# OREGON PLAN ASSESSMENT- HYDROPOWER PROGRAM
# OREGON COAST COHO SALMON

## ESU Perspective

The impacts to coho salmon populations from hydroelectric projects are variable among stream basins or within evolutionarily significant units (ESU). Hydropower development within the Oregon Coastal Coho ESU has not been as extensive as within other ESU's, and impacts are not a significant issue within this ESU, except in the Umpqua River Basin where two major hydroelectric projects have been constructed. These are PacifiCorp's North Umpqua project (FERC 1927) and Douglas County's Galesville project (FERC 7161). Both projects were constructed without fish passage facilities and prevent anadromous fish, including coho salmon, from accessing approximately 8 miles of historical habitat in the upper North Umpqua River (North Umpqua project) and 28 miles in Cow Creek (Galesville project), a tributary to the South Umpqua. There are five other small non-FERC licensed hydroelectric projects within this ESU which have hydroelectric licenses authorized by the Oregon Water Resources Department (OWRD). All are outside of coho spawning, rearing and migration corridors.

## ESU Perspective Conclusion

Generally, within the majority of the ESU, impacts from hydroelectric projects are insignificant or non-existent. Specifically, within the Umpqua basin, Oregon Coastal coho have been prevented from reaching 36 miles of spawning and rearing habitat by hydroelectric projects. Impacts to downstream reaches include; alteration of flows and interruption of natural sediment and large woody debris regimes. Mitigation measures have already been implemented and additional measures will be implemented as part of hydroelectric project relicensing and reauthorization.

## Umpqua Basin Perspective

The Oregon Department of Fish and Wildlife (ODFW) has identified three populations of coho salmon inhabiting the Umpqua Basin (ODFW 2003). These populations are:

- Smith, in the Smith River basin;
- Lower Umpqua, in the Umpqua River basin upstream to the mouth of the North Umpqua River; and
- Upper Umpqua, in the North and South Umpqua River basins.

Only the Upper Umpqua segment is impacted by hydroelectric project development.

ODFW estimates that 1,438 miles of spawning habitat are available to these three populations of coho, with approximately 131 miles in the North Umpqua, 507 in the South Umpqua, 452 in the mainstem Umpqua, and 348 in the Smith River.

Mitigation was not required for anadromous fish habitat blocked by the North Umpqua project dams when constructed in the late 1940's; however, the Federal Regulatory Energy Commission (FERC) recently issued a new license for the North Umpqua Hydroelectric project (the license is not final at this time due to request for rehearing). The new license will require PacifiCorp to implement mitigation measures that will benefit coho salmon populations over the term of the 35-year license.

The FERC issued a 50-year license to Douglas County in 1984 to construct and operate the Galesville project. Several mitigation measures, including augmented stream flows and a hatchery supplementation program for coho salmon were required as a condition of the license. It is unlikely that new fish and wildlife mitigation measures will be incorporated into the Galesville license until it undergoes re-licensing in 2029-34. Re-licensing of the North Umpqua project has already resulted in implementation of some measures, and will result in a series of additional comprehensive measures that will benefit Oregon Coast Coho over the duration of the new license.

There are two small non-FERC projects located in the Umpqua basin, (1) on Francis Creek (South Umpqua drainage) and (2) on an unnamed tributary to Deer Creek (North Umpqua River drainage). Both are located outside of known coho distribution and no mitigation or enhancement measures for coho were included in the state water right permits.

**North Umpqua Hydroelectric Project- North Umpqua River**

The North Umpqua project (Project) is located in Douglas County about 100 km east of Roseburg, Oregon. It was constructed between 1947 and 1956 near the headwaters of the North Umpqua River, and generates electricity using water diverted primarily from the North Umpqua River and two major tributaries, the Clearwater River and Fish Creek. The dams, impoundments, and generating facilities are located almost entirely within the Umpqua National Forest on lands administered by the U.S. Forest Service, the transmission facilities are located on private and U.S. Bureau of Land Management lands. The Project consists of eight dams and impoundments: five dams on the mainstem North Umpqua River (Soda Springs, Slide Creek, Toketee, Lemolo 1, and Lemolo 2), one on Fish Creek, and two on the Clearwater River (Clearwater 1 and 2). The two most downstream dams, Soda Springs (RM 69.5) and Slide Creek (RM 73), do not have fish passage facilities and prevent fish from accessing historical habitat, including coho salmon habitat. These two dams blocked access to about eight

