

Washington State Department of Natural Resources

Olympic Experimental State Forest

CATALOG OF RESEARCH AND MONITORING

INTRODUCTION, METHODS, AND ORGANIZATION

June 2008



WASHINGTON STATE DEPARTMENT OF
Natural Resources

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Colin Phifer • OESF Database Coordinator



Olympic Experimental State Forest Catalog of Research and Monitoring

Introduction

The Catalog of Research and Monitoring is part of DNR's Research and Monitoring Program strategy to share and incorporate new research into the management of the Olympic Experimental State Forest (OESF). The Catalog meets several needs. It is the product of extensive review of established research and monitoring activities and a search for new research work that relates to the OESF. Through this discovery process, we are developing a product that collects the government reports, cooperative research, academic theses, non-profit findings, private research and journal articles in one place. Through this effort, DNR is establishing a common reference and knowledge pool to assist in planning and management on the Experimental Forest.

Methods

The Catalog was developed through a deliberate process beginning with consultation with stakeholder and research partners. Academic institutions, tribal governments, city and local governments, state and federal agencies, and private landowners, and non-government organizations were interviewed to understand their research interests and past and on-going research and monitoring relevant to the HCP. Organizations' bibliographies and websites were reviewed and relevant literature databases searched. The list of organizations researched so far follows via the Acknowledgements.

Through these consultations, a comprehensive list of studies was then compiled. These studies were screened to identify those geographically and topically relevant to the conservation objectives on the OESF. Only those research and monitoring projects completed within the three Water Resource Inventory Assessment areas draining the OESF (WRIA's 19, 20, and 21) were considered. Of these, only projects directly relating to the HCP conservation strategies on the OESF were cataloged. A bibliographic database was then compiled and indexed. Indexing captures the conservation strategy (riparian, spotted owl, marbled murrelet, or multi-species) and the general line of study (management approach, species habitat, and/or species populations). This coarse indexing provides the basis for thematic reporting found on the DNR's website.

To date, the Catalog records about 1,000 citations, but is by no means complete. As the Catalog is used, we expect to discover more investigations that would be relevant to our

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conservation objectives on the OESF. As the Catalog is used, we expect to refine the indexing of these studies, both topically and geographically so that they become of more utility to researchers and managers. As the catalog is used, we expect to deliver links to the citations listed and, where possible, electronic versions of selected references. Over time, we expect the Catalog to play a central role in coordination of research on the OESF and its integration into management.

Organization

The OESF Catalog of Research and Monitoring is available on-line through the DNR's website. About 1,000 citations are compiled to-date and can be reviewed through the following themed reports, introduced briefly as follows:

Investigations of Species Populations

The HCP seeks to benefit three key populations on the Olympic Peninsula – anadromous fish, northern spotted owl, marbled murrelet – as well as several other special status species. Research and monitoring cataloged to date provides fundamental information on the abundance, structure, distribution, and movement of these populations.

Investigations of Species Habitat

Through habitat restoration, the DNR seeks to improve the chances for survival and recovery of these key populations. Numerous studies are cataloged characterizing species-specific habitat conditions and trends on the Olympic Peninsula. Most studies address habitat for riparian-dependent species. Several upland habitat studies are cataloged, too, focused on small mammals, the prey-base for the northern spotted owl.

Species-Habitat Relationships

Understanding the habitat conditions found where these populations of interest are successful helps us characterize habitat conditions likely to be of benefit. Other studies cataloged to date rate habitat quality based on our best current understanding of these species-habitat relationships. Several watershed assessments are cataloged, used for prioritizing habitat restoration activities.

Management to Benefit Species

Several conservation plans – federal, state, and private – are cataloged that provide guidance for land management activities and the recovery of our key populations of interest. Restoration plans are also listed, developed by local watershed groups to guide site-specific remedies. Periodic reports on activities pursuant to these strategies, providing an implementation record.

Effects of Management on Species Habitat

Over the past 30 years, there has been much focused study by many organizations concerning the effects of forest management on the habitat of the species we seek to benefit. Effectiveness of conservation measures has been of keen interest as has investigation of the effects of management occurring prior to conservation planning. Several DNR-sponsored projects are highlighted.

Effects of Management on Species Populations

The response of species populations to forest management has been a focus of investigation, too. Most studies address effects on salmonid populations in the Olympic Peninsula, many of which utilize streams crossing DNR-managed lands. Upland studies are also cataloged, mostly limited to reporting on the habitat use of various upland species in managed landscapes.

