed by formal consultations (six, or 27 percent) and technical assistance (four, or 16 percent). Batched and programmatic consultations account for the remaining 14 percent (four consultations) and four percent (one consultation), respectively. More than 90 percent of the consultation activity is expected to involve timber management actions, followed by transportation actions, other unspecified actions, restoration actions, recreation actions, and fire management/fuels reduction actions. In addition to the consultation efforts forecast above, each national forest and BLM district is expected to revise and consult and/or reinitiate consultation with the Service on their LMP or RMPs.

The anticipated post-designation incremental Section 7 consultation impacts are estimated at about $2.15 million at seven percent discount rate and approximately $2.89 million using a discount rate of three percent. Other than the USFS and BLM LMPs and RMPs, the geographic location of future projects is uncertain. Thus, approximately 81 percent and 84 percent of the forecast incremental administrative consultation impacts are unallocated at discount rates of seven and three percent, respectively. The remaining percent are allocated to the units by national forest and BLM district. In terms of entities impacted, about 31 percent and over 30 percent of the incremental administrative impacts will be borne by the Service at seven and three percent discount rates, respectively. Because the entire proposed designation is located on USFS and BLM managed lands, these agencies are expected to bear most of the remaining impacts, with approximately 60 percent accruing to USFS and about 10 percent to BLM at both discount rates.

The baseline impacts associated with Section 7 consultations amount to approximately $5.54 million and $7.72 million at seven and three percent discount rates, respectively. Approximately 94 percent of the forecast baseline administrative consultation impacts are unallocated using both discount rates. The remaining six percent are allocated to the units by national forest and BLM district. In terms of entities impacted, approximately 28 percent of the baseline impacts will be borne by the Service applying both discount rates. Similar to the distribution of incremental impacts, the USFS and BLM are expected to bear the remaining baseline administrative impacts, accounting for 62 percent and 10 percent of these, respectively, at both the discount rates.

ES.2 AREAS MOST LIKELY TO EXPERIENCE IMPACTS

Figure ES-2 illustrates the ranking of proposed designation units by incremental impact using seven and three percent discount rates, while Figure ES-3 presents the same information by baseline impact. Tables providing detailed impact estimates are presented in Appendix E. As shown, almost 81 percent of incremental impacts are unallocated due to uncertainty regarding the number of estimated post-

designation consultations for activities within a given unit applying a seven percent discount rate; this proportion changes to about 84 percent when a three percent discount rate is used. Units 12, 17, and 24 each account for over one percent of the incremental impacts applying both discount rates, while two more units, 19 and 29, are added to this list when a discount rate of seven percent is used. The remaining impacts are shared between other units. In terms of baseline impacts, most of these are allocated proportionately among the 29 units, while 0.01 percent is unallocated. Unit 5 is anticipated to bear the highest impact with over nine percent of baseline impacts applying both discount rates, followed by units 12 and 2 at approximately eight percent of impacts each.

ES.3 DISTRIBUTIONAL IMPACTS

Figure ES-4 illustrates the distribution of incremental and baseline impacts. The USFS is expected to bear approximately 60 percent of the total anticipated upper-bound incremental impacts using both discount rates of seven and three percent, while about 31 percent and over 30 percent of these impacts will accrue to the Service at seven and three percent discount rates, respectively. The remaining incremental impacts (about 10 percent applying both seven and three percent discount rates) are anticipated to be borne by BLM. In terms of baseline impacts, using both discount rates, USFS is anticipated to bear almost 86 percent of these impacts, while BLM is forecast to bear approximately 14 percent of these. The remaining (less than one percent) baseline impacts will accrue to the Service.

This study also analyzes whether a particular group or economic sector in expected to bear an undue proportion of the impacts. Specifically, Appendix B describes potential impacts of proposed designation to small entities.

Figure ES-2
Incremental Economic Impacts of the Proposed Designation, by Habitat Unit ($2007)

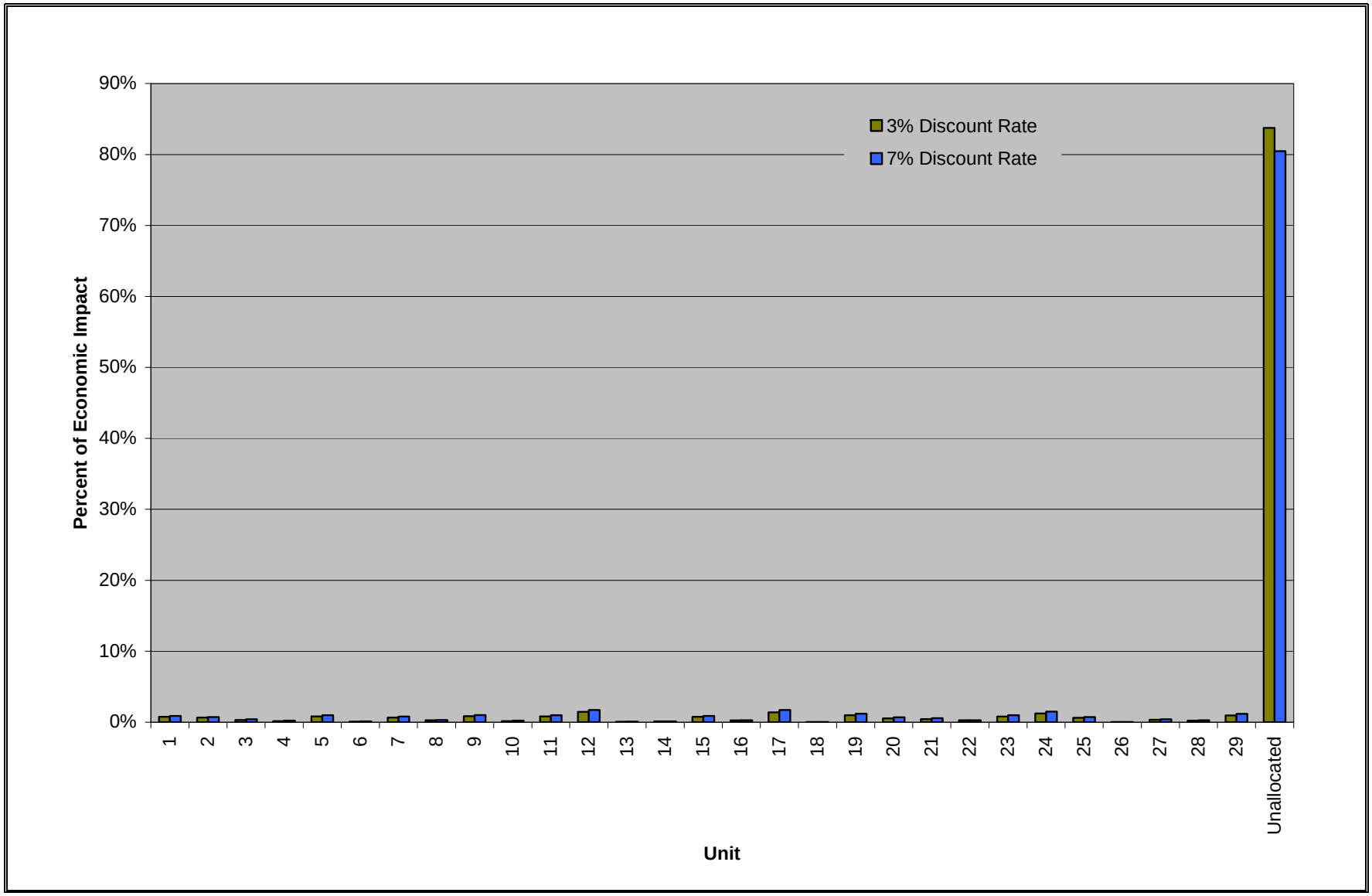


Figure ES-3
Baseline Economic Impacts of the Proposed Designation, by Habitat Unit ($2007)

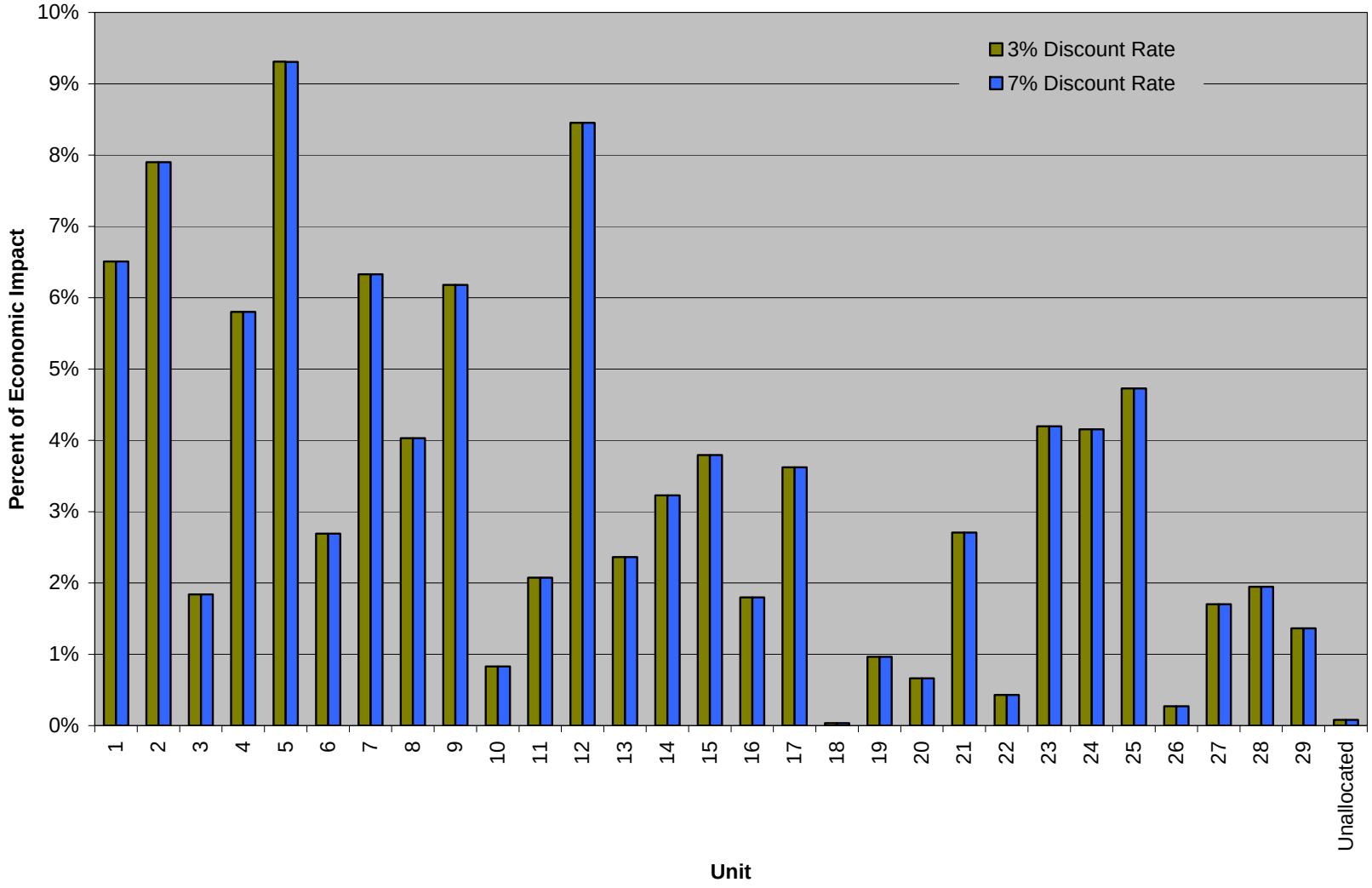
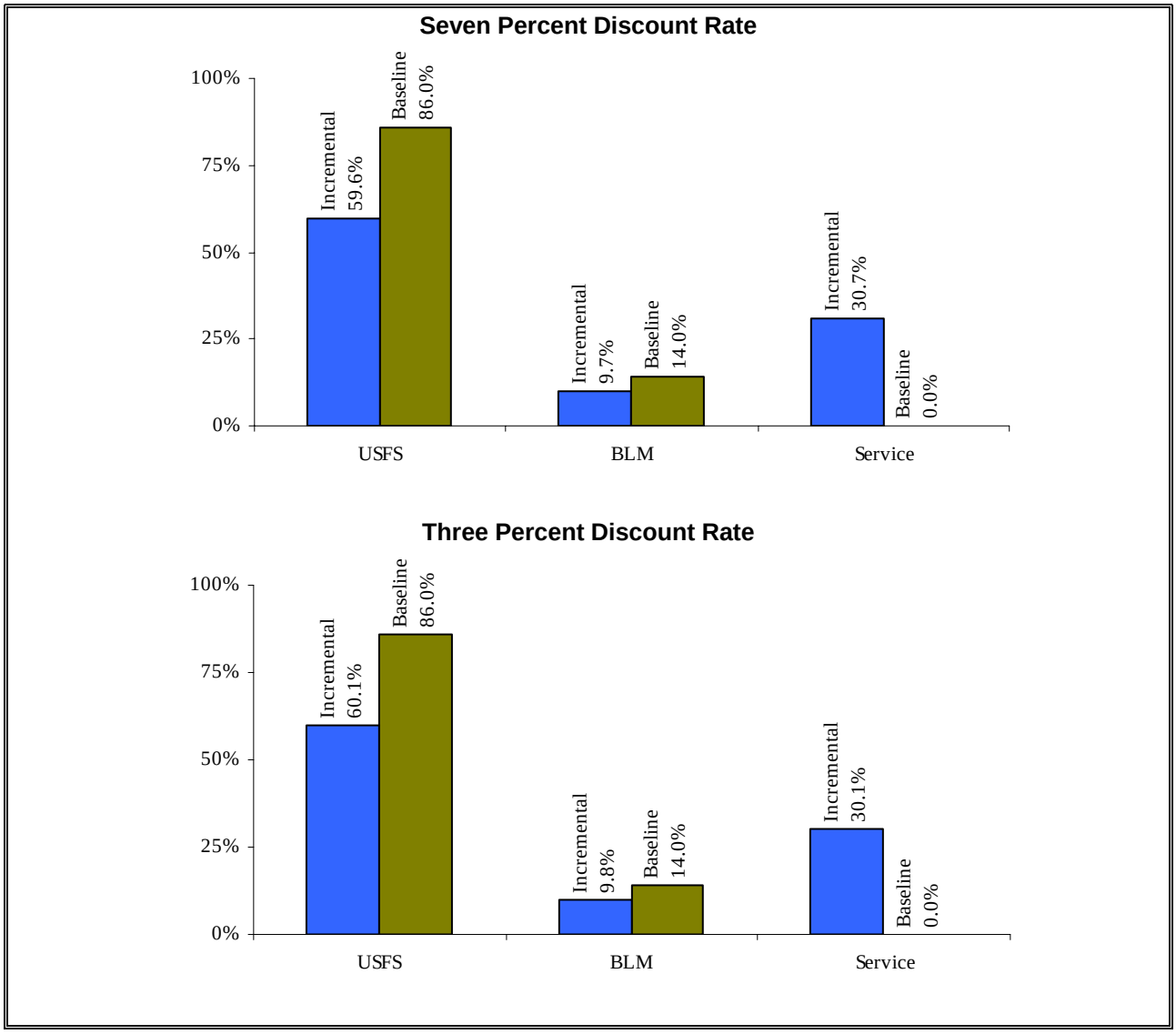


Figure ES-4
Relative Impact by Affected Party



1.0
FRAMEWORK FOR ANALYSIS

The purpose of this report is to estimate the economic impact of critical habitat designation to protect the Federally-listed *Strix occidentalis caurina* (northern spotted owl) (hereinafter, "NSO" or "species"), and its habitat. This analysis examines the impacts of restricting or modifying specific land uses or activities for the benefit of the species and its habitat within the areas considered for the proposed revised critical habitat designation.[6] Unless otherwise stated, all references to the critical habitat designation in this report are related to the *proposed revised* critical habitat designation.

The final rule listing NSO as threatened (hereinafter, referred to as "final listing")[7] and the proposed rule designating revised critical habitat for the species (hereinafter, referred to as "proposed rule")[8] identify competition with barred owl and loss, degradation, and fragmentation of habitat due to timber harvests and sales, fuel load management, and natural disturbances (e.g., wildfires and wind storms) as the primary threats to NSO. To a lesser extent, there are also certain types of development projects, primarily linear projects (such as pipelines, powerlines, and roads) proposed by Federal, state, local, or private entities on public lands, which could adversely affect NSO habitat. The identification of primary and secondary threats to NSO was refined through discussions with U.S. Fish and Wildlife Service (Service) biologists and USFS and BLM land managers. Therefore, while this economic analysis examines all activities identified in the proposed rule, it especially focuses on activities that appear to impact NSO the most; barred owl management and timber management.

This analysis employs "without critical habitat" and "with critical habitat" scenarios. The "without critical habitat" scenario represents the baseline for the analysis, considering protections already accorded the species; for example, under the Federal listing and other Federal, state, and local regulations. The "with critical habitat" scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts are those not expected to occur absent the designation of critical habitat for the species. The analysis looks retrospectively at baseline impacts incurred since the species was listed, and forecasts both baseline and incremental impacts likely to occur after the proposed critical habitat is finalized.

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6 Endangered and Threatened Wildlife and Plants; Proposed Revised Designation of Critical Habitat for the Northern Spotted Owl (*Strix occidentalis caurina*); Proposed Rule, *Federal Register*, Vol. 72, No. 152, June 12, 2007.

7 Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Northern Spotted Owl; Final Rule, *Federal Register*, Vol. 55, No. 123, June 26, 1990.

8 Endangered and Threatened Wildlife and Plants; Proposed Revised Designation of Critical Habitat for the Northern Spotted Owl (*Strix occidentalis caurina*); Proposed Rule, *Federal Register*, Vol. 72, No. 152, June 12, 2007.

This information is intended to assist the Secretary of the Interior (Secretary) in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.[9] In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).[10]

This section describes the framework for the analysis. First, it provides background on the framework applied. It then describes general categories of economic effects that may be associated with species conservation, including a discussion of both efficiency and distributional effects. Next, this section discusses the analytic framework and scope of the analysis, including the link between existing and critical habitat-related protection efforts and economic impacts, and the consideration of benefits. It then presents the information sources relied upon in the analysis and the structure of the report.

1.1 BACKGROUND

The U.S. Office of Management and Budget's (OMB) guidelines for conducting economic analysis of regulations direct Federal agencies to measure the costs of a regulatory action against a baseline, which it defines as the "best assessment of the way the world would look absent the proposed action."[11] In other words, the baseline includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the proposed designation of critical habitat absent the designation itself. Impacts that are incremental to that baseline (i.e., occurring over and above existing constraints) are attributable to the proposed regulation; these are the "incremental effects" of the proposed critical habitat. Significant debate has occurred regarding whether assessing the impacts of the Service's proposed regulations using this baseline approach is appropriate in the context of critical habitat designations.

In 2001, the U.S. Tenth Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat, regardless of whether those impacts are attributable coextensively to other causes.[12] Specifically, the court stated

> "The statutory language is plain in requiring some kind of consideration of economic impact in the CHD phase. Although 50 C.F.R. 402.02 is not at issue here, the regulation's definition of the jeopardy standard as fully encompassing the adverse

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9 16 U.S.C. §1533(B)(2)

10 Executive Order 12866, Regulatory Planning and Review, September 30, 1993; Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001; 5.U.S.C. §601 et seq; and Pub Law No. 104-121.

11 OMB, "Circular A-4," September 17, 2003.

12 *New Mexico Cattle Growers Assn v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).

> modification standard renders any purported economic analysis done utilizing the baseline approach virtually meaningless. We are compelled by the canons of statutory interpretation to give some effect to the congressional directive that economic impacts be considered at the time of critical habitat designation…. Because economic analysis done using the Services' baseline model is rendered essentially without meaning by 50 C.F.R. § 402.02, we conclude Congress intended that the Service conduct a full analysis of all of the economic impacts of a critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes. Thus, we hold the baseline approach to economic analysis is not in accord with the language or intent of the Endangered Species Act (ACT)."[13]

Since that decision, however, courts in other cases have held that an incremental analysis of impacts stemming solely from the critical habitat rulemaking is proper.[14] For example, in the March 2006 court order ruling that the August 2004 critical habitat rule for the Peirson's milk-vetch was arbitrary and capricious, the United States District Court for the Northern District of California stated,

> "The Court is not persuaded by the reasoning of *New Mexico Cattle Growers*, and instead agrees with the reasoning and holding of *Cape Hatteras Access Preservation Alliance v. U.S. Dep't of the Interior*, 344 F. Supp 2d 108 (D.D.C. 2004). That case also involved a challenge to the Service's baseline approach and the court held that the baseline approach was both consistent with the language and purpose of the ESA and that it was a reasonable method for assessing the actual costs of a particular critical habitat designation *Id* at 130. 'To find the true cost of a designation, the world with the designation must be compared to the world without it.'"[15]

In order to address the divergent opinions of the courts and provide the most complete information to decision-makers, this economic analysis reports both:

a. the baseline impacts of species conservation from protections afforded the species absent critical habitat designation; and

b. the estimated incremental impacts precipitated specifically by the designation of critical habitat for the species.

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13 Ibid.

14 *Cape Hatteras Access Preservation Alliance v. Department of Interior*, 344 F. Supp. 2d 108 (D.D.C.); CBD v. BLM, 422 F. Supp/. 2d 1115 (N.D. Cal. 2006).

15 Center for Biological Diversity v. Bureau of Land Management ("CBD v.BLM"), 422 F. Supp. 2d 1115, 1168 (N.D. Cal. 2006).

Summed, these two types of impacts comprise the fully co-extensive impacts of species conservation in areas considered for critical habitat designation.

Incremental effects of critical habitat designation are determined based on the statutory prohibition on "destruction or adverse modification" of critical habitat and using the Service's December 9, 2004 interim guidance on "Application of the 'Destruction or Adverse Modification' Standard Under Section 7(a)(2) of the Endangered Species Act" as well as information from the Service regarding what potential consultations and project modifications would be imposed as a result of critical habitat designation over and above those associated with the listing.[16] The following section describes the methods employed to identify baseline and incremental impacts of species conservation.

1.2 CATEGORIES OF POTENTIAL ECONOMIC EFFECTS OF SPECIES CONSERVATION

This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the species and its habitat (hereinafter referred to collectively as "species conservation efforts"). Economic efficiency effects generally reflect "opportunity costs" associated with the commitment of resources required to accomplish species and habitat conservation. For example, if activities that can take place on a parcel of land are limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under Section 7 represent opportunity costs of species conservation efforts.

This analysis also addresses the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation efforts on small entities and the energy industry. This information may be used by decision-makers to assess whether the effects of critical habitat designation unduly burden a particular group or economic sector. For example, while critical habitat may have a smaller impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience relatively greater impacts. The differences between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

1.2.1 EFFICIENCY EFFECTS

At the guidance of the OMB and in compliance with Executive Order 12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. In the context of regulations that protect NSO habitat,

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[16] Director, U.S. Fish and Wildlife Service, Memorandum to Regional Directors and Manager of the California-Nevada Operations Office, Subject: Application of the "Destruction or Adverse Modification" Standard under Section 7(a)(2) of the Endangered Species Act, dated December 9, 2004.

these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.[17]

In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a Federal land manager, such as the USFS, may enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the critical habitat component of the consultation is an economic opportunity cost; because the landowner or manager's time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets - that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded, given a change in price - the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.

Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that may constrain the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the market.

This analysis begins by measuring impacts associated with efforts undertaken to protect NSO and its habitat. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the cost of conservation efforts is expected to significantly impact markets, the analysis will consider potential changes in consumer and/or producer surplus in affected markets. For this analysis, compliance costs are estimated. Market effects are unlikely because the incremental impacts of the proposed regulation are administrative section 7 consultation costs borne by Federal government agencies.

The baseline economic impacts associated with timber resources in the proposed critical habitat estimated in this analysis are based on the estimated changes in timber harvests and revenues. It is important to note that Federal timber-based revenues are shared with the counties where the timber is harvested, with approximately 25 percent of the gross timber revenues from USFS timberlands and BLM public domain timberlands and 50 percent of the gross timber revenues from USFS and BLM O&C (Oregon and California Railroad Company) timberlands being shared with the counties. These revenue-sharing dollars are used by the counties to fund county services and schools. A portion of the baseline timber impacts estimated in this analysis will translate to lost timber revenue sharing dollars to affected counties.

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[17] For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see: Gramlich, Edward M., *A Guide to Benefit-Cost Analysis (2nd Ed.)*, Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, September 2000, available at http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html.

However, the actual impact to county revenues depends on whether the Federal government continues to offset lost timber-based revenues in the future. In the past, Federal programs were adopted to minimize the disruption to local government finances associated with declining harvest levels, such as the "Safety Net" program in 1991 and the "Secure Rural Schools and Community Self-Determination Act" in 2000. These programs provided the affected counties with hundreds of millions of dollars annually to counter some of the declining revenue sharing payments. However, the Safety Net program only provided the counties with guaranteed funding for ten years, the Secure Rural Schools bill was only funded through 2007, and the future funding of Federal programs to offset the lost timber-based revenues is uncertain.

1.2.2 Distributional and Regional Economic Effects

Measurements of changes in economic efficiency focus on the net impact of conservation efforts, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. The OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.[18] This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

[18] U.S. Office of Management and Budget, "Circular A-4," http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf, September 17, 2003.

Calculating Present Value and Annualized Impacts

For each land use activity, this analysis compares economic impacts incurred in different time periods in present value terms. The present value represents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in today's dollars. Translation of economic impacts of past or future impacts to present value terms requires the following: a) past or projected future impacts of species conservation efforts; and b) the specific years in which these impacts have been or are expected to be incurred. With these data, the present value of the past or future stream of impacts (PV_c) of species conservation efforts from year t to T is measured in 2007 dollars according to the following standard formula:[a]

$$PV_c = \sum_{t}^{T} \frac{C_t}{(1+r)^{t-2007}}$$

C_t = Cost of species conservation efforts in year t

r = Discount rate[b]

Impacts of conservation efforts for each activity in each unit are also expressed as annualized values (i.e., the series of equal annual costs over some defined time period that have the same present value as estimated total impacts). Annualized values are calculated to provide comparison of impacts across activities with varying forecast periods (T). For this analysis, however, all activities employ a forecast period of 20 years, 2008 through 2027. Annualized impacts of future species conservation efforts (APV_c) are calculated using the following standard formula:

$$APV_c = PV_c \left[\frac{r}{1-(1+r)^{-(N)}} \right]$$

N = Number of years in the forecast period

[a] To derive the present value of pre-designation conservation efforts for this analysis, t is 1990 and T is 2007; to derive the present value of post-designation conservation efforts, t is 2008 and T is 2027.

[b] To discount and annualize costs, guidance provided by the OMB specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates such as three percent, which, some economists believe, better reflects the social rate of time preference. (U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003.)

1.2.2.1 Impacts on Small Entities and Energy Supply, Distribution, and Use

This analysis also considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, might be impacted by the effects of critical habitat.[19] In addition, in response to Executive Order 13211 "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the future impacts of conservation efforts on the energy industry and its customers.[20]

1.2.2.2 Regional Economic Effects

Regional economic impact analysis can provide an assessment of the potential localized effects of conservation efforts. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that represent the relationship between a change in one sector of the economy (e.g., expenditures by recreators) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreators). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.

The use of regional input/output models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.

Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact. A regional economic analysis was not performed in this study because it is believed that the original effect to the industry has already trickled through since the current (1992) critical habitat designation of NSO, and the economy has more

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[19] 5 U.S.C. § 601 *et seq*.

[20] Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001.

or less adjusted in response. While there may be some regional impacts associated with the proposed designation, sufficient information is not available to analyze these.

1.3 ANALYTIC FRAMEWORK AND SCOPE OF THE ANALYSIS

This analysis identifies those economic activities believed to most likely threaten the listed species and their habitat and, where possible, quantifies the economic impact to avoid, mitigate, or compensate for such threats within the boundaries, or adjacent to, the proposed designation. This section provides a description of the methodology used to separately identify baseline impacts and incremental impacts stemming from the proposed designation of critical habitat for the species. This evaluation of impacts in a "with critical habitat designation" versus a "without critical habitat designation" framework effectively measures the net change in economic activity associated with the proposed rulemaking.

1.3.1 IDENTIFYING BASELINE IMPACTS

The baseline for this analysis is the existing state of regulation, prior to the designation of critical habitat, that provides protection to the species under the Endangered Species Act (Act), as well as under other Federal, state, and local laws and guidelines. The "without critical habitat designation" scenario, which represents the baseline for this analysis, considers a wide range of additional factors beyond the compliance costs of regulations that provide protection to the listed species. As recommended by OMB, the baseline incorporates, as appropriate, trends in market conditions, implementation of other regulations and policies by the Service and other government entities, and trends in other factors that have the potential to affect economic costs and benefits, such as the rate of regional economic growth in potentially affected industries.

Baseline impacts include sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections to the extent that they are expected to occur absent the designation of critical habitat for the species.

- Section 7 of the Act, absent critical habitat designation, requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species. The portion of the administrative costs of consultations under the jeopardy standard, along with the impacts of project modifications resulting from consideration of this standard, are considered baseline impacts.

- Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the unauthorized “take” of endangered wildlife, where “take” means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.”[21] Take

[21] 16 U.S.C. 1532.

by Federal actions can be authorized through the Section 7 incidental take statement as long as the take does not jeopardize the species. Non-Federal actions may receive an incidental take permit under Section 10. The economic impacts associated with this section manifest themselves in sections 7 and 10.

- Under Section 10(a)(1)(B) of the Act, a non-Federal entity (e.g., a landowner or local government) may develop a Habitat Conservation Plan (HCP) for a listed animal species as part of the conditions for issuance of an incidental take permit in connection with the development and management of a property.[22] The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. The development and implementation of HCPs is considered a baseline protection for the species and habitat unless the HCP is determined to be precipitated because of the designation of critical habitat, or the designation influences stipulated conservation efforts under HCPs.

The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as state and local governments, may also seek to protect the natural resources under their jurisdiction. If the Clean Water Act or State environmental quality act compliance, for example, protects habitat for the species, for the purpose of this analysis, such protective efforts are considered to be baseline protections and costs associated with these efforts are categorized accordingly. Of note, however, is that such efforts may not be considered baseline in the case that they would not have been triggered absent the designation of critical habitat. In these cases, they are considered incremental impacts and are discussed below.

1.3.2 Identifying Incremental Impacts

This analysis separately quantifies the incremental impacts of this rulemaking. The focus of the incremental analysis is to determine the impacts on land uses and activities from the designation of critical habitat that are above and beyond those impacts due to existing required or voluntary conservation efforts being undertaken due to other Federal, state, and local regulations or guidelines.

Section 7 requires all Federal agencies to consider whether their actions are likely to jeopardize the continued existence of a listed species. When critical habitat is designated, Federal agencies must additionally ensure that their actions will not result in the destruction or adverse modification of that critical habitat. The added administrative costs of including consideration of critical habitat in Section 7 consultations, and the additional impacts of implementing project modifications resulting from the protection of critical habitat are the direct compliance costs of designating critical habitat. These costs are not in the baseline, and are considered incremental impacts of the rulemaking.

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[22] U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," http://endangered.fws.gov/hcp/, accessed November 8, 2007.

Figure 1-1 depicts the decision analysis regarding whether an impact should be considered incremental. The following sections describe this decision tree in detail.

Incremental impacts may be the direct compliance costs associated with additional effort for forecast consultations, reinitiated consultations, new consultations occurring specifically because of the designation, and additional project modifications that would not have been required under the jeopardy standard. Additionally, incremental impacts may include indirect impacts resulting from reaction to the potential designation of critical habitat (e.g., developing HCPs specifically to try to avoid designation of critical habitat), triggering of additional requirements under State or local laws intended to protect sensitive habitat, and uncertainty and perceptional effects on markets.

1.3.2.1 Direct Impacts

The direct, incremental impacts of critical habitat designation stem from the consideration of the potential for destruction or adverse modification of critical habitat during Section 7 consultations. The two categories of direct, incremental impacts of critical habitat designation are: 1) the administrative costs of conducting Section 7 consultation; and 2) implementation of any project modifications requested by the Service through Section 7 consultation to avoid, compensate for, or mitigate potential destruction or adverse modification of critical habitat.

Administrative Section 7 Consultation Costs

Parties involved in Section 7 consultations include the Service, a Federal "action agency," and in some cases, a private entity involved in the project or land use activity. The action agency (i.e., the Federal nexus necessitating the consultation) serves as the liaison with the Service. While consultations are required for activities that involve a Federal nexus and may jeopardize the continued existence of the species regardless of whether critical habitat is designated, the designation may increase the effort for such consultations in the case that the project or activity in question may adversely modify critical habitat. Administrative efforts for consultation may therefore result in both baseline and incremental impacts.

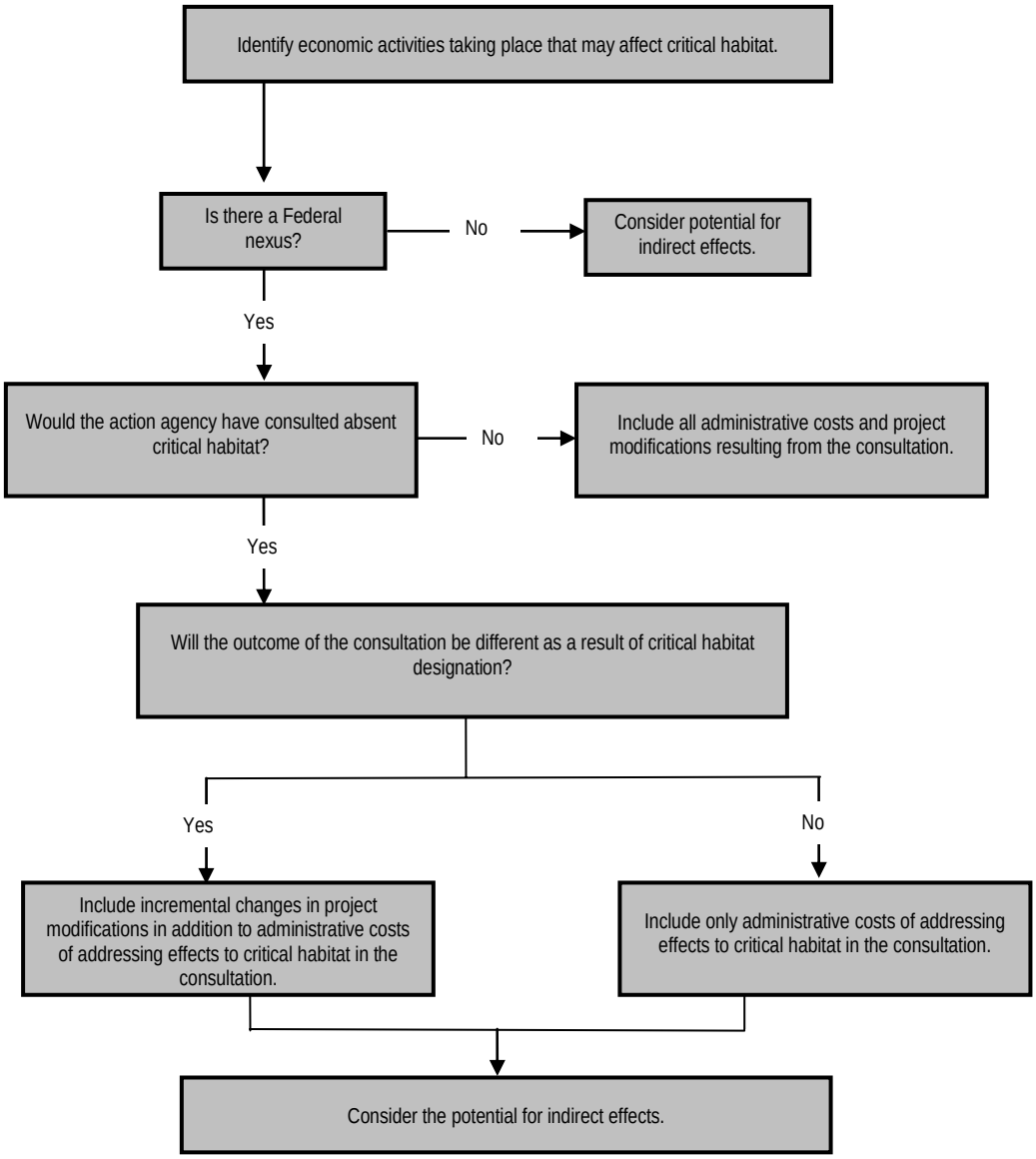
In general, three different scenarios associated with the designation of critical habitat may trigger incremental administrative consultation costs:

1. **Additional effort to address effects to critical habitat in a new consultation** - New consultations taking place after critical habitat designation may require additional effort to address critical habitat issues above and beyond the listing issues. In this case, only the additional administrative effort required to consider critical habitat is considered an incremental impact of the designation.