miles of historical anadromous fish habitat in the mainstem North Umpqua River and Fish Creek. Most of this habitat is not high quality habitat for coho spawning and rearing, and historical coho salmon production in this reach was likely relatively low (NMFS 2002). The FERC re-licensing process for this project began in 1992, and continued beyond expiration of the license in 1997. The governmental parties and PacifiCorp reached a settlement agreement in 2001 that has been incorporated into a new FERC license issued in November 2003; however, as of January 2004 the new license is not considered final because two requests for rehearing have been filed with FERC. Once the license becomes final, a series of comprehensive protection, mitigation, and enhancement measures will be implemented which will benefit coho salmon populations, including providing fish passage at Soda Springs Dam.

Coho salmon historically migrated upstream in the North Umpqua River at least up to Fish Creek (PacifiCorp 1995), and small numbers of coho salmon likely used the lower portion of Fish Creek. Under current conditions, coho salmon in the basin inhabit lower-gradient reaches of tributaries and in lower-elevation tributary basins. Coho salmon are usually found in streams with gradients less than 3% and generally do not spawn and rear in mainstem habitats as often as in tributaries, although mainstem spawning has been observed in the North Umpqua River upstream to Soda Springs Dam. Coho salmon are typically dependent on the availability of low-velocity habitats for overwintering habitat and tend to prefer instream cover provided by LWD, which is limited in the mainstem North Umpqua River and in Fish Creek below the natural obstacle. Of the project-affected reaches that will be accessible to coho salmon, the Soda Springs and Slide Creek bypass reaches are expected to be the most suitable for coho salmon, but would still be expected to provide only low suitability spawning and rearing habitat for coho salmon. Fish Creek generally has higher gradients and may be less suitable for coho salmon than these mainstem North Umpqua River reaches.

Most of the onsite protection, mitigation, and enhancement measures that were incorporated into the North Umpqua Settlement Agreement and new FERC license will primarily benefit fish species such as steelhead and spring chinook because of their propensity to use the habitats available in the upper basin. However, an overall benefit to coho populations will occur from restored access to historical habitat and improved habitat conditions. The greatest benefit to coho populations is expected from the offsite mitigation measures implemented in the Rock Creek basin.

Mitigation measures that benefit Oregon Coast coho in the North Umpqua River include:

- The Project creates a 0.5-mile-long bypass reach in the North Umpqua River below Soda Springs Dam. The current minimum instream flow for the bypass reach is 25 cfs year-round. Under the Settlement Agreement and FERC

license, the minimum instream flows in the bypass reach will be increased to 95 cfs commencing September 1, 2003 and increase to 275 cfs on September 1, 2005.

- Ramping rates below Soda Springs Dam are presently limited to 4 inches per hour and a maximum of 12 inches per day. However, PacifiCorp will modify this ramping regime to minimize Project-induced flow fluctuations in the Wild and Scenic River Reach below Soda Springs Dam at flows below 1,600 cfs. At flows above 1,600 cfs and up to the point where natural flows result in spilling at Soda Springs Dam, Project-induced fluctuations would be restricted to 0.1 foot per hour and 6 inches per day.

- After the first anniversary of the New License, PacifiCorp will eliminate all ramping in the eight bypass reaches, except during planned maintenance and emergency shutdowns

- Upstream and downstream fish passage facilities will be constructed at Soda Springs Dam and tested and functioning by the seventh anniversary of the new license. This measure would restore anadromous fish access to historically accessible reaches of the mainstem North Umpqua River between Soda Springs Dam and Slide Creek Dam and to the Fish Creek basin.

- PacifiCorp will modify the Soda Springs Dam spillway by the seventh anniversary of the New License to reduce the potential for outmigration delay and/or injury at this location.

