

CHAPTER 4 – SUPPORTING INFORMATION

Preparers and Contributors

The following is a list of contributors to this environmental impact statement. Other Forest Service employees contributed to the completion of this document through their assistance in support functions and/or by providing Forest level data and other information needs. Their help was greatly appreciated.

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Distribution of the Environmental Impact Statement

The following is a list of those state and local governments, agencies, tribes, and organizations who received a copy of this DEIS or notification of its availability.

State and Local Government and Agencies

Jefferson County Commissioner
Mason County Prosecutor's Office
Mason County Sheriff
Washington State Department of Ecology
Washington State Department of Fish & Wildlife

Washington State Department of Natural Resources
Washington State Parks & Recreation Commission

Federal Agencies:

Director, Planning and Review, Advisory Council on Historic Preservation
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Northwest Power Planning Council
U.S. Coast Guard (USCG), Environmental Management CG-443
Northwest Mountain Region, Regional Administrator, Federal Aviation Administration
Division Administrator, Federal Highway Administration, WA
U.S. Department of Energy, Director, Office of NEPA Policy and Compliance
USDI, National Park Service, Olympic National Park
U.S. Army Corps of Engineers, Regulatory Branch

American Indian Tribes

Jamestown S'Klallam Tribe
Lower Elwha Klallam Tribe
Port Gamble S'Klallam Tribe
Skokomish Indian Tribe

Businesses and Organizations

Backcountry Horseman	KMAS
Blue Ribbon Coalition, Inc.	Leavitt Trucking Inc.
Blue Ribbon Olympic Volunteers	Meridian Environmental
Boulton & Yarr Logging	National Audubon Society
Bremerton Sun	Northwest Forestry Association
Chinook Resources	Olympic Coast Alliance
Conservation Northwest	Olympic Forest Coalition
Entrix, Inc.	Olympic Park Associates
Forest Conservation Council	Olympic Peninsula Audubon Society
Friends of Miller Peninsula State Park	Pacific Northwest Trail Association
FSEEE	Pacific Rivers Council
Harza Engineering	Peninsula Wilderness Club
Hermann Bros. Logging & Constr.	Pope Resources
Hood Canal Environmental Council	Port Angeles Daily News
Hood Canal Salmon Enhancement	Port Ludlow Hiking Club
Jim H. Bower Logging	Port Townsend Leader
K Ply, Inc.	Port Townsend Paper

Chapter 4 Supporting Information

Protect the Peninsula's Future
Quilcene/Brinnon Chamber of Commerce
Resource Renewal, Inc.
Sequim Gazette
Shelton-Mason County Journal
Sierra Club, Cascade Chapter
Simpson Investment Company
Simpson Timber Company
Skokomish Watershed Coalition
The Mountaineers
Washington Native Plant Society
Washington Trails Association
Washington Wilderness Coalition
Wild Olympic Salmon

Glossary

Access and Travel Management (ATM) Plan – A document that outlines management policies for motorized vehicles and their associated travelways (development and maintenance).

Aggradation - To fill and raise the level of (the bed of a stream) by deposition of sediment.

Aggregate – Crushed rock used on road surfacing.

Alternative – One of several policies, plans, ways, or projects proposed for decision making. An alternative does not necessarily differ from other alternatives in all aspects.

Avulsion – The sudden abandonment of a part or the whole of a meander area by a stream for some new course.

Avulsion hazard zone – The portion of the channel migration zone that delineates avulsion hazards.

Bankfull Channel – Area used by a river or stream at its maximum flow without overflowing its banks.

Channel bed scour – Powerful and concentrated clearing and digging action of flowing water on the bottom of a river channel.

Channel migration zone – The area along a river within which the channel can be reasonably predicted to migrate over time as a result of natural processes.

Coarse Sediment – Substrate that are more than 2 millimeters in diameter; such as gravels, cobbles, and boulders.

Constituent elements – Habitat features associated with the terrestrial environment that support the requirements for nesting, roosting, and other normal behaviors of a species. Associated with designated critical habitat.

Cooperating agency – Any Federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal.

Cross drains – Installed structures, such as culverts and rolling dips that move water from one side of a road to the other.

Danger tree – Those trees and snags that have the potential for, or are of imminent danger, to roadway traffic.

Decommissioning – Activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFR 212.1, (FSM 7703). Decommissioning may include the following:

- Closing entrances -preferably using full-restoration techniques to obscure.

- Scarifying road surfaces, or decompacting (subsoiling or ripping) to establish vegetation and reduce run-off.
- Seeding to control erosion and in some cases provide forage.
- Partial to full restoration of stream channel by removing culverts and fills.
- Water-barring and cross-ditching of roadbed.
- Removing unstable portion of embankments.

Discounted Costs – The current value of costs that occur over time. A discount rate is used to reduce future costs to their present time equivalent.

Embeddedness – The degree to which large particles in a streambed (boulders, rubble, gravel) are surrounded or covered by fine sediment, usually measured in classes according to percent coverage.