2. **Re-initiation of consultation to address effects to critical habitat** - Consultations that have already been completed on a project or activity may require re-initiation to address critical habitat. In this case, the costs of re-initiating the consultation, including all associated

administrative and project modification costs are considered incremental impacts of the designation.

Figure 1-1
Identifying Incremental Impacts of Critical Habitat Designation



3. **Consultation resulting entirely from critical habitat designation -** Critical habitat designation may trigger additional consultations that may not occur absent the designation (e.g., for an activity for which effects to critical habitat may be an issue, while effects to the species are not or consultations resulting from the new information about the potential presence of the species provided by the designation). Such consultations may, for example, be triggered in critical habitat areas that are not currently occupied by the species. All associated administrative and project modification costs of such consultations are considered incremental impacts of the designation.

Section 7 Project Modification Impacts

Section 7 consultation considering critical habitat may also result in additional project modification recommendations specifically addressing potential destruction or adverse modification of critical habitat. For forecast consultations considering jeopardy and adverse modification, and for re-initiations of past consultations to consider critical habitat, the economic impacts of project modifications undertaken to mitigate effects to critical habitat or avoid adverse modification are considered incremental impacts of critical habitat designation. For consultations that are forecast to occur specifically because of the designation (incremental consultations), impacts of all associated project modifications are assumed to be incremental impacts of the designation. This is summarized below.

1. **Additional effort to address adverse modification in a new consultation -** Only project modifications associated solely with avoiding, compensating for, or mitigating adverse modification are considered incremental.

2. **Re-initiation of consultation to address effects to critical habitat -** Only project modifications associated solely with mitigating effects to critical habitat or avoiding adverse modification are considered incremental.

3. **Incremental consultation resulting entirely from critical habitat designation -** Impacts of all project modifications are considered incremental

1.3.2.2 Indirect Impacts

The designation of critical habitat may, under certain circumstances, affect actions that do not have a Federal nexus and thus are not subject to the provisions of Section 7 under the Act. Indirect impacts are those unintended changes in economic behavior that may occur outside of the Act, through other Federal, state, or local actions, which are caused by the designation of critical habitat. This section identifies common types of indirect impacts that may be associated with the designation of critical habitat. Importantly, these types of impacts are not always considered incremental. In the case that these types of conservation efforts and economic effects are expected to occur regardless of critical habitat designation, they are appropriately considered baseline impacts in this analysis.

Habitat Conservation Plans

HCPs intend to counterbalance potential harmful effects that a proposed activity may have on a species, while allowing the otherwise lawful activity to proceed. As such, the purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. Thus, HCPs are developed to ensure compliance with Section 9 of the Act and to meet the requirements of Section 10 of the Act.

HCPs are not required or necessarily recommended by a critical habitat designation. Some landowners, however, may voluntarily complete a HCP in response to the prospect of having their land designated as critical habitat with the expectation that their land may then be considered for exclusion from the designation. In this case, the effort involved in creating the HCP and undertaking associated conservation actions are considered an incremental effect of designation. Because proposed revised critical habitat for the NSO is located solely on Federal lands managed by the USFS and BLM, indirect impacts related to HCPs, which apply to nonfederal individuals/agencies, are not expected.

Other State and Local Laws

Under certain circumstances, critical habitat designation may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other state or local laws. In instances where these impacts would not have been triggered absent critical habitat designation, they are considered indirect, incremental impacts of the designation. In case of NSO, since all land within the proposed critical habitat designation is owned by Federal government agencies, there are no impacts related to state or local regulations.

Additional Indirect Impacts

In addition to the indirect effects of compliance with other laws or regulations triggered by the designation, project proponents, land managers and landowners may face additional indirect impacts, including the following:

- **Time Delays** - Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the need to reinitiate the Section 7 consultation process and/or compliance with other laws triggered by the designation. To the extent that delays result from the designation, they are considered indirect, incremental impacts of the designation.

- **Regulatory Uncertainty** - The Service conducts each Section 7 consultation on a case-by-case basis and issues a biological opinion on formal consultations based on species-specific and site-specific information. As a result, government agencies and affiliated private parties who consult with the Service under Section 7 may face uncertainty concerning whether project modifications will be recommended by the Service and what the nature of these modifications will be. This uncertainty may diminish as consultations are completed and additional information becomes

available on the effects of critical habitat on specific activities. Where information suggests that this type of regulatory uncertainty stemming from the designation may affect a project or economic behavior, associated impacts are considered indirect, incremental impacts of the designation.

- **Stigma** - In some cases, the public may perceive that critical habitat designation may result in limitations on private property uses above and beyond those associated with anticipated project modifications and regulatory uncertainty described above. Public attitudes about the limits or restrictions that critical habitat may impose can cause real economic effects to property owners, regardless of whether such limits are actually imposed. All else equal, a property that is designated as critical habitat may have a lower market value than an identical property that is not within the boundaries of critical habitat due to perceived limitations or restrictions. As the public becomes aware of the true regulatory burden imposed by critical habitat, the impact of the designation on property markets may decrease. To the extent that potential stigma effects on markets are probable and identifiable, these impacts are considered indirect, incremental impacts of the designation. Because proposed critical habitat is located solely on Federal lands managed by the USFS and BLM, stigma impacts on private property are not expected.

1.3.3 BENEFITS

Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.[23] The OMB's Circular A-4 distinguishes two types of economic benefits: *direct benefits and ancillary benefits*. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.[24]

In the context of the critical habitat designation, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.[25] *Rather than rely on economic measures, the Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

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[23] Executive Order 12866, *Regulatory Planning and Review*, September 30, 1993.

[24] U.S. Office of Management and Budget, "Circular A-4," http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf, September 17, 2003.

[25] Ibid.

Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, critical habitat designation can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.

It is often difficult to evaluate the ancillary benefits of critical habitat designation. To the extent that the ancillary benefits of the rulemaking may be captured by the market through an identifiable shift in resource allocation, they are factored into the overall economic impact assessment. For example, if habitat preserves are created to protect a species, the value of existing residential property adjacent to those preserves may increase, resulting in a measurable positive impact. Where data are available, this analysis attempts to capture the net economic impact (i.e., the increased regulatory burden less any discernable offsetting market gains), of species conservation efforts imposed on regulated entities and the regional economy.

1.3.4 Geographic Scope of the Analysis

The geographic scope of the analysis includes the areas proposed for critical habitat designation. The analysis focuses on activities within or affecting these areas, and presents impacts at the lowest level of resolution feasible, given available data. Where possible, impacts are reported for each unit identified in the proposed rule. Appendix C presents maps of the proposed designation units in the states of Washington, Oregon, and California.

1.3.5 Analytic Time Frame

The analysis estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. This analysis estimates economic impacts to activities from 1990 (year of the species' final listing) to 2027 (20 years from critical habitat designation, anticipated in 2008). Forecasts of economic conditions and other factors beyond the next 20 years would be speculative. Estimated impacts are divided into pre-designation (1990-2007) and post-designation (2008-2027) impacts. The land uses within the study area are not expected to substantially change over this time period.

1.4 INFORMATION SOURCES

The primary sources of information for this report were communications with and data provided by personnel from the Service, Federal action agencies, and relevant state agencies. Specifically, the analysis relies on data collected in communication with personnel from the following entities:

- Bureau of Land Management (BLM) – Oregon and California state offices, and Arcata and Redding field offices;
- California Department of Transportation (Caltrans);
- Oregon Department of Transportation (ODOT);
- U.S. Fish and Wildlife Service (Service);
- U.S. Forest Service (USFS) – relevant national forests in Oregon, Washington, and California, and regional offices for the Pacific Northwest and Pacific Southwest regions;
- Washington State Department of Transportation (WSDOT); and
- Western Federal Lands Highway Division (WFLHD).

In addition, this analysis relies upon the Service's Section 7 consultation records, public comments, and published journal sources.

1.5 STRUCTURE OF THE REPORT

The remainder of this report is organized as follows:

- Chapter 2: Background
- Chapter 3: Potential Economic Impacts to Timber Management;
- Chapter 4: Potential Economic Impacts to Barred Owl Management;
- Chapter 5: Potential Economic Impacts to Survey and Monitoring Activities;
- Chapter 6: Potential Economic Impacts to Fire Management;
- Chapter 7: Potential Economic Impacts to Other Activities;
- Appendix A: Administrative Costs;
- Appendix B: Small Business Analysis and Energy Impact Analysis;
- Appendix C: Maps of Land Ownership by Northwest Forest Plan Management Agencies;
- Appendix D: Maps of Northwest Forest Plan Land Allocations;
- Appendix E: Summary Results at Seven Percent, Three Percent, and Undiscounted; and
- Appendix F: Summary of Projected Post-Designation Real Cash Flows.

This chapter summarizes the study area and provides information on the land use activities considered in this analysis. The NSO is a member of the Strigidae family and belongs to the genus *Strix*. Its current range extends from southwest British Columbia through the Cascade Mountains, coastal ranges, and intervening forested lands in Washington, Oregon, and California, as far south as Marin County, California. The proposed rule describes the species and its habitat in detail.[26]

2.1 REGULATORY BACKGROUND

2.1.1 PROPOSED CRITICAL HABITAT DESIGNATION

The NSO was Federally-listed on June 26, 1990,[27] and the *current* critical habitat for the species was designated on January 15, 1992.[28] On April 21, 2003, the Service published a notice in the Federal Register initiating a five-year review of NSO, which was undertaken to reassess the status of the species based on the best scientific information available at the time of the review.[29] The Service completed its five-year review of NSO on November 15, 2004, and concluded that NSO should remain listed as a threatened species.

In June 2007, the Service proposed a *revised* critical habitat designation for NSO.[30] While the Service's current designation (1992) includes 6,887,000 acres of Federal lands as critical habitat for the species, the proposed revised designation encompasses 5,337,839 acres as critical habitat, which is consistent with the conservation areas proposed in the 2007 Draft Recovery Plan for the Northern Spotted Owl (Draft Recovery Plan). Of the revised acreage proposed, 4,468,200 acres are identical to the 1992 designation. An additional 869,639 acres of Federal land not previously designated are now proposed, and 2,399,490 acres of land previously designated are no longer proposed for designation. In addition, the proposed designation is organized into 29 critical habitat units compared to 190 units under the current designation.

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26 Endangered and Threatened Wildlife and Plants; Proposed Revised Designation of Critical Habitat for the Northern Spotted Owl (*Strix occidentalis caurina*); Proposed Rule, *Federal Register*, Vol. 72, No. 152, June 12, 2007.

27 55 FR 26114

28 57 FR 1796

29 68 FR 19569

30 Endangered and Threatened Wildlife and Plants; Proposed Revised Designation of Critical Habitat for the Northern Spotted Owl (*Strix occidentalis caurina*); Proposed Rule, *Federal Register*, Vol. 72, No. 152, June 12, 2007.

As discussed earlier in Chapter 1.0, all references to the critical habitat designation in this report are related to the proposed revised critical habitat designation, unless otherwise stated.

Table 2-1 summarizes land ownership by critical habitat unit within the boundaries of the proposed designation. The proposed critical habitat is located solely on Federal lands managed by the USFS and BLM in the states of Washington, Oregon, and California. More than 86 percent of the proposed critical habitat is located on USFS-administered land compared to 14 percent on BLM lands. In total, the proposed designation spans across 17 national forests administered by the USFS and nine BLM districts or field offices. These lands are managed in accordance with applicable USFS Land and Resource Management Plans (LRMPs) and BLM Resource Management Plans (RMPs). The LRMPs and RMPs in the range of NSO have been amended by the Record of Decision for the Northwest Forest Plan (NWFP),[31] which was signed on April 13, 1994 and is discussed in Section 2.1.2.

Table 2-1
Summary of Land Ownership in the Proposed Designation (acres)

State/Unit Number [1]	Name of Unit	Federal Agency		Total [2]
		USFS	US BLM	
Washington (WA)				
1	Olympic Peninsula	331,741	0	331,741
2	Northwest WA Cascades	410,871	0	410,871
3	Okanogan	115,638	0	115,638
4	Entiat	304,816	0	304,816
5	Southwest WA Cascades	523,708	0	523,708
6	Southeast WA Cascades	143,399	0	143,399
	Sub-total (WA)	**1,830,172**	**0**	**1,830,172**
Oregon (OR)				
7	Northern OR Coast Ranges	187,562	133,856	321,418
8	Southern OR Coast Ranges	67,751	136,524	204,275
9	Western OR Cascades North	334,736	0	334,736
10	Hood River	42,683	0	42,683
11	Eastern OR Cascades	106,665	0	106,665
12	Western OR Cascades South	448,323	79	448,402
13	Willamette/North Umpqua	0	119,637	119,637
14	Rogue-Umpqua	13,147	152,357	165,504
15*	OR Klamath Mountains	188,958	466	189,423
16*	Klamath Intra-Province	51,841	38,595	90,436

[31] The Northwest Forest Plan is also referred to as the *Amendments to Forest Service and BLM Planning Documents within the Range of the Northern Spotted Owl*.

State/Unit Number [1]	Name of Unit	Federal Agency		Total [2]
		USFS	US BLM	
17*	Southern Cascades	151,913	34,818	186,731
25*	Scott and Salmon Mountains	158	0	158
	Sub-total (OR)	**1,593,737**	**616,332**	**2,210,069**
California (CA)				
15*	OR Klamath Mountains	5,787	0	5.787
16*	Klamath Intra-Province	6,136	0	6,136
17*	Southern Cascades	39,698	0	39,698
18	Coastal Redwoods	6,937	0	6,937
19	Coastal Humboldt	0	49,308	49,308
20	King Range	0	40,308	40,308
21	South Fork Mountain Divide	141,053	4,126	145,179
22	Eel-Russian River	0	21,940	21,940
23	Mendocino Coast Ranges	215,104	0	215,104
24	Western Klamath/Siskiyou Mountains	236,460	3,669	240,129
25*	Scott and Salmon Mountains	242,291	0	242,291
26	Trinity Divide	13,869	0	13,869
27	Shasta-Trinity Lakes	85,729	1,090	86,819
28	Eastern Klamath Mountains	110,755	0	110,755
29	Shasta/McCloud	73,316	0	73,316
	Sub-total (CA)	**1,177,136**	**120,441**	**1,297,577**
Total		**4,601,044**	**736,773**	**5,337,818**
Percent of Total		**86.2%**	**13.8%**	**100%**

[1] There are four units that span two states (Oregon and California) and are denoted with an asterisk (*). For reporting purposes, they are presented in each state. The cumulative acreage totals for these units is as follows: Unit 15 (195,210 acres); Unit 16 (96,572 acres); Unit 17 (226,430 acres); and Unit 25 (242,449 acres).

[2] Total may not sum to acreage totals in the proposed rule due to rounding of data presented in the proposed rule.

2.1.2 NORTHWEST FOREST PLAN

In 1991, a series of Federal court injunctions halted the majority of timber sales occurring on Federal lands within the range of NSO. The courts held that the USFS and BLM failed to adequately protect NSO as required by the National Forest Management Act (NFMA), National Environmental Policy Act (NEPA), and the Act. On April 2, 1994, the Clinton Administration responded by convening the Forest Conference in Portland, Oregon. The President directed an interagency team comprised of experts (Forest Ecosystem Management Assessment Team - FEMAT) to prepare a report detailing a set of comprehensive management options for the 24.465 million acres of Federal land within the range of NSO

that would both protect old-growth forest species and produce a sustainable and predictable flow of timber and non-timber resources. The results of this report were used by the Federal agencies to produce a Draft Supplementary Environmental Impact Statement (Draft SEIS) and Final Supplementary Environmental Impact Statement (Final SEIS) that analyzed ten different options for management of Federal forests within the range of the northern spotted owl for all species and resources.

The Record of Decision (ROD) was signed on April 13, 1994 and adopted the Preferred Alternative, with modifications, from the Final SEIS. The ROD amended the planning documents of seven BLM districts and nineteen national forests to provide for a new comprehensive ecosystem management strategy. This strategy consists of applying Standards and Guidelines[32] to a set of seven land use allocation categories. The Land Use Allocations (LUAs) are summarized in Table 2-2 below (see Appendix D for maps of the LUAs within the proposed critical habitat).

Timber harvests are generally prohibited in the Congressionally Reserved (CR) areas and not specifically scheduled in Administratively Withdrawn (AW) areas. The Late Successional Reserves (LSRs), Managed Late Successional Areas (MLSAs), and Riparian Reserves (RRs) also do not allow large scale commercial harvesting of older forest; however, silvicultural treatments, thinning of young trees, and salvage harvests are permitted in certain circumstances. Timber harvest in Adaptive Management Areas (AMAs) varies according to the purposes of the AMA. Regular commercial timber harvest is allowed in the remaining Matrix lands. Together, these last two LUAs comprise 22 percent of the Federal land within the range of NSO and account for the 5,497,100 acres on which commercial timber harvest is focused.

Table 2-2 shows the distribution of critical habitat across LUAs under the proposed revised critical habitat designation. Approximately 92 percent (4,928,500 acres) of the proposed critical habitat acreage occurs within LSR-related areas, including LSRs, MLSAs, and Adaptive Management Reserves (AMRs), which are LSRs within AMAs. Another four percent (239,678) consists of AW areas where no timber harvest is allowed, for reasons other than the NSO. The remaining four percent consist of RRs, AMAs, and Matrix forests. As designed, most of the proposed critical habitat designation consists of the older growth, LSR areas.

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32 For a detailed description of the Standards and Guidelines, see the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl*, Attachment A, Section C, April 13, 1994.

Table 2-2
Northwest Forest Plan Land Use Allocations

Land Use Allocation	Description	Timber Harvest Allowed?	CH Acres
Congressionally Reserved	Congressionally Reserved (CR) Areas comprise 7,320,600 acres, representing 30 percent of the Federal land within the range of the northern spotted owl. These lands have been reserved by act of Congress for specific land allocation purposes. This decision can not and does not alter any of these congressionally mandated land allocations. Included in this category are National Parks and Monuments, Wilderness Areas, Wild and Scenic Rivers, National Wildlife Refuges, Department of Defense lands, and other lands with congressional designations.	No (unless specified under the congressional designation of such lands).	0
Late Successional Reserves Marbled Murrelet Areas (LSR 3) Northern Spotted Owl Activity Centers (LSR 4)	Late Successional Reserves (LSRs) comprise 7,430,800 acres, representing 30 percent of the Federal land within the range of the northern spotted owl. These LSRs, in combination with the other allocations and standards and guidelines, will maintain a functional, interactive, late-successional and old-growth forest ecosystem. They are designed to serve as habitat for late-successional and old-growth related species including the northern spotted owl.	No / Yes. Thinning of younger forests within the LSRs is allowed in order to foster old-growth development. Large scale commercial harvesting of trees is generally not permitted in LSRs. Salvage harvest may be allowed subject to review.	LSR: 4,647,756 LSR 3: 7,212 LSR 4: 12,200 Total LSR: 4,667,168
Managed Late Successional Areas	Managed Late Successional Areas (MLSAs) currently comprise 102,200 acres, representing one percent of the Federal land within the range of the northern spotted owl. MLSAs represent areas where regular and frequent fire is a natural part of the ecosystem. These lands are either: (1) mapped managed pair areas or (2) unmapped protection buffers. Managed pair areas are delineated for known northern spotted owl activity centers. Protection buffers are designed to protect certain rare and locally endemic species.	No / Yes. Certain silvicultural treatments and fire hazard reduction treatments are permitted to prevent complete stand destruction from large catastrophic events (e.g., wildfire).	36,059
Administratively Withdrawn	Administratively Withdrawn Areas (AWs) comprise 1,477,100 acres, representing six percent of the Federal lands within the range of the northern spotted owl. AWs are identified in current forest and district plans or draft plan preferred alternatives and include recreational and visual areas, back country, and other areas not scheduled for timber harvest. (The term "withdrawn" does not mean a withdrawal for purposes of Section 204 of the Federal Land Policy Management Act.)	No regularly-scheduled timber harvest.	239,678
Adaptive Management Area	Adaptive Management Areas (AMAs) comprise 1,521,800 acres, representing six percent of the Federal land within the range of the northern spotted owl. These AMAs are designed to develop and test new management approaches to integrate and achieve ecological, economic, and other social and community objectives. The USFS and BLM will work with other organizations, government entities and private landowners in accomplishing those objectives. Each AMA has a different emphasis to its prescription, such as maximizing the amount of late-successional forests, improving riparian conditions through silvicultural treatments, and maintaining a predictable flow of harvestable timber and other forest products. A portion of the timber harvest will come from this land. There are ten AMAs.	Yes/No. Depends on the focus and purpose of the individual AMA.	71,199

Land Use Allocation	Description	Timber Harvest Allowed?	CH Acres
Adaptive Management Reserve	Adaptive Management Reserves (AMRs) depict LSRs within AMAs.	No / Yes (see LSR)	225,273
Riparian Reserves	Riparian Reserves (RRs) initially comprise 2,627,500 acres, representing 11 percent of the Federal lands within the range of the northern spotted owl (acreage subject to change following watershed analysis). The calculation of RR acreage was done after all other designated areas. As a result, the acreage shown reflects only that portion of RR that is interspersed throughout the matrix. RRs are areas along all streams, wetlands, ponds, lakes, and unstable or potentially unstable areas where the conservation of aquatic and riparian-dependent terrestrial resources receives primary emphasis. The main purpose of the RRs is to protect the health of the aquatic system and its dependent species; the RRs also provide incidental benefits to upland species. These RRs will help maintain and restore riparian structures and functions, benefit fish and riparian-dependent non-fish species, enhance habitat conservation for organisms dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for terrestrial animals and plants, and provide for greater connectivity of late-successional forest habitat.	No. Timber harvest is prohibited, including fuelwood cutting, except for salvage harvests and silvicultural practices that are in accordance with the Aquatic Conservation Strategy.	91,635 *
Matrix	Matrix comprises 3,975,300 acres, representing 16 percent of the Federal land within the range of the northern spotted owl. The matrix is the Federal land outside the six categories of designated areas set forth above. It is also the area in which most timber harvest and other silvicultural activities will be conducted. However, the matrix does contain non-forested areas as well as forested areas that may be technically unsuited for timber production.	Yes. Most timber harvest and other silvicultural activities would be conducted in the portion of matrix with suitable forest lands, according to standards and guidelines. Matrix lands also include non-forested areas and areas that are technically unsuitable for timber production.	

* 91,635 acres are a combination of acres classified as RR and Matrix. The GIS layers used in this analysis included 6,807 acres with no LUA classification.

Source: Some information presented is from U.S. Forest Service and Bureau of Land Management, "Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl," April 13, 1994.

2.1.3 WESTERN OREGON PLAN REVISIONS

As discussed in Section 2.1.2, the NWFP amended the seven BLM RMPs and nineteen USFS LRMPs in the range of NSO. At this time, the six RMPs that govern BLM districts in western Oregon (Coos Bay, Eugene, Medford, Roseburg, Salem, and the Klamath Falls Resource Area of the Lakeview District) remain consistent with the NWFP. However, in a process known as the Western Oregon Plan Revision (WOPR), the BLM is currently revising the RMPs for these six districts in western Oregon.

These districts contain approximately 2.55 million acres of public land. Approximately 2.1 million acres of this land are revested from the Oregon and California Railroad and managed under the California Railroad and Coos Bay Wagon Road Grant Land Acts of 1937 (O&C Act). The O&C Act requires that O&C lands be managed "for permanent forest production…with the principle of sustainable yield" to produce "not less than the annual sustained yield capacity" (43 U.S.C. §1181a).

The WOPR is part of a settlement agreement (the Settlement Agreement) reached between the American Forest Resource Council (AFRC), et al. and the Secretaries of Interior and Agriculture in August 2003.[33] The AFRC filed the lawsuit in response to the NWFP, alleging that the O&C Act had not been appropriately considered in applying the NWFP's management direction to the O&C lands. "Under the settlement agreement, the BLM agreed to revise its resource management plans in western Oregon and in that revision the BLM would consider an alternative that would not create any reserves on the O&C lands, except those reserves required to avoid jeopardy to species listed as threatened or endangered under the Endangered Species Act. The BLM also agreed that all resource management plan revisions shall be consistent with the O&C Act as interpreted by the Ninth Circuit Court."[34]

Furthermore, the Settlement Agreement directs the BLM to revise the RMPs for the six districts of western Oregon to make them consistent with the O&C Act as interpreted by the 9th Circuit Court of Appeals.[35] The August 2007 *Draft Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts* (WOPR DEIS) describes the proposed changes. Expected impacts to the LUAs, NSO critical habitat, and timber in the WOPR area under the WOPR DEIS Preferred Alternative (PA) are discussed below.

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33 Settlement Agreement: *American Forest Resource Council et al. v. Clarke*, Civil No. 94-1031 TPJ (D.D.C.), appeal pending No. 02-5024 (D.C. Cir.).

34 Bureau of Land Management, 2007, "Draft Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts of Salem, Eugene, Roseburg, Coos Bay, and Medford Districts, and the Klamath Falls Resource Area of the Lakeview District," p. A-929.

35 *Headwaters, Inc. v. Bureau of Land Management*, 14 F.2d 1174 (1990).

2.1.3.1 Impacts to Land Use Allocations

As proposed, the revised critical habitat conforms to the preferred alternative described in the draft EIS for the WOPR. The current NSO critical habitat includes all LUAs. The No Action Alternative (NAA) would result in no change to the 1995 RMPs, as amended. The boundaries of the LUAs would remain the same and would be comprised of the following: 36 percent LSR, 25 percent Matrix, 14 percent RR, 14 percent AW, eight percent AMA, and three percent CR.

The PA would result in a new set of LUAs in the WOPR area. The LUAs would consist of the following, as described in the WOPR DEIS:

- **Timber Management Area (TMA), 48 percent:** These areas would be managed to achieve a high level of continuous timber production that could be sustained through a balance of growth and harvesting and an allowable sale quantity (ASQ) of timber. The rotation age would be approximately 80 to 100 years and there would be no green tree retention after regeneration harvesting.

- **Late Successional Management Area (LSMA), 19 percent:** These areas would provide habitat for NSO (large, connected blocks of suitable habitat). Salvaging would be allowed to recover economic value from the timber harvested after stand-replacement disturbances.

- **AW, 19 percent:** The boundaries of this LUA would increase by five percent from the NAA.

- **National Land Conservation System (NLCS), seven percent:** The NLCS was established in June 2000. It includes national monuments, national scenic and historic Trails, wild and scenic rivers, wilderness areas, wilderness study areas, and other conservation designations. Many of these places were already protected through congressional or presidential conservation designations. The NLCS adds to these designations by focusing on the opportunities and management needs of these national treasures.[36]

- **Riparian Management Area (RMA), six percent:** These areas would provide for the riparian and aquatic conditions that supply streams with shade, sediment filtering, leaf litter and large wood, and root masses that stabilize stream banks and maintain or promote the development of mature or structurally complex forests in these areas. All streams, except for intermittent non-fish-bearing streams, would have a 100-foot non-harvesting and shade retention area on each side of the stream. Intermittent non-fish-bearing streams that have a high risk of debris flows (a source of large wood) would also have a 100-foot non-harvesting and shade-retention area on each side of the stream. Other intermittent non-fish-bearing streams would retain a 25-foot area with non-commercial vegetation on each side of the stream and 12 conifer trees per acre.

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[36] National Landscape Conservation System, available at http://www.blm.gov/nlcs/

- **BLM Management Area Adjacent to Coquille Tribal Forest Land, one percent:** The Coquille Tribe's September 2006 *Management Direction for Tribal Cooperative Management Areas (TCMAs)* document (Tribal plan) provides the management direction for the Coquille Forest. The management of the 15,000 acres of BLM-administered lands that are adjacent to the Coquille Forest would adopt the management directions in this Tribal plan for managing the comparable resources in this adjacent area. Since the management in this adjacent area would be in a manner that is consistent with the Tribal plan, the Tribal plan would be considered by the BLM to conform to the BLM's RMPs in its entirety.

2.1.3.2 Impacts to Northern Spotted Owl Habitat

The NAA would increase the total amount of suitable habitat over time, while the PA would maintain approximately the current amount. Currently, suitable habitat in the WOPR area averages 49 percent of habitat-capable acres. Under the NAA, suitable habitat would increase to 54 percent (1,196,500 acres) of habitat-capable acres by 2016 and to 76 percent (1,674,800 acres) of habitat-capable acres by 2106. The respective numbers for the PA are 49 percent (1,075,400 acres) by 2016 and 51 percent (1,131,100 acres) by 2106.

2.1.3.3 Impacts to Timber

The PA would increase the annual ASQ, total annual harvested volume, and harvest land base as a percentage of forested acres relative to the NAA. It would also increase the estimated revenue generated from timber sales and the ASQ of trees greater than 200 years old during the first decade after implementation.

Table 2-3 compares the impacts to timber under the NAA and PA. Note that the volume from thinnings on the non-harvest land base (the non-ASQ) is higher under the NAA because that alternative would have a larger acreage in the non-harvest land base than the PA.

Table 2-3
Comparison between the WOPR DEIS NAA and PA Key Impacts to Timber

	No Action Alternative (NAA)	Preferred Alternative (PA)
Annual ASQ (mmbf)	268	727
Annual non-ASQ (mmbf)	87	40
Total annual harvested volume (mmbf)[1]	357	769
Harvest land base (as a % of forested acres)	27	54
10-year revenues ($billion)	0.84	2.16
10-year ASQ of trees greater than 200 years old (mmbf)	19	175

[1] Total annual harvested volume includes ASQ, non-ASQ, and an expected 2 mmbf/year from the eastern management lands of the Klamath Falls resource area

2.2 THREATS TO THE SPECIES AND ITS HABITAT

The categories of land uses, activities, and other factors that are known to threaten NSO have been developed from a review of the final rule listing NSO as threatened[37] and the proposed rule designating critical habitat for the species.[38] The primary threats to NSO include competition with the barred owl and the loss, degradation, and fragmentation of habitat that mainly occur as a result of timber harvests and sales, fuel load management, and natural disturbances (e.g., wildfires and wind storms). To a lesser extent, there are also certain types of development projects, primarily linear projects proposed by Federal, state, local, or private entities on public lands, which could adversely affect NSO habitat. The identification of primary and secondary threats to NSO was refined through discussions with Service biologists and USFS and BLM land managers.

2.3 ECONOMIC SETTING

In order to provide context for broader issues related to NSO, this section presents an overview of existing economic conditions in the regions affected by the species. This information includes trends in a range of socioeconomic variables, such as timber production, employment and unemployment, annual

[37] Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Northern Spotted Owl; Final Rule, *Federal Register*, Vol. 55, No. 123, June 26, 1990.

[38] Endangered and Threatened Wildlife and Plants; Proposed Revised Designation of Critical Habitat for the Northern Spotted Owl (*Strix occidentalis caurina*); Proposed Rule, *Federal Register*, Vol. 72, No. 152, June 12, 2007.

payrolls, and the number of business establishments operating in and outside of the timber industry. It also serves as the backdrop against which the economic impacts of the proposed critical habitat designation can be evaluated.

The general trends for all counties affected by NSO are first discussed in this section. A summary of economic trends for the counties specifically affected by the proposed revised critical habitat designation follows.

2.3.1 Counties Affected by the Northwest Forest Plan

The USFS Pacific Northwest Research Station (Station)[39] researched the effects of Federal forest management on local communities and economies. Specifically, the Station evaluated the socioeconomic impacts to the 72 counties affected by the listing of NSO and by the NWFP ROD.

This research suggests that communities within the NWFP area experienced job losses from 1990 to 2000. During this decade, the number of direct timber industry jobs within the NWFP area decreased by 30,000. Nineteen thousand of these were lost in the first four years (1990-1994), mainly due to reduced timber supplies. The Station cites declines in Federal harvests due to the listing of NSO for 11,400 of total jobs lost. Approximately one-third of total jobs lost were due to the closure of inefficient mills and mill investment in labor-mechanization technologies. According to the Station, additional job losses occurred in NWFP area communities as the USFS faced budget constraints. USFS field unit workforces declined by approximately 33 percent and contractual positions for ecosystem management work fell about 70 percent.

Job losses occurred over the same time period that timber harvest from USFS and BLM lands fell 89 percent (3.0 billion board feet) and production across all ownerships declined 33 percent. Federal timber harvests during the first decade after the NWFP was implemented were 54 percent below the probable sale quantity anticipated by the ROD.

The Station also tracked the socioeconomic well-being scores of 1,314 non-metropolitan communities within the NWFP area. Scores for 40 percent of communities located within five miles of Federal forests declined, 37 percent increased, and 23 percent remained the same.

Overall, employment in the NWFP area grew by 29 percent over the decade of the 1990s. Consistent with nationwide trends, NWFP area counties experienced employment and wage income shifts from the manufacturing to the services sector. Over the period, employment in the services sector grew by 56 percent, while manufacturing grew only three percent. The service sector wage income grew from 26 to

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[39] Charnley, S., tech. coord., 2006, *Northwest Forest Plan—the First 10 Years (1994–2003): Socioeconomic Monitoring Results*, Gen. Tech. Rep. PNW-GTR-649, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

29 percent of all income, while manufacturing sector wage income fell from 20 percent to 15 percent of all income.[40]

Literature suggests the difficulty in teasing out the socioeconomic impacts of protecting NSO from other variables. A technical report from the USGS Forest and Rangeland Ecosystem Science Center[41] explains that timber-dependent communities, regardless of whether they were located within or outside of the NWFP area, were subject to "many similar economic influences over the decade of the 1990s, including spillover impacts from growing urban economies, waves of in- and out-migration from urban areas, sweeping changes in environmental policy affecting all resource-based industries, and economic forces of globalization and centralization".[42] Domestic wood and wood products markets faced increasing foreign competition, and many mills became increasingly mechanized.[43] Furthermore, Cecilia Danks and Richard W. Haynes (2006)[44] suggest that increasingly larger service contracts and complicated bidding procedures resulted in local communities receiving a smaller proportion of timber sales and service contracts. The authors conclude that the way timber sales and forest work are contracted are more important determinants of local employment than timber harvest levels.

2.3.2 Counties Affected by the Proposed Revised Critical Habitat Designation

2.3.2.1 Methodology

This section summarizes key economic information for the 48 counties likely to be impacted by the proposed critical habitat designation. Annual payrolls, business establishments, full-time and part-time employment, and unemployment rates were examined. Data sources include the U.S. Census Bureau, U.S. Department of Commerce Bureau of Economic Analysis, U.S. Department of Labor Bureau of Labor Statistics, and state employment department web resources.

The year 1985 was selected as the baseline year because it provides a snapshot of the county economies prior to the listing of NSO. It is compared to the latest available data to show the change in the relative

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40 Ibid.

41 Sommers, Paul, 2001, *Monitoring Socioeconomic Trends in the Northern Spotted Owl Region: Framework, Trends Update, and Community Level Monitoring Recommendations*, U.S. Geological Service Forest and Rangeland Ecosystem Science Center, Cascadia Field Station, College of Forest Resources, Seattle, WA.

42 Ibid., pp. 22-24.

43 Charnley, S., tech. coord., 2006, *Northwest Forest Plan—the First 10 Years (1994–2003): Socioeconomic Monitoring Results*, Gen. Tech. Rep. PNW-GTR-649, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

44 Danks, Cecilia, Richard W. Haynes, 2001, "Socioeconomic Research", in *Northwest Forest Plan Research Synthesis*, Gen. Tech. Rep. PNW-GTR-498, tech. eds. G.E. Perez and R.W. Haynes, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.

importance of the timber industry to the county economies since the major economic impacts generated by the NWFP occurred.

Timber industry data for the year 2005 is taken from the North American Industry Classification System (NAICS) code 113 "Forestry and Logging". Data prior to the year 1990 is only available under the Standard Industrial Classification (SIC) system, which preceded NAICS. This analysis followed the U.S. Census Bureau's guidance for comparing SIC and NAICS data[45] and used SIC codes 08 "Forestry" and 24 "Lumber and Wood Products". The sum of codes 08 and 24 was therefore used to represent timber industry data prior to 1990.