- PacifiCorp will install tailrace barriers, designed to prevent salmonids from swimming upstream into the tailrace and being delayed in their migration at Soda Springs powerhouse, by the first anniversary of the New License.

- Under the existing license, the instream flow required in the Fish Creek bypass reach is 20 cfs from April 1 though Labor Day, and 10 cfs from the day after Labor Day to March 31. Under the new FERC license, instream flows in the bypass reach would range from 50 to 80 cfs commencing in the first anniversary of a new license, and 130 cfs by the seventh anniversary of a new license.

- The currently required instream flow for the Slide Creek bypass reach is 25 cfs year-round. PacifiCorp will increase this minimum instream flow to 50 cfs by the first anniversary of a new license, and 240 cfs by the seventh anniversary of a new license, when the reach will become accessible to anadromous fish

- PacifiCorp will provide tailrace barriers designed to prevent salmonids from swimming upstream into the tailrace at the Slide Creek powerhouse by the fifth anniversary of the new license

- Numerous investigations conducted during the re-licensing and settlement negotiations support the conclusion that installation of fish passage facilities at Slide Creek Dam is not warranted (FERC 2002; NMFS 2001, MOU 2001). The results of these evaluations indicate that providing fish passage at the Slide Creek Dam would provide fewer benefits to native, wild anadromous salmonids than the alternative mitigation measures.

- PacifiCorp will undertake a variety of measures to provide a net benefit to wild anadromous salmonids in the basin in lieu of providing fish passage at Slide Creek Dam. The Rock Creek basin was selected as the primary area for off-site, in-vicinity habitat enhancement because (1) it contains alluvial habitat that is relatively rare in the basin and that could provide high quality spawning and rearing habitat for anadromous fish, and (2) it is a high-priority fisheries enhancement area for ODFW. Three mitigation measures are included in a Memorandum of Understanding MOU) entered into by PacifiCorp and the Oregon Fish and Wildlife Commission:

  ⇒ Upgrading the Rock Creek Diversion Dam fishway to improve upstream passage for migratory fish and to allow for sorting of hatchery from wild fish,
  ⇒ Adding large woody debris to East Fork Rock Creek to enhance in-channel habitat for fish, and
  ⇒ Increasing riparian protection through purchase of conservation easements in portions of the Rock Creek basin.

- In addition to the mitigation measures included in the MOU, the Settlement Agreement includes three other mitigation funding components for impacts of the Project on anadromous fish: 1) a long-term monitoring and predator control plan for Soda Springs Reservoir, 2) a Mitigation Fund to be administered by the USFS, and 3) a Tributary Enhancement Fund for projects on private and non-USFS lands.

- PacifiCorp will also implement or fund habitat enhancement measures, including:

  ⇒ Providing up to 400 $yd^3$ of gravel annually at a cost of up to $5,000 per year until the completion of the Soda Springs enhancement project. Further, it will fund continuing gravel augmentation below Soda Springs Dam during the term of the license in an amount not to exceed $227,500.

  ⇒ Continuing its current practice of providing for passage of woody debris that enter Soda Springs and Slide Creek reservoirs past Soda Springs and Slide Creek dams using existing facilities

  ⇒ Providing for passage of sediment past Slide Creek Dam

⇒ Providing $410,000 for the restoration of spawning habitat in the North Umpqua River, below Soda Springs Dam.

⇒ Providing $227,500 for ongoing gravel augmentation in the North Umpqua River, below Soda Springs Dam to address the geomorphic effects of reduced sediment load below Soda Springs Dam.

⇒ Enhancing spawning habitat in the area from Slide Creek powerhouse upstream to the confluence of Fish Creek by placing new boulders or repositioning existing boulders to trap bedload mobilized by Fish Creek

**Galesville Hydroelectric Project- Cow Creek, South Umpqua River**

The Galesville Project is located in Douglas County about 42 miles South of Roseburg on Cow Creek (RM 60.2) a tributary to the South Umpqua River. FERC issued a 50-year license for the Project in 1984, storage of water began in October 1985, and normal operation began in the fall of 1986. The Project provides water storage primarily for irrigation, municipal/industrial use, and fisheries resource benefits, and was partly justified on the basis that it would improve stream conditions below the dam to increase production of salmonids (Cramer and Willis 1997). Hydroelectric energy generation is incidental to water releases for other purposes and the dam is not operated as a peaking facility.