Environmentally preferred alternative – The alternative which best meets section 101 of NEPA; that causes the least damage to the biological and physical environment and best preserves and enhances historical, cultural, and natural resources.

Erosion hazard zone – The area of the channel migration zone that delineates channel susceptibility to bank erosion from stream flow or mass wasting.

Fine Sediment – Substrate that are less than 2 millimeters in diameter; such as sands, silts, and clays.

Fluvial processes – Processes pertaining to rivers, produced by the action of a stream or river.

Forest road – A road wholly or partly within, or adjacent to, and serving the National Forest System and which is necessary for the protection, administration, and utilization of the National Forest System and the use and developments of its resources.

Full bench construction – Road construction that uses no fill or side-cast material.

Gabion – A specially designed container or structure used to hold coarse rock aggregate, used in forming a retaining wall.

Geomorphic processes – Processes which create or shape land forms.

High bank – The bare slope at the washout which is subject to river erosion, undercutting, and slope instability. It is also referred to as the bluff slope and the high glacial terrace.

Historical migration zone – The portion of the channel migration zone that the channel occupied in the historical record.

Hydromulching – Hydromulching, sometimes referred to as hydroseeding, is a grass planting process. This grass planting process is usually more effective than conventional seeding. The process begins by mixing mulch, seed, fertilizer, and water in the tank of a hydro-mulching machine. The mixed material is then pumped from the tank and sprayed onto the ground. The material is often referred to as a slurry, much like a soupy batch of green papier-mâché. Once

applied to the soil, the material enhances initial growth by providing a micro-environment beneficial to seed germination.

Impairment – National Park Service determination of impact that would harm the entire integrity of a resource or value, whose conservation is key to the cultural or natural integrity of the recreation area, or is a resource or value needed to fulfill a specific purpose identified in the park’s enabling legislation.

Interdisciplinary team (IDT) – A group of individuals with different training assembled to solve a problem or perform a task.

Invasive plants (noxious weeds) – Alien plant species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

Jersey barrier – A concrete barrier that acts as a traffic control device to prohibit traffic flow or prevent materials from entering the roadway or ditchline.

Key Watershed – A component of the Aquatic Conservation Strategy (ACS) of the Northwest Forest Plan which involves a system of large refugia comprising watersheds that are crucial to at-risk fish species and stocks and provide high quality water.

Late-Successional Reserve – A Northwest Forest Plan land allocation with an objective to protect and enhance conditions of late-successional and old-growth forest ecosystems.

Lead or Co-Lead agency – The agency preparing or having taken primary responsibility for preparing an environmental impact statement.

Log complexes – Structures designed to mimic natural logjams. They function to reduce river flow energy, redirect flow, scour pools, and create cover for aquatic species.

Maintenance level – Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria:

Maintenance Level 1 Assigned to intermittent service roads during the time they are not closed to vehicular traffic. The closure period is one year or longer. Basic custodial maintenance is performed.

Maintenance Level 2 Assigned to roads open to for use by high clearance vehicles. Passenger car traffic is not a consideration.

Maintenance Level 3 Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.

Maintenance Level 4 Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds.

Maintenance Level 5 Assigned to roads that provide a high degree of user comfort and convenience. Normally, these roads are double lane and paved or aggregate surfaced with dust abatement.

Meander bend – Curved portion of meandering channel where the current is directed toward the

stream bank.

Meandering channel – A winding channel pattern occurring in part from local variations in erosional resistance of bed and bank material.

Mitigation – Mitigation includes: (1) Avoiding the impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of an action; and (5) compensating for the impact by replacing or providing substitute resources of environments. (40 CFR Part 1508.20)

Pacific Decadal Oscillation – A cyclic climate pattern.

Perched water table or aquifer – An aquifer that occurs above the main water table, caused by an impermeable layer of rock above the main aquifer. Water percolating down gets trapped above the impermeable layer and if the flow intersects the surface the water is discharged as a spring.

Preferred alternative – The alternative which best fulfills an agency's statutory mission and responsibilities, considering environmental, social, economic, and other factors.

Present value of discounted costs – The sum of the discounted costs.

Proposed action - A proposed action is a proposal to authorize, recommend, or implement an action to meet a specific purpose and need. It is formed at that stage in the development of an action when agencies; in this case the Forest Service, WFLHD, and Park Service; have a goal and are actively preparing to make a decision on one or more alternative means to accomplish that goal (40 CFR 1508.23).

Reach analysis – An Olympic National Forest document summarizing geomorphic characteristics and processes and aquatic habitat conditions along one kilometer of the Dosewallips River in the vicinity of the washout.

Redds – Shallow depressions excavated in gravel by female salmon where eggs are laid.

Revetment – A facing of rock or other material built to protect an embankment from water erosion.

Riparian – A geographically delineated area with distinctive resource values and characteristics that is composed of aquatic and riparian ecosystems.

Riparian Reserve – A key element of the Northwest Forest Plan Aquatic Conservation Strategy (ACS) which provides an area along all streams, wetlands, ponds, lakes, and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis.

