

**STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY**

**IN THE MATTER OF GRANTING A
WATER QUALITY CERTIFICATION to:**
Public Utility District No. 2 of Grant County,
Washington in accordance with 33 USC 1341
(FWPCA section 401), RCW 90.48.260 and
WAC 173.201A

ORDER NO. 4219
Relicensing of the Priest Rapids
Hydroelectric Project (FERC No. 2114)
on the Columbia River,
Grant County, Washington

**TO: Mr. Tim Culbertson, General Manager
Public Utility District No. 2 of Grant County
P.O. Box 878
Ephrata, WA 98823**

On October 29, 2003, Public Utility District No. 2 of Grant County, Washington (Grant PUD) filed an application for a new license with the Federal Energy Regulatory Commission (FERC) for the Priest Rapids Project (Project), FERC License No. 2114. Grant PUD requested a 401 certification from the Washington State Department of Ecology (Ecology), pursuant to the provisions of 33 USC §1341 (§401 of the Clean Water Act). Grant PUD's most recent application was received by Ecology on October 3, 2006. This document is a response to that request, issued as an order, under the authority of RCW 90.48.

1.0 NATURE OF THE PROJECT

Development and operation of the Priest Rapids Project was authorized by Congress pursuant to P.L. 83-544 and the Project was constructed by Grant PUD pursuant to the Federal Power Act and Section 10 of the Rivers and Harbors Act. The Project includes two major developments on the Mid-Columbia River: the upstream Wanapum Dam and the lower Priest Rapids Dam, approximately 18 miles below Wanapum. The developments went into commercial service in 1964 and 1961, respectively. The Project includes areas in Grant, Yakima, Kittitas, Douglas, Benton, and Chelan counties of Washington State. The waters affected by project operation and releases from the project are portions of the Columbia River in central Washington within and immediately downstream of the Project.

The Wanapum development, located at river mile (RM) 415 near the I-90 Bridge at Vantage, Washington, has a generator nameplate capacity of 1,038 megawatts. The total length of Wanapum Dam is 8,637 feet, with the axis of the powerhouse being almost parallel with the general direction of river flow. The development has two 'elbows' in its layout; this geometry of the structure is unique on the Columbia River. The normal pool operating range is between 560 and 571.5 feet mean sea level (msl). The powerhouse contains 10 turbine units which operate at a design head of 80 feet and discharge of 178 thousand cubic feet per second (kcfs). The spillway has a total design capacity of 1,400 kcfs and includes twelve 50-foot-wide Tainter gates with deflectors in each spillbay and a 20-foot-wide top-spilling sluice gate modified to provide improved Total Dissolved Gas (TDG) exchange and fish passage at the east end of the spillway. Wanapum Reservoir extends 38 miles upstream to the tailwater of Rock Island Dam and has a surface area of approximately 14,680 acres.

The Priest Rapids development is located at RM 397, is upstream of the Vernita Bridge, and is the last dam on the Mid-Columbia River before the river enters the Hanford Reach. The normal pool operating range is between

481.5 and 488 feet msl. The powerhouse is 1,025 feet long and contains 10 turbine units, which operate at a design head of about 80 feet and discharge of 178 kcfs. The spillway is 1,152 feet long with a total design capacity of 1,400 kcfs. The spillway consists of 22 Tainter gates, each 40 feet wide. The Priest Rapids Development has a generating capacity of 955.6 megawatts. The Priest Rapids Reservoir extends for 18 miles upstream to the tailwater of Wanapum Dam and has a surface area of approximately 7,725 acres.

The total area within the Priest Rapids Project Boundary as defined by the current FERC license is 34,380 acres, consisting of the lands necessary for the safe operation, maintenance and energy transmission of the Project. In addition to power generation, other Project purposes include flood control, recreation, and protection of environmental and cultural resources.

Seasonal storage in the Columbia River Basin is provided by upstream storage reservoirs in Canada, the federal Grand Coulee and Chief Joseph dams on the Columbia River, and several tributary storage projects. The Priest Rapids Project represents one-half of one percent (0.005 or 0.5%) of the usable storage in the Columbia River Basin above the Priest Rapids Project and has a flushing rate calculated at 69.9 hours for Wanapum Reservoir and 23.9 hours for Priest Rapids Reservoir. The mass of water, rate of transport, and physical characteristics of the reservoirs limit the capability of the Project to alter the quality of water coming in to the Project. See Priest Rapids Project Final License Application (FLA), Exhibits B and E-3.

The Priest Rapids Project operates under various river flow coordination agreements established by the mid-Columbia utilities and government agencies for the purpose of optimizing the use of the Columbia River resource for the region. Various regional agreements that may affect Columbia River project operations or flows include, but are not limited to, the Agreement on the Hourly Coordination of Projects on the Mid-Columbia River (Hourly Coordination Agreement), the Pacific Northwest Coordination Agreement, the Columbia River Treaty, Canadian Entitlement Allocation Agreement, biological opinions and habitat conservation plans issued by U.S. National Oceanic and Atmospheric Administration (NOAA) Fisheries, the Hanford Reach Fall Chinook Protection Program and power sales agreements.

Approved License Amendments and Project Modifications. On December 16, 2004, FERC ordered a license amendment requiring Grant PUD to implement certain Reasonable and Prudent Measures (109 FERC ¶62,216). These include installation of fish passage facilities at both Wanapum and Priest Rapids dams that contain design features to reduce TDG consistent with the Biological Opinion issued by NOAA Fisheries on May 3, 2004 (BiOp Amendment). Construction of the fish passage facility is under way at Wanapum Dam and monitoring and evaluation is required in the certification issued by Ecology to Grant PUD on February 8, 2005 (Order No. 1951) to effectively evaluate achievement of the water quality objectives identified in this Certification. The BiOp amendment also establishes a 91% combined adult and juvenile salmon survival standard measured by a 95% dam passage and 93% project survival standard for downstream migrating juvenile salmonids.

TDG has been the subject of extensive studies and monitoring at the Priest Rapids Project for several years. Based on the results of those studies, Grant PUD plans to continue to implement a series of improvements intended to improve the TDG conditions as water passes through each development. In 2000, spillway deflectors were installed in each of the 12 spillways at Wanapum Dam. The deflectors reduce gas by reducing the extent that water entrains gas as it is released over the dam. In 2004, Grant PUD modified the sluice gate hydraulic conditions to improve fish passage survival and reduce TDG entrainment. Grant PUD is installing new turbines at Wanapum Dam that will increase the total hydraulic capacity of the ten turbines from a maximum capacity of 178 kcfs to a new maximum capacity of 188 kcfs with 75 feet of net head at the cavitation limit. Installation of the new turbines and the associated increase in hydraulic capacity at the Project will have the potential to reduce spill volume by a maximum of 23 kcfs (and thereby the amount of TDG generated by

spill). The new turbines were required to achieve juvenile passage survivals that are equivalent to or better than the survivals through the existing turbine units and otherwise achieve applicable operating criteria (FERC Orders 107 FERC ¶62,088 (April 30, 2004) and 108 FERC ¶62,075 (July 23, 2004), 113 FERC ¶62,205 (December 14, 2005), and Ecology's 401 certification and Order No. 1026 (March 12, 2004); FERC Order 109 FERC ¶62,216, December 16, 2005.)

Grant PUD completed a Fish Passage Alternatives Study, which evaluated over 40 different structural alternatives designed to improve downstream passage while meeting or reducing TDG saturation levels (Voskuilen et al. 2003). Additionally, Ecology staff participated for a number of years with a group of Priest Rapids Project relicensing stakeholders that included federal and state fishery resource agencies, tribes and other interested entities and individuals with the objective of integrating biological goals for fish with water quality objectives to be achieved within the Project during the term of the new license. This effort resulted in a series of abatement steps detailed in the FLA covered by this Certification.

Columbia River Hydropower Management Agreements. Grant PUD is party to several hydropower management agreements on the Columbia River:

- Columbia River Treaty. An agreement between Canada and the United States in which Canada has agreed to provide storage for improving flow in the Columbia River to maximize power and flood control.
- Pacific Northwest Coordination Agreement. An agreement among the U.S. Bureau of Reclamation (USBR), the Bonneville Power Administration (BPA), the U.S. Army Corps of Engineers (Corps), and 15 public and private generating utilities to maximize usable hydroelectric energy.
- Mid-Columbia Hourly Coordination Agreement. The mid-Columbia PUDs (Chelan, Douglas and Grant), the Corps, the USBR, BPA (collectively called the mid-Columbia owner/operators) and other purchasers of power set up additional procedures to maximize power.