In 1970 the Oregon Game Commission treated the lower 74 miles of Cow Creek and 45 miles of tributaries with rotenone. The stream was restocked with anadromous salmonids, and monitored for 11 years. ODFW concluded that high water temperatures limited the presence and production of salmonids below the dam (potential) site (Anderson 1979). When the dam was closed an estimated 100 coho and 186 steelhead spawned above the dam site (CH2M Hill 1982). Access by anadromous fish to over 28 miles of Cow Creek and tributaries upstream from the dam site was eliminated by construction of the project (FERC 1984). In the three years following closure of the dam, coho returns to the fish facility ranged from 14 to 148. These returns included both naturally reared fish from Cow Creek and tributaries and hatchery fish released in 1984-86. Pre-dam surveys conducted by ODFW in 1976 indicated that approximately 23 percent of the South Umpqua River coho returned to Cow Creek and its tributaries, and approximately 11 percent of the coho returning to Cow Creek were found in tributaries above the future Galesville Dam site (Douglas County 1989).

Mitigation measures that benefit Oregon Coast coho in Cow Creek include:

- Minimum flows in Cow Creek are 60cfs for November through April, 40 cfs from May, 20 cfs in June, 10cfs in July through Oct 15 and 30 cfs from October 15 to October 31. Instream flow into the reservoir during the summer

months averages 10cfs. The reservoir has the capacity to release up to 25,801 acre-ft of water for municipal supply, industrial use, fisheries enhancement and irrigation. The 10 year report, Effects of Galesville Hydroelectric Project on Fish and Their Habitat in Cow Creek, Umpqua Basin, Oregon (Cramer and Willis 1997), found that flows have increased sevenfold (ave. 50-60cfs) during mid-July to September due to augmented flows.

- The intake structure for the project was designed to provide the capability of releasing water from any depth with the normal operating range of the reservoir. This capability will allow the release of cool water from the reservoir to improve water temperatures conditions for salmonids during the low flow season. Stream temperatures in the summer months average 15-18F lower below the dam during the summer months and increase 0.5F every mile. Water temperatures were measured year around at various locations within Cow Creek in 1995. The beginning of coho spawning and rearing now extends 27 miles below the dam and temperatures did not exceed 66F during the summer months.

- Dissolved oxygen concentrations are maintained even when the reservoir becomes stratified by adjusting the depth of the intake structure or by discharging water as spray through a cone valve. Dissolved oxygen levels are greater than 7ppm throughout Cow Creek.

- The ODFW holds 4,000 acre-feet of storage capacity for release to enhance anadromous and resident fisheries habitat below the dam site at its discretion.

- Douglas County built a fish trapping facility at the base of the dam to allow for collection of coho adults. ODFW manages the fish trapping operation. Douglas County also funds a raceway at Rock Creek Hatchery to raise coho juveniles. Douglas County funds the operation, maintenance and replacement of these facilities. As a result of the above operations Douglas County funds all aspects of raising 60,000 coho smolts to mitigate for impacts to loss of habitat and fishing opportunity.

## Umpqua Basin Conclusion

Access to 36 miles of habitat has been eliminated in the Umpqua Basin due to hydroelectric dams. Current measures under a variety of laws such as the Federal Power Act to allow input for achieving fishery management and species recovery goals via the reintroduction or reestablishment of viable fish runs in a watershed; the improvement or augmentation of existing runs within a river basin; and the timely and safe physical passage of fish around hydropower projects.

Currently mitigation measures have been recommend and included in a license issued by FERC for the North Umpqua Hydroelectric Project. These licensee

requirements where recommended using extensive studies and best available science to mitigate impacts to all anadromous fish including Oregon Coastal Coho. Impacts to Oregon Coastal coho were mitigated in 1984 using best available science and the current framework of rules and regulations for the Galesville Hydroelectric Project. When the current licenses for these hydroelectric projects expire, another review will be conducted to assess effectiveness of past mitigation conditions and recommend new mitigation conditions. Recommendations will occur within the framework of existing rules and regulations.