Riprap – A layer of large, durable rock whose purpose is to prevent erosion by currents, and thereby preserves the shape of a surface.

River planform – The shape and size of channel and overbank features as viewed from above.

Shear stress – Stress caused by forces operating parallel to each other but in opposite directions.

Semi-primitive motorized – A management intensity class within the Recreation Opportunity Spectrum (ROS).

Soundscape – A National Park Service resource, referring to natural quiet and sounds associated with the physical and biological resources of the park.

Spawning gravels – An appropriate mix of fine and coarse sediment with the primary component being gravel size material with some smaller cobbles.

Stream Order – Stream size based on the confluence of one stream with another. First order streams are the origin or headwaters. The confluence or joining of two first order streams forms a second order stream.

Turbidity - A cloudiness or haziness of water (or other fluid) caused by individual particles (suspended solids) that are generally invisible to the naked eye, thus being much like smoke in air.

Visual quality objective – Categories of acceptable landscape alteration measured in degrees of deviation from the natural-appearing landscape.

Wetted perimeter – The width of the wetted contact between a river and its channel.

References

- Ament, S. 2006. Personal communication with Shelly Ament, Washington Department of Fish and Wildlife Biologist. Sequim, Washington.
- Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White, C.J. Schwarz, J. Nichols, J.E. Hines, G.S. Olson, S.H. Ackers, S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.P. Gerhardt, S.A. Gremel, R.J. Gutierrez, P.J. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, and S.G. Sovern. 2004. Status and Trends in Demography of Northern Spotted Owls, 1985-2003. Interagency Regional Monitoring Report. Portland, Oregon.
- Anthony, R.G., R. L. Knight, G.T. Allen, B.R. McClland, and J.I. Hodges. 1982. Habitat use by nesting and roosting bald eagles in the Pacific Northwest. Trans. North American, Wildlife National Resource Conference. 47:332-342.
- Aubry, K.B., and C.M. Raley. 1992. Landscape-level responses of pileated woodpeckers to forest management and fragmentation: a pilot study. Progress Report: 1990 and 1991. Olympia, WA: Pacific Northwest Research Station, Forest Service, USDA. 73 pp.
- Aubry, K.B., and C.M. Raley. 2002. The pileated woodpecker as a keystone habitat modifier in the Pacific Northwest. USDA, Forest Service. Gen. Tech. Rep. PWS-GTR-181.
- Bailey, I. 2006. Personal communication with Tim Davis, February 14, 2006. Brinnon, Washington.
- Bailey, V. and I. Bailey. 1997. A Scrapbook History of Brinnon. Bremerton, Washington.
- Bellingham Herald. 12/4/2005. Warning: Temperatures show steady upward trend. www.bellinghamherald.com. Bellingham, Washington.
- Biswell, B. 2005. Personal communication with Betsy Howell at the Olympic Supervisor's Office, Olympic National Forest. Olympia, Washington.
- Bloxton, T.D., Jr. 2002. Prey abundance, space use, demography, and foraging habitat of northern goshawk in western Washington. Master's Thesis. University of Washington, Seattle. 70 pp.
- Brenkman, S.J., S.C. Corbett, and S.H. Sebring. 2004. Inventory of Fish Species in the Bogachiel, Dosewallips, and Quinault River Basins, Olympic National Park, Washington. USDI, National Park Service. Port Angeles, Washington.
- CEMG. 1999. Elk management on the Olympic Peninsula: State-Tribal technical management document. June 1999. Cooperative Elk Management Group. 54 pp.
- Cenderelli, D., Shelmerdine, B., McHenry, M. 2003. Geomorphic Processes and Habitat Conditions along the Dosewallips River in the Vicinity of the washout on US Forest Service Road 2610 (*The Reach Analysis*). Olympic National Forest, Olympia WA.

CEQ. 2005. Memorandum on Guidance on the Consideration of Past Actions in Cumulative Effects Analysis. Washington, DC.

Channel Migration Zones (CMZ's) and Shoreline Management,
www.ecy.wa.gov/programs/sea/sma/st_guide/jurisdiction/CMZ.html.

Climate Impacts Group, University of Washington. 2004. Overview of Climate Change Impacts in the U.S. Pacific Northwest. www.cses.washington.edu/cig. Seattle Washington.

Cooper, B.A., M.G. Raphael, and D.Evans Mack. 2001. Radar-based monitoring of marbled murrelets. *Condor* 103:210-229.

Cooper, B.A., M.G. Raphael, and D.Evans Mack. 2003. Refining a landscape-scale habitat model and inland monitoring program for marbled murrelets in the Olympic Peninsula. Final Report prepared for USFS Pacific Northwest Research Station and Olympic Natural Resources Center. ABR, Inc., Environmental Research & Services, P.O. Box 249. Forest Grove, Oregon 97116.

Corkran, C.C. and C. Thoms. 1996. Amphibians of Oregon, Washington and British Columbia. Lone Pine Publishing. Redmond, Washington. 175 pp.