2.0 AUTHORITIES

In exercising authority under Section 401 of the Clean Water Act (33 USC 1341) and Revised Code of Washington (RCW) 90.48.260, Ecology has investigated this proposal for:

- 1) Conformance with all applicable water quality based, technology based, toxic or pretreatment effluent limitations as provided under 33 USC 1311, 1312, 1313, 1316, and 1317 (Federal Water Pollution Control Act Sections 301, 302, 303, 306 and 307).
- 2) Conformance with the state water quality standards as provided for in Chapter 173-201A WAC and by Chapter 90.48 RCW, and with other appropriate requirements of state law; and,
- 3) Conformance with all known, available and reasonable methods to prevent and control pollution of state waters as required by RCW 90.48.010.

3.0 CURRENT STANDARDS

1) Washington State Water Pollution Control Act

This Certification supports the goals of the State of Washington Water Pollution Control Act (Chapter RCW 90.48). This Certification describes a program to effectively monitor and evaluate conditions and progress toward achieving biological goals and water quality requirements to improve conditions for fish and water quality over existing conditions.

2) Designated Uses

Waters of the State are assigned designated uses under WAC 173-201A. Designated uses for this section of the Columbia River include, but are not limited to:

- Aquatic life uses
- Recreation
- Wildlife habitat
- Harvest
- Aesthetics
- Commerce and navigation

3) Numeric Criteria

Numeric criteria for the designated uses are found at WAC 173-201A. These include criteria for TDG, pH, dissolved oxygen (DO) and temperature.

4) Antidegradation

Existing and designated uses must be maintained and protected in accordance with WAC 173-201A.

5) Water Quality Attainment Plan

Under WAC 173-201A, for dams that cause or contribute to a violation of water quality standards, the dam owner is required to provide a detailed strategy for achieving compliance with state water quality standards.

4.0 FINDINGS ON AQUATIC LIFE USES

1) Aquatic Life Overview

The Columbia River is the largest and most complex river system within the state of Washington and hosts some of the largest anadromous fish runs in the Pacific Northwest. Almost all anadromous fish in the mid-Columbia River Basin, including Pacific lamprey and several Endangered Species Act (ESA)-listed species, must successfully pass the Project both upstream and downstream if they are to complete their life cycle. The Columbia River is widely known for its anadromous fish resources, which include spring, summer, and fall Chinook salmon (*Onchorychus tshawytscha*), summer steelhead (*O. mykiss*), Sockeye salmon (*O. nerka*), Coho salmon, Pacific lamprey (*Lampetra tridentata*), American shad (*Alosa sapidissima*) and white sturgeon (*Acipenser transmontanus*). All of these fish species occur in the project area. American shad is an introduced species that is restricted to the area below Priest Rapids. White sturgeon is an anadromous species that has adapted to a freshwater existence. Spring Chinook salmon and steelhead occurring in the project area have declined in abundance and are currently listed as endangered species, while summer Chinook, fall Chinook, and sockeye are comparatively stable. Coho salmon were historically present, but the endemic stock was extirpated by the 1940's (Mullan 1984). The Hanford Reach fall Chinook stock is recognized as the healthiest and most abundant stock of

salmon in the Columbia River Basin. This population is considered a critical “core population” of fall Chinook salmon that may re-colonize nearby tributaries and mainstem areas (ISG 2000). Hanford Reach fall Chinook support Columbia River Treaty Indian subsistence and commercial fisheries as well as non-Indian sport and commercial fisheries. Bull trout (*Salvelinus confluentus*), an ESA-listed species, are also found in the Project area.

- Covered Species. For the purpose of this Certification, Covered Species are spring, summer and fall Chinook, steelhead, sockeye and coho, as established under the Salmon Agreement described in Subsection 2g, below. The Salmon Agreement is a comprehensive and long-term adaptive management program for the protection, mitigation, and enhancement of Covered Species that may pass or be affected by the Project. Covered species include both ESA-listed and non-listed anadromous salmonid species. Relevant biological information for Upper Columbia River (UCR) spring-run Chinook salmon and UCR steelhead is described in the National Oceanic and Atmospheric Administration (NOAA) Biological Opinion (BiOp) for the Priest Rapids Project, described below.
- Non-Covered Species. For the purpose of this Certification, Non-Covered Species are grouped as bull trout, white sturgeon, Pacific lamprey, and native resident fish. Information about these species is provided below in Subsection 4, below.

2) Plans, Agreements, and Strategies to Protect Aquatic Life Uses

- a) 2004 NOAA Fisheries Biological Opinion for the Operation of the Priest Rapids Hydroelectric Project (NOAA BiOp). In accordance with Section 7 of the ESA as amended, NOAA Fisheries prepared a BiOp that represents their opinion on the effect of implementation of the Interim Protection Plan (IPP) on ESA-listed UCR steelhead and UCR spring Chinook salmon. UCR steelhead were listed by NOAA Fisheries as endangered on August 18, 1997 (62 FR 43937) in accordance with the ESA (16 USC 1531). UCR spring Chinook were listed as endangered by NOAA Fisheries on March 24, 1999 (64 FR 14308). In its BiOp, NOAA Fisheries determined that the action, as proposed, is likely to jeopardize the continued existence of UCR spring Chinook and UCR steelhead. Enclosed as Section 9 of this BiOp is NOAA Fisheries' Reasonable and Prudent Alternative (RPA) to the proposed action. The RPA contains forty actions which NOAA Fisheries finds that, if implemented, would not jeopardize the continued existence of UCR Spring Chinook and UCR steelhead. The BiOp also established a Priest Rapids Coordinating Committee (PRCC) under Action 39 to coordinate design and implementation of research and monitoring programs required by the BiOp. The BiOp declares that the PRCC will consist of NOAA Fisheries, the U.S. Fish and Wildlife Service (USFWS), the Washington Department of Fish and Wildlife (WDFW), the Yakama Nation (YN), the Confederated Tribes of the Colville Reservation (CCT), the Confederated Tribes of the Umatilla Reservation (CTUIR), and Grant PUD. The BiOp in its entirety appears in the FERC order: Amending License & Terminating Proceedings, Docket No. E-9569-000, December 16, 2004. A new BiOp is pending and will be issued by NOAA Fisheries in accordance with Grant PUD's application for a new 50-year FERC operating license for its Priest Rapids Project.
- b) 2007 USFWS Biological Opinion for the Relicensing of the Priest Rapids Hydroelectric Project (USFWS BiOp). In accordance with Section 7 of the ESA as amended, the USFWS has prepared a BiOp that represents their opinion on the effect of the relicensing of the Priest Rapids Project on bull trout. This BiOp was issued on March 14, 2007. The coterminous United States population of the bull trout was listed as threatened on November 1, 1999 (64 FR 58910). The threatened bull

trout occurs in the Klamath River Basin of south-central Oregon and in the Jarbidge River in Nevada, north to various coastal rivers of Washington to the Puget Sound and east throughout major rivers within the Columbia River Basin to the St. Mary-Belly River, east of the Continental Divide in northwestern Montana. The Columbia River interim recovery unit is one of five interim recovery units (along with the Jarbidge River, Klamath River, Coastal-Puget Sound, and St. Mary-Belly River units) the USFWS has identified as essential to survival and recovery of this species within the coterminous U.S. population of bull trout. The USFWS BiOp contains four reasonable and prudent measures (RPMs) that the USFWS believes are necessary and appropriate to minimize the impacts of take of the bull trout. The USFWS BiOp also contains 14 accompanying terms and conditions which implement the RPMs and with which FERC and Grant PUD must comply in order to be exempt from the prohibitions of section 9 of the ESA. The USFWS believes the terms and conditions are necessary and appropriate to minimize the impacts of take of the bull trout during the term of the Project's new operating license. Additionally, the USFWS BiOp contains one USFWS conservation recommendation: that FERC and Grant PUD consider implementing recovery actions and restoration opportunities identified in the USFWS draft Bull Trout Recovery Plan (USFWS 2002). Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

- c) 2004 Federal Columbia River Power System Biological Opinion (FCRPS BiOp). In accordance with Section 7 of the ESA as amended, NOAA Fisheries released a BiOp in 2004 that represented their opinion on the effect of the operation of the FCRPS on ESA-listed salmon and steelhead species in the Columbia River basin. The FCRPS BiOp was developed in consultation with the action agencies: the U.S. Army Corps of Engineers (Corps), the U.S. Bureau of Reclamation (USBR), and the Bonneville Power Authority (BPA). As a result of a court challenge, the original BiOp was replaced by the 2004 FCRPS BiOp, which was subsequently also challenged in court. It is currently under remand. The 2004 FCRPS BiOp remains in effect with the addition of a December 2005 court order requiring the Corps to increase spill at its FCRPS dams in 2006. The court has set a February 2007 deadline for submission of a new FCRPS BiOp by NOAA; however, the new BiOp has not yet been released.
- d) A Biological Strategy to Protect and Restore Salmonid Habitat in the Upper Columbia Region (Biological Strategy, draft May 2003). This document outlines a biological strategy to protect and restore salmonid habitat in the Upper Columbia Region (UC) and serves as a basis of the Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (draft December 2005). The intent of Biological Strategy document is to provide a technical foundation to set regional priorities for habitat protection and restoration, based on available information and the professional judgment of fisheries biologists familiar with the region. This report was developed by the Upper Columbia Regional Technical Team (RTT), which was established by the Upper Columbia Salmon Recovery Board (UCSRB). As of February 2007, the RTT is refining the Biological Strategy. The refined Biological Strategy will provide the basis for subbasin-level habitat protection and restoration priorities consistent with the UC Recovery Plan.
- e) Upper Columbia Spring Chinook Salmon, Steelhead, and Bull Trout Recovery Plan (draft June 2006). The UCSRB developed this plan to contribute toward recovery of Upper Columbia Spring Chinook salmon, steelhead, and bull trout. This plan is an outgrowth and culmination of several conservation efforts in the Upper Columbia Basin, including current efforts related to the ESA, state and tribal-sponsored recovery efforts, subbasin planning, and watershed planning. The deadline for review and comment for the draft ended January 29, 2007. NOAA Fisheries anticipates finalizing this plan by June 2007.