## Projects Outside of the Umpqua Basin

Five mini hydroelectric projects are located within the ESU, three of these projects are located outside of the Umpqua Basin. These projects are not under FERC jurisdiction because they are not located on federal lands or navigable waterways, or do not utilize surplus federal water; however, they are authorized by OWRD. Diversion capacity and generation ranges from 1 to 13 cfs and 2 to 35 kilowatts respectively. Two projects are located on the North Coast, and one on the Mid Coast.

None of these projects are located within the range of coho distribution and no impacts to Oregon Coastal Coho have been identified by ODFW.

## New Hydroelectric Projects

No applications have been filed with FERC or OWRD for preliminary permits within the ESU. OWRD has not issued a license for a proposed project within the ESU since the minimum standards of Oregon Revised Statute (ORS) 543 were adopted. The following minimum standards of ORS 543 apply to any action of the Oregon Water Resources Commission to the development of new hydroelectric power in Oregon:

- Anadromous salmon and steelhead resources of Oregon shall be preserved. No activity that may result in mortality or injury to anadromous salmon and steelhead resources or loss of natural habitat shall be allowed.

- No activity may be approved that results in a net loss of wild game fish or recreational opportunities. The commission may allow for mitigation in this category if mitigation areas are available in the immediate vicinity. Proposed mitigation of replacement of wild fish with hatchery fish is deemed unacceptable.

- There shall be no net loss in “other” natural resources in the project vicinity (water quality, wildlife, scenic and aesthetic values, historic, cultural and

archaeological sites. The commission shall consult with appropriate, state, federal and local agencies to ensure no net loss determination.

Applicants for new hydroelectric projects in Oregon are required to meet strict minimum standards pursuant to ORS 543, it unlikely that new projects be constructed and operated to meet these standards.