Courtney, S.P., J.A. Blakesley, R.E. Bigley, M.L. Cody, J.P. Dumbacher, R.C. Fleischer, A.B. Franklin, J.F. Franklin, R.J. Gutierrez, J.M. Marzluff, and L. Sztukowski. 2004. Scientific evaluation of the status of the Northern Spotted Owl ("The Status Review"). Sustainable Ecosystems Institute. Portland, Oregon.

Curtis, R.O. and D.D. Marshall. 1993. Douglas fir rotations—time for reappraisal? *Western Journal of Applied Forestry*. 8(3): 81-85.

Deer, C., R. Helliwell, A. Ruchty, L. Hoover, L. Geiser, D. Lebo and J. Davis. 2003. Survey Protocols for Survey & Manage Category A & C Lichens in the Northwest Forest Plan Area, Version 2.1. Portland, OR

Deer, C., R. Leshner, L. Geiser and M. Stein. 2003. 2003 Amendment to the Survey Protocol for Survey & Manage Category A & C Lichens in the Northwest Forest Plan Area, Version 2.1 Amendment, Sept. 2003. Portland, OR.

Duncan, N., T. Burke, S. Dowlan and P. Hohenlohe. 2003. Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan, Version 3.0. Portland, OR.

Edil, T. 1980. Control of Coastal Landslides. *Proceedings of the International Symposium on Landslides*. Vol. 3. New Delhi, India.

Edil, T. and Valejo, L. 1980. Mechanics of Coastal Landslides and the Influence of Slope Parameters. *Engineering Geology*, 16(1980): 83-96.

Ehrlich, P.R., D.S. Dobkin and D. Wheye. 1988. *The Birder's Handbook, A Field Guide to the Natural History of North American Birds*. Simon and Schuster, New York, NY.

FHWA, Western Federal Lands Highway Division. 2007. Wetland and Stream Delineation, Dosewallips Road Washout, Jefferson County, Washington. WA FS ERFO 2002(1)-21(4). Vancouver, Washington.

Federal Interagency Working Group. 1998. Stream Corridor Restoration.

Finn, S.P., J.M. Marzluff, and D.E. Varland. 2002a. Effects of landscape and local attributes on northern goshawk site occupancy in western Washington. *Forest Science* 48:427-436.

Finn, S.P., D.E. Varland, and J.M. Marzluff. 2002b. Does northern goshawk nest stand occupancy vary with nest stand characteristics on the Olympic Peninsula, Washington? *Journal of Raptor Research* 36:265-279.

Fisheries Management Division, Report 93-22. Olympia, Washington. June 1992.

Forsman, E.D., and A. R. Geise. 1997. Nests of northern spotted owls on the Olympic Peninsula, Washington. *Wilson Bulletin* 109(1):28-41.

Frissell, C., P. Morrison, S. Adams, L. Swope, and N. Hitt. 2000. Conservation Priorities: An Assessment of Freshwater Habitat for Puget Sound Salmon. Prepared for The Trust for Public Lands.

Furnish, J., T. Burke, T. Weasma, J. Applegarth, N. Duncan, R. Monthey and D. Gowan. 1997. Survey Protocol for Terrestrial Mollusk Species From the Northwest Forest Plan, Draft Version 2.0 (October 29, 1997). Portland, OR.

Gravenmier, B. 2008. Personal communication with Tim Davis, March 24, 2008.

Grover, P. 2002. Initial Review Worksheet for Botany, Dosewallips Washout Project.

Grubb, T.G. 1995. Constructing Bald Eagle Nests With Natural Materials. Rocky Mountain Forest and Range Experiment Station, RM-RN-535, 2500 S. Pine Knoll Dr. Flagstaff, Arizona 86001.

Hagar, J.C., W.C. McComb, and W.H. Emmingham. 1996. Bird communities in commercially thinned and unthinned Douglas-fir stands of western Oregon. *Wildl. Soc. Bull.* 24(2):353-366.

Hall. 2005. Likely Trends in National Forest Recreation in Region 6 (Oregon and Washington). Moscow, Idaho.

Hibler, C. and T. O'Dell. 1998. Survey Protocols for *Bridgeoporus (=Oxyporus) nobilissimus* Fungi, Version 2.0, May 13, 1998. Portland, OR

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, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-32, 280 p.

Johnson, Thom. Personal communication. December 10, 2002 and December 13, 2005.