- f) Hanford Reach Fall Chinook Protection Program Agreement (Hanford Reach Agreement). The Hanford Reach Agreement establishes the obligations of its signatories: Grant PUD, resource agencies (NOAA Fisheries, WDFW, USFWS), tribes (CCT and YN) and upstream operators (BPA, Douglas Public Utility District (PUD), and Chelan PUD), for the term of the New License for the Project. The entities have agreed to river flow management actions to support Grant PUD's effort to manage flow in the Hanford Reach to protect fall Chinook salmon redds and pre-emergent fry during spawning to emergence periods (typically October to May.) The agreement also includes operational measures to conserve and protect juvenile fall Chinook during the spring rearing period. The parties agreed, subject to the ten-year re-opener beginning in 2014, that during the term of the New License, these flow regimes address all issues in the Hanford Reach with respect to fall Chinook protection and the impact of operation of the seven dams operating under Mid-Columbia Hourly Coordination, including obligations of Grant, Chelan, and Douglas PUDs under any new licenses issued by FERC. Grant PUD's compliance with the Hanford Reach Agreement is intended to be an essential component of the fall Chinook program designed to achieve NNI in the program area (as defined in the agreement). More details on this agreement are provided below, under Subsection 3.
- g) Priest Rapids Salmon and Steelhead Settlement Agreement (Salmon Agreement), February 2006. Species covered under the Salmon Agreement are spring, summer and fall Chinook salmon, sockeye salmon, steelhead and Coho ("Covered Species"). To address the ESA-listed Covered Species (UCR steelhead and UCR spring Chinook salmon), the agreement incorporated the 40 Actions contained in NOAA's 2004 BiOp. These 40 Actions include adult and juvenile dam passage and Project passage survival standards. To address the non-listed Covered Species (summer and fall Chinook, sockeye salmon, and coho), the agreement adopted the 2004 NOAA BiOp survival standards for summer and fall Chinook, sockeye salmon, and coho. The agreement also established a no net impact (NNI) standard for *all* Covered Species. The NNI standard provides protection across all life history phases, including migration, spawning, and rearing that occur within the Project area. The agreement incorporates the Priest Rapids Coordination Committee (PRCC), established by Grant PUD consistent with the requirements Action 39 of the 2004 NOAA Fisheries BiOp, to serve as the forum for coordinating and implementing the Settlement Agreement. Under the 2004 NOAA BiOp, the PRCC is comprised of NOAA Fisheries, USFWS, WDFW, CCT, YN, CTUIR, and Grant PUD. However, except for the implementation of the anadromous fish activities set forth in the NOAA BiOp, decisions related to the implementation of the Settlement Agreement are made only by signatory parties to the Settlement Agreement (Grant PUD, USFWS, NOAA Fisheries, WDFW, CCT, and YN).
- h) Interagency Agreement Between Washington State Department of Ecology and Washington State Department of Fish and Wildlife. In 2005, Ecology entered into an Interagency Agreement (IA) with the WDFW for the purpose of obtaining WDFW's expert consultation and coordination on fishery issues involving the Priest Rapids Project. Under the Agreement, WDFW is to act as the primary representative for Ecology on aquatic life issues, subject to certain limitations. A copy of the IA is attached to this Certification as Appendix A.

3) **Hanford Reach Fall Chinook**

The Hanford Reach is the portion of the Columbia River that begins immediately below Priest Rapids dam and flows for approximately 52 miles downstream. The Reach is a unique part of the Columbia River in that it is still free-flowing (unimpounded by a reservoir) and in a semi-natural state. Hanford Reach fall Chinook are a valuable natural resource, to the State and tribes and as a

major contributor to ocean fisheries. Spawning and rearing of this species have been affected by variations in flows and, especially, flow fluctuations caused by hydropower operations.

The mainstem Columbia River historically supported at least eight major fall Chinook spawning areas, extending from rkm (river kilometer) 235 – 1124 (Dauble et al. 2003). Today, the Hanford Reach fall Chinook stock is the only remaining healthy, naturally-spawning population of upriver bright fall Chinook as rated in the 1992 Washington State Salmon and Steelhead Stock Inventory (SASSI 1992). SASSI defines a healthy stock as “a stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock. Healthy stocks represent those currently experiencing stable escapement, survival, and production trends and not displaying a pattern of chronically low abundance” (1992). The Hanford Reach population typically represents between 80 and 90% of fall Chinook salmon counted at McNary Dam (Dauble and Watson 1997). Although not nearly as high as pre-dam levels, returns of adult fall Chinook salmon to the Hanford Reach have increased since the beginning of the period of record, in 1954. From 1954 to 1957, run size over McNary Dam averaged about 8,600 adult fall Chinook salmon (Dauble and Watson 1990). Since then, adult fall Chinook runs upstream of McNary Dam have increased, with a peak in numbers in the mid- to late-1980s and again in recent years (2001-2005). During 2003-2005, ocean productivity was above average, harvest restrictions were maintained, and escapement again soared. During 2003, an estimated 90,000 adults spawned in the Hanford Reach. See the Figure 1 below. The 2005 escapement was the seventh highest recorded in the past 42 years with 71,967 fall Chinook. (Hoffarth 2006).

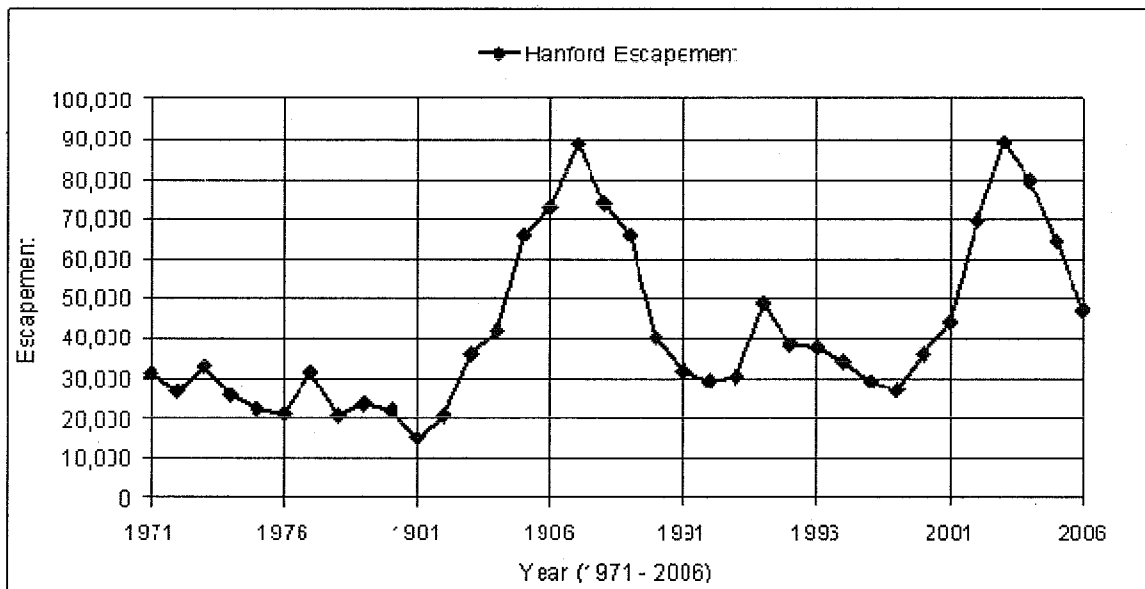


Figure 1 – Adult Upriver Bright Escapement to the Hanford Reach

- a) Studies by Grant PUD. Pacific Northwest National Laboratory (PNNL) performed a study for Grant PUD to evaluate the size of areas of fall Chinook rearing habitats affected by different flows fluctuations from the Project. The results are provided as “Evaluation of Time-Varying Physical Fish Habitat in the Hanford Reach” (FLA Technical Appendix E-4: N, Section 4.0). The work was used to compare the effects of fluctuating discharges on size of juvenile fall Chinook habitat under various Project operation scenarios during the fall Chinook rearing period (March through June) of 1999, 2000, 2001 and 2002.