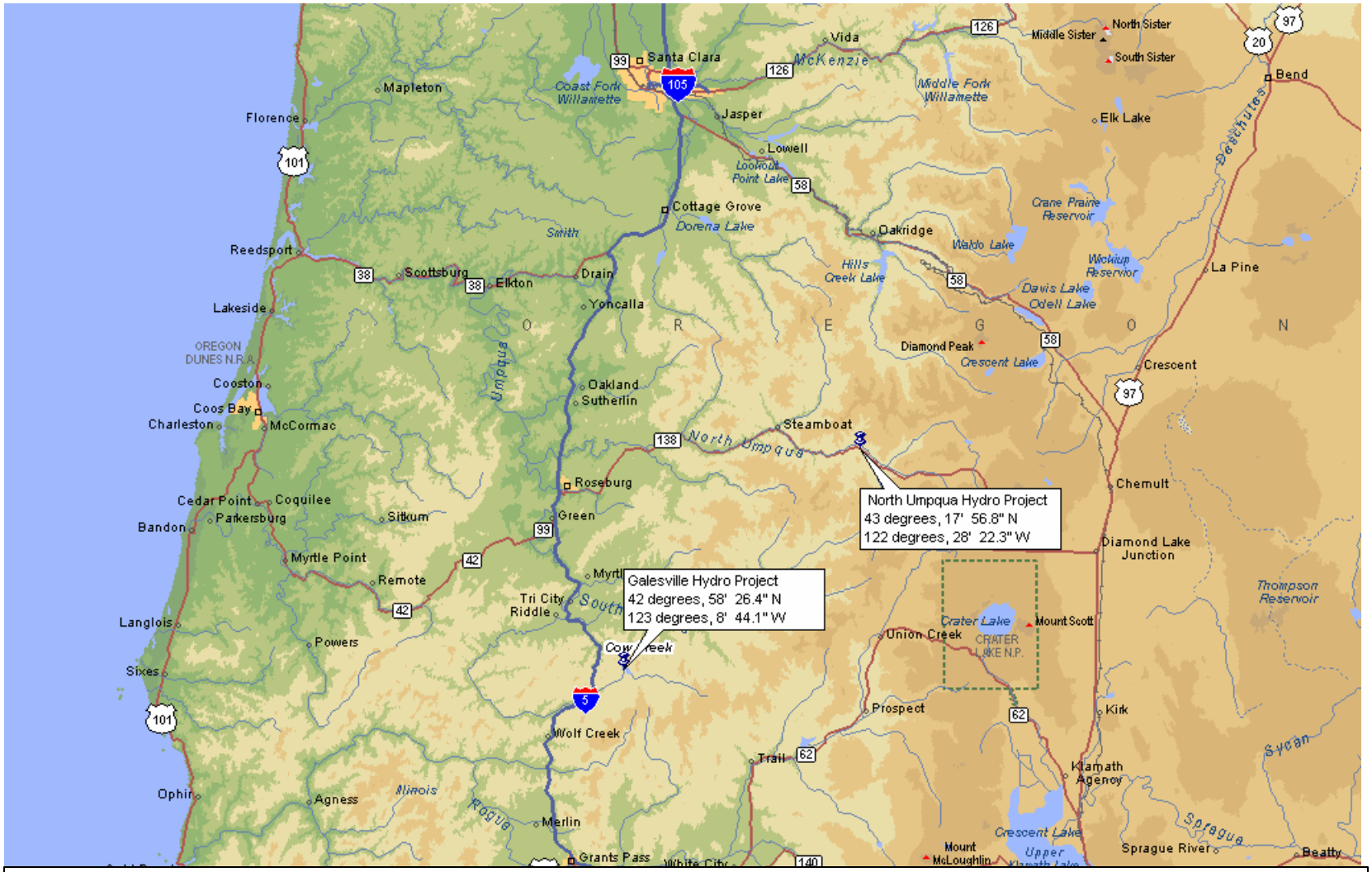


Figure 1. Southwest Oregon and the Umpqua River basin with locations of the Galesville Hydroelectric Project (FERC 7161) and North Umpqua Hydroelectric Project (FERC 1927) (location of lowest dam, Soda Springs).

## Literature Cited

Anderson. 1979. Proposed construction of Galesville Dam on Cow Creek, Douglas County, Oregon. Manuscript report. ODFW, Roseburg.

CH2M Hill. 1982. Galesville Project, Douglas County, Oregon. Preliminary Environmental Impact Statement. US Bureau of Reclamation, Boise, Idaho.

Cramer and Willis. 1997. Effects of Galesville hydroelectric project on fish and their habitat in Cow Creek, Umpqua basin, Oregon. Prepared for Douglas County Natural Resources Division, Roseburg Oregon.

Douglas County. 1989. Water Resources Management Program- Vol. II. Prepared by Tucson Myers and Associates in association with Campbell-Craven Environmental Consultants for Douglas County. Roseburg, Oregon.

FERC (Federal Energy Regulatory Commission). 2002. North Umpqua Hydroelectric Project, Oregon (FERC Project No. 1927). Draft Environmental Impact Statement FERC/DEIS - 0147D. FERC, Office of Energy Projects, Washington, D. C.

FERC. 1984. Order issuing major license, project 7161-001. June 29, 1984. Federal Energy Regulatory Commission, Washington DC.

MOU. 2001. Memorandum of Understanding to Wave Fish Passage Requirements, North Umpqua Hydroelectric Project. Oregon Fish and Wildlife Commission and PacifiCorp. March 2001.

NMFS. 2001. Revised Fishway Prescriptions, North Umpqua Hydroelectric Project.

NMFS. 2002. Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Consultation, North Umpqua Hydroelectric Project, FERC Project Number 1927-008. F/NWR/ 2002/00509. National Marine Fisheries Service, Portland, Oregon.

ODFW. 2003. Provisional list of species management units in Oregon for steelhead, chinook, coho, and chum. Oregon Department of Fish and Wildlife, Salem.

PacifiCorp. 1995. Application for new license for major modified project. North Umpqua Hydroelectric Project, FERC Project No. 1927, Douglas County, Oregon. Portland, Oregon.