General Investigations of OESF Ecosystems

Many studies are cataloged where the line of investigation is not specific to any particular species. Most of these characterize ecosystem dynamics and focus on communities – e.g., old-growth, lowland wetlands – or processes – e.g., wind disturbance, climate-landscape interactions. Several silvicultural trials are cataloged here as well, reporting on general stand response to management.

Socioeconomics Effects of Habitat Conservation

The effects of conservation measures on social and economic systems is a unique line of study not prioritized in the HCP. Studies cataloged here relate in some manner to the communities dependent on natural resources found on the Olympic Peninsula.

Within each themed report, citations are grouped by species of interest and organizations leading the research or monitoring effort. Related studies are grouped and generally categorized. All citations are formatted to be consistent with the American Fisheries Society publication standards. Listing of research and monitoring in the OESF Catalog of Research and Monitoring is not an endorsement of the research and monitoring work.

For More Information

Maintenance of the Catalog will be an on-going process. The DNR seeks to keep this catalog current through periodic review of organizations' research activities. Your interest and involvement in the Catalog is encouraged. If you have any comments, corrections, additions, or questions, please contact Teodora Minkova, DNR's OESF HCP Research and Monitoring Coordinator at 360.902.1175 or teodora.minkova@dnr.wa.gov.

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Acknowledgements

To date, the following organizations are represented in the OESF Catalog of Research and Monitoring. Many of them actively participated in and contributed to the development of this version of the Catalog. Their involvement is appreciated and DNR looks forward to continued collaboration in building this resource.

10,000 Year Institute
ABR, Inc.
Clallam County, Washington
Earth Systems Institute
Governor's Salmon Monitoring Oversight Committee
Green Crow
Hardwood Silvicultural Cooperative
Hoh Indian Tribe
Jefferson County, Washington
Lower Elwha Klallam Indian Tribe
Merrill and Ring
National Council for Air and Stream Improvement
National Park Service, Olympic National Park
NOAA Fisheries, Northwest Fisheries Science Center
NOAA Fisheries, Technical Recovery Team
North Olympic Salmon Coalition
Northwest Indian Fisheries Commission
Oregon State University
Pacific Fishery Management Council
Pacific Salmon Commission
Peninsula College
Pennsylvania State University
Quileute Indian Tribe
Rayonier
Rice University
Salmon Recovery Funding Board
The Evergreen State College
University of Chicago
University of Washington
US Bureau of Reclamation
US Fish and Wildlife Service, Pacific Region
US Forest Service, Pacific Northwest Experiment Station
US Forest Service, Regional Ecosystem Office
US Geological Survey, Forest and Range Ecosystem Science Center
US Geological Survey, Water Science Center
Washington State Conservation Commission
Washington State Department of Ecology
Washington State Department of Fish and Wildlife
Washington State Department of Natural Resources, Asset Mgt. and Protection Division
Washington State Department of Natural Resources, Forest Practices Division

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Washington State Department of Natural Resources, Land Management Division
Washington State Department of Natural Resources, Olympic Region
Washington State University
Western Washington University
Wild Salmon Center

Washington State Department of Natural Resources

Olympic Experimental State Forest

CATALOG OF RESEARCH AND MONITORING

INVESTIGATIONS OF SPECIES POPULATIONS

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Investigations of Riparian Species Populations

Federal Agencies

National Park Service, Olympic National Park

Distribution of Fish Populations in Olympic National Park

Brenkman, S.J. and J. Meyer. 1999. Distribution and spawning migration of bull trout in the Hoh River basin, Washington. U.S. Department of Interior, National Parks Service, Olympic National Park. Unpublished report.

Crain, P. On-going. Changed in adult fish assemblages over time. U.S. Department of Interior, National Parks Service, Olympic National Park. Personal communication.

Crain, P. On-going. Spawner surveys in selected stream systems. U.S. Department of Interior, National Parks Service, Olympic National Park. Personal communication.

Crain, P. On-going. Determining the extent of fish populations in upper watersheds. U.S. Department of Interior, National Parks Service, Olympic National Park. Personal communication.

Jacobs, R.G., G. Larson, J. Meyer, N. Currence, J. Hinton, M. Adkison, R. Burger, H. Geiger, and L. Lestelle. 1996. The sockeye salmon (*Oncorhynchus nerka*) population in Ozette Lake, Washington. U.S. Department of Interior, National Parks Service, Olympic National Park. NPS/CCSOSU/NRTR-96/04.

Olympic National Park. 1994. Evaluating the status and trends of selected native fish stocks in Olympic National Park. U.S. Department of Interior, National Parks Service, Olympic National Park. Unpublished report.