The Modular Aquatic Simulation System 2-D (MASS2) model was applied to a 23-mile portion of the Hanford Reach to simulate a range of steady discharges for which habitat area was computed. Then, the simulation results for each steady discharge were compared to that from the next high discharge to determine the size of the area affected by dewatering. MASS2 was also used to simulate unsteady Hanford Reach discharges during the rearing season of four separate years. In addition to the historical discharges, three sets of synthetic discharges were simulated, using Component-based Hierarchical Explorative Open Process Simulator model (CHEOPS). (More details on CHEOPS can be found in the FLA Exhibit B). The flows were entitled “proposed protection program”, “no program” and “flat (or steady) flows”. This information was used to re-shape the hourly Rock Island Dam outflow data during the spring of 1999, 2000, 2001 and 2002. According to the study report, of these scenarios, the flat flows affected much less total habitat area than any of the other scenarios.

The results suggested several factors are associated with the number of subyearling fall Chinook salmon impacted by stranding and entrapment. Those include the average fork length of the fish (greater impact for smaller fork lengths), the average 10,000 kcfs flow band in which the fluctuations occurred (greater impact when fluctuations occur in lower flow bands), the amount of habitat lost in flow bands less than 120 kcfs (greater impact when fluctuations occur in lower elevation portions of the river channel), and the amount of habitat lost at night (greater impact for habitat lost at night). These results suggest that a decrease in the number and size of fluctuations that occur at Priest Rapids Dam during the early part of the rearing season (when subyearling fall Chinook salmon are small), and especially those fluctuations that impact the lower flow bands and/or occur at night, would help reduce the impact on subyearling Chinook salmon rearing in the Hanford Reach.

These recommendations were incorporated into development of Hanford Reach experimental program criteria in 2002 and 2003 with the smallest allowable fluctuations based on low river discharge (e.g., fluctuation limit is 20 kcfs for total discharge <80 kcfs and increases in 10 kcfs increments as river discharge increases).

This research also showed that fall Chinook salmon fry in the Columbia River were less active and lower in the water column during the night than they were during the day. Underwater videography in a closed depression (i.e., a potential entrapment area) when the depression was connected to the river showed similar fish behavior and habitat use to that observed by snorkelers in open areas of the river where there were no closed depressions.

The report also stated that, “The analysis presented only provides estimates of impacts on physical habitat area. To make operational decisions, it will be necessary to quantify effects of these physical habitat impacts on the juvenile fall [C]hinook salmon population.”

Grant PUD (Grant PUD, August 2006) also developed the Mid-Columbia Operations On-peak/Off-peak Weekly Simulation model to simulate operations of the mainstem dams from Grant Coulee to Priest Rapids. The model and results were used with the CHEOPS model to develop the conditions used in the Hanford Reach Agreement.

Grant PUD has provided plots of flows for the springs of 1997 and 2000-2005 for the Grand Coulee, Rock Island and Priest Rapids projects. These plots show that in the more recent years, in general, flow fluctuations decrease in amplitude among the three projects in the downstream direction.

- b) Hanford Reach Agreement on Spawning and Rearing Studies. The Hanford Reach Agreement is described in more general terms under Subsection 2f above. The Agreement was developed

as the result of a lawsuit by WDFW against the mid-Columbia PUDs to address their project impacts on Hanford Reach fall Chinook. According to Grant PUD (Langshaw, 2006), the studies and negotiations took seven years to complete. Implementation began in 2004.

Under the Agreement, Grant PUD is to experiment with alternative flow regimes during the spawning period(s) of 2005 and 2006 (HRA Section C.1(b)). The 2005 study results have been issued as "Diel Spawning Behavior and Redd Site Fidelity by Fall Chinook Salmon at Vernita Bar, Columbia River" (Duvall, June 2006 draft.) At the time of this Certification, a study plan was prepared by Grant PUD for the 2006 fall spawning year titled, "2006 Hanford Reach Agreement Spawning Experiment, Final Proposal" (Duvall, Draft August 2006.)

The Hanford Reach Agreement also provides for monitoring the results of protection flows during the post hatch and emergence ("rearing") periods. A report of the results is to be provided by September of the following year. The Parties will also meet to develop a follow-up monitoring program to estimate fry losses during the rearing periods of 2011, 2012 and 2013. (HRA Section C6.6(c))

- c) Salmon Agreement. The Salmon Agreement is described more generally under Subsection 2g above. Among other actions, the agreement incorporates portions of the Hanford Reach Agreement. With respect to flow and impacts on aquatic life, the agreement states that if the Parties to the Hanford Reach Agreement agree to conduct flow evaluations related to impacts to fall Chinook or collect field data prior to 2011, Grant PUD will convene a joint working group and participate in the design, funding and implementation of the monitoring and evaluation. Such working group is to be comprised of members of the PRCC as well as the parties to the Hanford Reach Agreement. According to the Salmon Agreement, the members of the working group are to develop decision-making procedures (SSA Section 2.6).
- d) Entrapment Study. In 2006, the USFWS, United States Geological Survey (USGS), WDFW, Yakama Nation and Alaska Department of Fish and Game published the results of a study showing a quantitative evaluation of the impact of fluctuating flows on spawning and rearing of fall Chinook in the Hanford Reach (Anglin *et al.*, 2006). The report indicates that for the year 2003, there were significant entrapments in spite of the protection measures under the operations in effect at that time (under the Hanford Reach Agreement). Hydrodynamic models (River2D and MASS1) were used to determine entrapment flow bands and entrapment event histories. The studies' authors estimated that there were 1,297,104 mortalities of juveniles in 2003 due to entrapment alone. No estimates were made of stranding. They further estimated that in other years (operating under the Hanford Reach Agreement), the impacts increased from 12% to between 31% to over 90%. Simulation results suggest that mortality could be reduced significantly if flow fluctuations were kept at or below 10 kcfs. The general position advanced in the study was that additional efficiencies could be achieved on the Hanford Reach. The study also included a simple analysis of the ability of the Project to dampen flow fluctuations received from upstream. The analysis was applied to the months of March, April and May for the years 1995 through 2004. Based on the analysis, since 1998, storage capacity would have been exceeded in any given year, on average, less than three days.
- e) Follow-Up Entrapment Study (Proposed). In 2006, Washington's governor signed a bill (Engrossed Second Substitute Senate Bill 6581) that included funding to study flows in the Hanford Reach and their impact on the ecological conditions of the Hanford Reach, especially as the flows relate to the needs of salmon and steelhead in the reach. Ecology is responsible to work with interested parties on this study. As a response to the legislation, a plan for additional study on spring rearing of fall Chinook have been drafted by WDFW and USFWS (Hoffarth,

2006), with input from other parties, including Grant PUD, for implementation in the spring of 2007. Field work is expected to be completed by June of 2007. Analysis of the data is expected by September of 2007.

- f) WDFW Annual Reports. WDFW produces an annual report on the Hanford Reach fall Chinook population that incorporates the year's survey data, assesses the year's fall Chinook production success and provides an evaluation of the population for use by the Pacific Fisheries Management Council and the Pacific Salmon Commission. The information is used to evaluate the contribution of these salmon (called the Hanford Reach Upriver Bright fall Chinooks) to ocean fisheries, of which they are a major contributor.

4) **Non-Covered Species**

- a) Bull Trout. On June 10, 1998, the USFWS listed bull trout within the Columbia River Basin Distinct Population Segment (DPS) as threatened under the ESA. The Project lies within the geographic area of this DPS. Studies of bull trout movement in the Upper Columbia Recovery Unit are limited to work done by the USFWS and BioAnalysts (2002 and 2004) to date. BioAnalysts (2002 and 2004) study results indicate that some bull trout reside for considerable periods of time in some of the Columbia River mainstem reservoirs, and then pass upstream through the upstream fishways in late spring and early summer to enter tributaries. Of the 79 bull trout tagged during these studies at Rock Island, Rocky Reach, and Wells dams, only ten fish moved downstream past Rock Island dam into the Priest Rapids Project Wanapum Reservoir. The primary area of habitat use by bull trout is a 5-km reach immediately downstream of Rock Island Dam (FLA BioAnalysts, Inc. 2003). Bull trout presence has also been documented below Priest Rapids in the Hanford Reach and within the Wanapum reservoir. Some level of migratory behavior occurs between the Columbia River DPS and the Snake River Bull Trout sub-population (Gray and Dauble 1977; FLA Pfeifer 2001; Federal Register 63(111): 31647-31674).