2.3.2.2 Results

Business Patterns

Tables 2-4 and 2-5 show the annual payrolls and number of establishments, respectively, for the 48 counties likely to be impacted by the proposed revised critical habitat designation.

The timber industry's share of total annual payroll fell for every county between 1985 and 2005. In 1985, the timber industry's contribution to total annual payroll for the area of analysis was 5.68 percent and ranged across individual counties from 1.03 to 41.90 percent. By 2005, the timber industry's share had fallen to 0.40 percent, ranging from 0.03 to 7.96 percent across individual counties. The counties for which the largest decline in the timber industry's share of annual payroll occurred include Del Norte, Trinity, and Tehama counties in California; Douglas County, Oregon; and Skamania County, Washington. Although the relative importance of the timber industry to total annual payroll declined between 1985 and 2005, total annual payroll in the area of analysis increased by $44 billion (in $2007).

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45 U.S. Census Bureau, "2002 NAICS Definitions", http://www.census.gov/epcd/naics02/def/NDEF113.HTM, and U.S. Census Bureau, "How NAICS will Affect Data Users", http://www.census.gov/epcd/www/naicsusr.html#TABLE7 (accessed December 4, 2007).

Table 2-4
Economic Activity by County: Annual Payroll (1985 and 2005), 2005$

State	County	1985 Timber Industry	1985 All Industries	1985 Timber Industry as a % of Total	2005 Timber Industry	2005 All Industries	2005 Timber Industry as a % of Total	Change
California								
	Colusa	n/a	$134,437,553	n/a	n/a	$106,204,000	n/a	n/a
	Del Norte	$56,350,222	$135,288,814	41.65%	$1,033,000	$101,505,000	1.02%	-40.63%
	Glenn	n/a	$203,560,323	n/a	n/a	$140,528,000	n/a	n/a
	Humboldt	$271,243,754	$1,222,686,929	22.18%	$26,257,000	$957,698,000	2.74%	-19.44%
	Lake	n/a	$265,584,410	n/a	n/a	$281,144,000	n/a	n/a
	Mendocino	$174,501,280	$725,232,771	24.06%	$16,171,000	$635,104,000	2.55%	-21.52%
	Shasta	$133,658,894	$1,314,361,767	10.17%	$18,743,000	$1,566,012,000	1.20%	-8.97%
	Siskiyou	$82,405,348	$358,636,876	22.98%	$6,234,000	$231,450,000	2.69%	-20.28%
	Tehama	$113,364,755	$347,174,798	32.65%	$5,984,000	$379,023,000	1.58%	-31.07%
	Trinity	$32,355,185	$89,776,290	36.04%	$886,000	$40,230,000	2.20%	-33.84%
	Subtotal	**$863,879,438**	**$4,796,740,531**	**18.01%**	**$75,308,000**	**$4,438,898,000**	**1.70%**	**-16.31%**
Oregon								
	Benton	$61,424,182	$752,993,007	8.16%	$8,467,000	$945,793,000	0.90%	-7.26%
	Clackamas	$104,419,461	$2,218,092,554	4.71%	$4,428,000	$4,542,969,000	0.10%	-4.61%
	Coos	$140,178,772	$553,057,676	25.35%	$28,513,000	$514,099,000	5.55%	-19.80%
	Curry	$31,594,355	$108,842,551	29.03%	$3,206,000	$142,113,000	2.26%	-26.77%
	Deschutes	$112,429,332	$645,791,031	17.41%	$3,186,000	$1,628,387,000	0.20%	-17.21%
	Douglas	$354,193,332	$953,824,690	37.13%	$34,456,000	$961,201,000	3.58%	-33.55%
	Hood River	$24,567,624	$165,500,378	14.84%	$927,000	$186,097,000	0.50%	-14.35%
	Jackson	$230,937,234	$1,290,865,304	17.89%	$13,397,000	$2,115,004,000	0.63%	-17.26%
	Jefferson	$30,891,845	$109,364,243	28.25%	n/a	$125,346,000	n/a	n/a
	Josephine	$89,846,718	$408,883,717	21.97%	$9,939,000	$570,131,000	1.74%	-20.23%
	Klamath	$157,737,684	$524,450,066	30.08%	$7,275,000	$546,947,000	1.33%	-28.75%
	Lane	$473,788,058	$2,818,235,462	16.81%	$49,800,000	$3,813,163,000	1.31%	-15.51%
	Lincoln	$19,272,972	$300,872,407	6.41%	$4,150,000	$354,865,000	1.17%	-5.24%
	Linn	$200,866,493	$937,557,757	21.42%	$20,564,000	$1,088,624,000	1.89%	-19.54%
	Marion	$86,638,674	$2,322,061,987	3.73%	$4,030,000	$2,919,413,000	0.14%	-3.59%
	Multnomah	$117,983,085	$11,402,064,933	1.03%	n/a	$15,566,396,000	n/a	n/a
	Polk	$44,401,788	$247,584,164	17.93%	$10,509,000	$337,211,000	3.12%	-14.82%
	Tillamook	n/a	$134,167,367	n/a	$10,317,000	$171,403,000	6.02%	n/a
	Wasco	n/a	$174,291,013	n/a	n/a	$173,876,000	n/a	n/a
	Yamhill	$61,601,215	$465,613,264	13.23%	$4,389,000	$775,886,000	0.57%	-12.66%
	Subtotal	**$2,342,772,825**	**$26,534,113,570**	**8.83%**	**$217,553,000**	**$37,478,924,000**	**0.58%**	**-8.25%**

State	County	1985 Timber Industry	1985 All Industries	1985 Timber Industry as a % of Total	2005 Timber Industry	2005 All Industries	2005 Timber Industry as a % of Total	Change
Washington								
	Chelan	n/a	$634,461,828	n/a	$2,279,000	$734,473,000	0.31%	n/a
	Clallam	$73,500,271	$437,989,140	16.78%	$15,651,000	$478,518,000	3.27%	-13.51%
	Cowlitz	$154,793,268	$997,867,364	15.51%	$37,794,000	$1,071,336,000	3.53%	-11.98%
	Grays Harbor	$139,129,588	$678,024,264	20.52%	$45,691,000	$573,889,000	7.96%	-12.56%
	Jefferson	n/a	$96,730,609	n/a	$1,111,000	$210,536,000	0.53%	n/a
	King	$299,792,489	$27,377,693,685	1.10%	$16,298,000	$50,931,641,000	0.03%	-1.06%
	Kittitas	n/a	$206,875,689	n/a	n/a	$219,820,000	n/a	n/a
	Klickitat	n/a	$147,582,948	n/a	$5,319,000	$96,471,000	5.51%	n/a
	Lewis	$107,634,099	$533,805,346	20.16%	$14,981,000	$622,363,000	2.41%	-17.76%
	Mason	n/a	$235,534,909	n/a	$3,724,000	$281,845,000	1.32%	n/a
	Okanogan	n/a	$282,196,405	n/a	$4,100,000	$192,014,000	2.14%	n/a
	Pierce	$172,045,235	$4,772,332,620	3.61%	$6,847,000	$7,816,909,000	0.09%	-3.52%
	Skagit	n/a	$662,886,223	n/a	$4,337,000	$1,224,178,000	0.35%	n/a
	Skamania	$23,247,792	$55,488,447	41.90%	$637,000	$34,476,000	1.85%	-40.05%
	Snohomish	$114,371,247	$3,672,504,777	3.11%	$10,796,000	$7,948,916,000	0.14%	-2.98%
	Thurston	$47,151,656	$1,552,800,048	3.04%	$11,588,000	$1,886,806,000	0.61%	-2.42%
	Whatcom	n/a	$1,085,998,768	n/a	$6,005,000	$2,109,148,000	0.28%	n/a
	Yakima	n/a	$1,557,873,541	n/a	$6,305,000	$1,791,756,000	0.35%	n/a
	Subtotal	**$1,131,665,645**	**$44,988,646,611**	**2.52%**	**$193,463,000**	**$78,225,095,000**	**0.25%**	**-2.27%**
Total		**$4,338,317,908**	**$76,319,500,712**	**5.68%**	**$486,324,000**	**$120,142,917,000**	**0.40%**	**-5.28%**

Sources: 1985 Annual Payroll: CA numbers: Bureau of Economic Analysis, Regional Economic Information System 1969-2002 CD, CA05 Personal Income and Earnings by SIC Industry, "Wage and Salary Disbursements". OR numbers: Oregon Employment Department, Covered Employment and Wages, http://www.qualityinfo.org/olmisj/CEP. WA numbers: Washington State Employment Security Department, Labor Market and Economic Analysis, Covered Employment and Wages, http://www.workforceexplorer.com/cgi/dataanalysis/AreaSelection.asp?tableName=Industry.

Latest Annual Payroll: Data from U.S. Census Bureau, CenStats, County Business Patterns, http://censtats.census.gov/. Accessed November 2007. CA numbers: 2004. OR numbers: 2005. WA numbers: 2005.

Timber industry establishments as a percentage of total county business establishments fell for every county between 1985 and 2005. In 1985, the timber industry's share of the total establishments comprised 2.67 percent for the area of analysis, ranging from 0.49 to 16.96 percent across counties. In 2005, the timber industry accounted for only 0.62 percent of total business establishments, ranging from 0.02 to 5.27 percent across counties. The counties which experienced the greatest decline in the contribution of the timber industry to the total number of business establishments were Douglas County, Oregon and Clallam, Lewis, and Skamania counties in Washington. Although the relative importance of the timber industry to the total number of establishments declined between 1985 and 2005, the total number of establishments in the area of analysis grew by approximately 97,000.

Table 2-5
Economic Activity by County: Numbers of Establishments (1985 and 2005)

		1985			2005			
State	County	Timber Industry	All Industries	Timber Industry as a % of Total	Timber Industry	All Industries	Timber Industry as a % of Total	Change
California								
	Colusa	n/a	n/a	n/a	n/a	377	n/a	n/a
	Del Norte	n/a	n/a	n/a	7	481	1.46%	n/a
	Glenn	n/a	n/a	n/a	1	499	0.20%	n/a
	Humboldt	n/a	n/a	n/a	66	3,568	1.85%	n/a
	Lake	n/a	n/a	n/a	1	1,161	0.09%	n/a
	Mendocino	n/a	n/a	n/a	37	2,712	1.36%	n/a
	Shasta	n/a	n/a	n/a	32	4,709	0.68%	n/a
	Siskiyou	n/a	n/a	n/a	27	1,275	2.12%	n/a
	Tehama	n/a	n/a	n/a	11	1,098	1.00%	n/a
	Trinity	n/a	n/a	n/a	11	310	3.55%	n/a
	Subtotal	**n/a**	**n/a**	**n/a**	**193**	**16,190**	**1.19%**	**n/a**
Oregon								
	Benton	64	1,510	4.24%	37	2,064	1.79%	-2.45%
	Clackamas	132	4,960	2.66%	32	10,333	0.31%	-2.35%
	Coos	142	1,608	8.83%	92	1,746	5.27%	-3.56%
	Curry	44	552	7.97%	14	796	1.76%	-6.21%
	Deschutes	85	2,071	4.10%	12	5,988	0.20%	-3.90%
	Douglas	275	2,219	12.39%	134	2,901	4.62%	-7.77%
	Hood River	29	492	5.89%	6	846	0.71%	-5.19%
	Jackson	158	3,187	4.96%	43	6,205	0.69%	-4.26%
	Jefferson	20	282	7.09%	5	366	1.37%	-5.73%
	Josephine	70	1,315	5.32%	14	2,158	0.65%	-4.67%
	Klamath	57	1,406	4.05%	28	1,758	1.59%	-2.46%
	Lane	355	6,366	5.58%	122	9,931	1.23%	-4.35%
	Lincoln	52	1,196	4.35%	19	1,651	1.15%	-3.20%
	Linn	136	1,894	7.18%	67	2,648	2.53%	-4.65%
	Marion	112	4,865	2.30%	21	8,055	0.26%	-2.04%
	Multnomah	112	17,012	0.66%	6	24,146	0.02%	-0.63%
	Polk	61	747	8.17%	22	1,307	1.68%	-6.48%
	Tillamook	n/a	605	n/a	20	755	2.65%	n/a

State	County	1985 Timber Industry	1985 All Industries	1985 Timber Industry as a % of Total	2005 Timber Industry	2005 All Industries	2005 Timber Industry as a % of Total	Change
	Wasco	n/a	629	n/a	6	714	0.84%	n/a
	Yamhill	62	1,227	5.05%	19	2,276	0.83%	-4.22%
	Subtotal	**1,966**	**54,143**	**3.63%**	**719**	**86,644**	**0.83%**	**-2.80%**
Washington								
	Chelan	32	1,845	1.73%	13	2,363	0.55%	-1.18%
	Clallam	170	1,620	10.49%	58	2,265	2.56%	-7.93%
	Cowlitz	141	18,847	7.48%	60	2,309	2.60%	-4.89%
	Grays Harbor	216	1,999	10.81%	75	1,895	3.96%	-6.85%
	Jefferson	27	546	4.95%	9	1,095	0.82%	-4.12%
	King	200	40,509	0.49%	31	62,175	0.05%	-0.44%
	Kittitas	32	744	4.30%	15	1,126	1.33%	-2.97%
	Klickitat	48	446	10.76%	26	562	4.63%	-6.14%
	Lewis	168	1,591	10.56%	60	1,966	3.05%	-7.51%
	Mason	61	759	8.04%	14	1,068	1.31%	-6.73%
	Okanogan	41	1,033	3.97%	15	1,155	1.30%	-2.67%
	Pierce	165	9,907	1.67%	37	16,932	0.22%	-1.45%
	Skagit	81	2,160	3.75%	24	3,518	0.68%	-3.07%
	Skamania	29	171	16.96%	9	182	4.95%	-12.01%
	Snohomish	156	7,933	1.97%	39	16,967	0.23%	-1.74%
	Thurston	66	3,202	2.06%	28	5,645	0.50%	-1.57%
	Whatcom	54	3,199	1.69%	21	6,119	0.34%	-1.34%
	Yakima	33	4,583	0.72%	6	4,738	0.13%	-0.59%
	Subtotal	**1,720**	**84,131**	**2.04%**	**540**	**132,080**	**0.41%**	**-1.64%**
	Total	**3,686**	**138,274**	**2.67%**	**1,452**	**234,914**	**0.62%**	**-2.05%**

Sources: 1985 Establishments: CA numbers: Bureau of Economic Analysis, Regional Economic Information System 1969-2002 CD, CA05 Personal Income and Earnings by SIC Industry, "Wage and Salary Disbursements". OR numbers: Oregon Employment Department, Covered Employment and Wages, http://www.qualityinfo.org/olmisj/CEP. WA numbers: Washington State Employment Security Department, Labor Market and Economic Analysis, Covered Employment and Wages,http://www.workforceexplorer.com/cgi/dataanalysis/AreaSelection.asp?tableName=Industry.

Latest Establishments: Data from U.S. Census Bureau, CenStats, County Business Patterns, http://censtats.census.gov/. Accessed November 2007. CA numbers: 2004. OR numbers: 2005. WA numbers: 2005.

Employment

Table 2-6 shows full-time and part-time employment for the 48 counties likely to be impacted by the proposed critical habitat designation.

The timber industry's share of total employment fell for all counties between 1985 and 2005. In 1985, the timber industry accounted for 4.32 percent of total jobs, ranging from 0.79 to 37.33 percent across counties. By 2005, that number had decreased to 0.35 percent for the area of analysis, ranging from 0.01 to 4.32 percent across counties. The counties that experienced the greatest decline in timber industry

employment were Deschutes, Douglas, and Klamath counties, Oregon and Skamania County, Washington. Although the relative importance of the timber industry to total employment decreased between 1985 and 2005, total employment for the area of analysis increased by approximately 1.5 million jobs.

Table 2-6
Economic Activity by County: Full-Time and Part-Time Employment (1985 and 2005)

State	County	1985			2005			Change
		Timber Industry	All Industries	Timber Industry as a % of Total	Timber Industry	All Industries	Timber Industry as a % of Total	
California								
	Colusa	n/a	5,730	n/a	n/a	6,115	n/a	n/a
	Del Norte	800*	5,080	15.75%	29	6,714	0.43%	-15.32%
	Glenn	n/a	7,710	n/a	n/a	7,383	n/a	n/a
	Humboldt	n/a	38,500	n/a	557	47,027	1.18%	n/a
	Lake	n/a	9,810	n/a	n/a	13,429	n/a	n/a
	Mendocino	n/a	24,740	n/a	441	31,213	1.41%	n/a
	Shasta	1800*	38,600	4.66%	441	63,515	0.69%	-3.97%
	Siskiyou	1340*	12,740	10.52%	295	13,046	2.26%	-8.26%
	Tehama	1870*	11,630	16.08%	140	18,289	0.77%	-15.31%
	Trinity	n/a	2,920	n/a	23	2,755	0.83%	n/a
	Subtotal	**5,810**	**157,460**	**3.69%**	**1,926**	**209,486**	**0.92%**	**-2.77%**
Oregon								
	Benton	1,560	23,048	6.77%	306	30,744	1.00%	-5.77%
	Clackamas	2,630	67,475	3.90%	159	148,889	0.11%	-3.79%
	Coos	3,374	17,882	18.87%	746	22,364	3.34%	-15.53%
	Curry	806*	4,186	19.25%	97	7,236	1.34%	-17.91%
	Deschutes	4,180	22,432	18.63%	140	67,563	0.21%	-18.43%
	Douglas	7,923	29,308	27.03%	1,090	36,208	3.01%	-24.02%
	Hood River	595*	6,352	9.37%	44	10,861	0.41%	-8.96%
	Jackson	5,478	43,106	12.71%	955	83,345	1.15%	-11.56%
	Jefferson	667*	3,609	18.48%	39	5,894	0.66%	-17.82%
	Josephine	2,273	15,344	14.81%	292	23,979	1.22%	-13.60%
	Klamath	3,503	17,754	19.73%	246	24,869	0.99%	-18.74%
	Lane	11,277	92,216	12.23%	710	150,823	0.47%	-11.76%
	Lincoln	561	11,759	4.77%	130	18,409	0.71%	-4.06%
	Linn	4,629	27,615	16.76%	429	41,629	1.03%	-15.73%
	Marion	2,512	80,724	3.11%	867	143,832	0.60%	-2.51%
	Multnomah	2,623	319,583	0.82%	23	456,354	0.01%	-0.82%
	Polk	1,206	8,707	13.85%	265	18,098	1.46%	-12.39%
	Tillamook	526*	5,191	10.13%	384	8,893	4.32%	-5.81%
	Wasco	323*	6,801	4.75%	52	12,193	0.43%	-4.32%
	Yamhill	1,684	15,886	10.60%	211	33,091	0.64%	-9.96%
	Subtotal	**58,330**	**818,978**	**7.12%**	**7,185**	**1,345,274**	**0.53%**	**-6.59%**
Washington								
	Chelan	354*	23,200	1.53%	62	43,111	0.14%	-1.38%
	Clallam	1,912	14,777	12.94%	395	21,771	1.81%	-11.12%
	Cowlitz	3,438	27,104	12.68%	343	33,724	1.02%	-11.67%

State	County	1985 Timber Industry	1985 All Industries	1985 Timber Industry as a % of Total	2005 Timber Industry	2005 All Industries	2005 Timber Industry as a % of Total	Change
	Grays Harbor	3,484	20,977	16.61%	569	24,631	2.31%	-14.30%
	Jefferson	104*	3,796	2.74%	27	8,999	0.30%	-2.44%
	King	5,639	712,482	0.79%	233	1,161,413	0.02%	-0.77%
	Kittitas	176*	7,949	2.21%	28	14,378	0.19%	-2.02%
	Klickitat	792*	4,484	17.66%	130	5,499	2.36%	-15.30%
	Lewis	2,760	17,408	15.85%	445	25,573	1.74%	-14.11%
	Mason	1343*	7,742	17.35%	167	15,695	1.06%	-16.28%
	Okanogan	888*	10,865	8.17%	160	19,703	0.81%	-7.36%
	Pierce	4,260	151,194	2.82%	213	264,919	0.08%	-2.74%
	Skagit	828*	23,123	3.58%	119	48,974	0.24%	-3.34%
	Skamania	670	1,795	37.33%	53	3,518	1.51%	-35.82%
	Snohomish	3,120	105,941	2.95%	232	219,257	0.11%	-2.84%
	Thurston	1,466	47,798	3.07%	284	99,475	0.29%	-2.78%
	Whatcom	792*	37,032	2.14%	288	76,590	0.38%	-1.76%
	Yakima	1254*	61,331	2.04%	142	106,183	0.13%	-1.91%
	Subtotal	**33,280**	**1,278,998**	**2.60%**	**3,890**	**2,193,413**	**0.18%**	**-2.42%**
	Total	**97,420**	**2,255,436**	**4.32%**	**13,001**	**3,748,173**	**0.35%**	**-3.97%**

Note: *Data only includes SIC 24

Sources: Latest Timber Industry Employment: U.S. Census Bureau, Local Employment Dynamics, Quarterly Workforce Indicators, http://lehd.did.census.gov/led/datatools/qwiapp.html. Accessed November 2007. CA numbers: 4th Qtr 2004. OR numbers: 3rd Qtr 2006. WA numbers: 3rd Qtr 2006.

1985 Employment in Timber Industry: CA numbers: California Employment Development Department, Archived SIC Industry Employment, http://www.labormarketinfo.edd.ca.gov/cgi/databrowsing/?PageID=165. OR numbers: Oregon Employment Department, Covered Employment and Wages, http://www.qualityinfo.org/olmisj/CEP. WA numbers: Washington State Employment Security Department, Labor Market and Economic Analysis, Covered Employment and Wages, http://www.workforceexplorer.com/cgi/dataanalysis/AreaSelection.asp?tableName=Industry. Accessed November 2007.

Unemployment

Table 2-7 shows the 1980, 1990, 2000, and 2007 unemployment rates for the 48 counties likely to be impacted by the proposed revised critical habitat designation. For all counties, the unemployment rate in 2007 was less than in 1980. The average unemployment rates for Oregon and Washington counties in the area of analysis went from being higher in 1980 to lower in 2007 than their respective state averages; however, in 2007 the California counties in the area of analysis still had an average unemployment rate that was 1.3 percent higher than the state average.

Table 2-7
Unemployment Rate by County (1980, 1990, 2000, and 2007)

State	County	1980	1990	2000	2007	Change (1980 to 2007)
California						
	Colusa	8.2%	8.3%	10.7%	7.9%	-0.3%
	Del Norte	15.5%	10.9%	10.7%	7.4%	-8.1%
	Glenn	7.8%	9.8%	9.1%	7.4%	-0.4%
	Humboldt	12.2%	8.6%	8.6%	5.4%	-6.8%
	Lake	10.1%	8.5%	11.0%	7.0%	-3.1%
	Mendocino	11.5%	7.6%	7.3%	5.0%	-6.5%
	Shasta	13.8%	8.8%	8.7%	6.9%	-6.9%
	Siskiyou	13.5%	9.4%	9.6%	7.0%	-6.5%
	Tehama	11.7%	10.3%	9.7%	6.7%	-5.0%
	Trinity	17.6%	8.2%	13.9%	8.2%	-9.4%
CA Average		**12.2%**	**9.0%**	**9.9%**	**6.9%**	**-5.3%**
Oregon						
	Benton	7.0%	5.2%	4.9%	3.8%	-3.2%
	Clackamas	5.2%	4.2%	5.0%	4.3%	-0.9%
	Coos	11.4%	9.2%	8.5%	6.0%	-5.4%
	Curry	10.6%	4.6%	7.3%	5.3%	-5.3%
	Deschutes	11.1%	4.9%	5.2%	4.4%	-6.7%
	Douglas	11.0%	8.6%	7.6%	6.9%	-4.1%
	Hood River	10.4%	8.6%	6.6%	3.0%	-7.4%
	Jackson	11.6%	7.4%	7.3%	4.9%	-6.7%
	Jefferson	8.0%	7.8%	8.6%	5.7%	-2.3%
	Josephine	14.1%	10.4%	9.8%	6.4%	-7.7%
	Klamath	12.5%	10.0%	10.0%	5.7%	-6.8%
	Lane	10.1%	7.1%	6.4%	4.9%	-5.2%
	Lincoln	8.3%	5.7%	8.4%	4.8%	-3.5%
	Linn	11.3%	7.8%	7.9%	5.6%	-5.7%
	Marion	8.7%	6.3%	7.7%	4.7%	-4.0%
	Multnomah	6.6%	5.8%	6.4%	4.7%	-1.9%
	Polk	10.4%	6.9%	6.2%	4.4%	-6.0%
	Tillamook	9.8%	7.0%	4.4%	4.2%	-5.6%
	Wasco	8.8%	9.2%	7.9%	4.3%	-4.5%
	Yamhill	7.6%	5.0%	6.4%	4.8%	-2.8%
OR Average		**9.7%**	**7.1%**	**7.1%**	**4.9%**	**-4.8%**
Washington						
	Chelan	10.5%	7.9%	10.4%	3.5%	-7.0%
	Clallam	10.3%	8.0%	7.7%	5.3%	-5.0%
	Cowlitz	9.5%	7.2%	7.7%	6.3%	-3.2%
	Grays Harbor	10.7%	9.3%	8.3%	6.2%	-4.5%
	Jefferson	10.4%	7.2%	6.7%	4.5%	-5.9%
	King	5.4%	4.1%	4.5%	3.9%	-1.5%
	Kittitas	9.5%	7.1%	9.1%	4.1%	-5.4%
	Klickitat	17.2%	11.0%	10.4%	5.1%	-12.1%
	Lewis	8.8%	8.0%	9.0%	6.3%	-2.5%
	Mason	8.8%	7.0%	8.3%	5.3%	-3.5%

State	County	1980	1990	2000	2007	Change (1980 to 2007)
	Okanogan	12.7%	10.2%	12.0%	4.1%	-8.6%
	Pierce	8.6%	6.4%	6.5%	4.6%	-4.0%
	Skagit	11.0%	5.8%	6.9%	4.2%	-6.8%
	Skamania	15.5%	10.7%	11.1%	5.0%	-10.5%
	Snohomish	7.0%	4.1%	5.0%	4.2%	-2.8%
	Thurston	7.9%	6.9%	5.9%	4.2%	-3.7%
	Whatcom	9.9%	4.8%	7.4%	3.9%	-6.0%
	Yakima	9.2%	9.8%	11.1%	4.4%	-4.8%
WA Average		**10.2%**	**7.5%**	**8.2%**	**4.7%**	**-5.4%**
	Average	**10.4%**	**7.7%**	**8.1%**	**5.3%**	**-5.1%**

Sources: 1980, 1990, and 2000 Unemployment Rate: U.S. Census Bureau, CenStats Databases, USA Counties Data. Accessed November 2007.

Latest Unemployment Rate (September 2007): U.S. Department of Labor, Bureau of Labor Statistics, Employment & Unemployment, Local Area Unemployment Statistics. Accessed November 2007.

2.3.2.3 Discussion

The timber industry's contribution to the county economies in the area of analysis was significant in 1985. Local timber establishments provided income and employment to county and area residents. However, as with all 72 counties affected by the NWFP (see preceding discussion), the timber industry plays a far less prominent role in the area of analysis today. Preceding sections discuss the probable reasons for this decline.

Despite the declining role of timber, other economic indicators paint a more promising picture of the county economies. The total number of business establishments for the area of analysis grew by approximately 97,000 between 1985 and 2005. Total annual payroll increased by $44 billion ($2007) and employment increased by approximately 1.5 million jobs. While the unemployment rate for a handful of counties increased between 1980 and 2000, by 2007 unemployment for all counties fell below 1980 levels. This suggests that any effects the decline of the timber industry may have had on county economies were short-term and that the economies have rebounded. As presented in preceding discussions, the counties within the NWFP area experienced a shift of employment and wage income from the manufacturing sector to the growing service sector. This growth in services may explain the resilience of the county economies to the decline of the timber industry.

3.0
POTENTIAL ECONOMIC IMPACTS TO TIMBER RESOURCES

This chapter describes the past and anticipated future economic impacts associated with changes in timber production within the proposed critical habitat designation as a result of conservation activities related to NSO. Specifically, this analysis estimates the direct economic impacts attributed to reductions in timber harvests and values that have occurred since the listing of NSO as threatened under the Act in 1990.

This chapter is divided into six sections. The first provides background information on timber resources in the proposed designation, including an overview of how these resources have been managed over time and how prescribed conservation measures intended to benefit NSO affect timber harvests. Next is a description of the methods and conceptual model that were used to estimate the economic impacts that result from NSO conservation activities. This is followed by empirical data on historic and projected timber production in the range of NSO, as well as estimates of timber production within the proposed critical habitat based on the conceptual model developed as part of this analysis. Then, the results of the analysis are presented, including discussions of pre-designation economic impacts (i.e., impacts that have occurred between the time the species was listed and the revised critical habitat is expected to be designated); and post-designation impacts on timber resources within the proposed designation. To conclude, a brief summary of timber-related impacts is presented, and the final section identifies and discusses caveats to the economic analysis.

3.1 BACKGROUND

The range of NSO encompasses millions of acres of mostly highly productive forestland across 12 physiographic provinces throughout the Pacific Northwest, which includes the states of Washington, Oregon, and California. The NSO's primary habitat is older, structurally diverse coniferous forest in the northern part of its range and landscapes with a mix of old and younger forest types in the southern part of its range, which includes the proposed critical habitat designation on Federal land managed by USFS[46] and BLM.[47] These forest landscapes provide suitable nesting, roosting, and foraging, and dispersal habitat on which NSO depends for its survival. However, timber generated by these forest landscapes, and old-growth forest in particular, is also economically valuable from a resource extraction perspective. As a result, forestland in the Pacific Northwest has historically been subject to substantial levels of

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46 National Forests managed by the USFS in the proposed designation include: Deschutes, Gifford-Pinchot, Mt.Baker-Snoqualamie, Mt. Hood, Okanogan, Olympic, Rogue River, Siskiyou, Siuslaw, Umpqua, Wenatchee, Willamette, and Winema in Region 6; and Klamath, Lassen, Mendocino, Shasta-Trinity, and Six Rivers in Region 5.

47 BLM Districts and Field Offices in the proposed designation include: Coos Bay District, Eugene District, Lakeview District (Klamath Falls Resource Area), Medford District, Roseburg District, and Salem District in Oregon; and Arcata Field Office, Redding Field Office, and Ukiah Field Office in California.

commercial timber harvest, which resulted in the removal and/or degradation of NSO habitat, decline in NSO population, and ultimately contributed to listing of the species as threatened under the Act in 1990 and designation of the current critical habitat in 1992. Subsequently, the NWFP was adopted in 1994 in an effort to establish guidelines for forest management, including timber production, for the long-term benefit of NSO and other late-successional forest-dependent species. The inherent conflict between commercial timber harvest (and associated habitat impacts) and species conservation continues to represent one of the primary concerns related to NSO recovery.

3.1.1 Role of the NWFP and BLM Resource Management Plan Revisions on Timber Resources

Conservation of NSO has been the focus of several significant resource planning efforts in the Pacific Northwest. As referenced above, since 1994, National Forests and BLM land in the range of NSO, including the area within current and proposed revised critical habitat designation,[48] has been managed in accordance with the NWFP. The NWFP represents a comprehensive and coordinated management direction on most Federal lands within the range of NSO that address the dual needs for forest habitat and forest products. More specifically, the NWFP amended the applicable LRMPs (on USFS lands) and RMPs (on BLM lands) on which it applies. More recently, BLM has proposed revisions to the RMPs of the western Oregon BLM districts (WOPR), which are currently undergoing environmental review and would replace existing NWFP management direction on BLM lands in western Oregon. Both the NWFP and WOPR apply to lands within the current critical habitat designation, as well as the area proposed for designation; however, neither plan was developed nor designed specifically in response to critical habitat. Refer to sections 2.1.2 and 2.1.3 for more information on the NWFP and WOPR, respectively.

3.1.1.1 NWFP and Timber Resources

In the context of timber resources, the NWFP established LUAs and related standards and guidelines that aid in conservation of NSO and other forest-dependent species, including restrictions on timber harvests in certain areas, which substantially reduced the area and quantity of timber available for harvest. The primary LUA that restricts timber harvests on commercially-viable forestland is LSRs, which support a functional and interactive late-successional and old-growth forest ecosystem that serves as current and future habitat for NSO. A description of the various NWFP LUAs and their effect on timber management is presented in Table 3-1.

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[48] The current critical habitat designation for NSO is not a designated land use under the NWFP; however, lands managed in accordance with the NSO under the NWFP include the areas that are part of NSO's current critical habitat designation.

Table 3-1
Role of the NWFP Land Use Allocations (LUAs) on Timber Management

Land Use Allocation	Effect on Timber Harvest
Congressionally Reserved	No timber harvest allowed (unless specified under the congressional designation of such lands).
Late Successional Reserves (includes Northern Spotted Owl Activity Centers)	Large scale commercial harvesting of trees is not generally permitted in LSRs. Thinning of younger forests within the LSRs is allowed in order to foster old-growth development. Salvage harvest may be allowed subject to review.
Managed Late Successional Areas	Certain silvicultural treatments and fire hazard reduction treatments are permitted to prevent complete stand destruction from large catastrophic events (e.g., wildfire).
Administratively Withdrawn	No scheduled timber harvests.
Adaptive Management Area	Each area has a different emphasis to its prescription, such as maximizing the amount of late-successional forests, improving riparian conditions through silvicultural treatments, and maintaining a predictable flow of harvestable timber and other forest products.
Adaptive Management Reserve	LSRs within Adaptive Management areas. LSR restriction generally apply (see Late Successional Reserves).
Riparian Reserves	Timber harvest is prohibited, including fuelwood cutting, except for salvage harvests and silvicultural practices that are in accordance with the Aquatic Conservation Strategy.
Matrix	Most timber harvest and other silvicultural activities would be conducted in the portion of matrix with suitable forest lands in accordance with applicable standards and guidelines. (Matrix lands also include nonforested areas and areas that are technically unsuitable for timber production.)
Not Designated (no land use allocation)	*Not applicable.*

Source: *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (Northwest Forest Plan)* (1994).

As shown in Table 3-2, the predominant LUA in the proposed critical habitat designation is LSRs. Approximately 87.4 percent of the proposed designation is in LSRs, followed by AWs (4.5 percent) and AMRs (4.2 percent); the other LUAs combined account for the remaining 3.9 percent.[49] Accordingly, much of the proposed critical habitat is already subject to restrictions on timber harvests, which in turn would result in reduced timber harvests and foregone timber values relative to conditions without NSO conservation measures in place.

[49] These figures are based on GIS analysis by overlaying the boundaries of the proposed designation with the existing NWFP land allocations; refer to Appendix D for maps showing critical habitat and land allocations.

Table 3-2
NWFP Land Use Allocations (LUAs) and Proposed Critical Habitat

Land Use Allocation	Acres	Percent of Total
Adaptive Management Areas	71,199	1.3%
Adaptive Management Reserves	225,273	4.2%
Administratively Withdrawn	239,678	4.5%
Late Successional Reserves	4,667,168	87.4%
Managed Late Successional Areas	36,059	0.7%
Not Designated	6,807	0.1%
Other (Matrix and Riparian Reserves)	91,635	1.7%
Total	**5,337,818**	**100%**

3.1.1.2 BLM Plan Revisions and Timber Resources

The proposed WOPR would substantially alter future timber harvests on western Oregon lands managed by the BLM. According to the WOPR DEIS, revisions to the applicable resource management plans are being proposed because:

(1) The BLM plan evaluations found that the BLM has not been achieving the timber harvest levels directed by the existing plans, and the BLM now has more detailed and accurate information than was available in 1995 on the effects of sustained yield management on other resources;

(2) There is an opportunity to coordinate the BLM management plans with new recovery plans and re-designations of critical habitat currently under development; and

(3) BLM has re-focused the goal for management of the BLM-administered lands to the objectives of its statutory mandate to utilize the principles of sustained yield management on the timber lands covered under the O&C Act[50] of contributing to the economic stability of local communities and industries, and other benefits from such management to watersheds, stream flows, and recreation.[51]

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[50] Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act.

[51] Bureau of Land Management (2007). *Draft Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts of Salem, Eugene, Roseburg, Coos Bay, and Medford Districts, and the Klamath Falls Resource Area of the Lakeview District*.