- Labbe, T., Grotefendt, R., Carter-Mortimer, A., Jones, J. 2005. Dosewallips River Habitat Assessment: Coupling High-Resolution Remote Sensing and Ground Surveys to Prioritize Aquatic Conservation, Olympic Mountains, Washington State. Port Gamble S'Klallam Tribe, Natural Resources Department. Kingston, Washington. 91 p.
- LaGasse, P., Spitz, W., Zevenbergen, L., and Zachmann, D. 2004. Handbook for Predicting Stream Meander Migration, NCHRP Report 533. Transportation Research Board of the National Academies.
- Laubenheimer, Kurt. 2005. Personal communication with Betsy Howell at the Pacific Ranger District, Olympic National Forest. Forks, Washington.
- Leon, Sven. 2004. Memo to Dave Hilgendorf, WFLHD ERFO Coordinator, regarding the comments on the Forest Service reach analysis for the Dosewallips river washout. U.S. Dept. of Transportation, Federal Highways Administration, Western Federal Lands Highway Division. Vancouver, Washington. 3p.
- Leonard, W.P., H.A. Brown, L.L.C. Jones, K.R. McAllister, and R.M. Storm. 1993. Amphibians of Washington and Oregon. Seattle Audubon Society, The Trailside Series. Seattle, Washington.
- Lewis, J.C. and G.E. Hayes. 2004. Feasibility Assessment for Reintroducing Fishers to Washington. Washington Department of Fish and Wildlife. Olympia, Washington. 70 pp.
- Lichatowich, J. 1993. The status of Pacific salmon stocks in the Quilcene Ranger District. Quilcene Ranger District, Olympic National Forest, USDA Forest Service.
- Link, W. A., and J. R. Sauer. 1997. Estimation of population trajectories from count data. *Biometrics* 53:63-72.
- Manley, I.A. and S.K. Nelson. 1999. Habitat characteristics associated with nest success and predation at marbled murrelet tree nests (Abstract). *Pacific Seabirds* 26:40.
- Mantua, N. 1999. The Pacific Decadal Oscillation. www.atmos.washington.edu, Climate Impacts Group, University of Washington. Seattle, Washington.
- Maser, C. 1998. Mammals of the Pacific Northwest, From the Coast to the High Cascades. Oregon State University Press, Corvallis, Oregon. 406 pp.
- McShane, C., T. Hamer, H. Carter, G. Swartzman, V. Friesen, D. Ainley, R. Tressler, K. Nelson, A. Burger, L. Spear, T. Mohagen, R. Martin, L. Henkel, K. Prindle, C. Strong, and J. Keany. 2004. Evaluation report for the 5-year status review of the marbled murrelet in Washington, Oregon, and California. Unpublished report. EDAW, Inc. Seattle, Washington. Prepared for the U.S. Fish and Wildlife Service, Region 1. Portland, Oregon.
- Mongillo, P.E. 1993. The distribution of bull trout/Dolly Varden in Washington State. WDFW.

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grand, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-35, 443 p.

Newton, M. and E.C. Cole. 1987. A sustained-yield scheme for old-growth Douglas fir. *Western Journal of Applied Forestry*. 2(1): 22-25.

NMFS (National Marine Fisheries Service). 1995a. Endangered and Threatened Species; Proposed Threatened Status for Three Contiguous ESUs of Coho Salmon Ranging From Oregon Through Central California. 50 CFR Parts 227. 60(142) 38011.

NMFS (National Marine Fisheries Service). 1995b. Endangered and Threatened Species; West Coast Pink Salmon Petition Determination. 50 CFR Parts 227. 60(192) 51928.

NMFS (National Marine Fisheries Service). 1996. Endangered and Threatened Species; Proposed Endangered Status for Five ESUs of Steelhead and Proposed Threatened Status for Five ESUs of Steelhead in Washington, Oregon, Idaho, and California. 50 CFR Parts 222 and 227. 61(155) 41541.

NMFS (National Marine Fisheries Service). 1998. Endangered and Threatened Species: Proposed Threatened Status and Designated Critical Habitat for Hood Canal Summer-Run Chum Salmon and Columbia River Chum Salmon. 50 CFR Parts 226 and 227. 63(46) 11774.

NMFS (National Marine Fisheries Service). 1999a. Endangered and Threatened Species: Threatened Status for Three Chinook Salmon Evolutionarily Significant Units in Washington and Oregon, and Endangered Status of One Chinook Salmon ESU in Washington. 50 CFR Parts 223 and 224. 64(56) 14308.

NMFS (National Marine Fisheries Service). 1999b. Endangered and Threatened Species: Threatened Status for Two ESUs of Chum Salmon in Washington and Oregon. 50 CFR Part 223. 64(57) 14508.

NMFS (National Marine Fisheries Service). 2002. Magnuson-Stevens Act Provisions; Essential Fish Habitat (EFH). 50 CFR Part 600. 67(12) 2343.

NMFS (National Marine Fisheries Service). 2004. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. 69(73) 19975.

NMFS (National Marine Fisheries Service). 2006. Listing Endangered and Threatened Species and Designating Critical Habitat: 12- Month Findings of Petition to List Puget Sound Steelhead as an Endangered and Threatened Species under the Endangered Species Act. 50 CFR Part 223. 71(60) 15666.

National Park Service, U.S. Department of the Interior. 1976. Proposed Master Plan and Final Environmental Impact Statement. Olympic National Park, Washington.