NOAA Fisheries, Northwest Fisheries Science Center

Status Reviews of Selected Salmon Populations

Busby, P.J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. NMFS-NWFSC-27.

Gustafson, R.G., T.C. Wainwright, G.A. Winans, F.W. Waknitz, L.T. Parker, and R.S. Waples. 1997. Status review of sockeye salmon from Washington and Oregon. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. NMFS-NWFSC-33.

Hard, J.J., J.M. Myers, M.J. Ford, R.G. Cope, G.R. Pess, R.S. Waples, G.A. Winans, B.A. Berejikian, F.W. Waknitz, P.B. Adams, P.A. Bisson, D.E. Campton, and R.R. Reisenbichler. 2007. Status review of Puget Sound steelhead (*Oncorhynchus mykiss*). U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. NMFS-NWFSC-81.

Hard, J.J., R.G. Kope, W.S. Grant, F.W. Waknitz, L.T. Parker, and R.S. Waples. 1996. Status review of pink salmon from Washington, Oregon, and California. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. NMFS-NWFSC-25.

Johnson, O.W., W.S. Grant, R.G. Kope, K. Neely, F.W. Waknitz, and R.S. Waples. 1997. Status review of chum salmon from Washington, Idaho, Oregon, and California. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. NMFS-NWFSC-32.

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K.N. Steven, T. Lindley, and R.S. Waples. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. NMFS-NWFSC-35.

Weitkamp, L.A., T.C. Wainwright, G.J. Bryant, G.B. Milner, D.J. Teel, R.G. Kope, and R. S. Waples. 1995. Status review of coho salmon from Washington, Oregon, and California. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. NMFS-NWFSC-24.

Structure in Selected Trout Mating Systems

McMillan, J.R., S.L. Katz, and G.R. Pess. 2007. Observational evidence of spatial and temporal structure in a sympatric anadromous (winter steelhead) and resident rainbow trout mating system on the Olympic Peninsula, Washington. Transactions of the American Fisheries Society. In-press.

NOAA Fisheries, Technical Recovery Team

Lake Ozette Sockeye Populations

Currens, K., R. Fuerstenberg, W. Graeber, K. Rawson, M. Ruckelshaus, N. Sands, and J. Scott. 2008. Independent populations of sockeye salmon in Lake Ozette. Puget Sound Technical Recovery Team. Unpublished report.

Pacific Fishery Management Council

Queets Coho Stock Assessments

Pacific Fishery Management Council. 2001. Queets coho stock assessment. Pacific Fishery Management Council. Unpublished report.

Review of Ocean Salmon Fisheries

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Pacific Fishery Management Council. 2004. Review of 2003 ocean salmon fisheries. Pacific Fishery Management Council. Unpublished report.

Pacific Fishery Management Council. 2005. Review of 2004 ocean salmon fisheries. Pacific Fishery Management Council. Unpublished report.

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US Fish and Wildlife Service, Pacific Region

Misc. Salmon Population Assessments

Hiss, J.M., P.E. Bigelow, and S.R. Hagen. 1990. Pre-spawning adult distribution of Queets River spring-summer chinook and feasibility of radio telemetry to study adult in-river migration. U.S. Department of Interior, Fish and Wildlife Service, Fisheries Assistance Office. Unpublished report.

Meyer, J.H., J. Blum, S. Dilley, and R. Boomer. 1985. Distribution and abundance of juvenile salmonids in Clallam Bay and Neah Bay, Washington. U.S. Department of Interior, Fish and Wildlife Service, Fisheries Assistance Office. Unpublished report.

Peters, R.J., M.T. Celedonia, D.W. Lantz, and G.R. Pess. 2007. Diel distribution of juvenile salmonids near logjams in two western Washington rivers. Transactions of the American Fisheries Society. In-press.

U.S. Fish and Wildlife Service. 1971. Sockeye fishery investigations on the Quinault River System. U.S. Department of Interior, Bureau of Sport Fisheries and Wildlife, Division of Fishery Services. Unpublished report.

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US Geological Survey, Forest and Range Ecosystem Science Center

Amphibian Surveys in Olympic National Park

Adams, M.J. 2000. Amphibians of Olympic National Park. U.S. Department of Interior, United States Geological Survey, Biological Resources Division, Forest and Rangeland Ecosystem Science Center. USGS Fact Sheet 098-00.

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Bury, R. and L.C Jones. 2005. Olympic torrent salamander, *Rhyacotriton olympicus*. Seattle Audobon Society. Page 68-69 in L.C. Jones, W.P. Leonard, and D.H. Olson, editors. Amphibians of Pacific Northwest, Seattle Audobon Society.