Based on the rare observation in the past decades of adult bull trout at the Project adult ladders and of juvenile bull trout in the juvenile bypass facilities and the limited bull trout spawning and rearing habitat in the Project tributaries, it is likely that the low bull trout numbers now present in the Upper Columbia Recovery Unit result in limited use of the Project waters by bull trout.

- b) White Sturgeon. White sturgeon can exhibit an anadromous life history in the Columbia River system, although due to isolation caused by dams and other factors, many populations have adapted to an entirely freshwater life history. This is most likely the case for white sturgeon in the Project area (FERC, 2006). At a minimum, adult and juvenile sturgeon upstream of the Priest Rapids Project cannot migrate safely downstream through the Project, nor can sturgeon downstream of the Project migrate to habitat upstream of the Project. The lack of movement upstream and downstream would likely have a negative effect on genetic diversity and productivity, further depressing white sturgeon populations in the Columbia River.

White sturgeon populations in Priest Rapids and Wanapum reservoirs, on the middle Columbia River, were investigated from 1999 to 2003 to prepare the FLA (Porto et al. 2003). The Grant PUD investigation was the first comprehensive study conducted on white sturgeon within the Priest Rapids Project reservoirs and it described the distribution and movement patterns (spawning and general) of white sturgeon. The study acknowledged limitations in data analyses and interpretation but described the limitations as similar to those for studies conducted on white sturgeon populations throughout the Columbia River (Porto et al. 2003, Beamesderfer et

al. 1989, Beamesderfer and Rien 1993, R. L. & L. 2000). The Grant PUD study determined that white sturgeon spawn successfully below Rock Island and Wanapum dams. The study assessed the population status of white sturgeon in the Project area by determining growth rates, size and age-class composition, abundance, and sex ratios. Based on study results, a relatively small population of white sturgeon resides in the Priest Rapids Reservoir (lower estimate of 143 individuals) with a larger population in the Wanapum Reservoir (lower estimate of 398). A total of 115 white sturgeon were captured during set-line sampling, 94 from the Wanapum Reservoir and 21 from Priest Rapids Reservoir (Porto et al. 2003). All of the 21 sturgeon from Priest Rapids Reservoir were sub-adult or adult, with no juveniles (fish <100 cm) observed in samples. The larger catches in the Wanapum Reservoir contained 22 juvenile white sturgeon.

Based on the results of the Grant PUD study (Porto et al. 2003), there is not consistent recruitment to either the Wanapum reservoir or Priest Rapids reservoir with the Priest Rapids reservoir being more limiting than the Wanapum Reservoir for larvae and juvenile rearing habitat. In addition to limited recruitment, the lack of observations of sub adult or adult sturgeon past the Project fish count stations suggests a lack of adult upstream fish passage at Project dams.

Multiple activities and agreements are expected to form the basis of a regional white sturgeon recovery effort. In the FLA, Grant PUD proposed to construct a white sturgeon conservation facility at the Priest Rapids Hatchery, obtain broodstock, and raise juveniles for stocking in the Priest Rapids Project reservoirs as part of a hatchery supplementation program. Chelan PUD has agreed to implement a white sturgeon supplementation program as part of their new license for the Rocky Reach Hydroelectric Project (Chelan PUD 2005), located upstream of Grant PUD's Project. For the Wells Project, the next project upstream of the Rocky Reach, Douglas PUD has suggested that a white sturgeon supplementation program will be part of their new license application (scheduled for 2010). For projects much further upstream on the Columbia River, above Grant Coulee dam, the 2002 Upper Columbia White Sturgeon Recovery Plan (UCWSRP) serves as a master plan for sturgeon restoration efforts in the U.S. and Canadian portions of the Columbia River upstream from Grand Coulee Dam. This plan is a product of an Upper Columbia White Sturgeon Recovery Initiative by Canadian, U. S., and tribal governments, industrial and environmental organizations, stewardship groups, and citizens. The UCWSRP describes objectives, targets, strategies, measures, and a schedule to arrest the decline of white sturgeon in the recovery area, ensure the persistence and viability of naturally-reproducing populations, and restore opportunities for beneficial use if feasible. (<http://uppercolumbiasturgeon.org/RecoveryEfforts/Rec-RecPlan.html>).

- c) Pacific Lamprey. In 1995, the Northwest Power and Conservation Council (NPCC) established the Columbia Basin Fish and Wildlife Authority (CBFWA) Pacific Lamprey Technical Workgroup to serve and guide coordination activities for new and existing lamprey projects funded, or proposed for funding, through BPA. In April 2005, the Columbia River Basin Lamprey Technical Workgroup published Critical Uncertainties for Lamprey in the Columbia River Basin: Results from a Strategic Planning Retreat of the Columbia River Lamprey Technical Workgroup (CRBLTW 2005). In the Workgroup's prioritized list of seven critical uncertainties, lamprey status assessment and passage issues ranked as the top two most urgent critical uncertainties that need to be addressed.

Upstream passage through dam fishways is known to be problematic for adult Pacific lamprey throughout the Columbia River System. Studies at many dams indicate that 50% or less of adults are able to successfully pass a mainstem dam (Moser et al. 2002). This is perhaps reflected in declining adult Pacific lamprey counts at Columbia River and Snake River dams

over the period of record. Lamprey swimming performance and behavior differ from those of salmonids, for which the fishways were originally constructed. Consequently, lamprey may be obstructed by parts of the fishways that have not been identified as passage impairments to salmonids.

Preliminary passage results at Priest Rapids dam indicate that only about 50% of lamprey pass the dam successfully (Nass 2003). In 2006, the adult Pacific lamprey count at Priest Rapids Dam was 4,381, while only 1,326 adults were counted at Rock Island Dam (Fish Passage Center lamprey data at www.fpc.org/lamprey).

To evaluate the effects of Priest Rapids Project dams on adult Pacific lamprey upstream passage, Grant PUD performed a two-year study of adult lamprey upstream migration using radio-telemetry (Nass et al. 2003). Problem areas were identified and corrective modifications are slated to take place. Evaluation of the effects of the fishway modifications on adult lamprey passage will be conducted and further modifications made if needed.

Little is known about juvenile downstream migration. Juvenile lamprey may pass through a hydroelectric structure by several different routes, including the powerhouse (turbines), spillway (bottom or top discharge tainter gates), powerhouse gatewell slots (fish bypass collection area), and adult fishways (and their related water supply systems). Potentially high juvenile lamprey turbine entrainment rates are possible, given the tendency of juveniles to swim low in the water column (Long 1968 as cited in Moursund et al. 2000). In 1998, Pacific Northwest National Laboratory conducted laboratory tests to determine the effects of absolute change in pressure and shear stress on juveniles while passing through a simulated turbine environment (Moursund et al. 2000 and 2001). No negative effects were observed. Blade strike and disorientation effects have not been studied. An *in situ* juvenile passage survival study currently is not feasible due to lack of tag technology, methodology and test animals. Another concern regarding survival of lamprey passing downstream through dams can be impingement on the deflector screens in front of the turbine intakes (Moursund et al. 2001, 2002, 2003; Hatch and Parker 1996; Stark and Dalen 1995). As neither Wanapum nor Priest Rapids dams have deflector screens in front of their turbine intakes, there is no need to address this issue here.

- d) Native Resident Fish. A number of resident fish species inhabit the project area. These include six species of native game fish, 14 species of native non-game species, two species of introduced non-game fishes, and 11 species of introduced game fishes. Native resident species found in the project area include rainbow trout, bull trout, white sturgeon, mountain whitefish, and Northern pikeminnow, although information is limited about their abundance and distribution. Existing information indicates that as many as 43 different species of resident fish inhabit the project area. The relative abundance, distribution, and presence of these species were studied in 1999 through a descriptive survey of the project area. Complete descriptions of resident fish and their life histories, as well as considerable study of project impacts on anadromous fishes, can be found in the FLA (Exhibit E-4, especially Pfeiffer et al. 2001).

Studies of fish-habitat associations in the Priest Rapids Project Area found that during May and August (1999) species were widely distributed over various habitat types and habitat conditions (macrophyte, velocities, water temperature, and substrata). In November, many of the fishes exhibited more specific preferences for higher bottom velocity, warmer water temperatures, and macrophyte beds (Pfeiffer et al. 2001). Studies also indicate sub-yearling Chinook salmon tended to select warmer water than that in the main channel of the river during their early rearing period where greater food supply existed. (FLA, McMichael 2002).