Under all plan action alternatives, management of timber resources on western Oregon BLM lands would be based on a revised land management structure, which would replace the LUA system prescribed under the NWFP. For this analysis, only implementation of BLM's Preferred Alternative (PA) identified in the WOPR DEIS was considered.[52] Under the PA, LSMAs have been developed specifically to lend support to conservation of NSO. Overall, timber harvests on BLM lands in western Oregon are projected to increase substantially under the PA. Specifically, the annual allowable sale quantity (ASQ) would increase from 268 mmbf under the NAA (No Action Alternative) to 727 mmbf under the PA.[53] Further, accounting for harvests on the non-harvest land base, the total annual volume of timber projected to be harvested over the next 10 years would increase from 355 mmbf (NAA) to 767 mmbf (PA).[54] However, the projected increase in timber harvests would primarily come from areas designated as Timber Management Areas under the WOPR and would not come from areas being considered for critical habitat under the proposed designation. Of the total harvest forecast for the PA, only approximately 40 mmbf (or about five percent) would occur in LSMAs and RRs, where only thinning is allowed.[55] Of this thinning total, it is further estimated that approximately 90 to 95 percent would come from LSMAs, which coincide spatially to the proposed designation.[56]

3.1.2 Role of Timber Production and Management in Local Economies

It is also important to note the significant and dynamic role that timber production has had on the economies of local communities throughout the Pacific Northwest. Timber production has directly and indirectly supported thousands of jobs and generated millions of dollars in timber revenues, income, and tax payments to local jurisdictions. A summary of the effects that timber has had on local economies and communities over time is presented in Chapter 2.0.

3.2 Overview of Approach to Estimating Impacts

The economic impacts associated with timber resources in the proposed critical habitat are based on the estimated changes in timber harvests and revenues (or values) that occur in response to conservation efforts for NSO. The effect on timber values are based on a comparison of timber values before and after NSO was listed under the Act in 1990. Timber harvests and values prior to 1990 represent base conditions against which subsequent changes in timber production are measured. In other words, it is assumed timber harvest levels and values prior to 1990 are representative of conditions that would have

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52 Alternative 2 was identified as the Preferred Alternative in the WOPR DEIS.

53 Bureau of Land Management (2007). See pg. 557 and Table 167.

54 Bureau of Land Management (2007). See Tables 168 and 169. Excludes estimated harvest levels on eastern management lands of the Klamath Falls Resource Area (2 mmbf).

55 Personal communication with Michael Haske, Chief, Branch of Forest, Resources and Special Status Species, Bureau of Land Management, December 1, 2007.

56 Personal communication with Chris Cadwell, Forester, Bureau of Land Management, December 10, 2007.

continued without listing of NSO, holding all else equal. Although this assumption is made for analytical purposes, it is acknowledged that the timber industry and markets are dynamic and likely would not have remained static absent NSO.

For this analysis, the base condition covers the period between 1980 and 1989, which is intended to capture the natural market fluctuations in the timber industry before the effects of NSO were realized. Estimates of the average annual quantity of timber harvest that occurred during the 1980's were derived from historical data presented in the NWFP.[57] Timber harvest data since 1990 and representative timber values over the entire period of analysis were obtained from the USFS and BLM. Estimates of future harvest levels and values in the proposed designation are not available for all areas and are difficult to estimate; therefore, it is assumed that future harvest levels and values would continue based on current trends, except for BLM lands in western Oregon where information on future timber production is available.

3.2.1 Conceptual Model

This section describes the conceptual model that was used to estimate economic impacts associated with timber production. As indicated above, conceptually, changes in timber values that were realized after the listing of NSO in 1990 is the key measure used to estimate economic impacts. However, because the economic analysis is only applicable to areas within the proposed critical habitat designation, it was necessary to convert timber harvest and value data collected from the USFS and BLM, which generally represent forest-wide conditions and do not relate directly to the proposed designation, to per-acre values that can be applied to the areas proposed for critical habitat. To do so, a conceptual model of timber values was developed that accounts for the probability of timber harvests. Under base conditions and up through 1994 (i.e., the period prior to implementation of the NWFP), any acre of harvestable forestland is assumed to have the same probability of being harvested. For conditions after implementation of the NWFP, the probability of an acre of forestland being harvested is directly related to the NWFP LUAs, which guide forest management. An overview of the steps that comprise the model is presented in Table 3-3 and summarized below.

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[57] USFS and BLM (1994). *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (Northwest Forest Plan).* Pp. 3&4-265.

Table 3-3
Conceptual Model for Estimating Timber Harvest Impacts on Federal Lands

Step	Description (Units)	Value	Calculation[1/]
1	Estimate average annual volume of timber harvest (mbf)	A	--
2	Estimate average value of timber in harvest year ($/mbf in $2007)	B	--
3	Estimate total annual value of timber harvest (in $2007)	C	A x B
4	Estimate average annual timber yield per acre (mbf/acre)	D	--
5	Estimate average annual acres harvested (acres)	E	A / D
6	Estimate per-acre value of any harvestable acre of forestland in *harvest* year (in $2007)	F	C / E
7	Estimate total number of acres of forestland harvestable for timber (acres)	G	--
8	Estimate probability of any harvestable acre of forestland being harvested in *any* year (%)	H	E / G
9	Estimate per-acre value of any harvestable acre of forestland in *any* year ($/acre in $2007)	I	F x H
10	Adjustment factor to probability of harvests and timber values in critical habitat given NWFP land allocations (%)	J	--
11	Estimate adjusted per-acre value of any harvestable acre of forestland in critical habitat in any year ($/acre in 2007$)	K	I x J
12	Number of acres of critical habitat that are harvestable (acres)	L	--
13	Estimate total annual value of timber in critical habitat (in $2007)	M	K x L

1/ Representative calculations. Actual calculations may differ based on availability of data.

- **Step 1: Estimate average annual volume of timber harvest [A].** The first step in the model is to estimate annual timber harvests on forestland affected by NSO. For historic timber harvests that occurred between 1980 and 1989, data from the NWFP showing average annual harvests in NSO forests managed by the USFS and BLM were used.[58] For the period 1990 to 2007, timber harvest data were collected for each USFS National Forest and BLM District/Field Office (hereafter referred to as organizational units) in the range of NSO; these data were collected directly from the USFS and BLM state/regional offices.[59] Information on future timber harvests

58 Ibid.

59 Information for annual timber harvest volume, timber value, timber yield, and acres harvested were obtained or developed from information obtained from personal communication with: Diane Golemis, USFS, Region 6, November 15, 2007 (data provided for National Forests in Region 6); Fred Zenzen, USFS, Region 6,

was limited and difficult to estimate without a detailed review of timber harvest plans for each USFS/BLM organizational unit (where available). Therefore, projections of future timber harvests between 2008 and 2027 are based primarily on the continuation of existing patterns, which for this analysis is represented by an average of timber harvest levels over the preceding three years (2005 to 2007), except for BLM lands in western Oregon where forecasts of timber harvests have been developed as part of the planning and environmental review processes for the WOPR.[60] All estimates of timber harvests are measured in thousand board feet (mbf).

- **Step 2: Estimate average unit value of timber in harvest year [B].** The average value of timber harvests is based on stumpage values, which is associated with sales of timber or other products. In theory, the stumpage value of timber equals the value of lumber that can be sawed out, minus the costs of harvest, transport, and conversion to lumber (including a margin of profit). Commonly, the actual stumpage value is simply the price paid as part of a timber sale, which provides the right to harvest a pre-defined quantity of timber. Historic timber values for each year in the period of analysis were collected from the USFS and BLM, thereby accounting for fluctuating timber values that were directly and indirectly affected by NSO. (In many cases, data on timber values were provided in annual totals, so unit values were estimated by dividing total values by the quantity of timber harvests [C / A].) Similar to Step 1, future timber values are based on a continuation of existing patterns over the past three years and estimates of future values on western Oregon BLM lands from the WOPR. Average annual timber values are measured in dollars per thousand board feet ($/mbf), and all values were converted into 2007 dollars using the Consumer Price Index (CPI).

- **Step 3: Estimate total annual value of timber harvest [C].** The total annual value of timber harvests over the period of analysis were calculated by multiplying total harvests (mbf) by average annual timber values ($/mbf) [A x B] or provided directly by the USFS and BLM.

- **Step 4: Estimate average annual timber yield per acre [D].** Where available, data on average annual timber yields over the period of analysis were collected for each USFS/BLM organizational unit. This information was used to help estimate the number of acres harvested

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November 30, 2007 (data provided for National Forests in Region 6); Patricia Krueger USFS, Region 5, November 8, 2007 (data provided for National Forests in Region 5); Dan Golnick, USFS, Region 5, November 13, 2007 (data provided for National Forests in Region 5); Michael Landram, USFS, Region 5, November 19, 2007 (data provided for National Forests in Region 5); Lyndon Werner, Bureau of Land Management, Oregon State Office, November 7, 2007 (data provided for BLM Districts in Oregon); Hank Harrison, Bureau of Land Management, November 19, 2007 (data provided for Arcata and Ukiah Field Offices in California); and Walter Herzog, Bureau of Land Management, December 17 and 18, 2007 (data provided for Redding Field Office in California).

60 Information for future annual timber harvest volume and future timber values on Western BLM lands were obtained from Bureau of Land Management (2007). *Draft Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts of Salem, Eugene, Roseburg, Coos Bay, and Medford Districts, and the Klamath Falls Resource Area of the Lakeview District*.

annually by each organizational unit as explained in Step 5. (In many cases, the areas of timber harvests were provided directly by USFS/BLM, so timber yields were estimated by dividing total annual harvests by the number of acres harvested [A / E].)

- **Step 5: Estimate average annual acres harvested [E].** The number of acres harvested per year within each organizational unit over the period of analysis is critical in estimating per-acre timber values. The total annual number of acres harvested was calculated by dividing total annual harvests (mbf) by average timber yields (mbf/acre) [A / D] or provided directly by the USFS and BLM.

- **Step 6: Estimate per-acre value of any harvestable acre of forestland in harvest year [F].** The per-acre value of harvested forestland in the year it was harvested is calculated by dividing the total annual value of timber harvest by the number of acres harvested [C / E]. These per-acre values were calculated for each USFS/BLM organizational unit for each year over the period of analysis.

- **Step 7: Estimate total number of acres of forestland harvestable for timber [G].** The estimation of the total number of acres harvestable for timber is important in estimating the probability of timber harvest in subsequent steps. It excludes areas that are not harvestable either based on regulatory/administrative or physical constraints. For this analysis, the ability to harvest forestland is based primarily on NWFP LUAs. All LUAs are assumed to be harvestable for timber except for CR and AW areas. Timber harvests are explicitly prohibited in CRs unless specified under the congressional designation of such lands. The AW areas include lands not technically suitable for timber production (due to physical constraints, such as steep slopes), certain visual retention and riparian areas, and areas removed from timber production for the protection of locally endemic species.[61,62]

- **Step 8: Estimate probability of any harvestable acre of forestland being harvested in any year [H].** The probability of any harvestable acre of forestland being harvested in any year accounts for the fact that timber is harvested on a rotational basis (not annually). It is calculated by simply dividing the average annual number of acres harvested by the total number of acres harvestable for timber [E / G].

- **Step 9: Estimate per-acre value of any harvestable acre of forestland in any year [I].** This step estimates the per-acre value of harvested forestland taking into the account the probability of

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61 USFS and BLM (1994). *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (Northwest Forest Plan).*

62 The LSRs are considered "harvestable" for timber. This is intended to only exclude the areas that cannot be harvested by law (CR) or physical constraints (AW). In other words, it is intended to capture areas that are amenable to timber production and harvest absent the NWFP. The low probability of LSRs actually being harvested since the NWFP is captured in Step 10 based on historic data of harvests across land allocations.

harvest. It is calculated by multiplying the per-acre value of harvestable forestland in its *harvest* year by the probability of any one acre being harvested in *any* year [F x H].

- **Step 10: Adjustment factor to probability of harvests and timber values in critical habitat given NWFP LUAs [J].** Annual per-acre timber values estimated in Step 9 are based on an equal probability of any one acre being harvested in any one year, and therefore, assume that forestland in the range of NSO is homogenous from both a physical and regulatory/administrative perspective. Based on the large size of the study area, this assumption is applied to the period prior to implementation of the NWFP when there were no land use plans in place that guided timber harvests geographically; therefore, no adjustment factor is applied in the years 1994 and earlier (i.e., the adjustment factor is set to 1).

  However, with implementation of the NWFP (beginning in approximately 1995), the probability of timber harvests has been driven by LUAs. For example, lands designated as Matrix have a higher probability of being harvested compared to LSRs due to the restrictions on timber harvests in LSRs. To account for these varying probabilities across LUAs, data were collected from the USFWS that show the number of acres harvested across LUAs in the NWFP area since 2001. With these data, it was possible to develop an adjustment factor for each LUA that is based on the change in probability of timber harvest before and after implementation of the NWFP. The probability of harvesting any harvestable acre of forestland before the NWFP is based solely on the extent (or size) of LUAs, with each acre having an equal probability of harvest. The probability of harvesting any harvestable acre of forestland after the NWFP is based on the number of acres harvested across LUAs relative to the total acres harvested. The adjustment factor is calculated by dividing the probability of harvest after the NWFP by the probability of harvest prior to the NWFP. Based on the estimated adjustment factors for each LUA, a weighted adjustment factor was calculated for each critical habitat unit based on the composition of LUAs within each unit. Table 3-4 shows the adjustment factors used in this analysis.

Table 3-4
Calculation of Adjustment Factor for NWFP Land Use Allocations (LUAs)

	Land Use Allocation [1]						
	AMA	**AW [2]**	**CR [2]**	**LSR**	**MLSA**	**MX**	**Not Designated [3]**
Acres of Habitat Removed or Downgraded [4]	11,511	2,747	11,897	29,446	3,238	102,041	--
Probability of Harvest Given NWFP LUA [5]	7.2%	--	--	18.3%	2.0%	63.4%	--
Probability of Harvest Pre-NWFP [6]	9.3%	--	--	48.0%	0.6%	41.6%	--
Adjustment Factor	**0.77**	***1.00***	***1.00***	**0.38**	**3.22**	**1.53**	***1.00***

1/ Land use allocations are as follows: AMA (Adaptive Management Area), AW (Administratively Withdrawn, CR (Congressionally Reserved); LSR (Late Successional Reserve), MLSA (Managed Late Successional Area), and MX (Matrix).

2/ The adjustment factor for lands designated as Administratively Withdrawn (AW) and Congressionally Reserved (CR) was artificially set to 1, indicating that the probability of harvest in these areas do not change due to implementation of the NWFP.

3/ Not included in the USFWS database. Adjustment factor artificially set to 1.

4/ Based on database maintained by the USFWS that shows nesting, roosting, and foraging (NRF) & dispersal habitat that was removed or downgraded in the NWFP area between 2001 and 2007. These figures were adjusted to reflect acreage removed for directly or indirectly for timber production by excluding areas subject to wildfire. Source: Personal communication with U.S. Fish and Wildlife Service biologist, November 13, 2007.

5/ Calculated by divided the acres removed in each land allocation by the total acres removed.

6/ Based on an equal probability of any acre of harvestable forestland being removed for timber harvest (excludes Administratively Withdrawn and Congressionally Reserved areas).

For projected future harvests between 2008 and 2027, the weighted adjustment factors for each critical habitat unit (developed using the values in Table 3-4) were modified to reflect the revised probability of harvest in critical habitat areas based on the WOPR. For BLM lands in western Oregon, it is estimated that approximately 4,000 acres of the total 22,500 acres projected to be harvested annually would occur in the proposed critical habitat designation (approximately 17.8 percent).[63] This figure was calculated based on the estimated harvested acreage within the non-harvest land base and the proportion of the non-harvest land base comprised of LSMAs, which coincide with the proposed critical habitat. This BLM-specific adjustment factor was integrated into the weighting mechanism to calculate post-designation adjustment factors.

[63] Bureau of Land Management (2007). Interpreted from Figure 194 based on the first two decades, which corresponds to the period of analysis. In the BLM Plan, proposed critical habitat (LSMAs) are represented by the term the non-harvest land base (which also includes some limited areas of Riparian Reserves). In Figure 194, approximately 4,000 acres of non-harvest land base would be harvested over the first two decades out of the approximately 22,500 acres of total harvest.

- **Step 11: Estimate adjusted per-acre value of any harvestable acre of forestland in critical habitat in any year [K].** This step involves multiplying the estimated per-acre value of any harvestable acre in any year by the unit-specific adjustment factor described above [I x J]. No adjustment factor was applied for the years prior to NWFP implementation. The result is an adjusted per-acre value for any harvestable acre of forestland in any year that is specific to each proposed critical habitat unit.

- **Step 12: Number of acres of critical habitat that are harvestable [L].** Similar to Step 7, this step involves calculating the extent of harvestable forestland in each critical habitat unit based on NWFP LUAs. All LUAs are considered suitable for timber harvest, except for CR and AW.

- **Step 13: Estimate total annual value of timber in critical habitat [M].** The final step in the conceptual model is to estimate the total annual value of timber within the proposed critical habitat designation by multiplying the adjusted per-acre value of any harvestable acre of forestland in critical habitat in any year by the number of acres of critical habitat that are harvestable [K x L].[64]

The steps described above were repeated for each year in the period of analysis, with a single average value calculated for base conditions (1980-1989). As indicated above, future conditions are based on current harvest patterns and forecasts, and forecasted annual values are assumed constant between 2008 and 2027. Ultimately, estimated timber harvest and value impacts are calculated for each proposed critical habitat for each year between 1990 and 2028 by comparing the estimated annual timber values since 1990 to base conditions (i.e., 1980-1989). Changes in estimated timber values over time represent the economic impact on timber production as a result of listing of NSO in 1990. The incremental economic effects of the proposed critical habitat designation are discussed further in Section 3.5.1.

3.2.2 Summary of Key Assumptions and Analytical Considerations

Key assumptions and analytical considerations are summarized below. In addition, the potential effects of these assumptions and analytical considerations on the economic analysis are outlined in Table 3-12.

- It is assumed that timber harvests and values occurring between 1980 and 1989 are representative of conditions that would have occurred thereafter absent the listing of NSO in 1990.

- Based on the large size of the proposed designation, it is assumed that the all harvestable timber within the proposed designation is homogenous in terms of species composition, age-class, and value.

- Every acre of harvestable forestland had an equal probability of harvest in any year prior to implementation of the NWFP.

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64 "L" is by critical habitat unit, which was ultimately summed up for critical habitat as a whole.

- All forestland in the NWFP area is considered harvestable except for lands designated as CR and AW, absent standards and guidelines implemented under the NWFP.
- Future harvest levels and values are based on average values over a three-year period, generally corresponding to the period between 2005 and 2007.
- Only the PA was considered for actions related to implementation of the WOPR.
- All historic timber values were indexed to and reported in 2007 dollars.

3.3 ESTIMATES OF TIMBER HARVESTS AND VALUES

This section reports the estimated timber harvests and values over the period of analysis. It is organized into: (1) historic harvests and values that were reported by the USFS and BLM based on actual data, and (2) projected harvests and values that were estimated using the best data available. The figures reported in this section serve as the foundation for estimating the timber-related economic impacts presented in Section 3.4, which were developed in accordance with the methodology described in Section 3.2.

3.3.1 HISTORIC TIMBER HARVESTS AND VALUES

This section presents information on historic timber production on Federal lands in range of NSO. Data on historic timber harvests and values are reported separately for the baseline period between 1980 and 1989 (see Section 3.3.1.1) and the post-listing period between 1990 and 2007 (see Section 3.3.1.2). Timber production during the baseline period is used as the benchmark against which pre- and post-designation economic impacts are measured; in other words, it represents the anticipated level of timber production absent listing of NSO under the Act in 1990, holding all else equal.

3.3.1.1 Baseline Timber Harvests and Values (1980-1989)

According to the NWFP, the volume of timber harvested in the NWFP area averaged approximately 4.5 billion board feet annually during the period 1980 to 1989.[65] Information on average timber values and yields for this period were collected from the various USFS/BLM organizational units and used to calculate the corresponding number of acres harvested and total value of timber harvests in the NWFP area. Annual timber harvests and values in the NWFP area during this period are presented in Table 3-5.

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[65] USFS and BLM (1994). *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl.* Pp. 3&4-265.

Table 3-5
Annual Timber Harvest and Values in NWFP Area (1980-1989), in $2007

Agency / Region	Acres Harvested	Volume of Timber Cut (mbf)	Total Value	Timber Yield (mbf/acre)*	Value per Acre	Value per MBF
USFS - Region 5	37,010	561,000	$133,042,921	15.2	$3,595	$237
USFS - Region 6	154,757	3,048,000	$716,922,579	19.7	$4,633	$235
BLM – OR / CA	62,957	915,000	$277,985,484	14.5	$4,415	$304
Total	**254,724**	**4,524,000**	**$1,127,950,984**	**17.8**	**$4,428**	**$249**

* These values are based on data provided by U.S. Forest Service and Bureau of Land Management. These may seem low because the acres harvested include all harvests, including thinning.

The information presented in Table 3-5 is used in the calculation of baseline timber harvests and values within the proposed critical habitat designation shown in Table 3-6. The estimated value per acre ($4,428) represents the value of forestland in its harvest year; however, not every acre of forestland is harvested every year. The estimated probability of any acre of harvestable forestland (approximately 9.4 million acres)[66] being harvested is about 2.7 percent, which translates into an average per-acre value of harvestable forestland in *any* year of nearly $120. Based on the extent of harvestable forestland in the proposed designation (roughly 5.1 million acres), the estimated total annual value of timber production in the proposed critical habitat during the baseline period is $611.8 million.

[66] USFS and BLM (1994). *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl*. Pp. 3&4-25.

Table 3-6
Baseline Annual Timber Harvest and Values in Proposed Critical Habitat (1980-1989), in $2007

Step	Description	Value
1	Average annual volume of timber harvest (mbf)	4,524,000
2	Average value of timber in harvest year ($/mbf)	$249.33
3	Total annual value of timber harvest	$1,127,950,984
4	Average annual timber yield per acre (mbf/acre)	17.8
5	Average annual acres harvested	254,724
6	Estimated per-acre value of any harvestable acre of forestland in *harvest* year	$4,428
7	Estimated total number of acres of forestland harvestable for timber	9,400,000
8	Estimated probability of any harvestable acre of forestland being harvested in *any* year	2.7%
9	Estimated per-acre value of any harvestable acre of forestland in <u>any</u> year	$119.99
10	Adjustment factor to probability of harvests and timber values in critical habitat given NWFP land use allocations	1
11	Estimated adjusted per-acre value of any harvestable acre of forestland in critical habitat in any year	$119.99
12	Number of acres of critical habitat that are harvestable	5,098,140[1]
13	**Estimated total annual value of timber in proposed revised critical habitat**	**$611,750,232**

1/ This number represents acres of current critical habitat areas that would be harvestable (not CR or AW) absent the NWFP.

3.3.1.2 Post-Listing Timber Harvests and Values (1990-2007)

Table 3-7 shows annual timber harvest and values between 1990 and 2007. The figures represent an aggregation of data collected from each of the USFS/BLM organization units in the proposed designation. The data cover all land within each respective USFS National Forest and BLM District/Field Office, and therefore can include areas outside the NWFP area. Generally, timber volumes since 1990 exhibit a clear pattern of decline over time, thereby resulting in declines in total timber values (although unit timber values actually increased in the early 1990's). (In terms of timber yields, most of the decline occurred during the first three years after listing of the NSO in 1990, and after this initial impact, timber yields were generally stable.) Overall, the total value of timber harvests decreased from about $1.7 billion in 1990 to a low of $44.1 million in 2002, and on a per-acre basis, timber values in harvest years declined

from a peak of $7,035 to $938 illustrating the decrease in quantity and quality[67] of timber harvested over time.

Table 3-7
Annual Timber Harvests and Values (1990-2007)[1], in $2007

Year	Acres Harvested	Volume of Timber Cut (mbf)	Total Value	Timber Yield (mbf/acre)	Value per Acre	Value per MBF
1990	241,357	4,689,629	$1,697,831,278	19.4	$7,035	$362
1991	188,788	3,078,179	$1,046,757,848	16.3	$5,545	$340
1992	110,533	1,902,814	$661,529,287	17.2	$5,985	$348
1993	143,770	1,364,391	$594,360,127	9.5	$4,134	$436
1994	121,563	992,069	$400,550,767	8.2	$3,295	$404
1995	88,665	892,419	$328,256,501	10.1	$3,702	$368
1996	96,134	969,535	$330,718,749	10.1	$3,440	$341
1997	111,788	913,491	$326,823,806	8.2	$2,924	$358
1998	123,175	807,613	$244,183,332	6.6	$1,982	$302
1999	106,625	730,777	$200,074,131	6.9	$1,876	$274
2000	66,594	544,361	$130,743,249	8.2	$1,963	$240
2001	45,956	333,556	$46,064,207	7.3	$1,002	$138
2002	35,045	316,563	$44,055,368	9.0	$1,257	$139
2003	50,825	413,364	$47,684,558	8.1	$938	$115
2004	68,596	539,493	$87,760,279	7.9	$1,279	$163
2005	63,449	679,881	$94,338,214	10.7	$1,487	$139
2006	60,935	576,595	$85,977,617	9.5	$1,411	$149
2007	49,902	566,196	$73,885,710	11.3	$1,481	$130

1/ Values are aggregated across the *entire* jurisdiction of all USFS National Forests and BLM Districts/Field Offices in the range of NSO; therefore, they are not directly comparable to the values reported for 1980-89, which corresponds to the NWFP only.

Table 3-8 shows the key steps in the conceptual model used to estimate the total annual value of timber within the proposed critical habitat designation. Per-acre harvest values in *harvest* years were converted to per-acre values in *any* year based on the probability of harvest. This calculation was based on the number of harvestable acres of forestland across all land managed by the USFS/BLM organizational units in the range of NSO, which is estimated at approximately 19.0 million acres. Based on an equal

[67] Timber harvests after 1990 were typically not old-growth timber, but instead smaller trees that were not as efficient (and thus more costly) to harvest.

probability of harvest of any one acre across all harvestable forestland (not taking into account the NWFP), average per-acre values in any year range from $89.30 in 1990 to $2.32 in 2002. However, when restrictions on timber harvests under the NWFP are considered starting in 1995, adjusted per-acre values for land designated as critical habitat are even lower due to the higher percentage of LUAs with timber harvest restrictions being located within critical habitat relative to the NWFP area as a whole. Based on these adjusted per-acre values, the estimated total annual value of timber produced within the proposed critical habitat designation ranges from a high of $455.3 million (in 1990) to a low of $5.3 million (in 2002).

Table 3-8
Post-Listing Annual Timber Harvest and Values in Proposed Critical Habitat (1990-2007), in $2007

Year	Per-acre value of any harvestable acre of forestland in harvest year	Per-acre value of any harvestable acre of forestland in any year	Adjusted per-acre value of any harvestable acre of forestland in critical habitat in any year	Total annual value of timber in critical habitat
1990	$7,035	$89.30	$89.30	**$455,283,357**
1991	$5,545	$55.06	$55.06	**$280,694,220**
1992	$5,985	$34.80	$34.80	**$177,392,936**
1993	$4,134	$31.26	$31.26	**$159,381,134**
1994	$3,295	$21.07	$21.07	**$107,410,024**
1995	$3,702	$17.27	$7.82	**$39,848,543**
1996	$3,440	$17.40	$7.87	**$40,147,446**
1997	$2,924	$17.19	$7.78	**$39,674,622**
1998	$1,982	$12.84	$5.81	**$29,642,520**
1999	$1,876	$10.52	$4.76	**$24,287,905**
2000	$1,963	$6.88	$3.11	**$15,871,515**
2001	$1,002	$2.42	$1.10	**$5,591,943**
2002	$1,257	$2.32	$1.05	**$5,348,081**
2003	$938	$2.51	$1.14	**$5,788,644**
2004	$1,279	$4.62	$2.09	**$10,653,618**
2005	$1,487	$4.96	$2.25	**$11,452,143**
2006	$1,411	$4.52	$2.05	**$10,437,212**
2007	$1,481	$3.89	$1.76	**$8,969,321**

3.3.2 Projected Timber Harvests and Values (2008-2027)

Post-designation timber harvests and values projected between 2008 and 2027 are presented in Table 3-9. Based on the lack of data on future timber harvests over the post-designation period, future timber

harvests are expected to continue at recent levels, which were calculated as an average over the most recent three year period between 2005 and 2007. The exception is BLM-Oregon, where projections of future timber harvests and values were developed as part of the WOPR. For BLM-Oregon, the values reported in the table correspond to critical habitat areas only.

Table 3-9
Projected Annual Timber Harvest and Values (2008-2027), in $2007

Agency / Region	Acres Harvested	Volume of Timber Cut (mbf)	Total Value	Timber Yield (mbf/acre)	Value per Acre	Value per MBF
USFS - Region 5	21,510	132,922	$18,120,704	6.2	$842	$136
USFS - Region 6	27,195	320,467	$38,835,658	11.8	$1,428	$121
BLM – Oregon [1]	4,000 (22,500)	35,150	$10,244,858	8.8	$2,561	$291
BLM – California	974	2,522	$542,876	2.6	$557	$215
Total [2]	**53,679 (72,179)**	**491,061**	**$67,744,096**	**10.0**	**$1,346**	**$138**

1/ Values correspond to the proposed critical habitat areas only based on the WOPR. Estimated acres harvested across all western Oregon BLM lands (approximately 22,500 acres annually) are used in calculating probability of harvest.

2/ Total timber value and yields are calculated based on acreage and volume data for critical habitat areas on western Oregon BLM lands.

Tables 3-9 and 3-10 show that the estimated per-acre value of harvestable forestland in its *harvest* year would average $1,346 during the period 2008 to 2027. Further, accounting for the probability of harvest, the future per-acre value of forestland is roughly $5.11, which decreases to an adjusted value of $2.07 when considering NWFP LUAs. Based on these figures, the projected value of timber production in the proposed designation between 2008 and 2027 is approximately $10.5 million annually.

Table 3-10
Projected Annual Timber Harvest and Values in Proposed Critical Habitat (2008-2027), in $2007

Step	Description	Value
1	Average annual volume of timber harvest (mbf)	491,061
2	Average value of timber in harvest year ($/mbf)	$137.95
3	Total annual value of timber harvest	$67,744,096
4	Average annual timber yield per acre (mbf/acre)	10.0
5	Average annual acres harvested	72,179
6	Estimated per-acre value of any harvestable acre of forestland in harvest year	$1,346
7	Estimated total number of acres of forestland harvestable for timber	19,011,856
8	Estimated probability of any harvestable acre of forestland being harvested in any year	0.4%
9	Estimated per-acre value of any harvestable acre of forestland in any year	$5.11
10	Adjustment factor to probability of harvests and timber values in critical habitat given NWFP land use allocations	0.40
11	Estimated adjusted per-acre value of any harvestable acre of forestland in critical habitat in any year	$2.07
12	Number of acres of critical habitat that are harvestable	5,098,140
13	**Estimated total annual value of timber in critical habitat**	**$10,536,500**

3.4 PRE-DESIGNATION ECONOMIC IMPACTS

Pre-designation timber impacts cover changes in timber harvest values within the boundaries of the proposed designation between 1990 and 2007. These impacts reflect the decline in timber harvest values relative to base conditions on an annual basis based on the methodology described above. Annual impacts were summed for each critical habitat unit over the 18 year pre-designation period.

As shown in Table 3-6, the baseline value of timber production in the proposed critical habitat designation is approximately $611.8 million per year. Starting in 1990, timber harvests and values began to decline and are currently substantially below baseline levels. On average, the estimated annual value of timber production in the proposed designation over the period 1990-2007 was $79.3 million, and in total, the pre-designation economic impact of reduced timber harvests and values is an estimated $9.6 billion over the 17 year period. The extent of impacts across critical habitat units is directly related to their size and NWFP LUA. Accordingly, the largest impacts are located in Unit 5-Southwest Washington Cascades ($895.9 million) and the smallest impacts are in Unit 18-Scott and Salmon Mountains ($3.4 million).

3.5 POST-DESIGNATION ECONOMIC IMPACTS

Post-designation timber impacts capture projected changes in timber harvests and values between 2008 and 2027 (relative to base conditions). Post-designation impacts are delineated into incremental impacts (i.e., those impacts related directly to the designation of proposed critical habitat) and baseline impacts (i.e., impacts related to species listing and recovery generally).

3.5.1 INCREMENTAL IMPACTS

Conceptually, the incremental economic impacts of the proposed critical habitat on timber production are intended to isolate the role that critical habitat would have on future timber harvests and values. Management of timber resources during the post-designation period is expected to continue in accordance with the NWFP, except for western BLM lands, which would be managed based on the WOPR. The NWFP was developed in an effort to promote conservation of target species, including NSO, and not specifically in response to the historic designation of critical habitat in 1992, although critical habitat was part of the base data that was used in formulating NWFP; therefore it is not possible to attribute any actions under the NWFP to critical habitat.[68] Similarly, the WOPR were developed to refine public land management to achieve targeted timber harvest levels in accordance with the principles of sustained yield management on timber lands. While they provided the opportunity to coordinate the BLM management plans with components of the Draft Recovery Plan, they were not developed specifically as a result of the proposed designation.[69]

Insight on the incremental effects of proposed critical habitat can also be taken from historical context when the current critical habitat was designated in 1992. Based on discussions with the Service and USFS/BLM, it is commonly believed that the primary source of added (or incremental) costs due to critical habitat was administrative (i.e., re-initiation of consultations and addressing the adverse modification requirement in new consultations). There may have been some marginal effect of current critical habitat on timber production after 1992 (e.g., reduction in areas offered for timber sale to avoid critical habitat), but these effects were minimal and difficult to quantify because they were generally subsumed in the reaction of timber industry to listing of NSO under the Act (e.g., limiting timber production in response to potential lawsuits), as well as natural fluctuations in the timber industry. Consequently, between 1992 and 1994, timber harvest reductions cannot be attributed to critical habitat.

After 1994 when the NWFP was adopted, changes in timber harvests and values are attributed to the restrictions on timber harvests generated by the establishment of LSRs, which were not designed specifically to protect critical habitat, although the majority of current critical habitat overlaps with

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68 Personal communication with U.S. Fish and Wildlife Service biologist, November 7, 2007.

69 Personal communication with Michael Haske, Chief, Branch of Forest, Resources and Special Status Species, Bureau of Land Management, December 1, 2007.

LSRs.[70] For current critical habitat outside LSRs, such as in Matrix lands where timber harvest is allowed, avoidance of critical habitat could have resulted in incremental effects on timber production, although timber harvests have occurred in areas of current critical habitat. However, moving forward with the proposed designation, there is essentially no overlap between proposed critical habitat and areas designated for timber production. (Note that there are some lands currently designated as Matrix under the NWFP in the proposed critical habitat designation, but these are BLM lands which are subject to the WOPR that would re-designate these areas as LSMAs, which would be managed similarly to LSRs.)

Overall, the proposed critical habitat designation is not expected to conflict with management of timber resources under the NWFP and WOPR. In other words, continued implementation of the NWFP is expected to greatly reduce the potential for conflicts between NSO critical habitat and timber harvests, and the incremental effect attributed to critical habitat is expected to be negligible. As such, the economic effects attributed to decreases in timber harvests and values are considered baseline impacts, which are discussed in Section 3.5.2.

3.5.2 Baseline Impacts

Post-designation baseline impacts are attributed to actions related to general conservation of NSO. In the context of timber resources, these effects are based on the anticipated reduction in timber harvests and values in the future. Estimates of future harvests within the proposed designation are based on a combination of a continuation of recent levels and published forecasts. The total average annual baseline impact attributed to reductions in timber harvest in the proposed designation is estimated at $601.2 million between years 2008 and 2027 (see Table 3-11). Annual impacts in the proposed designation over the 20-year period are expected to stay constant based on the assumption that future timber harvests and values are fixed, an assumption that was made in lieu of comprehensive projections of future timber production in the planning area and over the entire period of analysis for all USFS/BLM organizational units, which were not available. Similar to pre-designation impacts, post-designation impacts are allocated to critical habitat units based on their size and NWFP LUAs, with the largest impacts expected in Unit 5 and the smallest impacts in Unit 18.

[70] Personal communication with U.S. Fish and Wildlife Service biologist, November 7, 2007.