Bury, R. and M.J. Adams. 1999. Variation in age at metamorphosis across a latitudinal gradient for the tailed frog, *Ascaphus truei*. Herpetologica. 55(2): 283-291.

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State Agencies

Washington State Department of Fish and Wildlife

Assessments of Steelhead Populations

Scott, J.B. and W.T. Gill, Jr. 2008. *Oncorhynchus mykiss*, assessment of Washington State's anadromous populations and programs. Washington State Department of Fish and Wildlife. Unpublished report.

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Genetic Characterization of Lake Ozette Sockeye

Crewson, M., M. Haggerty, A. Ritchie, S. Young, J. Shaklee, K. Currens, and W. Eldridge. 2001. Genetic characterization of Lake Ozette sockeye salmon for enhancement recovery strategies. Washington State Department of Fish and Wildlife. Unpublished report.

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Blakley, A., B. Leland, and J. Ames. 2000. 2000 salmonid stock inventory, coastal cutthroat trout. Washington State Department of Fish and Wildlife. Unpublished report.

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Surveying Headwater Stream Amphibians

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Washington State Department of Natural Resources, Forest Practices Division

Genetic Diversity and Gene Flow of Amphibians

Spear, S. F., J. Baumsteiger, A. Storfer. 2008. Genetic diversity and gene flow of coastal tailed frogs (*Ascaphus truei*) and Cope's giant salamander (*Dicaptodon copei*) across three regions of western Washington. Cooperative Monitoring, Evaluation and Research Committee. Unpublished report.

Movement Patterns of Salmonids

Peterson, J., N. Banish, and R. Thurow. 2003. Analysis of movement patterns of stream-dwelling salmonids in response to three survey methods. Timber/Fish/Wildlife Cooperative Management, Evaluation, and Research Committee. CMER #01-104.

Tribal Governments

Hoh Indian Tribe

Hoh River Index Stream Spawner Surveys

Scarlett, W. On-going. Index stream spawner surveys in the Hoh River watershed. Hoh Indian Tribe. Personal communication.

Lower Elwha Klallam Indian Tribe

Clallam Index Stream Spawner Surveys

McHenry, M. On-going. Spawner surveys in streams of the Clallam River system. Lower Elwha Klallam Indian Tribe. Personal communication.

Northwest Indian Fisheries Commission

Misc. Salmon Stock Assessments

Joint Coho DIT Analysis Workgroup. 2003. Analysis of coho salmon double index tag (DIT) data for the brood years 1995-1997. Northwest Indian Fisheries Commission. Unpublished report.

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Smith, C. and P. Castle. 1994. Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*) escapement estimates and methods, 1991. Northwest Indian Fisheries Commission. Unpublished report.

Salmon Run Reconstructions

Northwest Indian Fisheries Commission. 2007. Pink Puget Sound escapement estimates. Northwest Indian Fisheries Commission. Online database.

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Northwest Indian Fisheries Commission. 2007. Late chum stock strength calculation summaries. Northwest Indian Fisheries Commission. Online database.

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Northwest Indian Fisheries Commission. 2007. Coho WDF catch-escapement run size calculation summaries. Northwest Indian Fisheries Commission. Online database.

Northwest Indian Fisheries Commission. 2007. Early chum stock strength calculation summaries. Northwest Indian Fisheries Commission. Online database.

Quileute Indian Tribe

Quileute Index Stream Spawner Surveys

Lien, R.. On-going. Spawner surveys in streams of the Quileute River system. Quileute Indian Tribe. Personal communication.

Non-Government Organizations

Wild Salmon Center

Historical Steelhead Abundance

McMillan, B. and N. Gayesk. 2006. Historic steelhead abundance, Washington northwest coast and Puget Sound. Wild Salmon Center. Unpublished report.

Academic Institutions

University of Washington

Salmon Population Dynamics in Coastal Streams

Edie, B.G. 1975. A census of the juvenile salmonids of the Clearwater River basin, Jefferson County, Washington in relation to logging. University of Washington. Master's thesis.

June, J.A. 1981. Life history and habitat utilization of cutthroat trout (*Salmo clarki*) in a headwater stream on the Olympic Peninsula, Washington. University of Washington. Master's thesis.

Tagart, J.V. 1976. The survival from egg deposition to emergence of coho salmon in the Clearwater River, Jefferson County, Washington. University of Washington. Master's thesis.

Washington State University

Landscape Genetic Structure of Amphibian Species

Spear, S.F. and A. Storfer. 2007. Landscape genetic structure of coastal tailed frogs (*Ascaphus truei*) in protected versus managed forests. *Molecular Ecology*. In-press.