- National Park Service, U.S. Department of the Interior. 1996. "Statement for Management: *Conserving for the Future.*" Olympic National Park, Port Angeles, Washington.
- Parametrix. 2002. Olympic National Park Transportation and Access Needs Technical Information Report. Prepared for the USDI National Park Service. Kirkland, Washington.
- Partners in Flight. 1998. North American Bird Conservation Initiative (NABCI): Strategy and Action Plan.
- Perlmeter, S.I. 1995. Bats and Bridges: A Field Study of the Thermal Conditions and Social Organization of Night Roosts in the Willamette National Forest. Msc. Thesis, Graduate Programme in Biology, York University, North York, Ontario.
- Perschel, Robert T., A. Evans and M Summers. 2007. Climate Change, Carbon, and the Forests of the Northeast. Forest Guild. December 2007.
- Phelps, S., J. Uehara, D. Hendrick, J. Hymer, A. Blakley and R. Brix. 1995. Genetic diversity units and major ancestral lineages for chum salmon in Washington. Pages C1-C55 in C.B. Busack and J.B. Shaklee, eds., Genetic diversity units and major ancestral lineages of salmonid fishes in Washington. WDFW. Fish Management Program, Resource Assessment Division. Olympia, Washington.
- Phelps, S.R., S. Leider, P. Hulett, B. Baker and T. Johnson. 1997. Genetic analysis of Washington steelhead: preliminary results of incorporating 36 new collections from 1995 and 1996. WDFW. Progress Report. WDFW. Olympia, Washington.
- PNPTC (Point No Point Treaty Council), Skokomish Tribe, Port Gamble S'Klallam Tribe, Jamestown S'Klallam Tribe, Washington Dept. of Fish and Wildlife. 1999. Hood Canal/Eastern Strait of Juan De Fuca Summer Chum Habitat Recovery Plan.
- PNPTC (Point No Point Treaty Council). 1995 Documents submitted to the ESA Administrative Record for west coast chinook salmon by N. Lampsakis, September 1995.
- Pyle, R.M. 2002. The Butterflies of Cascadia. Seattle Audubon Society, Seattle, Washington. 420 pp.
- Rapp, R., and Abbe, T. 2003. A Framework for Delineating Channel Migration Zones. Ecology Publication #04-06-027, Washington Departments of Ecology, and Transportation.
- Reeves, G.H., Benda, L.E., Burnett, K.M., Bisson, P.A., and Sedell, J.R. 1995. A disturbance-based ecosystem approach to maintaining and restoring freshwater habitats of evolutionarily significant units of anadromous salmonids in the Pacific Northwest. Pages 334-349 in J.L. Nielsen, editor. Evolution and the aquatic ecosystem: defining unique units in population conservation. American Fisheries Society Symposium 17. Bethesda, Maryland.
- Roderick, E., and R. Milner, eds. 1991. Management recommendations for Washington's priority habitats and species. Washington Department of Fish and Wildlife. Olympia, Washington.

Shaklee, J.B. 2001. Memo to Ann Blakley (WDFW), Jim Ames (WDFW) and Don Hendrick (WDFW) regarding an update of genetic information for SaSI pink salmon stocks. WDFW. Olympia. Washington.

Shared Strategy for Puget Sound. 2005. Draft Puget Sound Recovery Plan Volume 1. June 30, 2005 - Revised December 2005. Seattle, Washington.

Sheets, T.J. 1993. Washington State Pine Marten Distribution. Washington Conservation Corps, Washington Department of Fish & Wildlife.

Shelmerdine, W.S. 2006. Geomorphic Processes and the Dosewallips washout alternatives. Specialist Report for the Dosewallips E.I.S. Olympic National Forest. Olympia, Washington. 12 p.

Stalmaster, M. V. 1987. The bald eagle. Universe Books, New York. 227pp.

Steinberg, E.K. 1995. A study of genetic differentiation and variation in the Mazama pocket gopher (*Thomomys mazama*) with emphasis on Fort Lewis populations. Final report submitted to Fort Lewis and The Nature Conservancy. 46 pp + appendices. California Department of Fish and Game, Nongame Bird and Mammal Program Report 94-5.

Steinberg, E.K., and D. Heller. 1997. Using DNA and rocks to interpret the taxonomy and patchy distribution of pocket gophers in western Washington prairies. Pp. 43–51 in *South Puget Sound Prairie Landscapes* (P. Dunn and K. Ewing, eds.). The Nature Conservancy of Washington, Seattle. 289 pp.

Taber, RD, and KJ Raedeke. 1980. Status report, Roosevelt elk of the Olympic National Forest. University of Washington, College of Forest Resources. Seattle, Washington.

Taylor, G. 1999, Long-term climate and ocean trends and salmon populations in the Pacific Northwest. Proceedings of the Symposium on Ocean Conditions and the management of Columbia River Salmon.

Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990. A Conservation Strategy for the Northern Spotted Owl. USDA Forest Service, USDI Bureau of Land Management, USDI Fish and Wildlife Service, USDI National Park Service. Portland, Oregon.

Thomas, J.W., ed. 1979. Wildlife habitats in managed forests – the Blue Mountains of Oregon and Washington. Handbook No. 533. Washington, D.C.:U.S.Dep. Agric. 512 pp.

Thomas, J.W., M.G. Raphael and R.G. Anthony [et al.]. 1993. Viability assessments and management considerations for species associated with late-successional and old-growth forests of the Pacific Northwest. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 523 p.