Annual pre-construction catch of all game fish within the Project area was estimated at 64,000 fish from the region of the Priest Rapids reservoir and 36,000 fish from the region of the Wanapum reservoir (WDFW historical catch records). Project effects on resident fish likely include turbine entrainment and effects on shoreline habitat within the reservoirs and tailwater areas due to hydropower operations. Some fish that are entrained at the project dams are likely killed or injured. The remainder either continue moving downstream or become part of the existing resident fish community of the downstream area. It is expected that few resident fish return upstream via the ladders (FERC FEIS 2006). FERC staff concluded, "it is likely that resident fish are recruited to the project area from upstream projects, which may help to offset any losses that occur at the project dams" (FERC FEIS 2006). The basis for this FERC conclusion is unclear. The FERC FEIS (2006) also notes that flows within the project area fluctuate on an hourly, daily, and weekly basis and that these fluctuations are the result of the Project operations in combination with upstream operations at five other mainstem dams, including Grand Coulee dam. These flow fluctuations can influence water depths and velocities in shoreline areas typically inhabited by resident fish. Rapid changes in these parameters may affect feeding or spawning behavior, dewater nests, or expose juvenile fish to increased predation (FERC FEIS 2006).

5.0 FINDINGS ON WATER QUALITY NUMERIC CRITERIA

1) Total Dissolved Gas (TDG)

a) Numeric Criteria. The Water Quality numeric criteria require that TDG shall not exceed 110 percent (WAC 173-201A). The water quality criteria for TDG do not apply when the stream flow exceeds the seven-day, ten-year frequency flood stage (7Q10). A special fish passage exemption to these standards applies to this section of Columbia River. When spilling water at dams is necessary to aid fish passage, and the operator has a gas abatement plan (GAP) approved by Ecology, the following special standards apply:

- TDG must not exceed an average of 115% as measured in the forebays of the next downstream dams. (The Pasco Fixed Monitoring Station (FMS) RM 329.1 is the substitute forebay monitoring site for McNary Dam). These averages are based on the twelve highest hourly readings of TDG in any one day.
- TDG must not exceed an average of 120% as measured in the tailraces of each dam. These averages are based on the twelve highest hourly readings in any one day of TDG.
- TDG must not exceed a maximum hourly average of 125%, relative to atmospheric pressure, during spillage for fish passage.

The purpose of these special criteria is to pass juvenile salmonids through the spill and thus avoid harm from passage through the turbines. A consequence of spillway releases is the entrainment of air and the associated exchange of atmospheric gasses that can result in TDG supersaturation. The special conditions for TDG were determined through risk analyses performed by NOAA Fisheries in 1996 and updated in 2002. The risk analyses balanced harm from gas bubble trauma to juvenile salmonids with risk of injury from passage through turbines.

b) 7Q10. The 7Q10 flood flow is the highest seven consecutive day average flow with a 10-year recurrence frequency. The 7Q10 flood flow was calculated to be 264 thousand cubic feet per second (kcfs) for Wanapum and Priest Rapids dams. The TDG standard is waived for flows equal to and greater than the 7Q10 flood flow.

- c) Monitoring. The TDG levels at Wanapum and Priest Rapids dams were measured by routine TDG monitoring at fixed monitoring stations (FMS), regularly scheduled manual cross sectional sampling of TDG levels, and detailed near-field TDG studies. Monitoring at the FMSs has been conducted for more than a decade and involves a station in the forebay and tailwater of each development. The interim FMSs are:

Wanapum Tailwater, Beverly Bridge RM 412.2
Priest Rapids Dam Tailwater, Vernita Bridge RM 388.1
Pasco FMS RM 329.1

- d) Monitoring Results. TDG values have been measured above the numeric criteria:

- The 110% TDG criterion has been exceeded due to spill between August 31 and April first.
- The 115% TDG criterion has been exceeded at the FMSs in the forebays of Wanapum dam (RM 415.8), Priest Rapids dam (RM 397.1) and Pasco FMS (RM 329.1).
- The 120% TDG criterion has been exceeded at the interim FMSs for the tailraces of Wanapum dam (RM 412.2) and below Priest Rapids dam (RM 388.1).
- The 125% TDG criteria also has been exceeded at the interim FMSs for the tailraces of Wanapum and Priest Rapids dams.

TDG exceedances have been documented in Ecology's 303(d) Lists of Impaired Water Bodies and can also be found in the U.S. Army Corps of Engineers Northwestern Division, North Pacific Region, Water Management Division, Reservoir Control Center Yearly Total Dissolved Gas Annual Reports, 1995-2004.

- e) TDG TMDL. Ecology, with the United State Environmental Protection Agency (EPA), issued a Total Maximum Daily Load (TMDL; or Water Quality Cleanup Plan) for TDG in the mainstem Columbia River from the Canadian border to the Snake River confluence (Ecology, 2004). The elevated TDG levels are caused by spill events at dams: water plunging from a spill generates TDG at high levels, which can cause "gas bubble trauma" in fish. The TMDL sets TDG allocations for each dam.
- f) Current Project Work. Grant PUD is installing Advanced Turbines at Wanapum Dam pursuant FERC Orders 107 FERC ¶62,088 (April 30, 2004), 108 FERC ¶62,075 (July 23, 2004), and 113 FERC ¶62,205 (December 14, 2005), and in accordance with Ecology's 401 certification and Order No. 1026 (March 12, 2004). The PUD is also installing the Future Unit #11 Fish Passage Facility at Wanapum Dam in accordance with FERC Order 109 FERC ¶62,216 (December 16, 2004) and the BiOp Amendment, and subject to Ecology certification and Order No. 1951 (February 8, 2005).
- g) Studies. Grant PUD provided Ecology with engineering, modeling, drawings, calculations, data submission and evaluation of the proposed TDG improvements. Grant PUD retained the United States Army Corps of Engineers (Corps) - Environmental Research and Development Center, an independent federal research agency, to assist in the evaluations and reviews. The table in Appendix B describes the predicted levels of TDG for the two dams, based on engineering analysis and the assumptions in Appendix B. The values in the table are derived from several sources, as listed in the appendix.
- h) Study Results. Under the assumptions in Appendix B and after the planned project modifications required by this Certification are implemented, the modeling predicts:

- During the *non-fish* spill season (modeled for August 31 to April 1), when the 110 % criteria applies, Wanapum Dam will meet the criteria 99.2% of the time and Priest Rapids Dam will meet criteria 98.9% of the time.
- During *fish spill* seasons (modeled as April 1 to August 31), when the special TDG numeric criteria exemptions apply, TDG will be met by Year 10.

2) Water Temperature

- a) Numeric Criteria. The Water Quality numeric criteria for the Columbia River from Grand Coulee downstream (incorporating the Priest Rapids project) require that water temperature not exceed 18°C upstream of the Priest Rapids Dam (RM 397.1) and 20°C downstream of the dam (WAC 173-201A). When natural conditions exceed these criteria, water temperatures caused by human activities shall not increase by more than 0.3°C.
- b) Impaired Listings. Portions of the Columbia River within the Project boundary are currently classified as impaired for temperature under Section 303(d) of the Clean Water Act. Some data reflect excursions of the numeric criteria for temperature in water entering the Project. Portions of the Columbia River upstream of the Project also are currently classified as impaired for temperature.
- c) TMDL. A TMDL for temperature is expected to be developed by EPA that will establish a final wasteload and load allocation.
- d) Evaluation. Grant PUD completed several years of field work, research, and modeling to evaluate the temperature effects of the Priest Rapids Project. The principal studies are referenced in the FLA as Normandeau, 2000, Juul, 2003, and Perkins, 2002. Detailed bathymetry maps were developed for the Priest Rapids Project to support this effort (FLA, Exhibit E-4, Figure 4-10; maps 1-21). Throughout 2004-2005, Ecology staff conducted a detailed review of the results of these studies including the model, structure, calibration, and input and output files from FLA (Perkins, 2002). This report and conclusions are summarized in an internal Ecology Memorandum containing references and citations (Whiley 2004).
- e) MASS1. Grant PUD used the Modular Aquatic Simulation System 1-dimension (MASS1) model, by Battelle. Grant PUD has demonstrated MASS1 is appropriate for the Project and is capable of assessing compliance with water quality standards with results equivalent to other models (Whiley 2004). MASS1 model output predicting reservoir effects for Priest Rapids Project is generally similar to the CE-QUAL-W2 model output predicting reservoir effects for Rocky Reach Project (Whiley 2004).

Water temperature in the Priest Rapids Project reservoirs is well mixed with little thermal stratification and the reservoirs do not thermally stratify (FLA; see Juul, 2003 and Normandeau, 2000). The MASS1 was applied to the following three separate water temperature scenarios for the mid-Columbia Area and Priest Rapids Project (Perkins et al. 2003):

- **Current Conditions**. This scenario represented the mid-Columbia River as it is today. All dams were assumed to be in place and operated at seasonal pool levels.
- **Priest Rapids Project (PRP) Effects Removed (No PRP)**. This scenario was identical to the Current Conditions scenario, except that the water currently controlled by Priest and Wanapum dams was assumed to be at natural river elevations instead. This scenario was run to identify the effect of Wanapum and Priest Rapids Dams on mid-Columbia River temperature given current conditions.