Steele, C. and A. Storfer. 2007. Phylogeographic incongruence of codistributed amphibian species based on small divergences in geographic distribution. *Molecular Phylogenetics and Evolution*. 43: 468-479.

Investigations of Spotted Owl Populations

Federal Agencies

National Park Service, Olympic National Park

Spotted Owl Monitoring in Olympic National Park

Gremel, S. 2001. Spotted owl monitoring in Olympic National Park, 2001 annual report. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Unpublished report.

Gremel, S. 2008. Spotted owl monitoring in Olympic National Park, 2007 annual report. U.S. Department of Interior, National Parks Service, Olympic National Park. Unpublished report.

Gremel, S. On-going. Revised protocols for spotted owl demography surveys. U.S. Department of Interior, National Parks Service, Olympic National Park. Personal communication.

US Forest Service, Pacific Northwest Experiment Stations

Northern Spotted Owl Demography

Crozier, M.L., M.E. Seaman, R.J. Gutierrez, P.J. Loschl, R.B. Horn, S.G. Sovern, and E.D. Forsman. 2006. Does the presence of barred owls suppress the calling behavior of spotted owls?. *Condor*. 108(4): 760-769.

Forsman, E.D, B. Biswel, D. Kelso, and K. Laubenheimer. 2007. Demographic characteristics of northern spotted owls on the Olympic Peninsula, 1987-2006. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Unpublished report.

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US Geological Survey, Forest and Range Ecosystem Science Center

Spotted Owl Monitoring in Olympic National Park

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State Agencies

Washington State Department of Natural Resources, Olympic Region

Surveys of Northern Spotted Owl

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Olympic Experimental State Forest

CATALOG OF RESEARCH AND MONITORING

INVESTIGATIONS OF SPECIES HABITAT

June 2008



WASHINGTON STATE DEPARTMENT OF
Natural Resources

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Washington State Department of Natural Resources

Olympic Experimental State Forest

CATALOG OF RESEARCH AND MONITORING

SPECIES-HABITAT RELATIONSHIPS

June 2008



WASHINGTON STATE DEPARTMENT OF
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Riparian Species Habitat Relationships

Federal Agencies

National Park Service, Olympic National Park

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Olympic Experimental State Forest

CATALOG OF RESEARCH AND MONITORING

MANAGEMENT TO BENEFIT SPECIES

June 2008



WASHINGTON STATE DEPARTMENT OF
Natural Resources

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Management to Benefit Riparian Species

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Olympic Experimental State Forest

CATALOG OF RESEARCH AND MONITORING

EFFECTS OF MANAGEMENT ON SPECIES HABITAT

June 2008



WASHINGTON STATE DEPARTMENT OF
Natural Resources

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Effects of Management on Riparian Species Habitat

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Effects of Management on Spotted Owl Habitat

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Effects of Management on Marbled Murrelet Habitat

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US Forest Service, Regional Ecosystem Office

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Washington State Department of Natural Resources

Olympic Experimental State Forest

CATALOG OF RESEARCH AND MONITORING

EFFECTS OF MANAGEMENT ON SPECIES POPULATIONS

June 2008



WASHINGTON STATE DEPARTMENT OF
Natural Resources

Mark Teply • OESF HCP Research and Monitoring Manager
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Effects of Management on Riparian Species Populations

Federal Agencies

NOAA Fisheries, Northwest Fisheries Science Center

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Effects of Management on Spotted Owl Populations

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Academic Institutions

University of Washington

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State Agencies

Washington State Department of Natural Resources, Forest Practices Division

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Tribal Governments

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Washington State Department of Natural Resources

Olympic Experimental State Forest

CATALOG OF RESEARCH AND MONITORING

GENERAL INVESTIGATIONS OF OESF ECOSYSTEMS

June 2008



WASHINGTON STATE DEPARTMENT OF
Natural Resources

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Characteristics of the OESF Ecosystems

Federal Agencies

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State Agencies

Washington State Department of Natural Resources, Land Management Division

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Tribal Governments

Hoh Indian Tribe

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Non-Government Organizations

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Old-Forest Characteristics and Development

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Washington State Department of Natural Resources

Olympic Experimental State Forest

CATALOG OF RESEARCH AND MONITORING

SOCIOECONOMIC ASPECTS OF HABITAT CONSERVATION

June 2008



WASHINGTON STATE DEPARTMENT OF
Natural Resources

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Socioeconomics Aspects of Habitat Conservation

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Olympic Experimental State Forest

CATALOG OF RESEARCH AND MONITORING

COMPREHENSIVE BIBLIOGRAPHY

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