Table 3-11
Projected Impacts on Timber Values in Proposed Critical Habitat (2008-2027), in $2007

Unit	Baseline Timber Value (Annual)	Projected Timber Value (Annual)	Annual Impact
1	$39,807,202	$645,993	-$39,161,210
2	$48,354,553	$815,062	-$47,539,491
3	$11,313,507	$238,675	-$11,074,832
4	$35,633,404	$726,042	-$34,907,362
5	$57,077,261	$1,064,292	-$56,012,970
6	$16,890,916	$684,177	-$16,206,739
7	$38,568,508	$486,854	-$38,081,654
8	$24,511,991	$255,973	-$24,256,018
9	$37,865,899	$671,670	-$37,194,230
10	$5,076,063	$83,567	-$4,992,497
11	$12,680,478	$208,881	-$12,471,597
12	$51,756,600	$891,797	-$50,864,803
13	$14,334,676	$108,539	-$14,226,137
14	$19,587,296	$161,969	-$19,425,328
15	$23,211,669	$381,752	-$22,829,917
16	$10,969,350	$155,992	-$10,813,357
17	$22,137,474	$350,248	-$21,787,226
18	$219,720	$7,829	-$211,891
19	$5,916,653	$114,098	-$5,802,555
20	$4,072,789	$83,052	-$3,989,737
21	$16,574,238	$290,200	-$16,284,039
22	$2,632,741	$42,724	-$2,590,017
23	$25,669,403	$420,286	-$25,249,117
24	$25,487,205	$491,191	-$24,996,014
25	$28,914,121	$473,895	-$28,440,226
26	$1,664,267	$27,008	-$1,637,259
27	$10,415,116	$169,089	-$10,246,027
28	$11,982,414	$273,265	-$11,709,149
29	$8,424,718	$212,381	-$8,212,336
Total	**$611,750,232**	**$10,536,500**	**-$601,213,732**

3.6 SUMMARY OF IMPACTS

The pre-designation impacts between 1990 and 2007 associated with timber resources in the proposed designation are estimated to be $9.58 billion (in 2007 dollars). Table E-3 provides a summary of the incremental and baseline post-designation timber-related impacts that are anticipated to occur within the proposed designation. Following the designation, there would be no incremental impacts of critical habitat related to timber resources. This is based on the fact that the NWFP and proposed BLM Plan Revisions were not designed specifically in response to critical habitat, and therefore these plans' effects on timber resources cannot be attributed to the designation of critical habitat. The baseline impacts associated with timber resources amount to approximately $6.37 billion in present value terms at a seven percent discount rate. Annualized baseline impacts are anticipated to be $601.21 million. Economic impacts tend to be distributed proportionally across critical habitat units, with Unit 5 expected to incur the largest share of impacts (about 9 percent). The USFS and BLM would incur all of the timber impacts.[71]

The baseline economic impacts associated with timber resources in the proposed critical habitat estimated in this analysis are based on the estimated changes in timber harvests and revenues. It is important to note that Federal timber-based revenues are shared with the counties where the timber is harvested, with approximately 25 percent of the gross timber revenues from USFS timberlands and BLM public domain timberlands and 50 percent of the gross timber revenues from USFS and BLM O&C timberlands being shared with the counties. These revenue-sharing dollars are used by the counties to fund county services and schools. A portion of the baseline timber impacts estimated in this analysis will translate to lost timber revenue sharing dollars to affected counties. However, the actual impact to county revenues depends on whether the Federal government continues to offset lost timber-based revenues in the future. In the past, Federal programs were adopted to minimize the disruption to local government finances associated with declining harvest levels, such as the "Safety Net" program in 1991 and the "Secure Rural Schools and Community Self-Determination Act" in 2000. These programs provided the affected counties with hundreds of millions of dollars annually to counter some of the declining revenue sharing payments. However, the Safety Net program only provided the counties with guaranteed funding for ten years, the Secure Rural Schools bill was only funded through 2007, and the future funding of Federal programs to offset the lost timber-based revenues is uncertain.

3.7 CAVEATS TO ECONOMIC ANALYSIS OF IMPACTS ON TIMBER RESOURCES

There are six BLM districts in western Oregon that cover the range of the NSO in western Oregon (i.e., Coos Bay, Eugene, Medford, Roseburg, Salem, and the Klamath Falls Resource Area of the Lakeview District). Currently, these six districts are being managed under separate RMPs that have been amended to be consistent with the NWFP. However, the BLM is in the process of revising and aggregating these separate RMPs into a single plan as part of the Western Oregon Plan Revision (WOPR). The description of the proposed WOPR and its associated environmental impacts are presented in the *Draft*

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[71] At a three percent discount rate, the baseline impacts associated with timber resources is estimated at $8.94 million. Annualized baseline impacts are anticipated to be $601.21 million.

Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management Districts (WOPR DEIS) released in August 2007. The WOPR EIS analyzed a total of four alternatives, including the No Action Alternative (NAA), and Alternative 2 was selected as the Preferred Alternative (PA) by BLM. For the purposes of the analysis of economic impacts related to timber resources, only Alternative 2 (PA) was considered because it is the most likely to be adopted by BLM and, therefore, provides the most reasonable estimate of future economic impacts. However, because the WOPR has not been formally adopted at this time, the analysis of the PA would not reflect economic impacts under the scenario where the WOPR were not adopted (i.e., the NAA) as described below.

Overall, timber harvests on BLM lands in western Oregon under the WOPR are projected to be higher with the PA relative to the NAA. According to the WOPR DEIS, the PA would result in the greatest amount of timber harvest of any of the alternatives considered (769 mmbf on the harvest and non-harvest land base annually during the first decade of implementation), while the least amount of timber harvest is expected under the NAA (357 mmbf). However, timber harvests under the PA would primarily come from areas originally designated as Matrix under the NWFP and not from areas included in the proposed critical habitat designation. Under the NAA, timber harvest would occur in accordance with the NWFP, with a higher proportion of harvest expected to take place on the non-harvest land base, which coincides more closely with the proposed critical habitat designation. Based on the differences in the spatial orientation of LUAs between these alternatives, total harvest within the proposed critical habitat is likely greater under the NAA compared to the PA. Accordingly, the estimated economic impact associated with reductions in timber harvests and values in the proposed designation is greater under the PA and, therefore, the results on timber harvest impacts presented in the draft report may overestimate impacts if the WOPR were not adopted. While the economic analysis did not quantify impacts associated with the NAA, because the proportion of BLM land in western Oregon accounts for only 11.5 percent of the total area proposed for designation, the role that the NAA, as well as the other alternatives under the WOPR, has on the overall economic impact attributed to timber harvests is likely to be small.

Table 3-12 discusses this and other sources of uncertainty regarding impacts on timber harvest and management.

Table 3-12
Caveats to the Economic Analysis of Impacts on Timber Resources

Key Assumption	Effect on Impact Estimate
The NWFP was developed primarily in response to conservation of NSO, but also addressed multiple other species. Due to the difficulty in delineating economic impacts across species, it is assumed that all of the impacts are attributed to NSO.	+
It is assumed timber harvest levels and values prior to 1990 are representative of conditions that would have continued absent NSO, holding all else equal.	+/-
Based on the large size of the proposed designation, it is assumed that the all harvestable timber within the proposed designation is homogenous in terms of species composition, and age-class, and value.	+/-
Under base conditions and up through 1994 (i.e., the period prior implementation of the NWFP), any acre of harvestable forestland is assumed to have the same probability of being harvested.	+/-
Lands within all NWFP land use allocations, except for areas designated as AW and CR, are assumed to be amenable to timber harvest absent NWFP standards and guidelines.	+
Estimated acres of harvestable timber in each USFS/BLM organizational unit are based on the percent of harvestable timber in the NWFP-portion of each jurisdiction.	+/-
Future harvests levels are based on continuation of recent levels (3 years).	+/-
Only the Preferred Alternative in the WOPR is considered in the analysis.	
Relative to the No Action Alternative.	+
Relative to other action alternatives.	+/-

- : This assumption may result in an underestimate of real costs.
+ : This assumption may result in an overestimate of real costs.
+/- : This assumption has an unknown effect on estimates.

4.0
POTENTIAL ECONOMIC IMPACTS TO BARRED OWL MANAGEMENT

This chapter describes the past and anticipated future economic costs related to applying barred owl control measures in the area proposed for critical habitat designation. This chapter is divided into six sections. The first provides background information on the barred owl and related research and control efforts in the area proposed for designation over time. Next is a description of methods used to estimate the economic impacts associated with barred owl research and control activities. This is followed by discussions of pre-designation economic impacts (i.e., impacts that have occurred between the time the species was listed and the revised critical habitat is designated) and post-designation impacts in the proposed designation. Then, a brief summary of impacts is presented. The final section identifies and discusses caveats to the economic analysis.

4.1 BACKGROUND

The Draft Recovery Plan[72] identifies competition from the barred owl (*Strix varia*) as one of the most significant threats currently facing NSO. The key factors that characterize barred owl as a threat to NSO are that it is larger and more aggressive; may compete for habitat, nest sites, and prey; may hybridize with NSOs; and may occasionally prey on NSOs. These factors are exacerbated by the fact that the range of the barred owl has expanded in recent years and now completely overlaps that of NSO. This overlap in habitat also complicates population monitoring for NSO because NSOs may be less likely to call when barred owls are also present, and therefore may be undetected by standard survey methods.

For the reasons described above, the barred owl has been identified as a greater threat to NSO than was previously recognized. Accordingly, the Draft Recovery Plan identifies a comprehensive suite of future actions recommended by the multi-agency Recovery Team to address the barred owl threat. The barred owl-related actions listed in the Draft Recovery Plan are:[73]

- **Recovery Action #2:** Management (includes a barred owl management plan, identification of target areas for barred owl removal, and assessment of Federal/state requirements)
- **Recovery Action #3:** Establish Working Group
- **Recovery Action #4:** Analyze Existing Demographic Datasets
- **Recovery Action #5:** Analyze Habitat Use (incl. radio-telemetry studies)
- **Recovery Action #6:** Estimate Threshold Densities and Experimental Removal Program

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72 U.S. Fish and Wildlife Service, 2007, 2007 Draft Recovery Plan for the Northern Spotted Owl, *Strix occidentalis caurina*: Merged Options 1 and 2, Portland, Oregon, 170 pp.

73 Proposed recovery actions are the same for Option 1 and 2 described in the Recovery Plan.

- **Recovery Action #7:** Incorporate the Presence of Barred Owl into Ongoing Spotted Owl Monitoring
- **Recovery Action #8:** Create and Implement Outreach Strategy
- **Recovery Action #9:** Recommend Permitting of Experimental Barred Owl Removal be Given High Priority
- **Recovery Action #10:** Evaluate Effectiveness of Existing Northern Spotted Owl Detection Protocols due to Barred Owl
- **Recovery Action #11:** Evaluate the Use of Northern Spotted Owl Surveys for Determining Occupancy
- **Recovery Action #12:** Create Incentives for Development of Northern Spotted Owl Habitat

The likelihood of implementing the barred owl-related recovery actions listed above varies as some actions are more feasible than others. Generally, recovery actions that are administrative in nature (e.g., collecting ecological information, mining existing data, and establishing working groups) will likely be more feasible to implement relative to actions that involve specific and direct management of barred owls, which are likely to be controversial and require regulatory and environmental compliance. For this analysis, it is assumed that all of the proposed recovery actions would be implemented in accordance with the Draft Recovery Plan.

Also, included in the Draft Recovery Plan are estimated costs of implementing these recovery actions over the Draft Recovery Plan's 30-year planning period, which extends from year 2007 to year 2036. The cost estimates were derived from professional opinion of the Recovery Team, past experience, the use of surrogates, and several specific proposals. In general, most of the cost figures reported are considered planning-level estimates except in the cases where proposals were used (i.e., barred owl and NSO interaction study). These cost estimates can be refined over time based on additional cost proposals and modeling, as well as the actual costs incurred during implementation of some of the actions over time. In lieu of better information and actual cost data, this analysis is based on the cost estimates presented in the Draft Recovery Plan.

There have been no comprehensive efforts in the past to address barred owl control. However, the Service has been involved in the localized removal of barred owl in California under a scientific collecting permit held by the California Academy of Sciences. This removal was conducted on private and public lands, which included activities in proposed Unit 17 (Southern Cascades). In addition, several research projects have been initiated so as to inform potential barred owl removal, including a barred owl/NSO interaction study and habitat preference and behavioral studies; however, none of these research activities can be attributed to the proposed critical habitat designation.

4.2 OVERVIEW OF APPROACH TO ESTIMATING IMPACTS

The approach used to estimate the economic impact of barred owl control varies for pre- and post-designation impacts. Pre-designation impacts are based on interviews with Service staff that have been

involved with the localized barred owl removal in California. All of these historic costs are assigned to the proposed critical habitat unit (Unit 17) where the removal occurred. For post-designation impacts, expected future costs of barred owl control and management are based directly on the costs of applicable recovery actions reported in the Draft Recovery Plan. These costs are applicable to the entire range of NSO, which is estimated at 57 million acres. Projected recovery costs for barred owl control and management were converted into per-acre values by dividing total barred owl costs by the number of acres in the range of NSO. These per-acre values were multiplied by the number of acres in the proposed critical habitat designation to estimate annual barred owl control and management costs over time. Per-acre costs are appropriate to use to allocate impacts to the proposed designation because the barred owl management actions listed in the Draft Recovery Plan would occur across the entire range of NSO and would not be focused in areas of proposed critical habitat;[74] in other words, each acre in the range of NSO has the same probability of being targeted for barred owl management actions, including the area within the proposed designation.

4.3 PRE-DESIGNATION ECONOMIC IMPACTS

Pre-designation impacts associated with barred owl management are related in part to the localized barred owl removal implemented between 2005 and 2007 in on both private and public lands. Removal on public lands has occurred in Unit 17, an approximate 39,700-acre area managed by the USFS (Klamath National Forest). The cost of these past barred owl removals in California includes two components: (1) survey and monitoring and (2) barred owl removal, which includes costs related to staffing and travel/vehicles. It is estimated that annual survey and monitoring activities cost an estimated $25,000-$30,000.[75] For barred owl removal, the estimated total cost is approximately $8,000, which was allocated evenly over three-years ($8,000 ÷ 3 = $2,667 per year). Based on these figures, the total cost to date has been roughly $83,000 to $98,000. These costs are allocated entirely to Unit 17.

In addition, pre-designation impacts also capture the first year costs (i.e., year 2007) of barred owl control measures listed in the Draft Recovery Plan. These estimated costs total about $1.4 million across the range of NSO, which equates to approximately $135,600 in the proposed designation.

4.4 POST-DESIGNATION ECONOMIC IMPACTS

4.4.1 INCREMENTAL IMPACTS

None of the future recovery actions related to barred owl management and control have been developed specifically due to the proposed critical habitat designation, but instead would be implemented for the

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74 Personal communication with U.S. Fish and Wildlife Service biologist, November 1, 2007.

75 Ibid, December 11, 2007. Biological monitoring in this area by the Service has been an ongoing effort and cannot be attributed entirely to the experimental removal program, but is included in the program costs for this analysis.

long-term conservation of NSO.[76] Further, barred owl management efforts are expected to occur across the entire range of NSO and would not be focused within the proposed critical habitat designation. Therefore, there are no incremental post-designation economic impacts associated with barred owl management and control activities.

4.4.1.1 Baseline Impacts

The post-designation baseline economic impact associated with barred owl control and management for the benefit of NSO consist of the total estimated costs of implementing the range of the relevant recovery actions listed in the Draft Recovery Plan. These costs have been estimated by the Recovery Team on an annual basis over an approximate 30-year timeframe starting in year 2007 and are presented in Table 4-1.

Table 4-1
Estimated Barred Owl Management and Control Costs, $2007

Recovery Action:	Total Costs (2007-2036)	Total Costs (2008-2027)
Recovery Action #2	$11,800,000	$6,490,000
Recovery Action #3	$96,000	$69,000
Recovery Action #4	$190,000	$0
Recovery Action #5	$1,820,000	$1,630,000
Recovery Action #6	$3,000,000	$2,400,000
Recovery Action #7	$9,600,000	$6,400,000
Recovery Action #8	$48,000	$24,000
Recovery Action #9	$6,000	$0
Recovery Action #10	$200,000	$100,000
Recovery Action #11	$9,000	$0
Recovery Action #12	$12,000	$6,000
Total Costs	**$26,781,000**	**$17,119,000**
Acres Covered by Draft Recovery Plan	**57,000,000**	
Average Total Cost per Acre	**$0.47**	**$0.30**
Number of Acres in Critical Habitat	**5,337,818**	
Total Cost in Critical Habitat	**$2,507,932**	**$1,603,125**
Average Annual Costs in Critical Habitat (and range)	**$83,598 ($327,000 - $1,547,000**	**$80,156 ($30,622 - $144,870)**
Average Annual Cost per Acre	**$0.01 - $0.03**	

Source: U.S. Fish and Wildlife Service, 2007

[76] Personal communication with U.S. Fish and Wildlife Service biologist, November 1, 2007.

The total cost of implementing barred owl recovery actions in the area proposed for designation is estimated to be $1.6 million between years 2008 and 2027, and the average annual costs associated with these actions is $80,156 (undiscounted dollars). The range in annual costs in the proposed designation over the 20-year period is approximately $30,600 to $144,900 (or $0.01 to $0.03 per acre). Because future barred owl management measures have an equal probability of occurring on any acre in any critical habitat unit, these costs are allocated proportionately across units based on their size.

4.5 SUMMARY OF IMPACTS

The pre-designation impacts between 1990 and 2007 associated with barred owl management in the proposed designation range between $217,000 and $232,000 (in 2007 dollars). Pre-designation impacts are concentrated in Unit 17 (Southern Cascades) and have been borne primarily the Service. Table E-4 in Appendix E provides a summary of the incremental and baseline post-designation barred owl management impacts that are anticipated to occur within the area proposed for designation. Following the designation, there would be no post-designation incremental costs related to barred owl management. The baseline impacts associated with barred owl management amount to approximately $880,000 in present value terms at a seven percent discount rate. Annualized baseline impacts are anticipated to be $84,000. Post-designation baseline impacts are expected to occur proportionately across all critical habitat units and would be incurred by a range of Federal land management and regulatory agencies, including USFS, BLM, and the Service.[77]

[77] At a three percent discount rate, the baseline impacts associated with barred owl management are estimated at $1.21 million. Annualized baseline impacts are anticipated to be $82,000.

4.6 CAVEATS TO ECONOMIC ANALYSIS OF IMPACTS FROM BARRED OWL MANAGEMENT

Table 4-2 discusses sources of uncertainty regarding economic impacts from implementation of barred owl management actions.

Table 4-2
Caveats to the Economic Analysis of Impacts from Barred Owl Management

Key Assumption	Effect on Impact Estimate
It is assumed that all of the recovery actions related to barred owl management and control listed in the Draft Recovery Plan would be implemented in accordance with the Plan, although the likelihood of implementation varies across proposed actions.	+
Costs of implementing future recovery actions related to barred owl management and control are based on the estimated costs reported in the Draft Recovery Plan	+/-
Pre-designation monitoring costs associated with the barred owl removal in Unit 17 are assumed to be independent of the ongoing monitoring program implemented under the NWFP.	+

- : This assumption may result in an underestimate of real costs.

+ : This assumption may result in an overestimate of real costs.

+/- : This assumption has an unknown effect on estimates.

5.0
POTENTIAL ECONOMIC IMPACTS TO SURVEY AND MONITORING ACTIVITIES

This chapter describes the past and anticipated future economic costs of NSO monitoring efforts in the area proposed for critical habitat designation. This chapter is divided into six sections. The first provides background information on monitoring activities in the area proposed for designation and how these efforts have been implemented over time. Next is a description of methods used to estimate the economic impacts attributed to monitoring for NSO. This is followed by discussions of pre-designation economic impacts (i.e., impacts that have occurred between the time the species was listed and the revised critical habitat is designated) and post-designation impacts in the area proposed for designation. Then, a brief summary of impacts is presented. The final section identifies and discusses caveats to the economic analysis.

5.1 BACKGROUND

The NSO has been subject to intensive surveys and monitoring activities prior to and in response to listing of the species, as well as implementation of the NWFP. In fact, the *Northern Spotted Owl Effectiveness Monitoring Plan for the Northwest Forest Plan*[78] was developed in 1999 to establish formal guidelines related to monitoring activities for NSO. The purpose of the existing monitoring plan is to assess trends in NSO populations and habitat, and includes the following objectives:

1. Assess changes in population trend and demographic performance of NSOs on Federally-administered forest lands within the range of NSO; and

2. Assess changes in the amount and distribution of nesting, roosting, and foraging habitat and dispersal habitat for NSOs on Federally-administered forest lands.

The future status of the NWFP monitoring plan is currently undergoing review. It is anticipated that monitoring efforts would continue for at least the next five to ten years, but the status of the program is uncertain beyond that point.[79]

Prior to development of the NWFP monitoring plan, intensive population monitoring of NSOs was implemented separately by Federal land management agencies with little or no inter-agency coordination.[80]

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78 Lint, Joseph; Noon, Barry; Anthony, Robert; Forsman, Eric; Raphael, Martin; Collopy, Michael; Starkey, Edward, 1999, "Northern Spotted Owl Effectiveness Monitoring Plan for the Northwest Forest Plan." General Technical Report, PNW-GTR-440, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 43 p.

79 Personal communication with Joseph Lint, Bureau of Land Management, December 6, 2007.

5.2 OVERVIEW OF APPROACH TO ESTIMATING IMPACTS

The cost of implementing the NWFP monitoring plan is directly related to the degree of risk or uncertainty in the amount and type of data collected and how those data will be made available for future decisions.[81] It is also driven by the number of agencies and staff required to implement the plan. The monitoring program developed as part of the NWFP requires a coordinated inter-agency effort, primarily between the USFS, BLM, NPS and Service. In terms of staffing, it is estimated that between 15 and 17 full-time equivalents (FTEs) was required to implement Phase I of the monitoring plan (during the period 1998 to 2002), and during Phase II (years 2003 to 2005), staffing requirements decreased to seven FTEs.[82]

A summary of the annual funding estimate associated with surveys and monitoring activities for the period 1996 to 2005 is presented in the *Northern Spotted Owl Effectiveness Monitoring Plan for the Northwest Forest Plan* (1999). The projected costs reported in the monitoring plan fluctuate between $1.2 million to $3.3 million between 1996 and 2005; for this analysis, the reported cost estimates were only used for the period up through year 2000. More accurate estimates of monitoring costs are available for recent years, which indicate that these costs averaged about $2.5 million (ranging from $2.4 to $2.65 million) between 2001 and 2005, and which are expected to continue through 2008.[83] Future costs of implementing the NWFP monitoring program are uncertain as the program is currently undergoing review. It is likely that the program would be extended for at least another five and possibly up to 10 years at an average annual cost ranging from $1.0 million to $2.5 million.[84] Beyond that point, it would be speculative to forecast whether the program would continue, what form it would take, and at what cost; therefore, for this analysis, it is assumed that there would be no future monitoring costs beyond the next 10 years. For past monitoring costs (1990-1995), no documented cost estimates are available. However, monitoring efforts during that period were at least as extensive as current efforts, and therefore, it is conservatively assumed that Federal agencies spent at least as much on monitoring as they do today (approximately $2.5 million annually).

This analysis is based on a per-acre cost for NWFP monitoring activities. Per-acre costs are appropriate to use in this case because the NWFP monitoring plan applies to all Federal land in the range of NSO, with each acre having the same probability of being surveyed and monitored, including the area within

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80 Personal communication with Joseph Lint, Bureau of Land Management, December 6, 2007.

81 Lint, Joseph; Noon, Barry; Anthony, Robert; Forsman, Eric; Raphael, Martin; Collopy, Michael; Starkey, Edward, 1999, "Northern Spotted Owl Effectiveness Monitoring Plan for the Northwest Forest Plan." General Technical Report, PNW-GTR-440, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 139 p.

82 Ibid.

83 Personal communication with Joseph Lint, Bureau of Land Management, November 6, 2007.

84 Ibid, December 6, 2007.

the proposed designation. Per-acre monitoring costs were estimated by dividing total monitoring costs by the number of acres subject to monitoring under the NWFP (approximately 24.5 million acres). It is estimated that per-acre monitoring costs range between $0.04 and $0.13 depending on the year (see Table 5-1). These per-acre values were multiplied by the number of acres in the proposed critical habitat designation to estimate annual monitoring costs over time.

Table 5-1
Estimated Annual Survey and Monitoring Costs, $2007

Year:	1990-1995	1996-2000	2001-2008	2009-2018	2019-2027
Total Cost (in millions$)	$2.5	$2.4 - 3.1	$2.5	$1.0 (low) - $2.5 (high)	$0
Number of Acres Subject to Monitoring			24,455,200		
Average Annual Cost per Acre	**$0.10**	**$0.10 - $0.13**	**$0.10**	**$0.04 - $0.10**	**$0.0**

Sources: Lint, et al., 1999; and Lint, 2007

5.3 PRE-DESIGNATION ECONOMIC IMPACTS

Pre-designation impacts cover the period from the time NSO was listed (1990) to 2007. During this period, monitoring costs are estimated to have fluctuated between $516,000 and $683,000 per year within the boundaries of the proposed critical habitat, and the estimated total cost of monitoring is $10.1 million.

5.4 POST-DESIGNATION ECONOMIC IMPACTS

5.4.1.1 Incremental Impacts

None of the ongoing/projected monitoring activities anticipated under the NWFP are designed and/or implemented to address conditions in the proposed critical habitat area.[85] In addition, no additional monitoring is planned in areas of proposed critical habitat.[86] Therefore, there are no incremental post-designation economic impacts associated with surveying and monitoring activities related to NSO.

5.4.1.2 Baseline Impacts

The post-designation baseline economic impacts associated with monitoring activities related to NSO consist of the total estimated cost of implementing the NWFP monitoring plan in the future. The cost of implementing the NWFP monitoring plan in the proposed designation is estimated to be $546,000 in year 2008 and range between $218,000 (low estimate) and $546,000 (high estimate) annually through the year

[85] Personal communication with Joseph Lint, Bureau of Land Management, November 6, 2007.

[86] Ibid.

2018. Past 2018, monitoring costs are assumed to be $0 because the long-term status of the monitoring plan is uncertain. Because monitoring activities have an equal probability of occurring on any acre in any critical habitat unit, these costs are allocated proportionately across units based on their size.

5.5 SUMMARY OF IMPACTS

The pre-designation impacts between 1990 and 2007 associated with monitoring amount to $10.10 million (in 2007 dollars). Table E-5 provides a summary of the incremental and baseline post-designation monitoring-related impacts that are anticipated to occur within the area proposed for designation. Following the designation, there would be no post-designation incremental monitoring impacts. The baseline impacts due to monitoring amount to approximately $1.94 million to $4.10 million in present value terms at a seven percent discount rate. Annualized baseline impacts are anticipated to range between $181,000 and $387,000. These impacts are expected to occur proportionately across all critical habitat units and would be incurred by Federal land management agencies, primarily USFS and BLM, who have monitoring responsibilities under the NWFP.[87]

5.6 CAVEATS TO ECONOMIC ANALYSIS OF IMPACTS FROM NWFP MONITORING

Table 5-2 discusses sources of uncertainty regarding economic impacts from implementation of monitoring efforts.

Table 5-2
Caveats to the Economic Analysis of Impacts from NWFP Monitoring

Key Assumption	Effect on Impact Estimate
Monitoring costs between 1990 and 1995 (prior to implementation of the NWFP) are assumed to be the same as current levels, although monitoring efforts were more intensive during that historical period.	-
The future status of the NWFP monitoring plan is uncertain beyond year 2018 and is assumed to be discontinued at that point.	-

- : This assumption may result in an underestimate of real costs.

+ : This assumption may result in an overestimate of real costs.

+/- : This assumption has an unknown effect on estimates.

[87] At a three percent discount rate, the baseline impacts associated with monitoring-related activities range from $2.34 million to $5.05 million. Annualized baseline impacts are anticipated to range between $155,000 and $338,000.

According to the proposed rule, some habitat losses resulting from increased wildfire frequency, intensity, and size can be attributed to excessive fuel buildup due to many decades of fire suppression. NSO habitat is particularly vulnerable in some drier forest systems, which have experienced recent wildfire losses exceeding the range of historical variability. Fuel reduction treatments have been implemented to control fuel load and minimize wildfire risk, which may be modified to benefit NSO. However, fuel reduction techniques can themselves result in the loss, degradation, or fragmentation of NSO habitat. The key, therefore, is to balance the short-term impacts of fire hazard reduction projects with the long-term risk of catastrophic loss of NSO habitat due to wildfires. This chapter discusses the potential impacts, if any, of critical habitat designation on fire management activities, including fuel load management and fire suppression.

6.1 APPROACH TO ESTIMATING IMPACTS

This discussion of potential fire management impacts in the area proposed for designation is based on information provided by relevant agency staff. The 17 national forests containing the proposed designation and BLM state offices in Oregon and California were contacted in order to understand if and how the designation can affect fire management activities on these lands. Of these, a representative sample of nine national forests in Oregon and Washington and two in California, as well as one BLM state office responded with the information. Further, personnel from the Service involved with past Section 7 consultations related to NSO were contacted to develop an understanding of possible species conservation measures taken while implementing various management activities.

6.2 FUEL LOAD MANAGEMENT

In Washington and Oregon, some drier national forests located to the east of the Washington Cascades and in the Eastern and Southern Oregon Cascades are more vulnerable to wildfires relative to the western forests. Similarly, amongst the national forests in California, the east sides of Klamath, Shasta-Trinity, and Lassen national forests and the west sides of Mendocino and Six Rivers national forests have a relatively higher risk of wildfires.[88] Consequently, the forests that are less vulnerable to wildfires have limited fuel load management programs and anticipate minimal to no impacts on related activities due to

[88] Personal communication with Patricia A. Krueger, Regional Threatened and Endangered Species Coordinator, Pacific Southwest Region – U.S. Forest Service, December 18, 2007.

the proposed designation. These include the Olympic National Forest (a rainforest),[89] the Mt. Baker and Snoqualmie National Forest,[90] and the Willamette National Forest (a moist coniferous forest).[91]

Additionally, the Gifford-Pinchot National Forest, which is not typically a fire prone forest, presently has a treatment program going on in a very small area in its southeastern part due to Spruce budworm infestation.[92] This area, which is a combination of LSR and Matrix, was maintained as NSO habitat prior to the infestation and had six pairs of the species. The infestation became severe about seven years ago and the treatment process started in 2005 with 2,200 acres planned for treatment. Of these, about 600 acres are in Matrix areas while the remaining 1,600 in LSR. Over the past three years, 1,500 acres have been treated, including the 600 in Matrix. The LSR and Matrix areas are treated differently, with LSR treatments including under-thinning, cutting green trees up to 11 inches in diameter only, and leaving most of the fallen matter on the ground. The LSR treatments tended to be more expensive, costing between $700 to $833 per acre, while the treatments in Matrix areas paid for themselves due to the timber value associated with fallen trees and other material.[93] This analysis only qualitatively describes these costs and does not quantify them as these are captured in Chapter 3.0 under timber management impacts.

In national forests and BLM lands where fuel load management activities are a higher priority, the program is modified within the LSR to preserve the habitat for NSO and other late successional species. The most common variation is doing thinning from below in order to maintain the upper canopy for NSO and general forest health. Thus, the emphasis is on more restoration forestry than clear-cutting. The costs of these modifications are considered minimal.[94] However, there is also the additional cost associated with lost timber value as emphasized by some national forests and BLM.[95] These costs are not analyzed in this chapter and are captured in Chapter 3.0 under impacts to timber management. Some forests also

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89 Personal communication with Cathy O'Halloran, Forest Wildlife Biologist, Olympic National Forest, December 19, 2007.

90 Personal communication with Jesse Plumage, Forest Wildlife Biologist, Mt. Baker and Snoqualmie National Forest, December 17, 2007.

91 Personal communication with Joe Doerr, Forest Wildlife Biologist, Willamette National Forest, December 20, 2007.

92 Personal communication with Mitch Wainwright, Forest Biologist, Mt. St. Helens National Monument, Gifford-Pinchot National Forests, December 11, 2007.

93 Personal communication with Bruce Holmson, Silviculturist (southeast), Mt. Adams Ranger District, Gifford-Pinchot National Forests, December 11, 2007.

94 Personal communications with Jen Sanborn, Forest Biologist, Winema-Fremont National Forest, December 13, 2007; and Dave Clayton, Forest Biologist, Rogue River-Siskiyou National Forest, December 7, 2007.

95 Personal Communications with Tom Frolli, Program Leader, Range, Wildlife, Fisheries, and Botany, Lassen National Forest, December 17, 2007; and Lyndon Werner, Michael Haske, and Joe Lint, Bureau of Land Management, Oregon State Office, December 10, 2007.

work on creating islands of less fire prone areas in order to stop a potential wildfire from spreading.[96] In some national forests in California, the fuel treatments are generally geared towards removing some brush and maintaining canopy closures, which in turn reduces the growth of brush.[97]

In addition to modifying ongoing fuel management programs, some national forests have implemented or planned fuel treatment projects specifically for NSO and its habitat. Examples include Five Buttes, McCache, and Metolius Basin in Deschutes National Forest,[98] and projects planned by Umpqua National Forest.[99] However, due to anticipated budget constraints stemming from reduced revenues from timber sales, there is uncertainty regarding the implementation of the planned projects. Therefore, the costs associated with these projects are not quantified in this economic analysis.

6.3 FIRE SUPPRESSION

Public safety is the prime directive in all emergency situations, including fire suppression. As such, during initial attack, NSO or its critical habitat has no impact on such operations other than the USFS providing information regarding the presence of critical habitat in certain areas to the inter-agency team. In some national forests, Minimum Impact Suppression Techniques (MIST) are applied in LSRs and current critical habitat designation for NSO. These include minimum snagging and mop-up distances from fire lines and are used in wilderness areas. These techniques tend to cost a little more than the traditional methods, however, since these measures benefit a number of other species, the additional costs attributed to NSO and its critical habitat would be minimal.[100] Other measures taken to benefit NSO by some agencies minimizing helicopter flights in suitable habitat or having the helicopters fly higher in order to minimize noise in LSR and Matrix areas.[101] These activities only add minimal, if any, costs to the operation.

During later stages of fire suppression activities and during Burned Area Emergency Rehabilitation (BAER), Section 7 consultations are conducted in which the Service provides recommendations to

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96 Personal communication with Bill Gaines, Forest Biologist, Okanogan-Wenatchee National Forest, December 6, 2007.

97 Personal communication with Brenda Devlin, Forest Wildlife Biologist, Six Rivers National Forest, December 17, 2007.

98 Personal Communication with Lauri Turner and Bob Obedzinski, Deschutes National Forest, December 10, 2007.

99 Personal Communication with Greg Lesch, Planning and Products Staff Officer, Umpqua National Forest, December 20, 2007.

100 Personal communication with Brenda Devlin, Forest Wildlife Biologist, Six Rivers National Forest, December 17, 2007.

101 Personal communication with Jesse Plumage, Forest Wildlife Biologist, Mt. Baker and Snoqualmie National Forest, December 17, 2007.

minimize impacts to critical habitat.[102] These typically result in additional administrative costs due to Section 7 consultations and other labor costs. The Section 7 consultation costs are captured in Appendix A, while other costs tend to be minimal and are not quantified in this economic analysis.

[102] Personal communication with U.S. Fish and Wildlife Service Biologist, December 7, 2007.

In addition to the impacts discussed in preceding sections and Appendix A, the consultation history for the NSO was examined in order to identify other potential areas of impact. Based on this analysis, three types of activities emerged as the sources of about 30 percent of Section 7 consultations between 1990 and 2007. These include linear projects, restoration activities, and recreation. This chapter discusses the potential impacts, if any, of critical habitat designation on these three activities. Similar to fire management, the analysis in this chapter is based on conversations with relevant personnel from nine national forests in Oregon and Washington and two in California, one BLM state office, and Service biologists involved with past Section 7 consultations related to NSO. Additionally, for transportation projects, relevant state and Federal transportation agencies were contacted.

7.1 LINEAR PROJECTS

Linear projects include transportation and pipelines/powerlines. Although hazard tree removal cross-cuts linear projects as well as recreation, such measures are included under linear projects for the purpose of this analysis.