- Baseline. This scenario most closely represents “natural” conditions, representing the Mid-Columbia River without any impoundments below the Canadian border.
- f) MASS1 Monitoring Results. Grant PUD’s evaluation was developed in consultation with its relicensing workgroup, the Fish, Water Quality and Limnology Solution Group. Members of this group include the USFWS, WDFW, and Ecology.

Historically, water temperatures in the Columbia River during the summer months under “natural conditions” in Washington exceeded the maximum temperature criterion (of either 18 or 20°C) (FLA, Juul 2003). After comparing the Baseline to Current Conditions scenarios, it was shown that the Current Conditions scenario had resulted in a shift forward in the fall cooling cycle by approximately two to four weeks. It was concluded (FLA, Perkins et al. 2003) that the shift in the fall cooling cycle was due to the influence of upstream storage projects, including Grand Coulee Dam. The Priest Rapids Project does not contribute to the seasonal shift.

Results from the modeling evaluation showed that the average daily maximum July to August temperatures would actually be slightly higher under the Baseline scenario than Current Conditions and No PRP scenarios because the large volumes of the reservoirs moderate maximum daily temperatures in the river. (FLA, Perkins 2003)

The model showed no significant difference between the No PRP and Current Conditions scenarios in the number of days that temperatures exceeded 16 to 20°C (Whiley 2004). However, throughout July and August, maximum water temperatures would increase by approximately 0.2°C with the Project removed.

MASS1 modeling results indicated that during the March to August period, the Current Conditions temperature was approximately 0.1°C cooler than the No PRP scenario and approximately 0.3°C higher than the Baseline scenario (FLA, Perkins 2003). This indicates that on average the project is cooling water during this period and that higher temperature is caused by conditions upstream of the Project.

Under the No PRP scenario, when temperatures exceeded 18°C, MASS1 modeling indicated that 24-hour high daily temperatures were 0.1°C and 0.2°C warmer than the Current Conditions scenario at the Wanapum and Priest Rapids monitoring locations. Perkins et al. (2003; in FLA) reached a similar conclusion when comparing monthly average daily maximum temperatures. This is supported by a separate analysis by Ecology of the Perkins et al. (2003) input and output data files. Ecology’s analysis found that maximum water temperatures through the Project reach (Wanapum and Priest Rapids dams) occurring in July and August would increase by approximately 0.2°C if the PRP dams were removed. (Whiley 2004).

While the MASS1 study showed that overall temperatures are lower under the Current Conditions than the No PRP scenario, model output predicted a few instances [28% Wanapum and 22% Priest Rapids] where temperatures under the Current Conditions would be higher, and in some rare cases [4% Wanapum and 2% Priest Rapids] over 0.3°C higher.

- g) Fish Ladders. Grant PUD has completed an analysis of water temperatures in the Priest Rapids and Wanapum fish ladders (FLA, Brush and Juul). Grant PUD has proposed to modify the water supply for Priest Rapids fish ladders on the right bank. This fish ladder currently receives a portion of its supply water from a gravity intake gate. The modification would involve installing pumps to supply ladder water. Pumping water from the tailrace provides for a slightly cooler water supply (approximately 0.3°C in late summer) and addresses the tendency of the right bank fish ladder to have elevated water temperatures. Based on the fish ladder temperature

study, similar issues or concerns were not observed in the fish ladders at Wanapum Dam (FLA, Exhibit 3).

3) Other Water Quality Parameters

- a) DO and pH. Numeric criteria for the designated uses for this section of the Columbia River require that DO exceed 8.0 mg/L and pH be within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.5 units. The Priest Rapids Project has limited ability to influence DO and pH due to the limited storage capacity, high rate of discharge through the reservoir, limited shallow areas that contain extensive aquatic macrophyte growth, and a turbulent discharge that tends to increase rather than decrease DO. In general, the vast majority of all monitoring found that DO and pH levels were within applicable criteria. DO criteria excursions only appear on the record during 2001, which was an exceptionally low flow year. The data does not show occasional pH levels elevated above criteria as associated with plankton blooms or macrophyte growth within the Project area or other Project related effect, but the cause remains uncertain. It is possible that the project has some influence on those low DO and high pH events, due to the effects of impounding the water, but it is also likely that factors outside the project are the primary cause of low DO and high pH event (Weitkamp 2004)
- b) Turbidity. Numeric criteria for the uses in this section of the Columbia River require that turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU. Turbidity data rarely exceed standards and high turbidities appear to result from conditions outside the project. Existing data indicates that the project overall significantly reduces turbidity.
- c) Fecal Coliform. All values measured in the Project were less than the numeric criteria (WAC 173-201A) with reporting a geometric mean value of 2 colony forming units per milliliter (cfu/100 mL) and no events above 200 cfu/mL. (FLA, Normandeau.)
- d) Spills. Monitoring of lubricants, stormwater, and related discharges, and inventory procedures for these products has not been done.

4) Water Quality Monitoring Plan

In its FLA, Grant PUD submitted a plan for monitoring and tracking compliance with the water quality standards and of actions they intended to take to provide reasonable assurance of compliance with applicable water quality standards. The plan contains some of the requirements set forth in this Certification, including water quality monitoring, reporting and Adaptive Management.

5) Aquatic Invasive Species (AIS)

Overall biomass does not appear to be at nuisance levels in either reservoir; however, the invasive and nonnative Eurasian water milfoil (*Myriophyllum spicatum*) is the dominant species in both reservoirs. Grant PUD proposes to develop a plan to periodically monitor the composition and biomass of aquatic plants (Eurasian water milfoil) at or around key recreation sites, including information and signage intended to educate boaters and local residents about milfoil and how to avoid spreading it to nearby waters. Grant PUD has worked cooperatively with WDFW to monitor for zebra mussels (veliger monitoring) within the Priest Rapids Project area. To date, all plankton

samples collected from the Priest Rapids Project Area have been negative. Grant PUD has stated their commitment to continue working cooperatively with WDFW. (FLA Exhibit E-3-6.0, 7.0)

AIS present a significant risk to the Priest Rapids Project (Athearn 1999). AIS enter western states' waters from a number of different pathways, including recreational watercraft. The potential costs in both economic impacts and environmental impacts of an AIS invasion could be significant. This risk for zebra mussels and other AIS has been exacerbated by the alteration of the mid-Columbia River system. AIS flourish in lake type environments and generally do poorly in running rivers. The operation of the Priest Rapids Project has created an environment that attracts a highly mobile marine recreation population. The large boats and outboards originating from within areas of major infestation would not have sufficient water depth to use the Columbia River but for the existence of the Priest Rapids Project Reservoirs and other hydroelectric project pools on the Columbia River system. A Priest Rapids Project AIS Prevention Program would be an integral part of WDFW's statewide AIS interdiction and prevention program. AIS prevention programs have proven to be significantly more successful and less expensive in preventing the spread of AIS (Kraft 1993). Providing staff (in addition to signage) to talk to boaters at boat ramps and inspecting the boats for weeds and zebra mussels has been demonstrated to be very effective in changing boater behavior.

6.0 WATER QUALITY CERTIFICATION CONDITIONS

In view of the foregoing and in accordance with Section 401 of the Clean Water Act (33 USC 1341), RCW 90.48.260 and Chapter 173-201A, Ecology finds reasonable assurance that the proposed license will comply with state and federal water quality standards and other appropriate requirements of state law provided the following conditions are met.

6.1 GENERAL CONDITIONS

- 1) The Project shall comply with all water quality standards (currently codified in WAC 173-201A), ground water standards (currently codified in WAC 173-200), and sediment quality standards (currently codified in WAC 173-204) and other appropriate requirements of state law that are related to compliance with such standards. The conditions in Section 6 provide reasonable assurance that the Project will protect and maintain designated uses and therefore will meet the state's anti-degradation standard. Further, the conditions in Section 6 provide a detailed strategy to achieve compliance with state water quality standards and for purposes of this Certification constitute a water quality attainment plan under WAC 173-201A.
- 2) In the event of changes in or amendments to the state water quality, ground water, or sediment standards or changes in or amendments to the state Water Pollution Control Act (RCW 90.48) or changes in or amendments to the Federal Clean Water Act, such provisions, standards, criteria or requirements shall apply to the Project and any attendant agreements, orders, or permits, to the fullest extent permitted by law.
- 3) Discharge of any solid or liquid waste to the waters of the State of Washington without prior approval from Ecology is prohibited.
- 4) Grant PUD shall consult with Ecology before it undertakes any change to the Project or Project operations that might significantly and adversely affect compliance with any applicable water quality standard (including designated uses) or other appropriate requirement of state law. If, following such consultation, Ecology determines that such change would violate state water quality

standards or other appropriate requirements of state law, Ecology reserves the right to condition or deny such change, in accordance with applicable federal and state law. Ecology will respect the dispute resolution process contained in the Salmon Agreement.