US Bureau of the Census. 2000. <http://www.census.gov>.

USDA Forest Service and USDI Bureau of Land Management. 1994. Record of Decision and 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. Portland, Oregon.

USDA Forest Service and USDI Bureau of Land Management. 1997. Survey Protocols for Survey and Manage Component 2 Bryophytes, Version 2.0, Dec. 11, 1997. Portland, OR.

USDA Forest Service and USDI Bureau of Land Management. 1999. Survey Protocols for Protection Buffer Bryophytes, Version 2.0, December 3, 1999. Portland, OR.

USDA Forest Service and USDI Bureau of Land Management. 2001. Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines in Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl, as amended or modified as of March 21, 2004. Portland, Oregon.

USDA Forest Service and Washington State Department of Fish and Wildlife. 2005. Memorandum of Understanding between the Washington State Department of Fish and Wildlife and USDA Forest Service, Pacific Northwest Region regarding Hydraulic Projects Conducted by the USDA Forest Service, Pacific Northwest Region. Portland, Oregon.

USDA Forest Service Olympic National Forest, Elwha Klallam Tribe, and Washington Department of Ecology. 2002. Deep Creek, East Twin, West Twin Rivers Watershed Analysis. Olympic National Forest. Olympia, Washington.

USDA Forest Service Olympic National Forest, Washington Department of Natural Resources Olympic Region, and Quileute Indian Tribe. 1995. Sol Duc Pilot Watershed Analysis. Olympic National Forest. Olympia, Washington.

USDA Forest Service Olympic National Forest. 2007. Outdoor Recreation Strategy July 2007.

USDA Forest Service. 1990a. Olympic National Forest Land and Resource Management Plan. Olympia, Washington.

USDA Forest Service. 1990b. Record of Decision and Final Environmental Impact Statement Land and Resource Management Plan. Olympic National Forest. Olympia, Washington.

USDA Forest Service. 1994. The Scientific Basis for Conserving Forest Carnivores, American Marten, Fisher, Lynx, and Wolverine in the Western United States. GTR RM-254. Fort Collins, CO.

USDA Forest Service. 1996. Hood Canal North LSR Assessment. Olympic National Forest. Olympia, Washington.

USDA Forest Service. 1999. Dosewallips Watershed Analysis. Olympic National Forest. Olympia, Washington.

USDA Forest Service. 2000a. Olympic National Forest Interim Programmatic Biological Assessment for USFWS. Olympic National Forest, Olympia, WA.

USDA Forest Service. 2000b. Olympic National Forest Ecological Unit Inventory. Olympic National Forest. Olympia, Washington.

USDA Forest Service. 2001. Roadless Area Conservation Rule. 36 CFR 294. Washington, D.C.

USDA Forest Service. 2003. Access and Travel Management Plan. Olympic National Forest. Olympia, Washington.

USDA Forest Service. 2004. Regional Forester's Sensitive List, updated April 2004. U.S. Forest Service, Pacific Northwest Region, Portland, Oregon.

USDA Forest Service. 2005a. Dosewallips Road Washout – Choosing By Advantage Analysis. Olympic National Forest. Olympia, Washington.

USDA Forest Service. 2005b. Record of Decision and Final Environmental Impact Statement for Pacific Northwest Region Invasive Plant Program – Preventing and Managing Invasive Plants. Portland, Oregon.

USDA Forest Service. 2006a. Northwest Forest Plan. Socioeconomic Monitoring of the Olympic National Forest and Three Local Communities. Pacific Northwest Research Station. General Technical Report PNW-GTR-679. Portland, Oregon.

USDA Forest Service. 2006b. Northwest Forest Plan. Socioeconomic Monitoring Results Volume III: Rural Communities and Economics. Pacific Northwest Research Station. General Technical Report PNW-GTR-649 Vol. III. Portland, Oregon.

USDA Forest Service. 2007. Record of Decision to Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Forest Service Land and Resource Management Plans Within the Range of the Northern Spotted Owl. Pacific Northwest and Southwest Regions.

USDI Fish and Wildlife Service. 1986. Recovery Plan for the Pacific Bald Eagle. Portland, Oregon. 160 pp.

USDI Fish & Wildlife Service. 1992. Critical Habitat for the Northern Spotted Owl, Maps and Legal Descriptions, Washington. Portland, Oregon.

USDI Fish & Wildlife Service. 1993. Listed and Proposed Endangered and Threatened Species and Critical Habitat; Candidate Species; and Species of Concern in the Western Portion of Washington State. Western Washington Fish and Wildlife Office. Lacey, Washington.

USDI Fish & Wildlife Service. 1999. Final Rule to Remove the American Peregrine Falcon from the Federal List of Endangered and Threatened Wildlife, and to Remove the Similarity of Appearance Provision for Free-Flying Peregrines in the Conterminous United States. Federal Register, Vol. 64, No. 164, August 25, 1999.