7.1.1 TRANSPORTATION (INCLUDING HAZARD TREE MANAGEMENT)

The majority of transportation projects conducted by the USFS in the proposed designation involve maintenance of existing roads, while a few are new road constructions or removal of roads originally constructed for timber harvest. Most of the past Section 7 consultations related to transportation revolved around hazard tree removal. A tree identified as a "hazard tree" is cut and dropped to the ground for safety purposes regardless of whether it is present in the proposed critical habitat or not, and whether it is a nesting tree or not. However, within the LSRs and present NSO critical habitat, it is likely to be left on the ground and not removed unless it is creating a problem, such as in a campground or on a road.[103] While this may reduce costs associated with tree removal, it also eliminates any cost recovery potential from hauling these trees to a mill. Some national forests regard timber as a by-product in the hazard tree

[103] Personal communications with Mitch Wainwright, Forest Biologist, Mt. St. Helens National Monument, Gifford-Pinchot National Forests, December 11, 2007; Jen Sanborn, Forest Biologist, Winema-Fremont National Forest, December 13, 2007; Brenda Devlin, Forest Wildlife Biologist, Six Rivers National Forest, December 17, 2007; Bill Gaines, Forest Biologist, Okanogan-Wenatchee National Forest, December 6, 2007; Cathy O'Halloran, Forest Wildlife Biologist, Olympic National Forest, December 19, 2007; Jesse Plumage, Forest Wildlife Biologist, Mt. Baker and Snoqualmie National Forest, December 17, 2007; Joe Doerr, Forest Wildlife Biologist, Willamette National Forest, December 20, 2007; Dave Clayton, Forest Biologist, Rogue River-Siskiyou National Forest, December 7, 2007; and U.S. Fish and Wildlife Service Biologist, December 7, 2007.

management process and, thus, consider the lost timber value as non-existent or minimal.[104] In the national forests where these costs are potentially higher, the lost commercial value of timber is captured in Chapter 3.0 under timber management impacts. The additional Section 7 consultation costs associated with USFS transportation and hazard tree removal projects are discussed in Appendix A.

The non-USFS transportation projects in the proposed designation entail construction and maintenance of state routes and highways. Most highway projects passing through Federal lands are conducted by WFLHD, while some ODOT and WSDOT projects occur in the vicinity if the proposed designation.[105] For projects carried out by WFLHD, restrictions due to threatened and endangered species and critical habitat designations can potentially extend project construction timelines and overall project costs due to the regulatory process and additional planning and mitigation. However, it is difficult to segregate the impacts related to the proposed designation on a certain project. Further, the proposed designation would only have an indirect impact on WFLHD activities.[106] Similar to WFLHD, ODOT and WSDOT project in the vicinity of the proposed designation can potentially result in project delays and additional regulatory, planning, and mitigation costs. However, since the two state agencies do not build many new roads in the area and mainly focus on maintenance of existing roads, the impacts of the proposed designation are anticipated to be minimal.[107] The additional Section 7 consultation costs associated with these transportation projects are discussed in Appendix A.

7.1.2 Pipelines/Powerlines

Similar to construction of roads, laying pipelines passing through the proposed designation can potentially lead to additional regulatory, planning, and mitigation costs. Probable time delays and route modifications can also account for additional costs. Preliminary research revealed that three liquid natural gas (LNG) pipelines are proposed in the vicinity of the proposed designation; the Pacific Connector Gas Pipeline (PCGP), Palomar Gas Transmission (PGT), and Oregon LNG Pipeline (OLP).

The PCGP is a 230-mile, 36-inch diameter pipeline designed to transport up to one billion cubic feet of LNG per day from the Jordan Cove LNG terminals in Coos Bay, Oregon to markets in the region. The pipeline, a joint project of The Williams Companies, Inc., Pacific Gas and Electric Corp. (PG&E), and Fort Chicago LNG, will extend from Coos Bay to Malin, Oregon. Figure 7-1 presents a map of the

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[104] Personal communication with Jen Sanborn, Forest Biologist, Winema-Fremont National Forest, December 13, 2007.

[105] Personal communication with Greg Holthoff, Environmental Project Manager, Oregon Department of Transportation, December 11, 2007.

[106] Personal communication with Susan Pobar, Environmental Staff Representative, Western Federal Lands Highway Department – Federal Highway Administration, December 21, 2007.

[107] Personal communications with Greg Holthoff, Environmental Project Manager, Oregon Department of Transportation, December 11, 2007; and Matt Vasquez, Wildlife Biologist, Environmental Services Office, Washington State Department of Transportation, December 13, 2007.

proposed route for PCGP. If this route is approved, about eight percent of the pipeline will pass through two units in the proposed designation. This will include four miles crossing through Unit 14 and 14 miles traversing Unit 17. Additionally, the southwest corner of Unit 8 will be about 1,800 feet from PCGP's centerline and, depending on width of the corridor, may also be impacted. Some portions of the pipeline are anticipated to pass directly through NSO nesting patches/core areas. If the proposed route for the pipeline is approved, there will likely be impacts related to loss of critical habitat as well as direct impacts to individual owls.[108]

The PGT, a joint venture between Northwest Natural and TransCanada, is a proposed interstate natural gas pipeline that will provide additional energy infrastructure to serve Oregon, the Pacific Northwest, and other western states. When approved, this 36-inch diameter underground pipeline will be approximately 220 miles long and crosses the Mt. Hood National Forest in Oregon. The third pipeline, 36-inch diameter OLP, will run approximately 117 miles from the terminal in Warrenton to Molalla Gate Station, Oregon. The project will provide natural gas to entities in the Pacific Northwest Region as well as other parts of the western United States. Figure 7-1 illustrates the location of the PGT and OLP pipelines relative to the proposed critical habitat designation. The PGT and OLP preferred routes do not pass through the proposed designation.

The PGT project is presently in the process of seeking a certificate from the Federal Energy Regulatory Commission for permission to construct and operate the proposed pipeline. Surveys and other environmental studies are already underway to facilitate the process. If approved, construction of the pipeline can commence by late 2009 and 2010. Given that the project is not yet approved and the impact study not completed, the extent of the impact of the proposed designation on the PGT project, if any, is unclear. Also, absent the environmental review, there is uncertainty regarding the nature of mitigation measures that may be required to protect the NSO and its habitat. This economic analysis, therefore, does not quantify potential impacts of the proposed designation on the PGT pipeline.

7.2 RESTORATION

Restoration projects within the current NSO designation and LSRs comprise, among others, thinning the new growth in harvested areas, culvert projects, projects for fish such as placing logs in streams (for dams in some cases), and snag creation. Within the LSRs and current NSO critical habitat, the thinning of new growth is carried out so as to create uneven spacing and facilitate development of late successional habitat. Additionally, diversity is encouraged and more gaps are created in these new growth areas. Based on this description, there are zero to minimal additional costs associated with applying these measures in the area proposed for designation. Given their proximity to roads, most of the culvert projects also have minimal impacts on NSO and its habitat. Some larger culvert projects tend to have relatively larger impacts, which can be minimized by leaving big trees behind if possible, taking up lesser area, and limiting construction during the NSO breeding season to avoid disturbance. Projects for fish do

[108] Personal communication with U.S. Fish and Wildlife Service Biologist, December 18, 2007.

not affect NSO as long as these utilize smaller trees, do not take larger logs from NSO habitat, and are not carried out during the NSO breeding season. Impacts from snag creation in LSRs and proposed critical habitat can also be minimized by conducting these activities outside the NSO breeding season.[109]

7.3 RECREATION

Recreation in most of the current NSO critical habitat and LSRs is limited in almost all of the national forests contacted, with recreation management activities limited to minor trail and campground maintenance. Further, no new recreation projects are planned for these areas.[110] One larger recreation site within the proposed designation is the Lake of the Woods recreational residences site in Winema-Fremont National Forest. The 1,823-acre facility includes a resort, a restaurant, a store, a visitors center, an RV park, two USFS campgrounds, and 218 recreational residences. Since this is an old growth area, hazard tree management could be an issue leading to additional Section 7 consultation costs.[111] These impacts are captured in Appendix A. In the Willamette National Forest, deer and elk hunting activities may potentially be affected due to less availability of these species when old forest is restored.[112] However, these impacts will occur in the long-term and are beyond the scope of this study.

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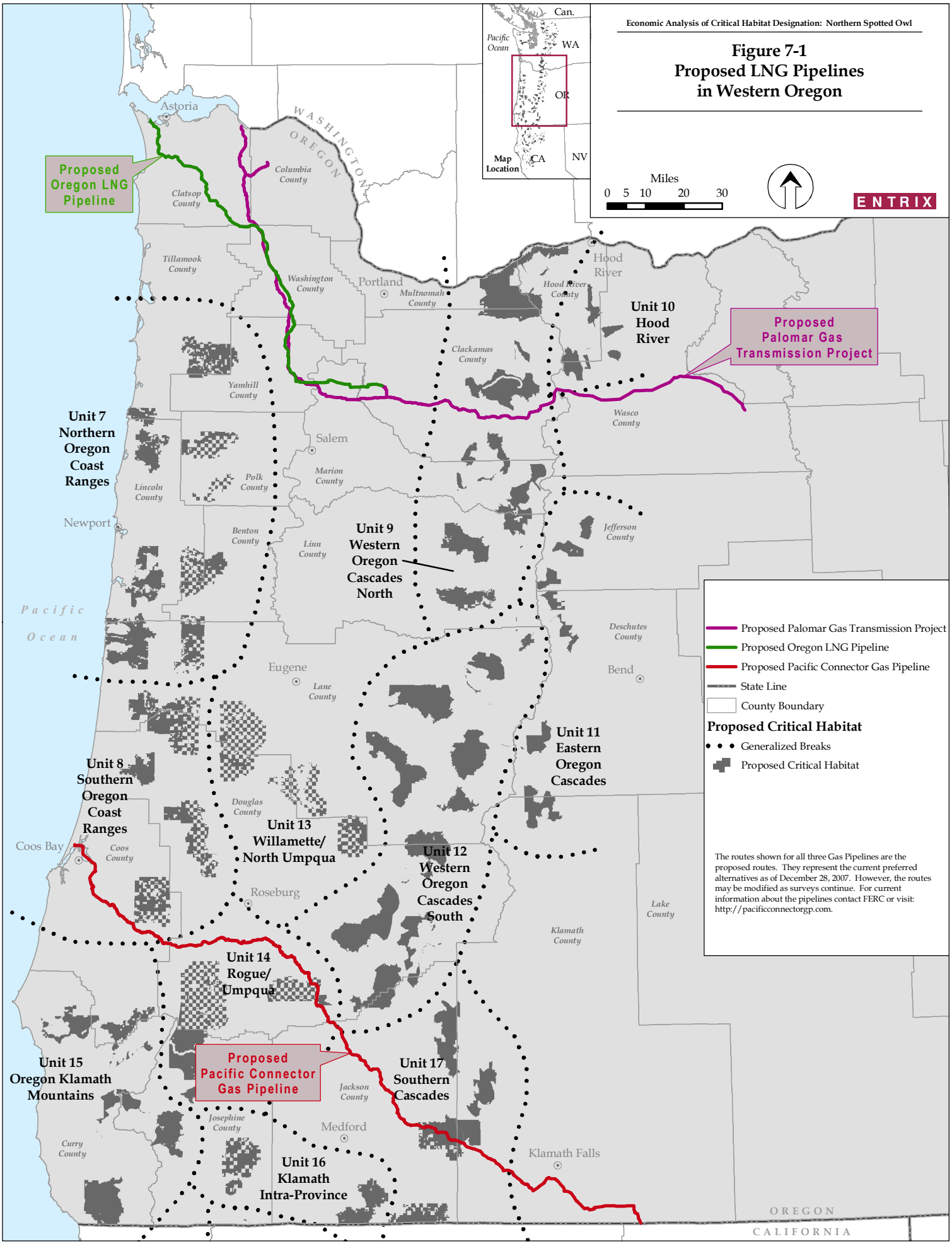
[109] Personal communication with U.S. Fish and Wildlife Service Biologist, December 14, 2007.

[110] Personal communications with Mitch Wainwright, Forest Biologist, Mt. St. Helens National Monument, Gifford-Pinchot National Forests, December 11, 2007; Jen Sanborn, Forest Biologist, Winema-Fremont National Forest, December 13, 2007; Brenda Devlin, Forest Wildlife Biologist, Six Rivers National Forest, December 17, 2007; Bill Gaines, Forest Biologist, Okanogan-Wenatchee National Forest, December 6, 2007; Cathy O'Halloran, Forest Wildlife Biologist, Olympic National Forest, December 19, 2007; Jesse Plumage, Forest Wildlife Biologist, Mt. Baker and Snoqualmie National Forest, December 17, 2007; Joe Doerr, Forest Wildlife Biologist, Willamette National Forest, December 20, 2007; and Dave Clayton, Forest Biologist, Rogue River-Siskiyou National Forest, December 7, 2007.

[111] Personal communication with Jen Sanborn, Forest Biologist, Winema-Fremont National Forest, December 13, 2007.

[112] Personal communication with Joe Doerr, Forest Wildlife Biologist, Willamette National Forest, December 20, 2007.



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Personal communication with Susan Pobar, Environmental Staff Representative, Western Federal Lands Highway Department – Federal Highway Administration, December 21, 2007.

Personal communication with Tom Frolli, Program Leader, Range, Wildlife, Fisheries, and Botany, Lassen National Forest, December 17, 2007.

Personal communication with U.S. Fish and Wildlife Service Biologists, November 1, 7, 14 and December 7, 11, and 14, 2007.

Personal communication with Walter Herzog, Bureau of Land Management, December 17 and 18, 2007 (data provided for Redding Field Office in California).

This appendix presents administrative costs of actions taken under Section 7 of the Act associated with the geographic area proposed as critical habitat for NSO. First, this Appendix defines the types of administrative costs likely to be associated with the proposed habitat. Next, the Appendix presents estimates of the number of technical assistance efforts and consultations expected to result from the designation of critical habitat and/or the listing of NSO, as well as the per-unit costs of each of these activities. Based on this analysis, estimates of past and future administrative costs are derived.

A.1 CATEGORIES OF ADMINISTRATIVE COSTS

The following section provides an overview of the categories of administrative cost impacts that arise due to the implementation of Section 7 in the geographic area proposed as critical habitat for NSO.

A.1.1 TECHNICAL ASSISTANCE

Frequently, the Service responds to requests for technical assistance from a variety of Federal and state agencies, local municipalities, and private landowners and developers who may have questions regarding whether specific activities may affect a species or its critical habitat. Technical assistance can include a species list provided by the Service; information on listed, proposed, or candidate species; and contact information for people/agencies that can provide further assistance. Technical assistance costs represent the estimated economic costs of voluntary informational conversations between these entities and the Service regarding the NSO, including the designation of critical habitat for NSO. Most likely, such conversations will occur between public land managers or private property owners and the Service regarding lands designated as critical habitat or lands adjacent to critical habitat.

A.1.2 SECTION 7 CONSULTATIONS

Section 7(a)(2) of the Act requires Federal agencies (action agencies) to consult with the Service whenever activities that they undertake, authorize, permit, or fund may affect a listed species or designated critical habitat. Parties involved in Section 7 consultations include the Service, a Federal action agency (e.g., USFS), and in some cases, a non-Federal entity (e.g., state agencies and private landowners involved in the project or land use activity). The action agency (i.e., the Federal nexus necessitating the consultation) generally serves as the primary contact with the Service during the consultation. While consultations are required for activities that involve a Federal nexus and that may affect the species regardless of whether critical habitat is designated, the designation may increase the effort for consultations in the case that the project or activity in question may affect critical habitat.

In general, three different scenarios associated with the designation of critical habitat may trigger incremental administrative consultation costs:

1. **Additional effort to address effects to critical habitat in a new consultation -** New consultations taking place after critical habitat designation may require additional effort to address critical habitat issues above and beyond the listing issues. In this case, only the additional administrative effort required to consider critical habitat is considered an incremental impact of the designation.

2. **Re-initiation of consultation to address effects to critical habitat** – Some consultations that have already been completed on a project or activity may require re-initiation to address critical habitat. In this case, the costs of re-initiating the consultation, including all associated administrative and project modification costs are considered incremental impacts of the designation.

3. **Incremental consultation resulting entirely from critical habitat designation -** Critical habitat designation may trigger additional consultations that may not occur absent the designation. Such consultations may, for example, be triggered in critical habitat areas that are not occupied by the species or result from the new information about the potential presence of the species provided by the designation. All associated administrative and project modification costs of incremental consultations are considered incremental impacts of the designation.

During a consultation, the Service and the action agency (with the assistance of the non-Federal third party applying for Federal funding or permitting if applicable) may communicate in an effort to reduce or remove adverse effects to the proposed or listed species and/or to the proposed or designated habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depend on a number of variables, including the type of consultation, the species, the activity of concern, and the potential effects to the species and designated critical habitat associated with the activity that has been proposed. The duration and complexity also depend on the Federal agency, and whether there is a private applicant involved.

Section 7 consultations with the Service may be either informal or formal. *Informal consultations* consist of discussion among the Service, the action agency, and the applicant concerning an action that may affect a listed species or its designated critical habitat. The process is designed to identify and resolve potential concerns at an early stage in the planning process. If the action agency and Service can reach concurrence that the project is not likely to adversely affect the species or critical habitat, the Service can issue a letter of concurrence concluding the consultation process. By contrast, a *formal consultation* is required if the action agency or the Service determines that the proposed action may adversely affect the listed species or designated critical habitat. In the formal consultation process, the action agency provides information on the action and its effect on listed species and critical habitat in a request for initiation of consultation (referred to as a biological assessment), and the Service provides its biological opinion (BO) on whether the action is likely to jeopardize a species or destroy or adversely modify critical habitat. In addition, the document will include information on whether the action will result in take of a listed animal species, and if so will include an incidental take statement authorizing such take subject to reasonable and prudent measures and mandatory terms and conditions to minimize the impacts of such

take. A consultation can also include *programmatic level consultation* on an Action agency's proposal to apply specified standards or design criteria to future proposed actions, or to implement a land use plan. Programmatic consultations may streamline the Section 7 consultation process, as much of the effects analysis is completed initially during the Section 7 consultation on the program, rather than repeated each time a new action, or batch of actions, is proposed.

Multiple consultations can also be grouped and consulted on together as a *batched consultation*. Batched consultations are groups of projects or actions included in a single consultation document for efficiency. A batched consultation may include groups of projects with similar activity types, or include a variety of activity types in a common geographic area, and may include from as little as two to more than 100 individual actions. Because of the variety of projects included, batched consultations may include some projects that require formal consultation or some requiring only concurrence. The batched approach is an important tool for reducing consultation costs per action by utilizing common information and analyses for similar or geographically-localized projects. Regardless of the type of consultation or proposed project, Section 7 consultations can require substantial administrative effort on the part of all participants.

A.2 ESTIMATED COSTS OF CONSULTATIONS AND TECHNICAL ASSISTANCE

Estimates of the cost of an individual consultation and technical assistance request were developed from a review and analysis of historical Section 7 files from a number of Service field offices around the country conducted in 2002. These files addressed consultations conducted for both listings and critical habitat designations. Cost figures were based on an average level of effort of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.

The administrative cost estimates presented in this section take into consideration the level of effort of the Service, the action agency, and any applicant, as well as the varying complexity of the consultation or the technical assistance request. Costs associated with these consultations include the administrative costs associated with conducting the consultations, such as the costs of time spent in meetings, preparing letters, and the development of a BO. Table A-1 provides a summary of the estimated administrative costs of consultations and technical assistance requests.

Table A-1
Administrative Costs of Consultation and Technical Assistance Efforts (per Effort), $2007

Consultation Type	Service	Action Agency	Third Party	Biological Assessment
Technical Assistance	$530	N/A	$1,050	N/A
Informal Consultation	$2,300	$2,900	$2,050	$2,000
Formal Consultation	$5,150	$5,800	$3,500	$4,800
Batched Consultation [1/]	$15,450	$17,400	$10,500	$14,400
Programmatic Consultation	$15,500	$12,950	N/A	$5,600

Source: Industrial Economics, Inc., analysis based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2006, and a review of consultation records from several Service field offices across the country conducted in 2002.

[1/] The Wenatchee, Lacey, Arcata, Oregon, and Yreka Field Offices estimate batched consultations take approximately three times the level of effort, on average, of a similar type of individual project formal consultation. Source: Personal communication with Service Biologist, October 24, 2007.

Note: Estimates reflect average hourly time required by staff.

The above consultation costs represent the effort required for all types of consultation, including those that considered both adverse modification and jeopardy, and are therefore not representative of the incremental administrative costs of consultation triggered specifically by critical habitat designation. To estimate the fraction of the administrative costs associated with consultation the following assumptions were applied:

- The costs of an incremental consultation (one only occurring because of the designation of critical habitat) are the greatest, as all costs associated with this consultation are included.

- Re-initiation of a consultation is assumed to require approximately half the level of effort of the incremental consultation. This assumes that re-initiations are less time-consuming as the groundwork for the project has already been considered in terms of its effect on the species.

- Efficiencies exist in considering both effects to the species and to critical habitat at the same time (e.g., in staff time saved for project review and report writing). Therefore, incremental administrative costs of considering effects to critical habitat in consultations that will already be required to consider effects to the species result in the least incremental effort of these three consultation categories, roughly half that of a re-initiation.

The cost model in Table A-2 presents the estimated baseline (effects to species) and incremental (effects to critical habitat) costs of consultation for each of the three categories of consultation described above.

Table A-2
Estimated Range of Baseline and Incremental Administrative Costs of Consultation and Technical Assistance Efforts (per Effort), $2007

BASELINE ADMINISTRATIVE COSTS OF CONSULTATION					
Consultation Type	**Service**	**Action Agency**	**Third Party**	**Biological Assessment**	**Total Costs**
Consultation Considering Only Effects to Species (No Consideration of Critical Habitat Designation)					
Technical Assistance	$530	N/A	$1,050	N/A	$1,500
Informal Consultation	$2,300	$2,900	$2,050	$2,000	$9,500
Formal Consultation	$5,150	$5,800	$3,500	$4,800	$19,500
Batched Consultation [1/]	$15,450	$17,450	$10,500	$14,400	$57,750
Programmatic Consultation	$15,500	$12,950	N/A	$5,600	$34,050
Effort to Address Effects to Species in a New Consultation that Considers Effects to Species and Critical Habitat					
Technical Assistance	$398	N/A	$788	N/A	$1,125
Informal Consultation	$1,725	$2,175	$1,538	$1,500	$7,125
Formal Consultation	$3,863	$4,350	$2,625	$3,600	$14,625
Batched Consultation [1/]	$11,588	$13,050	$7,875	$10,800	$43,313
Programmatic Consultation	$11,625	$9,713	N/A	$4,200	$25,538
INCREMENTAL ADMINISTRATIVE COSTS OF CONSULTATION					
Consultation Type	**Service**	**Action Agency**	**Third Party**	**Biological Assessment**	**Total Costs**
Incremental Consultation Resulting Entirely from Critical Habitat Designation					
Technical Assistance	$530	N/A	$1,050	N/A	$1,500
Informal Consultation	$2,300	$2,900	$2,050	$2,000	$9,500
Formal Consultation	$5,150	$5,800	$3,500	$4,800	$19,500
Batched Consultation [1/]	$15,450	$17,450	$10,500	$14,400	$57,750
Programmatic Consultation	$15,500	$12,950	N/A	$5,600	$34,050
Re-Initiation of Consultation to Address Effects to Critical Habitat					
Technical Assistance	$265	N/A	$525	N/A	$750
Informal Consultation	$1,150	$1,450	$1,025	$1,000	$4,750
Formal Consultation	$2,575	$2,900	$1,750	$2,400	$9,750
Batched Consultation [1/]	$7,725	$8,700	$5,250	$7,200	$28,875
Programmatic Consultation	$7,750	$6,475	N/A	$2,800	$17,025
Additional Effort to Address Effects to Critical Habitat in a New Consultation					
Technical Assistance	$133	N/A	$263	N/A	$375
Informal Consultation	$575	$725	$513	$500	$2,375
Formal Consultation	$1,288	$1,450	$875	$1,200	$4,875
Batched Consultation [1/]	$3,863	$4,350	$2,625	$3,600	$14,438
Programmatic Consultation	$3,875	$3,238	N/A	$1,400	$8,513

Source: Industrial Economics, Inc., analysis based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2006, and a review of consultation records from several Service field offices across the country conducted in 2002.

[1/] The Wenatchee, Lacey, Arcata, Oregon, and Yreka Field Offices estimate batched consultations take approximately three times the level of effort, on average, of a similar type of individual project formal consultation. Source: Personal communication with Service Biologist, October 24, 2007.

Note: Estimates reflect average hourly time required by staff.

Numbers may not sum due to total shown due to rounding.

A.3 SUMMARY OF PAST ADMINISTRATIVE COSTS

Data on the number of historic consultations was provided by the Service, compiled by the various field offices from databases designed to track consultation workload for budget purposes. The earliest databases were initiated in 1992 and contain limited information on the project other than the species involved and consultation type. Recently, the Service began collecting and tracking more extensive information. However the databases were not designed to track the location of the activities or projects. For this reason, it is not always possible to determine whether a consultation considered areas within the proposed designation.

Since 1992 (and through 2006), there have been more than 2,700 Section 7 consultations and technical assistance efforts related to NSO (see Table A-3). Of these consultations, approximately 430 considered areas of current critical habitat, which was finalized on January 15, 1992, and 1,371 considered areas outside of critical habitat. It is not possible to determine from the databases whether the remaining 916 consultations considered areas within the current critical habitat.

Table A-3
Consultation and Technical Assistance Efforts, by Year, 1992 - 2006

		Current Critical Habitat		
Year	**Total**	**Yes**	**No**	**Unknown**
1992	1	1		
1993	136		9	127
1994	132	14	40	78
1995	177	25	89	63
1996	295	50	166	79
1997	205	33	107	65
1998	203	26	91	86
1999	234	41	135	58
2000	261	52	116	93
2001	240	35	126	79
2002	178	12	82	84
2003	163	25	117	21
2004	181	34	129	18
2005	180	44	87	49
2006	130	38	77	15
Total	**2,717**	**430**	**1,371**	**916**

Source: Information provided by the Wenatchee, Lacey, Arcata, Oregon, and Yreka Field Offices. Personal communication with U.S. Fish and Wildlife Service Biologist, October 24, 2007.

Note: Numbers may not sum due to total shown due to rounding.

Approximately 90 percent of the consultation activity (more than 2,470 consultations) involved individual informal, formal, and technical assistance efforts, with informal consultations accounting for almost 60 percent (1,427 consultations) of the individual consultation efforts, followed by formal consultations (625, or 26 percent) and technical assistance (363, or 15 percent). Batched and programmatic consultations accounted for the remaining 10 percent (259 consultations) and two percent (43 consultations), respectively (see Table A-4).

Table A-4
Consultation and Technical Assistance Efforts, by Consultation Activity and Type, 1992 - 2006

			Current Critical Habitat		
Activity	**Type**	**Total**	**Yes**	**No**	**Unknown**
Individual	TA	363	53	99	211
	Informal	1,427	211	926	290
	Formal	625	101	251	273
	Subtotal	*2,415*	*365*	*1,276*	*774*
Batched		259	45	79	135
Programmatic		43	20	16	7
Total		**2,717**	**430**	**1,371**	**916**

Source: Information provided by the Wenatchee, Lacey, Arcata, Oregon, and Yreka Field Offices. Personal communication with Service Biologist, October 24, 2007.

Note: Numbers may not sum to total shown due to rounding.

Six types of activities have accounted for more than 90 percent (2,451 consultations) of the consultation efforts during the 15 year period from 1992 to 2006. Timber management actions comprise the largest number of consultations, (969 or 36 percent), followed by transportation actions (593 consultations, or 22 percent), other unspecified actions (324 consultations or 12 percent), restoration actions (290 consultations or 11 percent), recreation actions (175 consultations or six percent), and fire management/fuels reduction actions (100 consultations or four percent) (see Table A-5).

To provide a more complete estimate of the administrative costs associated with pre-designation (1990 to 2007) Section 7 consultation activity within the boundaries of the *proposed revised* critical habitat designation, the analysis 1) allocates consultations with unknown locations ("unknown consultations," hereafter) to the current critical habitat; 2) estimates consultations within the current critical habitat designation during the period 1990 to 1992 when consultation history does not exist, or is limited; 3) estimates consultations within the current critical habitat designation for 2007, a year for which complete and consistent consultation data from the various field offices is not available; and 4) adjusts the number of estimated consultations within the current critical habitat to account for the smaller area in the proposed revised designation.

Table A-5
Consultation and Technical Assistance Efforts, by Consultation Action, 1992 - 2006

		Current Critical Habitat		
Action	**Total**	**Yes**	**No**	**Unknown**
Timber management	969	139	311	519
Transportation	593	92	346	156
Other (unspecified)	324	68	253	3
Restoration	290	39	178	73
Recreation	175	38	94	43
Fire management/fuels reduction	100	30	47	23
Pipeline/power lines, etc.	69	8	36	25
Cell tower	38	3	35	
Fire suppression/BAER	33	3	14	16
Land exchanges	33	3	14	16
Mining	18	2	6	10
Hydro	17	2	15	
HCP	7		6	1
Scientific take permit	6			6
Special use permit	6		6	
Grasshopper control	3	1		2
Grazing	3		2	1
Research	3		1	2
Rock pit	3			3
Wastewater treatment	3		1	2
Construction	2		2	
Dredging	2		1	1
Monitoring	2		2	
Gopher baiting	1	1		
Water temperature project	1	1		
Dam	1		1	
Dam removal	1			1
Disaster mitigation	1			1
Fish hatchery	1		1	
Fish ladder	1			1
Geothermal plant construction	1			1
Gravel extraction	1		1	
Gypsy moth spraying	1		1	
Helicopter	1		1	
Nest boxes	1			1
Oil spill	1			1
Reservoir expansion	1			1
System improvement	1			1
Water system	1			1
Weir cleaning	1			1
Wildlife surveys	1			1
Total	**2,717**	**430**	**1,374**	**913**

Source: Information provided by the Wenatchee, Lacey, Arcata, Oregon, and Yreka Field Offices.
Personal communication with U.S. Fish and Wildlife Service Biologist, October 24, 2007.

Note: Numbers may not sum to totals shown due to rounding.

The first adjustment allocates the unknown consultations, which account for approximately 35 percent of the historic NSO-related consultations, to the current critical habitat designation. To estimate whether an unknown consultation occurred within the boundaries of the current critical habitat, this analysis relies on additional data from the regional Northwest Forest Plan Section 7 Consultation Effects database. It was designed and implemented to assist the Service field biologists and management in Region 1 to accurately record, monitor, and analyze key information relating to NSO consultations and BOs on a range-wide basis. The database was designed to track effects to the species, not individual consultations, and includes information on acres of various levels of effect to NSOs, general location information (province or critical habitat), and land allocation, among other items (see Table A-6).

Table A-6
Critical Habitat as a Component of Consultations (Informal and Formal) on Federal Lands, by Year, 1994 - 2006

Year	Acres of Critical Habitat Included in Consultations	Total Acres Included in Consultations	Percent Critical Habitat
1994 – 2001	37,786	537,785	7.0%
2002	1,777	11,266	15.8%
2003	4,216	18,196	23.2%
2004	1,625	6,511	25.0%
2005	668	8,014	8.3%
2006	13,639	47,898	28.5%

Source: Information provided by the Service. Personal communication with U.S. Fish and Wildlife Service Biologist, October 24, 2007.

Note: Information does not include technical assistance efforts or consultations on private or Native American lands.

While data is only available on a yearly basis starting in 2002, the economic analysis relies on the acreage (i.e., effects) information from the database to allocate all unknown consultations. The annual proportion of critical habitat acres consulted on, relative to total acres consulted on, is used to allocate the unknown consultations for each year, respectively, during the 2002 to 2006 period. The allocation for unknown consultations that occurred during the 1992 to 2001 period is based on the acres of critical habitat consulted on, relative to the total acres consulted on, during the period 1994 to 2001.

The next adjustment estimates consultations for the period 1990 to 1992. Data from the listing of the species (1990) until 1992 were not available in the existing databases. However, substantial consultation effort took place on ongoing and planned projects at the start of the consultation period, though this

slowed with the advent of lawsuits in the first few years of listing.[113] To estimate consultations for this two and one-half year period, the analysis assumes the annual number of annual consultations is equivalent to the five-year average during the period 1996 to 2000, the years following the slow consultation activity documented in the databases during the three year period (1993 to 1995) immediately following listing, which likely reflect the initial lawsuits.

Since a complete and consistent set of data for 2007 is also not available in the existing databases, the third adjustment estimates consultations for 2007. To estimate consultations for 2007, the analysis assumes the annual number of consultations is equivalent to the six-year average during the period 2001 to 2006, a more recent period that likely reflects a consultation pattern more typical of current conditions, as opposed to the pattern of consultation activity during the period immediately following listing (1990) and critical habitat designation (1992).

The consultation history and three adjustments described above relate to the boundaries of the current critical habitat designation from 1992. The Service's designation in 1992 included 6,887,000 acres of Federal lands (BLM and USFS) within the 24,465,000 acre Northwest Forest Plan area as critical habitat for NSO. The Service proposes a revised designation of 5,337,839 acres of Federal lands (BLM and USFS) as critical habitat. Of the revised acreage proposed, 4,468,200 acres are identical to the 1992 designation (65 percent of the current 6,887,000 acre designation). An additional 869,639 acres of land not previously designated are now proposed (five percent of the Northwest Forest Plan area (17,573,000 acres) that were not part of the 1992 designation), and 2,399,490 acres of land previously designated are no longer proposed for designation (35 percent of the current 6,887,000 designation). Therefore, to estimate historic consultation activity within the boundaries of the *proposed revised* critical habitat designation, the analysis applies the following factors to the consultation data in the final adjustment:

- 65 percent of the historic consultations that occurred within the current critical habitat designation would have occurred within the proposed revised critical habitat designation;

- 35 percent of the historic consultations that occurred within the current critical habitat designation would not have occurred within the proposed revised critical habitat designation; and

- Five percent of the historic consultations that occurred outside the current critical habitat designation would have occurred within the proposed revised critical habitat designation.

Considering these adjustments, the analysis estimates that 3,615 NSO-related Section 7 consultations have occurred since the species was listed in 1990, through 2007; 550 occurred within the boundaries of the proposed revised designation and 3,065 occurred outside the boundaries of the proposed revised designation, respectively. Approximately 87 percent of the consultation activity within the proposed revised designation (more than 475 consultations) involved individual informal, formal, and technical

[113] Personal communication, U.S. Fish and Wildlife Service Biologist, December 3, 2007.

assistance efforts, with informal consultations accounting for 57 percent (273 consultations) of the individual consultation efforts, followed by formal consultations (130, or 27 percent) and technical assistance (73, or 15 percent). Batched and programmatic consultations account for the remaining 10 percent (54 consultations) and four percent (20 consultations), respectively (see Table A-7). More than 90 percent of the consultation activity involved timber management actions, followed by transportation actions, other unspecified actions, restoration actions, recreation actions, and fire management/fuels reduction actions (see Table A-5).

Table A-7
Estimated Consultation and Technical Assistance Efforts, by Year, 1990 - 2007

Year	TA	Informal	Formal	Batched	Programmatic	Total
1990	4.8	18.3	9.2	2.7	1.5	36.6
1991	4.8	18.3	9.2	2.7	1.5	36.6
1992	4.8	18.3	9.2	3.3	1.5	37.2
1993	2.6	2.9	1.7	0.2		7.4
1994	0.8	10.3	3.3	0.9		15.4
1995	1.2	15.7	5.3	1.2	0.7	24.1
1996	2.8	27.9	8.3	4.1	2.1	45.1
1997	1.9	16.0	7.4	3.0	2.1	30.3
1998	3.3	7.4	12.5	3.0	0.1	26.2
1999	6.0	15.4	11.8	1.3	2.1	36.6
2000	9.9	25.1	6.1	2.2	1.4	44.7
2001	12.4	14.4	3.4	1.1	2.1	33.4
2002	2.3	10.9	5.1	3.9	0.0	22.2
2003	1.8	11.9	6.6	4.1	1.4	25.8
2004	2.4	13.7	7.6	7.5	0.9	32.0
2005	3.3	19.0	8.5	4.6	0.7	36.3
2006	4.1	14.1	8.6	4.3	0.7	31.9
2007	3.7	13.1	6.1	4.1	1.0	27.9
Total	**73.0**	**272.8**	**130.0**	**54.0**	**19.8**	**549.6**

Source: Information provided by the Wenatchee, Lacey, Arcata, Oregon, and Yreka Field Offices. Personal communication with U.S. Fish and Wildlife Service Biologist, October 24, 2007.

Note: Numbers may not sum due to total shown due to rounding.

A.4 SUMMARY OF FUTURE ADMINISTRATIVE COSTS

This analysis of forecast consultations by type (technical assistance, informal, formal, batched, and programmatic) is based on a review of historical consultations and information received from the Service, BLM, and USFS regarding future consultations on USFS Land Management Plans (LMPs) and BLM Resource Management Plans (RMPs). Other than future consultations related to LMPs and RMPs,

consultations are estimated by type based on the frequency and distribution of past Section 7 consultations during the period 2000 to 2006, a more recent period that likely reflects a consultation pattern more typical today. The distribution and frequency of past consultations are considered a reliable indicator of the distribution and frequency of future consultations because the majority of the proposed revised critical habitat designation has been designated critical habitat for NSO since 1992.

The number of estimated post-designation consultations for activities within a given unit is highly uncertain. Specific information on the geographic distribution of past consultations is not readily available, and the exact location of specific future projects is speculative. As a result, administrative consultation costs are quantified in an "unallocated" line item of the cost model for areas proposed for critical habitat and are included in the total impact estimates.

The analysis estimates that 28 consultations will occur annually within the boundaries of the proposed designation during the post-designation period. Furthermore, the analysis also assumes the future annual consultations will address both the jeopardy and adverse modification standards, thus, all of these consultations will require additional effort to address critical habitat issues above and beyond the listing issues. Approximately 82 percent of the annual consultation activity (23 consultations) are expected to involve individual informal, formal, and technical assistance efforts, with informal consultations accounting for 57 percent (13 consultations) of the individual consultation efforts, followed by formal consultations (six, or 27 percent) and technical assistance (four, or 16 percent). Batched and programmatic consultations account for the remaining 14 percent (four consultations) and four percent (one consultation), respectively. More than 90 percent of the consultation activity is expected to involve timber management actions, followed by transportation actions, other unspecified actions, restoration actions, recreation actions, and fire management/fuels reduction actions (see Table A-5).

In addition to the consultation efforts forecast above, each national forest and BLM district is expected to revise and consult and/or reconsult with the Service on their LMP or RMPs. The revision and reconsultation schedule is as follows:[114]

- The Okanogan and Wenatchee National Forest LMPs and Oregon BLM RMP are scheduled to be revised in 2008. This analysis assumes the RMPs and LMP will be consulted on in 2008.

- The Deschutes and Winema National Forests LMPs are scheduled to be revised in 2011. This analysis assumes the LMP consultations will be reinitiated in 2009 and the revised LMPs consulted on in 2011.

[114] Personal communication with Phil Mattson, Assistant Director, Resource Planning and Monitoring, USDA Forest Service, Pacific Northwest Region, Portland, OR, December 11, 2007, personal communication with Paul Roush, Wildlife Program Lead, BLM California, Arcata, CA, December 12, 2007, and personal communication with Patricia A. Krueger, Regional Threatened and Endangered Species Coordinator, USDA Forest Service, Pacific Southwest Region, American Canyon, CA, December 18, 2007.

- The Lassen National Forest LMP is scheduled to be revised in 2012. This analysis assumes the LMP consultation will be reinitiated in 2009 and the revised LMP consulted on in 2012.

- The Mendocino, Klamath, Six Rivers, and Shasta – Trinity National Forest LMPs are scheduled to be revised in 2013. This analysis assumes the LMP consultations will be reinitiated in 2009 and the revised LMPs consulted on in 2013.

- The Rogue, Siskiyou, Umpqua, Mt. Hood, Sluslaw, and Willamette National Forest LMPs are scheduled to be revised in 2014. This analysis assumes the LMP consultations will be reinitiated in 2009 and the revised LMPs consulted on in 2014.

- The Olympic, Mt. Baker – Snoqualmie, and Gifford Pinchot National Forest LMPs are scheduled to be revised in 2017. This analysis assumes the LMP consultations will be reinitiated in 2009 and the revised LMPs consulted on in 2017.

- The Redding BLM RMP was last updated in 1993. According to BLM, it is unlikely the RMP will be refreshed before 2010. This analysis assumes the Redding RMP consultation will be reinitiated in 2009 and revised during the period 2011 to 2020.

- Arcata BLM is covered by the Arcata RMP (1996), King Range RMP (2005), and Headwaters RMP (2004). There is no firm date for refreshing any of these RMPs, even Arcata. Considering recent revisions, this analysis assumes the King Range and Headwaters RMP consultations will be reinitiated in 2009, and that the Arcata RMP consultation will be reinitiated in 2009 and revised during the period 2016 to 2025.

A.5 SUMMARY OF IMPACTS

The pre-designation impacts between 1998 and 2007 associated with Section 7 consultations on NSO and current critical habitat amount to approximately $6.95 to $9.03 million (in 2007 dollars). Table E-6 provides a summary of the incremental and baseline post-designation Section 7-related impacts that are anticipated to occur within the proposed designation.

Following the designation, approximately $1.40 million to $2.15 million in post-designation incremental Section 7 consultation impacts are forecast in present value terms at a seven percent discount rate. Expected annualized incremental impacts are estimated to range between $132,000 and $202,000.[115]

As previously described, other than the USFS and BLM LMPs and RMPs, the geographic location of future projects is uncertain. Thus, approximately 81 percent of the forecast incremental administrative

[115] At a three percent discount rate, approximately $1.87 million to $2.89 million in post-designation incremental Section 7 consultation impacts are forecast in present value terms. Expected annualized incremental impacts are estimated to range between $122,000 and $195,000.

consultation impacts are unallocated. The remaining 19 percent are allocated to the units by national forest and BLM district. In terms of entities impacted, approximately 31 percent of the incremental impacts will be borne by the Service. Because the entire proposed designation is located on USFS and BLM managed lands, the USFS and BLM are expected to bear most of the remaining impacts. However, the geographic location of future projects is uncertain. Thus, it is not possible to estimate what portion of the remaining impacts each entity will bear. Considering 86 percent and 14 percent of the proposed designation occurs on USFS and BLM land, respectively, the USFS will likely bear most of the remaining incremental impact (approximately 60 percent). Other Federal, state, and local government agencies will also bear some of the incremental impact as action agencies or third parties, but their share of the burden is likely to be small relative to the USFS, BLM, and Service.[116]

The baseline impacts associated with Section 7 consultations amount to approximately $3.44 million to $5.54 million in present value terms at a seven percent discount rate. Expected annualized baseline impacts are estimated to range between $324,000 and $522,000.[117]

Approximately 94 percent of the forecast baseline administrative consultation impacts are unallocated. The remaining six percent are allocated to the units by national forest and BLM district. In terms of entities impacted, approximately 28 percent of the baseline impacts will be borne by the Service. Similar to the distribution of incremental impacts, the USFS and BLM are expected to bear most of the remaining baseline impact (about 62 percent and approximately 10 percent, respectively). Other Federal, state, and local government agencies will also bear some of the baseline impact as action agencies or third parties, but their share of the burden is likely to be small relative to the USFS, BLM, and Service.[118]

A.6 CAVEATS

The number of consultations and technical assistance efforts to be undertaken in the future for activities within a given complex is highly uncertain. The frequency of such efforts will be related to the level of economic activity, the presence of regional plans, and the extent to which economic activity overlaps with critical habitat. To the extent that this analysis over- or under- estimates the number of these efforts in the future, estimated costs will also be over or understated.

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[116] At a three percent discount rate, approximately 84 percent of the forecast incremental administrative consultation impacts are unallocated. The remaining 16 percent are allocated to the units by national forest and BLM district. In terms of entities impacted, approximately 30 percent of the incremental impacts will be borne by the Service, over 60 percent by USFS, and about 10 percent by BLM.

[117] At a three percent discount rate, the baseline impacts associated with Section 7 consultations amount to approximately $4.79 million to $7.72 million. Expected annualized baseline impacts are estimated to range between $320,000 and $518,000.

[118] The baseline results are expected to be similar at a three percent discount rate, with approximately 94 percent of the forecast baseline administrative consultation impacts not allocated to a particular unit. The remaining 6 percent are allocated to the units by national forest and BLM district. In terms of entities impacted, approximately 28 percent of the incremental impacts will be borne by the Service.

This appendix considers the extent to which the incremental impacts results presented in the previous sections reflect potential future impacts to small entities and the energy industry. The analysis presented in this appendix is conducted pursuant to the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) in 1996. The energy analysis in Section A.2 is conducted pursuant to Executive Order No. 13211.

The analyses of impacts to small entities and the energy industry rely on the estimated incremental impacts associated with the proposed critical habitat designation, and not the post-designation baseline impacts of NSO conservation. The incremental impacts of the rulemaking are considered most relevant for the small business and energy impacts analyses as they are expected to stem from the critical habitat designation, and are therefore not expected to occur in the case that critical habitat is not designated for NSO. The post-designation baseline impacts associated with the listing of NSO, as quantified in chapters 3 though 7 and Appendix A of this report, are expected to occur regardless of the outcome of this rulemaking and are therefore not considered in terms of their impacts on small businesses and the energy industry.

B.1 SBREFA IMPACTS

In accordance with SBREFA, when a Federal agency publishes a notice of rulemaking for any proposed or final rule, it must make available for public comments a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). No regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have significant economic impact on a substantial number of small entities. To assist in this process, this appendix provides a screening level analysis of the potential for the proposed rulemaking to affect small entities.

This screening analysis is based on the estimated incremental impacts associated with the proposed rulemaking as described in chapters 3 through 7 and Appendix A of this analysis. The analysis evaluates the potential for economic impacts related to several categories, including: (1) timber management, (2) barred owl management and control, (3) NSO survey and monitoring, (4) fire management, (5) linear projects (i.e., transportation, pipelines, and powerlines), (6) restoration, (7) recreation, and (8) administrative costs associated with Section 7 consultation. As summarized below, the proposed rulemaking is not expected to affect small entities.

- Post-designation incremental impacts associated with proposed critical habitat designation-related conservation activities are not anticipated for timber management (Chapter 3), barred owl

management and control (Chapter 4), NSO survey and monitoring (Chapter 5), fire management (Chapter 6), and linear projects, restoration, and recreation (Chapter 7).

- The incremental administrative costs of post-designation Section 7 consultations and technical assistance requests (Appendix A) associated with the proposed critical habitat designation will be borne by Federal government agencies. These agencies are the USFS, BLM, and Service.

While incremental impacts associated with the proposed revised designation are not anticipated for the small businesses in the timber industry, the report acknowledges that the industry has changed since the listing of the NSO on June 26, 1990[119] and the designation of the *current* critical habitat on January 15, 1992.[120] As described in Chapter 2, the timber industry's contribution to the county economies in the area of analysis was significant in 1985. Local timber establishments provided income and employment to county and area residents. However, since 1990 the number of timber industry-related companies and jobs within the NWFP area decreased, due in part to reduced timber supplies, some associated with declines in Federal harvests due to NSO listing, increased foreign competition, the closure of inefficient mills, mill investment in labor-mechanization technologies, and USFS budget constraints. It is believed, however, that the original effect to the timber industry has already trickled through the economy since the current critical habitat designation of NSO, and the economy has more or less adjusted in response. The proposed revised designation is not expected to result in further impacts to timber industry-related small businesses.[121]

B.2 POTENTIAL IMPACTS TO THE ENERGY INDUSTRY

Pursuant to Executive Order No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, Federal agencies must prepare and submit a "Statement of Energy Effects" for all "significant energy actions." The purpose of this requirement is to ensure that all Federal agencies "appropriately weigh and consider the effects of the Federal Government's regulations on the supply, distribution, and use of energy."[122]

The Office of Management and Budget (OMB) provides guidance for implementing this Executive Order, outlining nine outcomes that may constitute "a significant adverse effect" when compared with the regulatory action under consideration:

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119 55 FR 26114

120 57 FR 1796

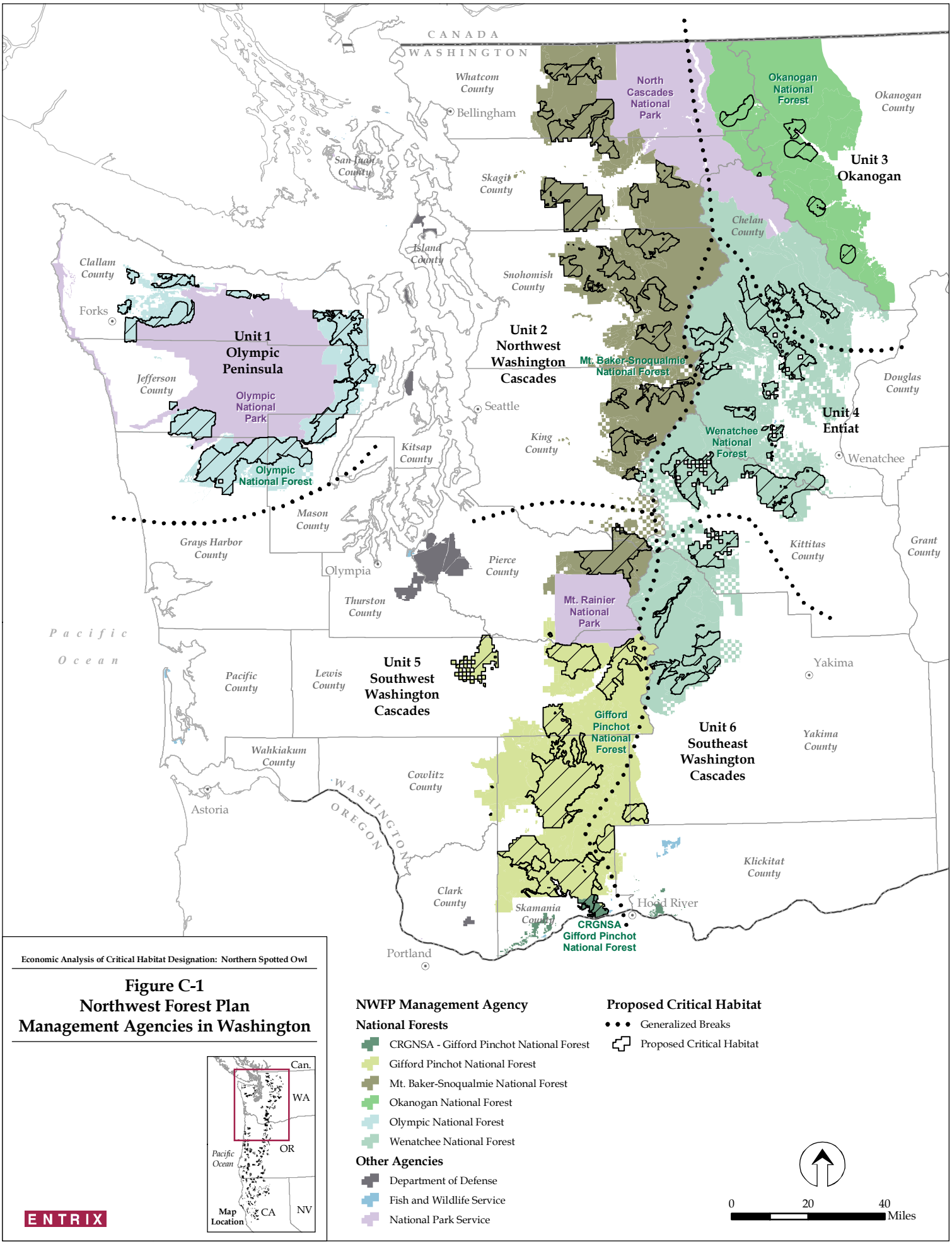
121 Note: The proposed critical habitat is located solely on Federal lands managed by the USFS and BLM and the area of proposed critical habitat is 22 percent smaller than the current critical habitat designation.

122 Memorandum for Heads of Executive Department Agencies and Independent Regulatory Agencies, Guidance for Implementing E.O. 13211, M-01-27, Office of Management and Budget, http://www.whitehouse.gov/omb/memoranda/m01-27.html, July 31, 2001.

- Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
- Reductions in fuel production in excess of 4,000 barrels per day;
- Reductions in coal production in excess of five million tons per year;
- Reductions in natural gas production in excess of 25 million cubic-feet (Mcf) per year;
- Reductions in electricity production in excess of one billion kilowatt-hours per year, or in excess of 500 megawatts of installed capacity;
- Increases in energy use required by the regulatory action that exceed the thresholds above;
- Increases in the cost of energy production in excess of one percent;
- Increases in the cost of energy distribution in excess of one percent; or
- Other similarly adverse outcomes.[123]

As none of these criteria is relevant to this analysis, energy-related incremental impacts associated with the proposed rulemaking are not anticipated.

[123] Ibid.



Economic Analysis of Critical Habitat Designation: Northern Spotted Owl

Figure C-1
Northwest Forest Plan
Management Agencies in Washington

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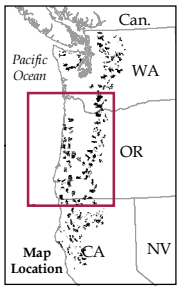
Figure C-2
Northwest Forest Plan Management Agencies in Oregon



ENTRIX

Proposed Critical Habitat

- Generalized Breaks
- Proposed Critical Habitat

NWFP Management Agencies

Bureau of Land Management

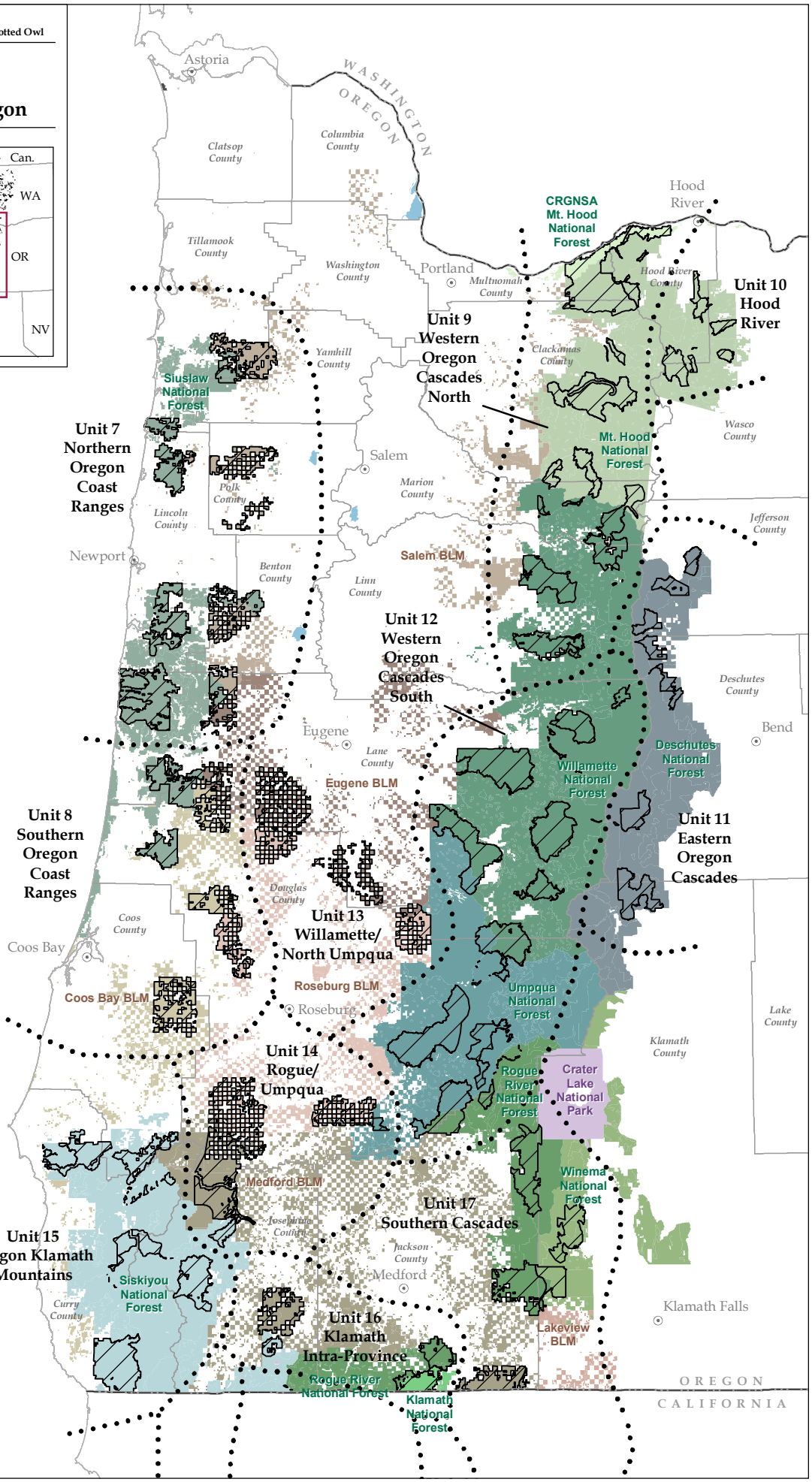
- Coos Bay District
- Eugene District
- Lakeview District
- Medford District
- Roseburg District
- Salem District

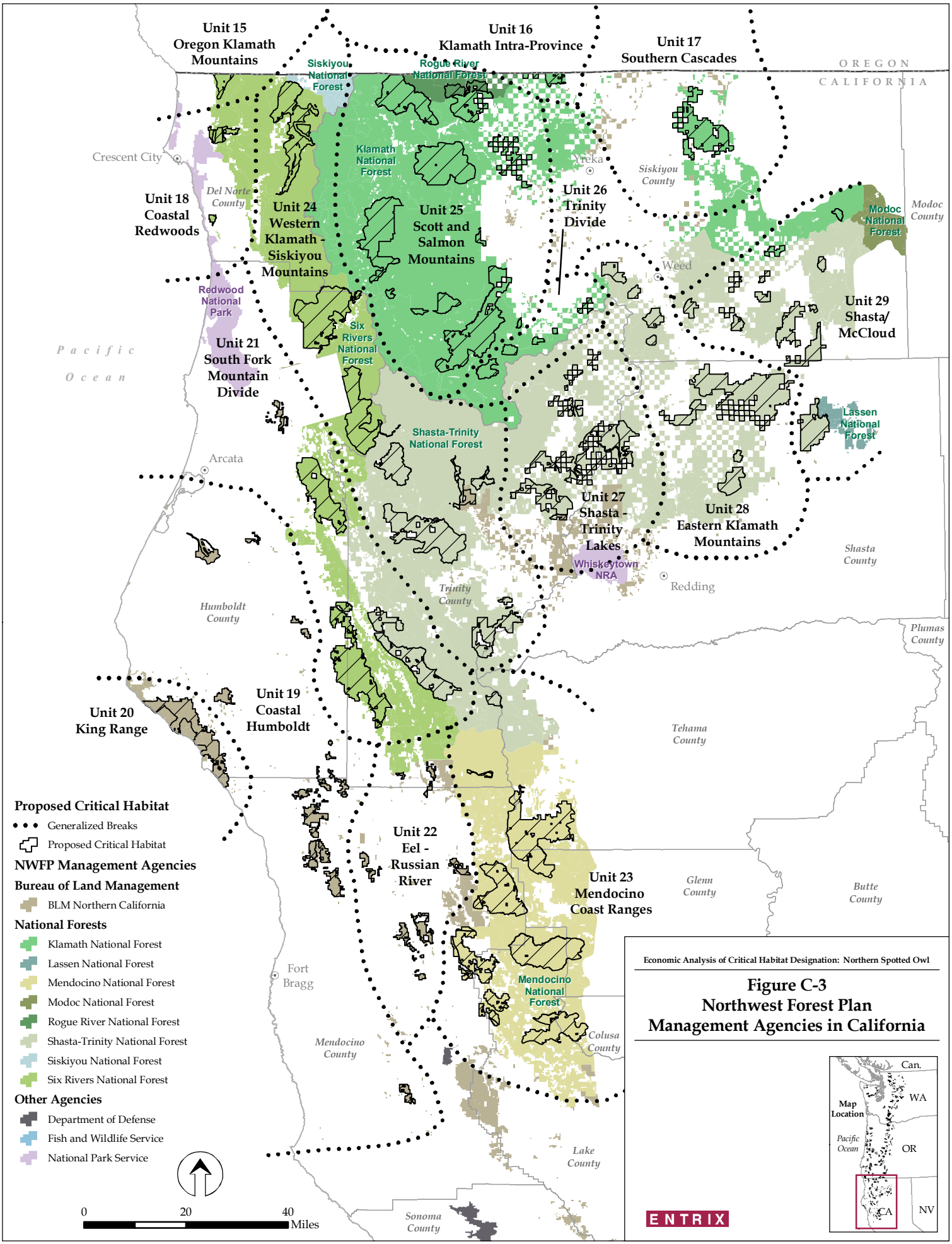
National Forests

- CRGNSA - Mt. Hood National Forest
- Deschutes National Forest
- Klamath National Forest
- Mt. Hood National Forest
- Rogue River National Forest
- Siskiyou National Forest
- Siuslaw National Forest
- Six Rivers National Forest
- Umpqua National Forest
- Willamette National Forest
- Winema National Forest

Other Agencies

- Department of Defense
- Fish and Wildlife Service
- National Park Service





Economic Analysis of Critical Habitat Designation: Northern Spotted Owl

Figure C-3
Northwest Forest Plan Management Agencies in California

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APPENDIX D
NORTHWEST FOREST PLAN LAND USE ALLOCATIONS WITHIN THE PROPOSED CRITICAL HABITAT DESIGNATION UNITS

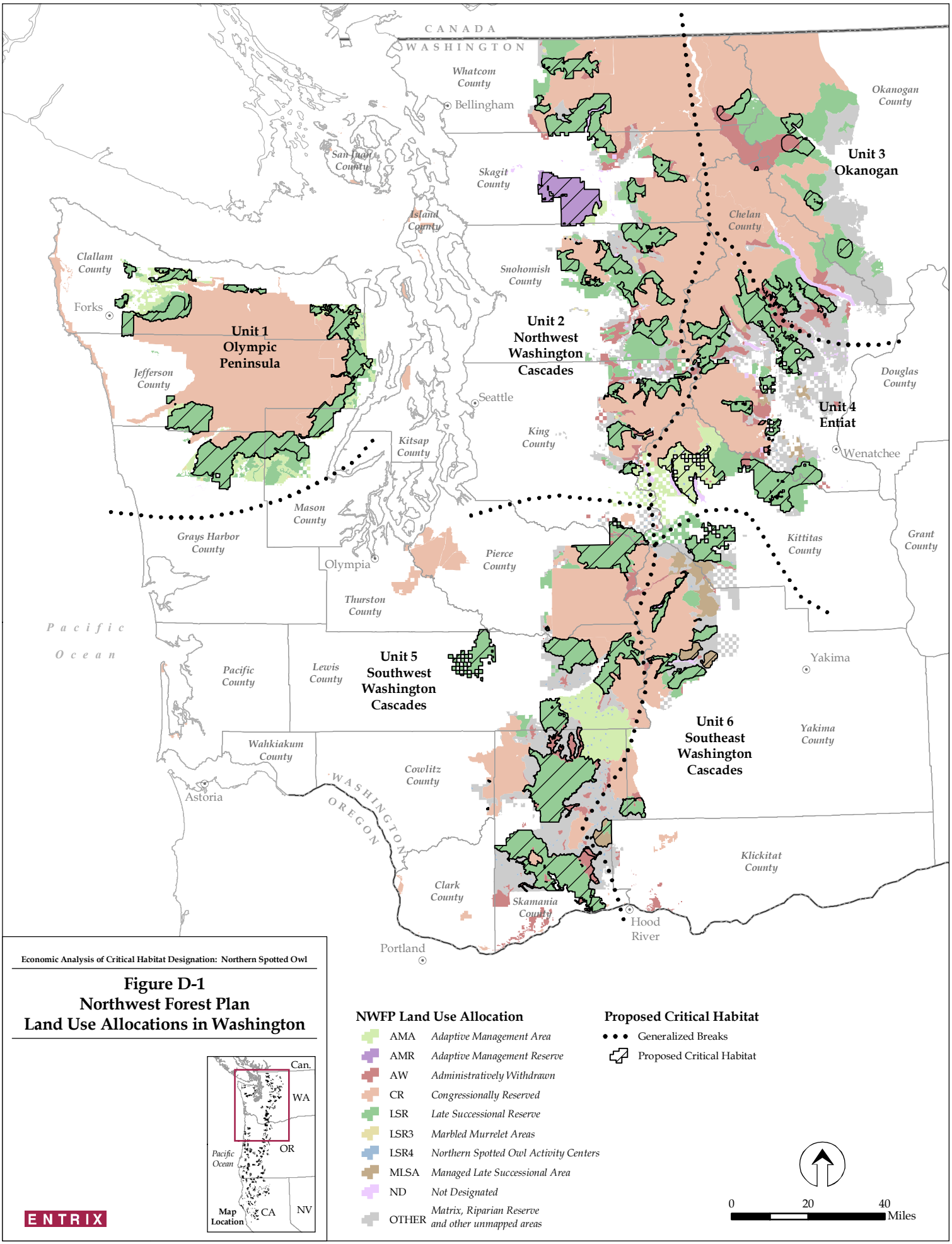

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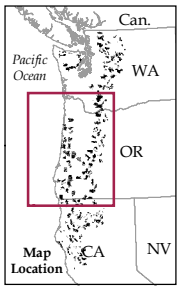
Figure D-2
Northwest Forest Plan
Land Use Allocations in Oregon



ENTRIX

Proposed Critical Habitat

- Generalized Breaks
- Proposed Critical Habitat

NWFP Land Use Allocation

AMA	*Adaptive Management Area*
AMR	*Adaptive Management Reserve*
AW	*Administratively Withdrawn*
CR	*Congressionally Reserved*
LSR	*Late Successional Reserve*
LSR3	*Marbled Murrelet Areas*
LSR4	*Northern Spotted Owl Activity Centers*
MLSA	*Managed Late Successional Area*
ND	*Not Designated*
OTHER	*Matrix, Riparian Reserve and other unmapped areas*

Astoria
WASHINGTON
OREGON
Clatsop County
Columbia County
Hood River
Tillamook County
Washington County
Portland
Multnomah County
Hood River County
Unit 10 Hood River
Unit 9 Western Oregon Cascades North
Yamhill County
Clackamas County
Wasco County
Unit 7 Northern Oregon Coast Ranges
Salem
Marion County
Polk County
Lincoln County
Jefferson County
Newport
Benton County
Linn County
Unit 12 Western Oregon Cascades South
Eugene
Bend
Lane County
Deschutes County
Unit 8 Southern Oregon Coast Ranges
Unit 11 Eastern Oregon Cascades
Douglas County
Coos County
Coos Bay
Unit 13 Willamette/ North Umpqua
Roseburg
Lake County
Klamath County
Unit 14 Rogue/ Umpqua
Pacific Ocean
Josephine County
Unit 17 Southern Cascades
Unit 15 Oregon Klamath Mountains
Jackson County
Medford
Curry County
Unit 16 Klamath Intra-Province
Klamath Falls
OREGON
CALIFORNIA

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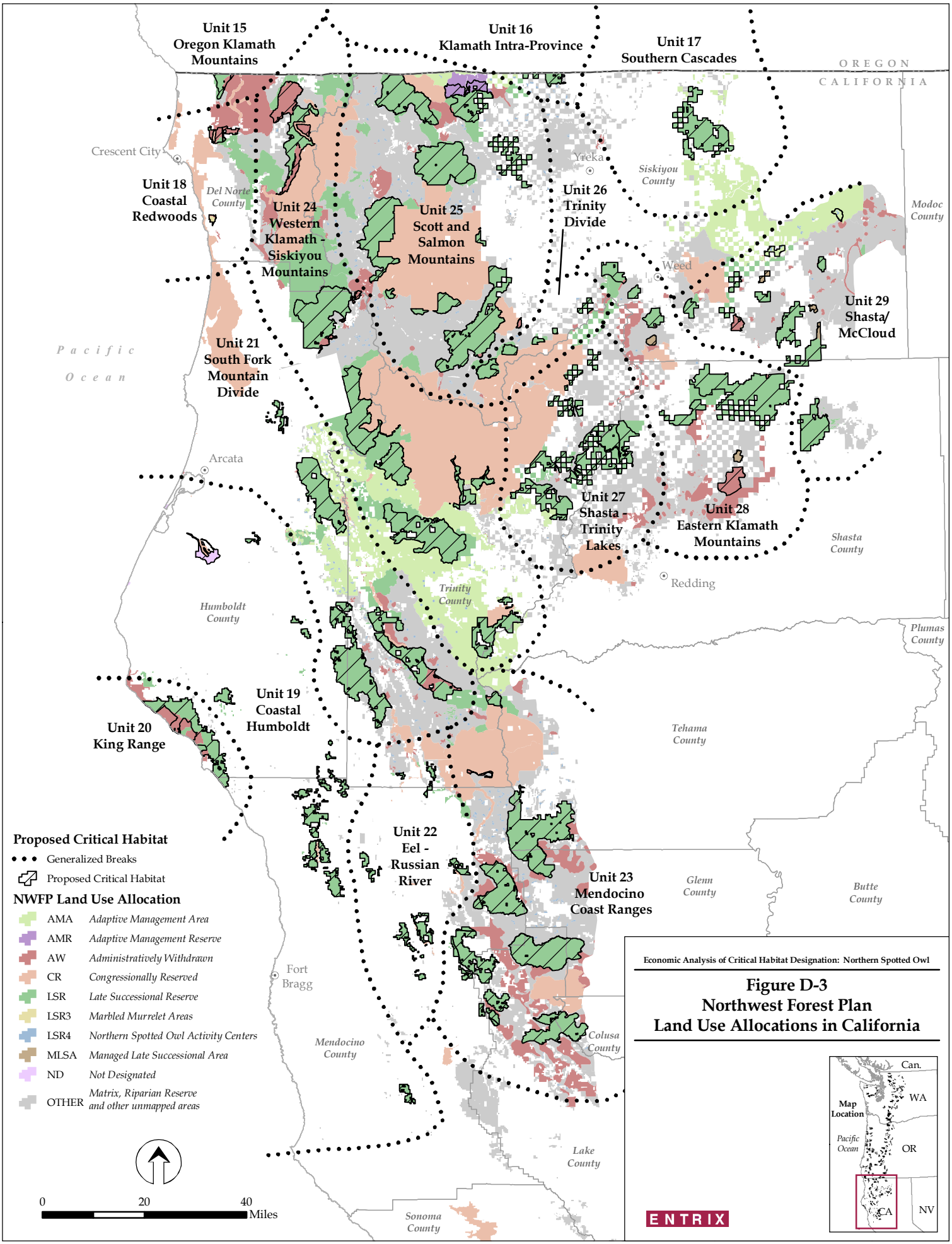

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Table E-1
Summary of Total Pre-Designation (1990-2007)
Economic Impacts by Habitat Unit, in 1,000s

	Units	Low	High
1	Olympic Peninsula	$626,803	$626,803
2	Northwest Washington Cascades	$760,766	$760,766
3	Okanogan	$177,026	$177,026
4	Entiat	$557,994	$557,994
5	Southwest Washington Cascades	$895,929	$895,929
6	Southeast Washington Cascades	$257,358	$257,358
7	Northern Oregon Coast Ranges	$607,095	$607,095
8	Southern Oregon Coast Ranges	$384,342	$384,342
9	Western Oregon Cascades North	$595,072	$595,072
10	Hood River	$79,904	$79,904
11	Eastern Oregon Cascades	$199,603	$199,603
12	Western Oregon Cascades South	$813,899	$813,899
13	Willamette/North Umpqua	$221,318	$221,318
14	Rogue-Umpqua	$303,452	$303,452
15	Oregon Klamath Mountains	$365,320	$365,320
16	Klamath Intra-Province	$172,338	$172,338
17	Southern Cascades	$346,390	$346,405
18	Coastal Redwoods	$3,380	$3,380
19	Coastal Humboldt	$92,783	$92,783
20	King Range	$63,786	$63,786
21	South Fork Mountain Divide	$260,545	$260,545
22	Eel-Russian River	$41,455	$41,455
23	Mendocino Coast Ranges	$404,114	$404,114
24	Western Klamath/Siskiyou Mtns.	$399,744	$399,744
25	Scott and Salmon Mountains	$455,185	$455,185
26	Trinity Divide	$26,205	$26,205
27	Shasta-Trinity Lakes	$163,995	$163,995
28	Eastern Klamath Mountains	$187,041	$187,041
29	Shasta/McCloud	$131,072	$131,072
	Unallocated	$6,946	$9,030
	Total	$9,600,860	$9,602,959

Results are shown in $1,000s. Numbers may not sum due to rounding

Table E-2
Summary of Total Post-Designation (2008-2027) Economic Impacts, by Habitat Unit, in $1,000s