USDI Fish & Wildlife Service. 2003a. Biological Opinion and letter of concurrence for effects to bald eagles, marbled murrelets, northern spotted owls, bull trout, and designated critical habitat for marbled murrelets and northern spotted owls from Olympic National Forest program of activities for August 5, 2003 to December 31, 2008. USDI Fish and Wildlife Service. Lacey, Washington. August 2003; revised September 2004.

USDI Fish and Wildlife Service. 2003b. Listed and proposed endangered and threatened species and critical habitat; candidate species, and species of concern in the western portion of Washington State, as prepared by the U.S. Fish and Wildlife Service, Western Washington Fish and Wildlife Office (revised July 14, 2003). Jefferson County, Washington.

USDI National Park Service. 1976. Proposed Master Plan and Final Environmental Impact Statement. Olympic National Park, Washington.

USDI National Park Service. 1996. Statement for Management: Conserving for the Future. Olympic National Park. Port Angeles, Washington.

USDI National Park Service. 2001. National Park Service Management Policies 2001.

USDI. 1978. Determination of certain bald eagle populations as endangered or threatened. Federal Register 43:6230-6233.

USDI. 1992. Endangered and threatened wildlife and plants; determination of threatened status for the Washington, Oregon, and Californian population of the marbled murrelet. Federal Register, October 1, 1992, Vol. 57, No. 191, Pages 54238-45337.

USDI. 1996. Endangered and threatened wildlife and plants; determination of critical habitat for the marbled murrelet, final rule. Federal Register, May 24, 1996, Vol. 61, No. 102, Pages 26256-26320.

USDI. 1997. Recovery plan for the threatened marbled murrelet (*Brachyramphus marmoratus*) in Washington, Oregon, and California. U.S. Fish and Wildlife Service, Portland, Oregon.

USDI. 1999. Field guide to survey and manage terrestrial mollusk species from the Northwest Forest Plan. Bureau of Land Management, Oregon State Office.

USFWS (U.S. Fish and Wildlife Service). 1999. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for Bull Trout in the Coterminous United States. 50 CFR Part 17. 64(210) 58910.

USFWS (U.S. Fish and Wildlife Service). 2004. Draft Recovery Plan for Coastal-Puget Sound Distinct Population Segment of Bull Trout (*Salvelinius confluentus*). July 2004. Lacey, Washington.

Washington Administrative Code (WAC 173-26-020) Washington Department of Ecology, Shoreline Management.

Washington Department of Ecology, Shorelines and Environmental Assistance (SEA) program. <http://www.ecy.wa.gov/programs/sea/pubs/93-31/chap1.html>.

Washington Department of Fish & Wildlife. 1991. Management recommendations for priority species. Olympia, Washington.

Washington Department of Fish & Wildlife. 1996. Final environmental impact statement for the Washington State management plan for elk. Wildlife Program, Washington Department of Fish and Wildlife. Olympia, Washington. 217 pp.

Washington Department of Fish & Wildlife. 2004. Washington State elk herd plan, Olympic elk herd. Olympia, Washington.

Washington Herp Atlas. 2005. Washington Natural Heritage Program. Washington Department of Fish and Wildlife, U.S.D.I. Bureau of Land Management and U.S. Forest Service.

Washington State Aquatic Habitat Guidelines Program. 2002. Integrated Streambank Protection Guidelines. Washington Department of Fish and Wildlife, Department of Transportation, and Department of Transportation. Olympia Washington.

WDF (Washington Dept. of Fisheries). 1975. A Catalog of Washington Streams and Salmon Utilization. Volume 1: Puget Sound. Olympia, Washington.

WDFW (Washington Department of Fish and Wildlife), and Point No Point Treaty Tribes. 2000. Summer Chum Salmon Conservation Initiative: An Implementation Plan to Recover Summer Chum in the Hood Canal and Strait of Juan de Fuca Region. Washington Department of Fish and Wildlife. Olympia, Washington.

WDFW (Washington Department of Fish and Wildlife). 1998. 1998 Washington Salmonid Stock Inventory (SaSI) - Appendix: Bull Trout and Dolly Varden. Washington Department of Wildlife. Olympia, Washington.

WDFW (Washington Department of Fisheries & Wildlife), and Western Washington Treaty Indian Tribes. 2003. 2002 Salmonid Stock Inventory (SaSI). Washington Dept. of Fish & Wildlife. Olympia, Washington.

Wilke, Thomas. 2004. Genetic and Anatomical Analyses of the Jumping Slugs, Final Report, Contract #43-05G2-1-10086.

Witmer, GW, and DS deCalesta. 1985. Effects of forest roads on habitat use by Roosevelt elk. Northwest Science. 59:122-125.

Ziegltrum, J. 2001. Olympic National Forest Monitoring Report. Olympia, Washington.

Ziegltrum, J. 2004. Draft Management Recommendations for Two Species of the Genus *Hemphillia*. Olympic National Forest. Olympia, Washington

Ziegltrum, J. 2005. Personal communication with Betsy Howell at the Olympic Supervisor's Office, Olympic National Forest. Olympia, Washington.

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