	Units	PV 3%		PV 7%		Annualized 3%		Annualized 7%	
		Low	High	Low	High	Low	High	Low	High
INCREMENTAL IMPACT									
1	Olympic Peninsula	$19	$22	$16	$19	$1	$2	$2	$2
2	Northwest Washington Cascades	$16	$19	$14	$16	$1	$1	$1	$2
3	Okanogan	$8	$9	$7	$9	$1	$1	$1	$1
4	Entiat	$5	$5	$4	$5	$0	$0	$0	$0
5	Southwest Washington Cascades	$20	$24	$18	$21	$1	$2	$2	$2
6	Southeast Washington Cascades	$3	$3	$3	$3	$0	$0	$0	$0
7	Northern Oregon Coast Ranges	$16	$19	$14	$17	$1	$1	$1	$2
8	Southern Oregon Coast Ranges	$7	$8	$6	$7	$0	$1	$1	$1
9	Western Oregon Cascades North	$21	$25	$18	$22	$1	$2	$2	$2
10	Hood River	$4	$5	$4	$5	$0	$0	$0	$0
11	Eastern Oregon Cascades	$20	$24	$18	$21	$1	$2	$2	$2
12	Western Oregon Cascades South	$35	$42	$31	$37	$2	$3	$3	$3
13	Willamette/North Umpqua	$1	$2	$1	$2	$0	$0	$0	$0
14	Rogue-Umpqua	$3	$4	$3	$3	$0	$0	$0	$0
15	Oregon Klamath Mountains	$18	$22	$16	$19	$1	$1	$2	$2
16	Klamath Intra-Province	$6	$7	$5	$6	$0	$0	$0	$1
17	Southern Cascades	$35	$41	$31	$37	$2	$3	$3	$3
18	Coastal Redwoods	$1	$1	$0	$1	$0	$0	$0	$0
19	Coastal Humboldt	$24	$29	$21	$26	$2	$2	$2	$2
20	King Range	$13	$16	$12	$15	$1	$1	$1	$1
21	South Fork Mountain Divide	$11	$13	$10	$12	$1	$1	$1	$1
22	Eel-Russian River	$6	$8	$5	$6	$0	$1	$1	$1
23	Mendocino Coast Ranges	$20	$23	$17	$21	$1	$2	$2	$2
24	Western Klamath/Siskiyou Mtns.	$30	$36	$26	$32	$2	$2	$2	$3
25	Scott and Salmon Mountains	$15	$18	$14	$16	$1	$1	$1	$2
26	Trinity Divide	$1	$1	$1	$1	$0	$0	$0	$0
27	Shasta-Trinity Lakes	$8	$10	$7	$9	$1	$1	$1	$1
28	Eastern Klamath Mountains	$5	$6	$5	$6	$0	$0	$0	$1
29	Shasta/McCloud	$23	$28	$21	$25	$2	$2	$2	$2
	Unallocated	$1,471	$2,424	$1,048	$1,726	$99	$163	$99	$163
	Total	$1,865	$2,894	$1,396	$2,145	$122	$195	$132	$202

Units		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
		Low	High	Low	High	Low	High	Low	High
BASELINE IMPACT									
1	Olympic Peninsula	$582,856	$583,028	$415,061	$415,196	$39,177	$39,188	$39,178	$39,191
2	Northwest Washington Cascades	$707,555	$707,766	$503,861	$504,028	$47,558	$47,572	$47,560	$47,576
3	Okanogan	$164,866	$164,928	$117,410	$117,461	$11,082	$11,086	$11,083	$11,087
4	Entiat	$519,549	$519,706	$369,983	$370,109	$34,922	$34,932	$34,923	$34,935
5	Southwest Washington Cascades	$833,696	$833,966	$593,691	$593,903	$56,037	$56,055	$56,040	$56,060
6	Southeast Washington Cascades	$241,216	$241,290	$171,776	$171,835	$16,213	$16,218	$16,215	$16,220
7	Northern Oregon Coast Ranges	$566,790	$566,957	$403,622	$403,754	$38,097	$38,108	$38,099	$38,112
8	Southern Oregon Coast Ranges	$361,012	$361,118	$257,085	$257,170	$24,266	$24,273	$24,267	$24,275
9	Western Oregon Cascades North	$553,598	$553,772	$394,228	$394,365	$37,210	$37,222	$37,211	$37,225
10	Hood River	$74,309	$74,331	$52,917	$52,935	$4,994	$4,996	$4,994	$4,996
11	Eastern Oregon Cascades	$185,636	$185,694	$132,197	$132,243	$12,478	$12,483	$12,480	$12,484
12	Western Oregon Cascades South	$757,068	$757,303	$539,123	$539,309	$50,887	$50,904	$50,889	$50,907
13	Willamette/North Umpqua	$211,732	$211,794	$150,780	$150,829	$14,232	$14,236	$14,232	$14,237
14	Rogue-Umpqua	$289,115	$289,202	$205,885	$205,953	$19,433	$19,440	$19,435	$19,441
15	Oregon Klamath Mountains	$339,797	$339,901	$241,976	$242,057	$22,840	$22,846	$22,841	$22,848
16	Klamath Intra-Province	$160,945	$160,995	$114,613	$114,653	$10,817	$10,820	$10,818	$10,823
17	Southern Cascades	$324,322	$324,444	$230,960	$231,058	$21,799	$21,807	$21,802	$21,810
18	Coastal Redwoods	$3,158	$3,162	$2,249	$2,251	$212	$212	$212	$213
19	Coastal Humboldt	$86,368	$86,395	$61,503	$61,524	$5,806	$5,808	$5,806	$5,809
20	King Range	$59,384	$59,404	$42,289	$42,305	$3,992	$3,994	$3,992	$3,994
21	South Fork Mountain Divide	$242,372	$242,447	$172,598	$172,657	$16,291	$16,296	$16,292	$16,298
22	Eel-Russian River	$38,553	$38,565	$27,454	$27,464	$2,591	$2,591	$2,591	$2,592
23	Mendocino Coast Ranges	$375,804	$375,917	$267,617	$267,707	$25,259	$25,267	$25,260	$25,270
24	Western Klamath/Siskiyou Mtns.	$372,064	$372,191	$264,956	$265,057	$25,009	$25,017	$25,010	$25,019
25	Scott and Salmon Mountains	$423,294	$423,420	$301,435	$301,535	$28,452	$28,460	$28,453	$28,463
26	Trinity Divide	$24,368	$24,375	$17,353	$17,359	$1,637	$1,638	$1,637	$1,638
27	Shasta-Trinity Lakes	$152,501	$152,546	$108,599	$108,635	$10,251	$10,254	$10,251	$10,254
28	Eastern Klamath Mountains	$174,281	$174,339	$124,109	$124,155	$11,714	$11,718	$11,715	$11,719
29	Shasta/McCloud	$122,250	$122,291	$87,059	$87,091	$8,216	$8,220	$8,218	$8,220
	Unallocated	$4,414	$7,273	$3,143	$5,179	$297	$489	$297	$489
	Total	$8,952,873	$8,958,520	$6,375,532	$6,379,777	$601,769	$602,150	$601,801	$602,205

Results are shown in $1,000s. Numbers may not sum due to rounding

Table E-3
Summary of Total Post-Designation (2008-2027) Economic Impacts Related to Timber Management, by Habitat Unit, in $1,000s

Units		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
		Low	High	Low	High	Low	High	Low	High
INCREMENTAL IMPACT									
1	Olympic Peninsula	$0	$0	$0	$0	$0	$0	$0	$0
2	Northwest Washington Cascades	$0	$0	$0	$0	$0	$0	$0	$0
3	Okanogan	$0	$0	$0	$0	$0	$0	$0	$0
4	Entiat	$0	$0	$0	$0	$0	$0	$0	$0
5	Southwest Washington Cascades	$0	$0	$0	$0	$0	$0	$0	$0
6	Southeast Washington Cascades	$0	$0	$0	$0	$0	$0	$0	$0
7	Northern Oregon Coast Ranges	$0	$0	$0	$0	$0	$0	$0	$0
8	Southern Oregon Coast Ranges	$0	$0	$0	$0	$0	$0	$0	$0
9	Western Oregon Cascades North	$0	$0	$0	$0	$0	$0	$0	$0
10	Hood River	$0	$0	$0	$0	$0	$0	$0	$0
11	Eastern Oregon Cascades	$0	$0	$0	$0	$0	$0	$0	$0
12	Western Oregon Cascades South	$0	$0	$0	$0	$0	$0	$0	$0
13	Willamette/North Umpqua	$0	$0	$0	$0	$0	$0	$0	$0
14	Rogue-Umpqua	$0	$0	$0	$0	$0	$0	$0	$0
15	Oregon Klamath Mountains	$0	$0	$0	$0	$0	$0	$0	$0
16	Klamath Intra-Province	$0	$0	$0	$0	$0	$0	$0	$0
17	Southern Cascades	$0	$0	$0	$0	$0	$0	$0	$0
18	Coastal Redwoods	$0	$0	$0	$0	$0	$0	$0	$0
19	Coastal Humboldt	$0	$0	$0	$0	$0	$0	$0	$0
20	King Range	$0	$0	$0	$0	$0	$0	$0	$0
21	South Fork Mountain Divide	$0	$0	$0	$0	$0	$0	$0	$0
22	Eel-Russian River	$0	$0	$0	$0	$0	$0	$0	$0
23	Mendocino Coast Ranges	$0	$0	$0	$0	$0	$0	$0	$0
24	Western Klamath/Siskiyou Mtns.	$0	$0	$0	$0	$0	$0	$0	$0
25	Scott and Salmon Mountains	$0	$0	$0	$0	$0	$0	$0	$0
26	Trinity Divide	$0	$0	$0	$0	$0	$0	$0	$0
27	Shasta-Trinity Lakes	$0	$0	$0	$0	$0	$0	$0	$0
28	Eastern Klamath Mountains	$0	$0	$0	$0	$0	$0	$0	$0
29	Shasta/McCloud	$0	$0	$0	$0	$0	$0	$0	$0
	Unallocated	$0	$0	$0	$0	$0	$0	$0	$0
	Total	$0	$0	$0	$0	$0	$0	$0	$0

	Units	PV 3%		PV 7%		Annualized 3%		Annualized 7%	
		Low	High	Low	High	Low	High	Low	High
BASELINE IMPACT									
1	Olympic Peninsula	$582,620	$582,620	$414,874	$414,874	$39,161	$39,161	$39,161	$39,161
2	Northwest Washington Cascades	$707,268	$707,268	$503,634	$503,634	$47,539	$47,539	$47,539	$47,539
3	Okanogan	$164,766	$164,766	$117,327	$117,327	$11,075	$11,075	$11,075	$11,075
4	Entiat	$519,333	$519,333	$369,809	$369,809	$34,907	$34,907	$34,907	$34,907
5	Southwest Washington Cascades	$833,332	$833,332	$593,402	$593,402	$56,013	$56,013	$56,013	$56,013
6	Southeast Washington Cascades	$241,115	$241,115	$171,694	$171,694	$16,207	$16,207	$16,207	$16,207
7	Northern Oregon Coast Ranges	$566,559	$566,559	$403,438	$403,438	$38,082	$38,082	$38,082	$38,082
8	Southern Oregon Coast Ranges	$360,868	$360,868	$256,969	$256,969	$24,256	$24,256	$24,256	$24,256
9	Western Oregon Cascades North	$553,356	$553,356	$394,036	$394,036	$37,194	$37,194	$37,194	$37,194
10	Hood River	$74,276	$74,276	$52,891	$52,891	$4,992	$4,992	$4,992	$4,992
11	Eastern Oregon Cascades	$185,546	$185,546	$132,124	$132,124	$12,472	$12,472	$12,472	$12,472
12	Western Oregon Cascades South	$756,740	$756,740	$538,862	$538,862	$50,865	$50,865	$50,865	$50,865
13	Willamette/North Umpqua	$211,649	$211,649	$150,712	$150,712	$14,226	$14,226	$14,226	$14,226
14	Rogue-Umpqua	$289,000	$289,000	$205,792	$205,792	$19,425	$19,425	$19,425	$19,425
15	Oregon Klamath Mountains	$339,652	$339,652	$241,860	$241,860	$22,830	$22,830	$22,830	$22,830
16	Klamath Intra-Province	$160,875	$160,875	$114,557	$114,557	$10,813	$10,813	$10,813	$10,813
17	Southern Cascades	$324,139	$324,139	$230,814	$230,814	$21,787	$21,787	$21,787	$21,787
18	Coastal Redwoods	$3,152	$3,152	$2,245	$2,245	$212	$212	$212	$212
19	Coastal Humboldt	$86,327	$86,327	$61,472	$61,472	$5,803	$5,803	$5,803	$5,803
20	King Range	$59,357	$59,357	$42,267	$42,267	$3,990	$3,990	$3,990	$3,990
21	South Fork Mountain Divide	$242,265	$242,265	$172,513	$172,513	$16,284	$16,284	$16,284	$16,284
22	Eel-Russian River	$38,533	$38,533	$27,439	$27,439	$2,590	$2,590	$2,590	$2,590
23	Mendocino Coast Ranges	$375,643	$375,643	$267,490	$267,490	$25,249	$25,249	$25,249	$25,249
24	Western Klamath/Siskiyou Mtns.	$371,878	$371,878	$264,808	$264,808	$24,996	$24,996	$24,996	$24,996
25	Scott and Salmon Mountains	$423,119	$423,119	$301,296	$301,296	$28,440	$28,440	$28,440	$28,440
26	Trinity Divide	$24,358	$24,358	$17,345	$17,345	$1,637	$1,637	$1,637	$1,637
27	Shasta-Trinity Lakes	$152,435	$152,435	$108,547	$108,547	$10,246	$10,246	$10,246	$10,246
28	Eastern Klamath Mountains	$174,203	$174,203	$124,047	$124,047	$11,709	$11,709	$11,709	$11,709
29	Shasta/McCloud	$582,620	$582,620	$414,874	$414,874	$39,161	$39,161	$39,161	$39,161
	Unallocated	$0	$0	$0	$0	$0	$0	$0	$0
	Total	$8,944,543	$8,944,543	$6,369,266	$6,369,266	$601,212	$601,212	$601,212	$601,212

Results are shown in $1,000s. Numbers may not sum due to rounding

Table E-4
Summary of Total Post-Designation (2008-2027) Economic Impacts Related to Barred Owl Management, by Habitat Unit, in $1,000s

Units		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
		Low	High	Low	High	Low	High	Low	High
INCREMENTAL IMPACT									
1	Olympic Peninsula	$0	$0	$0	$0	$0	$0	$0	$0
2	Northwest Washington Cascades	$0	$0	$0	$0	$0	$0	$0	$0
3	Okanogan	$0	$0	$0	$0	$0	$0	$0	$0
4	Entiat	$0	$0	$0	$0	$0	$0	$0	$0
5	Southwest Washington Cascades	$0	$0	$0	$0	$0	$0	$0	$0
6	Southeast Washington Cascades	$0	$0	$0	$0	$0	$0	$0	$0
7	Northern Oregon Coast Ranges	$0	$0	$0	$0	$0	$0	$0	$0
8	Southern Oregon Coast Ranges	$0	$0	$0	$0	$0	$0	$0	$0
9	Western Oregon Cascades North	$0	$0	$0	$0	$0	$0	$0	$0
10	Hood River	$0	$0	$0	$0	$0	$0	$0	$0
11	Eastern Oregon Cascades	$0	$0	$0	$0	$0	$0	$0	$0
12	Western Oregon Cascades South	$0	$0	$0	$0	$0	$0	$0	$0
13	Willamette/North Umpqua	$0	$0	$0	$0	$0	$0	$0	$0
14	Rogue-Umpqua	$0	$0	$0	$0	$0	$0	$0	$0
15	Oregon Klamath Mountains	$0	$0	$0	$0	$0	$0	$0	$0
16	Klamath Intra-Province	$0	$0	$0	$0	$0	$0	$0	$0
17	Southern Cascades	$0	$0	$0	$0	$0	$0	$0	$0
18	Coastal Redwoods	$0	$0	$0	$0	$0	$0	$0	$0
19	Coastal Humboldt	$0	$0	$0	$0	$0	$0	$0	$0
20	King Range	$0	$0	$0	$0	$0	$0	$0	$0
21	South Fork Mountain Divide	$0	$0	$0	$0	$0	$0	$0	$0
22	Eel-Russian River	$0	$0	$0	$0	$0	$0	$0	$0
23	Mendocino Coast Ranges	$0	$0	$0	$0	$0	$0	$0	$0
24	Western Klamath/Siskiyou Mtns.	$0	$0	$0	$0	$0	$0	$0	$0
25	Scott and Salmon Mountains	$0	$0	$0	$0	$0	$0	$0	$0
26	Trinity Divide	$0	$0	$0	$0	$0	$0	$0	$0
27	Shasta-Trinity Lakes	$0	$0	$0	$0	$0	$0	$0	$0
28	Eastern Klamath Mountains	$0	$0	$0	$0	$0	$0	$0	$0
29	Shasta/McCloud	$0	$0	$0	$0	$0	$0	$0	$0
	Unallocated	$0	$0	$0	$0	$0	$0	$0	$0
	Total	$0	$0	$0	$0	$0	$0	$0	$0

	Units	PV 3%		PV 7%		Annualized 3%		Annualized 7%	
		Low	High	Low	High	Low	High	Low	High
BASELINE IMPACT									
1	Olympic Peninsula	$75	$75	$55	$55	$5	$5	$5	$5
2	Northwest Washington Cascades	$93	$93	$68	$68	$6	$6	$6	$6
3	Okanogan	$26	$26	$19	$19	$2	$2	$2	$2
4	Entiat	$69	$69	$50	$50	$5	$5	$5	$5
5	Southwest Washington Cascades	$118	$118	$86	$86	$8	$8	$8	$8
6	Southeast Washington Cascades	$32	$32	$24	$24	$2	$2	$2	$2
7	Northern Oregon Coast Ranges	$73	$73	$53	$53	$5	$5	$5	$5
8	Southern Oregon Coast Ranges	$46	$46	$34	$34	$3	$3	$3	$3
9	Western Oregon Cascades North	$76	$76	$55	$55	$5	$5	$5	$5
10	Hood River	$10	$10	$7	$7	$1	$1	$1	$1
11	Eastern Oregon Cascades	$24	$24	$18	$18	$2	$2	$2	$2
12	Western Oregon Cascades South	$101	$101	$74	$74	$7	$7	$7	$7
13	Willamette/North Umpqua	$27	$27	$20	$20	$2	$2	$2	$2
14	Rogue-Umpqua	$37	$37	$27	$27	$3	$3	$3	$3
15	Oregon Klamath Mountains	$44	$44	$32	$32	$3	$3	$3	$3
16	Klamath Intra-Province	$22	$22	$16	$16	$1	$1	$2	$2
17	Southern Cascades	$51	$51	$37	$37	$3	$3	$4	$4
18	Coastal Redwoods	$2	$2	$1	$1	$0	$0	$0	$0
19	Coastal Humboldt	$11	$11	$8	$8	$1	$1	$1	$1
20	King Range	$9	$9	$7	$7	$1	$1	$1	$1
21	South Fork Mountain Divide	$33	$33	$24	$24	$2	$2	$2	$2
22	Eel-Russian River	$5	$5	$4	$4	$0	$0	$0	$0
23	Mendocino Coast Ranges	$49	$49	$35	$35	$3	$3	$3	$3
24	Western Klamath/Siskiyou Mtns.	$54	$54	$40	$40	$4	$4	$4	$4
25	Scott and Salmon Mountains	$55	$55	$40	$40	$4	$4	$4	$4
26	Trinity Divide	$3	$3	$2	$2	$0	$0	$0	$0
27	Shasta-Trinity Lakes	$20	$20	$14	$14	$1	$1	$1	$1
28	Eastern Klamath Mountains	$25	$25	$18	$18	$2	$2	$2	$2
29	Shasta/McCloud	$17	$17	$12	$12	$1	$1	$1	$1
	Unallocated	$0	$0	$0	$0	$0	$0	$0	$0
	Total	$1,207	$1,207	$880	$880	$82	$82	$84	$84

Results are shown in $1,000s. Numbers may not sum due to rounding

Table E-5
Summary of Total Post-Designation (2008-2027) Economic Impacts Related to NWFP Survey and Monitoring, by Habitat Unit, in $1,000s

Units		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
		Low	High	Low	High	Low	High	Low	High
INCREMENTAL IMPACT									
1	Olympic Peninsula	$0	$0	$0	$0	$0	$0	$0	$0
2	Northwest Washington Cascades	$0	$0	$0	$0	$0	$0	$0	$0
3	Okanogan	$0	$0	$0	$0	$0	$0	$0	$0
4	Entiat	$0	$0	$0	$0	$0	$0	$0	$0
5	Southwest Washington Cascades	$0	$0	$0	$0	$0	$0	$0	$0
6	Southeast Washington Cascades	$0	$0	$0	$0	$0	$0	$0	$0
7	Northern Oregon Coast Ranges	$0	$0	$0	$0	$0	$0	$0	$0
8	Southern Oregon Coast Ranges	$0	$0	$0	$0	$0	$0	$0	$0
9	Western Oregon Cascades North	$0	$0	$0	$0	$0	$0	$0	$0
10	Hood River	$0	$0	$0	$0	$0	$0	$0	$0
11	Eastern Oregon Cascades	$0	$0	$0	$0	$0	$0	$0	$0
12	Western Oregon Cascades South	$0	$0	$0	$0	$0	$0	$0	$0
13	Willamette/North Umpqua	$0	$0	$0	$0	$0	$0	$0	$0
14	Rogue-Umpqua	$0	$0	$0	$0	$0	$0	$0	$0
15	Oregon Klamath Mountains	$0	$0	$0	$0	$0	$0	$0	$0
16	Klamath Intra-Province	$0	$0	$0	$0	$0	$0	$0	$0
17	Southern Cascades	$0	$0	$0	$0	$0	$0	$0	$0
18	Coastal Redwoods	$0	$0	$0	$0	$0	$0	$0	$0
19	Coastal Humboldt	$0	$0	$0	$0	$0	$0	$0	$0
20	King Range	$0	$0	$0	$0	$0	$0	$0	$0
21	South Fork Mountain Divide	$0	$0	$0	$0	$0	$0	$0	$0
22	Eel-Russian River	$0	$0	$0	$0	$0	$0	$0	$0
23	Mendocino Coast Ranges	$0	$0	$0	$0	$0	$0	$0	$0
24	Western Klamath/Siskiyou Mtns.	$0	$0	$0	$0	$0	$0	$0	$0
25	Scott and Salmon Mountains	$0	$0	$0	$0	$0	$0	$0	$0
26	Trinity Divide	$0	$0	$0	$0	$0	$0	$0	$0
27	Shasta-Trinity Lakes	$0	$0	$0	$0	$0	$0	$0	$0
28	Eastern Klamath Mountains	$0	$0	$0	$0	$0	$0	$0	$0
29	Shasta/McCloud	$0	$0	$0	$0	$0	$0	$0	$0
	Unallocated	$0	$0	$0	$0	$0	$0	$0	$0
	Total	$0	$0	$0	$0	$0	$0	$0	$0

	Units	PV 3%		PV 7%		Annualized 3%		Annualized 7%	
		Low	High	Low	High	Low	High	Low	High
BASELINE IMPACT									
1	Olympic Peninsula	$145	$314	$121	$254	$10	$21	$11	$24
2	Northwest Washington Cascades	$180	$389	$150	$315	$12	$26	$14	$30
3	Okanogan	$51	$109	$42	$89	$3	$7	$4	$8
4	Entiat	$133	$288	$111	$234	$9	$19	$10	$22
5	Southwest Washington Cascades	$229	$495	$191	$401	$15	$33	$18	$38
6	Southeast Washington Cascades	$63	$136	$52	$110	$4	$9	$5	$10
7	Northern Oregon Coast Ranges	$141	$304	$117	$246	$9	$20	$11	$23
8	Southern Oregon Coast Ranges	$89	$193	$74	$157	$6	$13	$7	$15
9	Western Oregon Cascades North	$147	$317	$122	$257	$10	$21	$11	$24
10	Hood River	$19	$40	$16	$33	$1	$3	$1	$3
11	Eastern Oregon Cascades	$47	$101	$39	$82	$3	$7	$4	$8
12	Western Oregon Cascades South	$196	$424	$163	$344	$13	$29	$15	$32
13	Willamette/North Umpqua	$52	$113	$44	$92	$4	$8	$4	$9
14	Rogue-Umpqua	$72	$157	$60	$127	$5	$11	$6	$12
15	Oregon Klamath Mountains	$85	$185	$71	$150	$6	$12	$7	$14
16	Klamath Intra-Province	$42	$91	$35	$74	$3	$6	$3	$7
17	Southern Cascades	$99	$214	$82	$174	$7	$14	$8	$16
18	Coastal Redwoods	$3	$7	$3	$5	$0	$0	$0	$1
19	Coastal Humboldt	$22	$47	$18	$38	$1	$3	$2	$4
20	King Range	$18	$38	$15	$31	$1	$3	$1	$3
21	South Fork Mountain Divide	$64	$137	$53	$111	$4	$9	$5	$11
22	Eel-Russian River	$10	$21	$8	$17	$1	$1	$1	$2
23	Mendocino Coast Ranges	$94	$203	$78	$165	$6	$14	$7	$16
24	Western Klamath/Siskiyou Mtns.	$105	$227	$87	$184	$7	$15	$8	$17
25	Scott and Salmon Mountains	$106	$229	$88	$186	$7	$15	$8	$18
26	Trinity Divide	$6	$13	$5	$11	$0	$1	$0	$1
27	Shasta-Trinity Lakes	$38	$82	$32	$67	$3	$6	$3	$6
28	Eastern Klamath Mountains	$48	$105	$40	$85	$3	$7	$4	$8
29	Shasta/McCloud	$32	$69	$27	$56	$2	$5	$3	$5
	Unallocated	$0	$0	$0	$0	$0	$0	$0	$0
	Total	$2,336	$5,048	$1,944	$4,095	$155	$338	$181	$387

Results are shown in $1,000s. Numbers may not sum due to rounding

Table E-6
Summary of Total Post-Designation (2008-2027) Section 7 Administrative Impacts, by Habitat Unit, in $1,000s

	Units	PV 3%		PV 7%		Annualized 3%		Annualized 7%	
		Low	High	Low	High	Low	High	Low	High
INCREMENTAL IMPACT									
1	Olympic Peninsula	$19	$22	$16	$19	$1	$2	$2	$2
2	Northwest Washington Cascades	$16	$19	$14	$16	$1	$1	$1	$2
3	Okanogan	$8	$9	$7	$9	$1	$1	$1	$1
4	Entiat	$5	$5	$4	$5	$0	$0	$0	$0
5	Southwest Washington Cascades	$20	$24	$18	$21	$1	$2	$2	$2
6	Southeast Washington Cascades	$3	$3	$3	$3	$0	$0	$0	$0
7	Northern Oregon Coast Ranges	$16	$19	$14	$17	$1	$1	$1	$2
8	Southern Oregon Coast Ranges	$7	$8	$6	$7	$0	$1	$1	$1
9	Western Oregon Cascades North	$21	$25	$18	$22	$1	$2	$2	$2
10	Hood River	$4	$5	$4	$5	$0	$0	$0	$0
11	Eastern Oregon Cascades	$20	$24	$18	$21	$1	$2	$2	$2
12	Western Oregon Cascades South	$35	$42	$31	$37	$2	$3	$3	$3
13	Willamette/North Umpqua	$1	$2	$1	$2	$0	$0	$0	$0
14	Rogue-Umpqua	$3	$4	$3	$3	$0	$0	$0	$0
15	Oregon Klamath Mountains	$18	$22	$16	$19	$1	$1	$2	$2
16	Klamath Intra-Province	$6	$7	$5	$6	$0	$0	$0	$1
17	Southern Cascades	$35	$41	$31	$37	$2	$3	$3	$3
18	Coastal Redwoods	$1	$1	$0	$1	$0	$0	$0	$0
19	Coastal Humboldt	$24	$29	$21	$26	$2	$2	$2	$2
20	King Range	$13	$16	$12	$15	$1	$1	$1	$1
21	South Fork Mountain Divide	$11	$13	$10	$12	$1	$1	$1	$1
22	Eel-Russian River	$6	$8	$5	$6	$0	$1	$1	$1
23	Mendocino Coast Ranges	$20	$23	$17	$21	$1	$2	$2	$2
24	Western Klamath/Siskiyou Mtns.	$30	$36	$26	$32	$2	$2	$2	$3
25	Scott and Salmon Mountains	$15	$18	$14	$16	$1	$1	$1	$2
26	Trinity Divide	$1	$1	$1	$1	$0	$0	$0	$0
27	Shasta-Trinity Lakes	$8	$10	$7	$9	$1	$1	$1	$1
28	Eastern Klamath Mountains	$5	$6	$5	$6	$0	$0	$0	$1
29	Shasta/McCloud	$23	$28	$21	$25	$2	$2	$2	$2
	Unallocated	$1,471	$2,424	$1,048	$1,726	$99	$163	$99	$163
	Total	$1,865	$2,894	$1,396	$2,145	$122	$195	$132	$202

	Units	PV 3%		PV 7%		Annualized 3%		Annualized 7%	
		Low	High	Low	High	Low	High	Low	High
BASELINE IMPACT									
1	Olympic Peninsula	$16	$19	$11	$13	$1	$1	$1	$1
2	Northwest Washington Cascades	$14	$16	$9	$11	$1	$1	$1	$1
3	Okanogan	$23	$27	$22	$26	$2	$2	$2	$2
4	Entiat	$14	$16	$13	$16	$1	$1	$1	$1
5	Southwest Washington Cascades	$17	$21	$12	$14	$1	$1	$1	$1
6	Southeast Washington Cascades	$6	$7	$6	$7	$0	$0	$1	$1
7	Northern Oregon Coast Ranges	$17	$21	$14	$17	$1	$1	$1	$2
8	Southern Oregon Coast Ranges	$9	$11	$8	$10	$1	$1	$1	$1
9	Western Oregon Cascades North	$19	$23	$15	$17	$1	$2	$1	$2
10	Hood River	$4	$5	$3	$4	$0	$0	$0	$0
11	Eastern Oregon Cascades	$19	$23	$16	$19	$1	$2	$2	$2
12	Western Oregon Cascades South	$31	$38	$24	$29	$2	$3	$2	$3
13	Willamette/North Umpqua	$4	$5	$4	$5	$0	$0	$0	$0
14	Rogue-Umpqua	$6	$8	$6	$7	$0	$1	$1	$1
15	Oregon Klamath Mountains	$16	$20	$13	$15	$1	$1	$1	$1
16	Klamath Intra-Province	$6	$7	$5	$6	$0	$0	$0	$1
17	Southern Cascades	$33	$40	$27	$33	$2	$3	$3	$3
18	Coastal Redwoods	$1	$1	$0	$0	$0	$0	$0	$0
19	Coastal Humboldt	$8	$10	$5	$6	$1	$1	$0	$1
20	King Range	$0	$0	$0	$0	$0	$0	$0	$0
21	South Fork Mountain Divide	$10	$12	$8	$9	$1	$1	$1	$1
22	Eel-Russian River	$5	$6	$3	$4	$0	$0	$0	$0
23	Mendocino Coast Ranges	$18	$22	$14	$17	$1	$1	$1	$2
24	Western Klamath/Siskiyou Mtns.	$27	$32	$21	$25	$2	$2	$2	$2
25	Scott and Salmon Mountains	$14	$17	$11	$13	$1	$1	$1	$1
26	Trinity Divide	$1	$1	$1	$1	$0	$0	$0	$0
27	Shasta-Trinity Lakes	$8	$9	$6	$7	$1	$1	$1	$1
28	Eastern Klamath Mountains	$5	$6	$4	$5	$0	$0	$0	$0
29	Shasta/McCloud	$22	$26	$18	$21	$1	$2	$2	$2
	Unallocated	$4,414	$7,273	$3,143	$5,179	$297	$489	$297	$489
	Total	$4,787	$7,722	$3,442	$5,536	$320	$518	$324	$522

Results are shown in $1,000s. Numbers may not sum due to rounding

APPENDIX F
SUMMARY OF PROJECTED POST-DESIGNATION REAL CASH FLOWS

Table F-1
Projection of Post-Designation Real Cash Flows (2008-2027), Incremental, in $1,000s

Year	Timber		Barred Owl		Monitoring		Section 7 Administration		Total	
	Low	High	Low	High	Low	High	Low	High	Low	High
2008	$0	$0	$0	$0	$0	$0	$120	$188	$120	$188
2009	$0	$0	$0	$0	$0	$0	$383	$503	$383	$503
2010	$0	$0	$0	$0	$0	$0	$99	$163	$99	$163
2011	$0	$0	$0	$0	$0	$0	$114	$181	$114	$181
2012	$0	$0	$0	$0	$0	$0	$99	$163	$99	$163
2013	$0	$0	$0	$0	$0	$0	$128	$198	$128	$198
2014	$0	$0	$0	$0	$0	$0	$142	$215	$142	$215
2015	$0	$0	$0	$0	$0	$0	$100	$164	$100	$164
2016	$0	$0	$0	$0	$0	$0	$100	$165	$100	$165
2017	$0	$0	$0	$0	$0	$0	$122	$190	$122	$190
2018	$0	$0	$0	$0	$0	$0	$100	$165	$100	$165
2019	$0	$0	$0	$0	$0	$0	$100	$165	$100	$165
2020	$0	$0	$0	$0	$0	$0	$100	$165	$100	$165
2021	$0	$0	$0	$0	$0	$0	$100	$164	$100	$164
2022	$0	$0	$0	$0	$0	$0	$100	$164	$100	$164
2023	$0	$0	$0	$0	$0	$0	$100	$164	$100	$164
2024	$0	$0	$0	$0	$0	$0	$100	$164	$100	$164
2025	$0	$0	$0	$0	$0	$0	$100	$164	$100	$164
2026	$0	$0	$0	$0	$0	$0	$99	$163	$99	$163
2027	$0	$0	$0	$0	$0	$0	$99	$163	$99	$163

Results are shown in $1,000s. Numbers may not sum due to rounding.

Table F-2
Projection of Post-Designation Real Cash Flows (2008-2027), Baseline, in $1,000s

Year	Timber		Barred Owl		Monitoring		Section 7 Administration		Total	
	Low	High	Low	High	Low	High	Low	High	Low	High
2008	$601,214	$601,214	$145	$145	$546	$546	$361	$565	$602,265	$602,470
2009	$601,214	$601,214	$128	$128	$218	$546	$297	$489	$601,857	$602,376
2010	$601,214	$601,214	$128	$128	$218	$546	$297	$489	$601,857	$602,376
2011	$601,214	$601,214	$98	$98	$218	$546	$341	$543	$601,872	$602,400
2012	$601,214	$601,214	$128	$128	$218	$546	$297	$489	$601,857	$602,376
2013	$601,214	$601,214	$31	$31	$218	$546	$384	$594	$601,847	$602,384
2014	$601,214	$601,214	$31	$31	$218	$546	$427	$645	$601,889	$602,435
2015	$601,214	$601,214	$31	$31	$218	$546	$299	$491	$601,761	$602,281
2016	$601,214	$601,214	$31	$31	$218	$546	$301	$494	$601,764	$602,284
2017	$601,214	$601,214	$85	$85	$218	$546	$365	$571	$601,882	$602,415
2018	$601,214	$601,214	$86	$86	$218	$546	$301	$494	$601,819	$601,339
2019	$601,214	$601,214	$85	$85	$0	$0	$301	$494	$601,600	$601,793
2020	$601,214	$601,214	$86	$86	$0	$0	$299	$494	$601,600	$601,793
2021	$601,214	$601,214	$85	$85	$0	$0	$299	$491	$601,598	$601,790
2022	$601,214	$601,214	$86	$86	$0	$0	$299	$491	$601,598	$601,791
2023	$601,214	$601,214	$85	$85	$0	$0	$299	$491	$601,598	$601,790
2024	$601,214	$601,214	$86	$86	$0	$0	$299	$491	$601,598	$601,791
2025	$601,214	$601,214	$85	$85	$0	$0	$299	$491	$601,598	$601,790
2026	$601,214	$601,214	$86	$86	$0	$0	$297	$489	$601,596	$601,788
2027	$601,214	$601,214	$85	$85	$0	$0	$297	$489	$601,596	$601,788

Results are shown in $1,000s. Numbers may not sum due to rounding.