- 5) This Certification does not exempt compliance with other statutes and codes administered by federal, state and local agencies.
- 6) Any provisions of this Certification that incorporate the substantive obligations of the Salmon Agreement shall continue to apply even if the Salmon Agreement ceases to exist, or if FERC fails to fully incorporate any provisions of the Salmon Agreement in the Project license, unless otherwise ordered by Ecology. However, if a conflict or inconsistency exists or arises between this Certification and the Salmon Agreement or any part thereof that is incorporated in this Certification, the terms of this Certification shall govern, unless Ecology directs otherwise.
- 7) Ecology retains the right to modify schedules and deadlines provided under this Certification or provisions of the Comprehensive Plan that it incorporates.
- 8) Ecology retains the right to require additional monitoring, studies, or measures if it determines that there is a likelihood or probability that violations of water quality standards or other appropriate requirements of state law have or may occur, or insufficient information exists to make such a determination.
- 9) Ecology reserves the right to amend this Certification by further order if it determines that the provisions hereof no longer provide reasonable assurance that the proposed FERC license will comply with water quality standards or other appropriate requirements of state law. Any such amended certification shall take effect immediately upon issuance of such order, unless otherwise provided in the order, and may be appealed to the Pollution Control Hearings Board (PCHB) under RCW 43.21B.
- 10) Ecology reserves the right to issue administrative orders, assess or seek penalties under state or federal, and to initiate legal actions in any court or forum of competent jurisdiction for the purposes of enforcing the requirements of this Certification or applicable state or federal laws.
- 11) The conditions of this Certification should not be construed to prevent or prohibit Grant PUD from either voluntarily or in response to legal requirements imposed by a court, the FERC, or any other body with competent jurisdiction, taking actions which will provide a greater level of protection, mitigation or enhancement of water quality or of existing or designated uses.
- 12) If five or more years elapse between the date that this Certification is issued and the date of issuance of the New License for the Project, this Certification shall have deemed to be expired and denied at such time and Grant PUD shall send Ecology an updated 401 application that reflects then current conditions, regulations and technologies. This provision should not be construed to otherwise limit the reserved authority of Ecology to withdraw, amend or correct the Certification before or after the issuance of the New License.
- 13) All documents required under this Certification to be submitted to Ecology shall be submitted to Washington State Department of Ecology, Eastern Regional Office, Water Quality Program, Section Manager.

- 14) Copies of this Certification and associated permits, licenses, approvals and other documents shall be kept on site and made readily available for reference by Grant PUD, its contractors and consultants, and by Ecology.
- 15) Grant PUD shall allow Ecology access to inspect the Project and Project records required by this Certification for the purpose of monitoring compliance with the conditions of this Certification. Access will occur after reasonable notice, except in emergency circumstances.
- 16) Grant PUD shall, upon request by Ecology, fully respond to all reasonable requests for materials to assist Ecology in making determinations under this Certification and any resulting rulemaking or other process.
- 17) If an action required under or pursuant to this Certification requires as a matter of federal law that the FERC approve the action before it may be undertaken, Grant PUD shall not be considered in violation of such requirements to the extent that FERC refuses to provide such approval, provided that Grant PUD diligently seeks such approval and so notifies Ecology.
- 18) The reservations contained in this Certification do not preclude or limit any right of Grant PUD to contest the validity of any such reservation in connection with any order or any other action taken by Ecology pursuant to such reservation.
- 19) All information prepared or collected as a requirement of this Certification (e.g., plans, reports, monitoring results, meeting minutes, raw data) shall be made available to the public on Grant PUD's website or by another readily accessible means. Where data or quantitative analysis is involved, it shall be provided in a format that allows others to efficiently validate and analyze data and results.
- 20) Where this certification refers to "reasonable and feasible" actions or measures, Ecology retains the authority to ultimately determine if an action or measure qualifies as "reasonable and feasible."
- 21) Within this Certification, Ecology has required the use of an Adaptive Management process to meet a number of State water quality standards. As used in this Certification, Adaptive Management means an iterative and rigorous process used to improve decision-making and achieve objectives in the face of uncertainty. It is intended to improve the management of natural resources affected by Project in order to achieve desired objectives as effectively and efficiently as possible. For purposes of this Certification, Adaptive Management involves the following steps:
 - Develop initial hypothesis regarding any Project effects and potential remedial measures
 - Develop objectives for addressing such impacts
 - Develop and implement reasonable and feasible measures in accordance with an established schedule
 - Develop or identify monitoring and evaluation methodologies for determining whether such objectives have been achieved
 - Monitor and evaluate the implementation of such measures and their effectiveness toward achieving such objectives
 - Review monitoring and evaluation efforts

- Confirm such objectives have been achieved or, if not achieved, evaluate additional or revised measures, and implement any appropriate and reasonable measures.

6.2 AQUATIC LIFE

1) General

Grant PUD shall operate the Project in compliance with the Salmon Agreement, the Biological Objectives and Implementation Measures set forth in Appendix C, and the Fish Management Plans to be developed in accordance with Subsection 5b below.

Ecology expects the processes for adaptive management contained within this section will be adequate to protect aquatic life as required under state law and the Clean Water Act. In the event that the Salmon Agreement, or any of the Biological Objectives, Implementation Measures or Fish Management plans fail, or begin to fail, as determined by Ecology, to adequately protect, in a timely manner, existing and designated uses or water quality, Ecology reserves the right to require such changes including, but not limited to, Biological Objectives, Implementation Measures, or any operation or physical structures, as it determines necessary to protect these uses or water quality.

Ecology reserves the right to modify the processes or decisions described herein, including timeframes. If timely progress is not made or plans or reports are not timely submitted, Ecology reserves the right to impose penalties.

2) Adaptive Management

The Adaptive Management process (described under Section 6.1 21 above) has been and will continue to be used for the protection of aquatic species. For Covered species, adaptive management is provided through the Salmon Agreement process. For non-Covered species, the adaptive management process was used in the development of the outlined fish management plans, in Appendix C. Under both processes, for each aquatic species, hypotheses were developed regarding Project effects and potential remedial measures. Based on these hypotheses, objectives were developed (see "Biological Objectives" immediately below). Implementation measures were developed, with a schedule. Plans are to be developed under the Settlement Agreement and for this certification which will include detailed monitoring and evaluation procedures to determine attainment of the Biological Objectives. The results of the evaluations will be reviewed by fish management agencies, tribes and Ecology and used to determine attainment of the Biological Objectives. Further measures may be required, as described in this Certification, Subsections 5 c through h, below.

3) Biological Objectives

For purposes of this Certification, the Biological Objectives represent important steps toward meeting the designated uses of a water body. They serve as quantifiable goals for moving toward attaining full support of designated uses. They are not intended to serve as a surrogate for the requirement to support and protect designated uses of the waters. Ecology reserves the authority to modify or supplement any of the Biological Objectives insofar as is necessary to achieve full support and protection of designated uses. Grant PUD is required to undertake all reasonable and feasible actions to support and protect designated uses and to achieve the Biological Objectives, in consultation with the relevant forums and workgroups, as described below.

- a) Covered Species. The Biological Objectives for Covered Species are in the Salmon Agreement. The Salmon Agreement (and Biological Objectives) include a no net impact (NNI) objective, which refers to the condition whereby the Project does not produce any unmitigated Project-related mortality to Covered Species. Under the agreement, NNI is achieved when:
- There is a minimum of 91% combined adult and juvenile survival rate for each Covered Species past each dam and through each reservoir (survival standard), *and*
 - Grant PUD implements:
 - 2% mitigation in the form of funding habitat restoration and conservation work in mid-Columbia tributary streams and 7% mitigation in the form of hatchery supplementation, *or*
 - Alternate mitigation as further specified in Sections IX through XII of the Salmon Agreement.

The fundamental objective of the Salmon Agreement is to achieve the survival standards for Covered Species by 2013.

The Salmon Agreement also includes a NNI Fund to exist until NNI is achieved for each Covered Species. The NNI fund is to provide for mitigation during the early years of the New License, specifically to address the gap between measured or estimated Project survival and the survival standards.

This combination of adult and juvenile survival standards, 2% habitat fund, 7% hatchery supplementation and NNI Fund provide protection across all life history phases including migrations, spawning, and rearing that occur within the program area.

- b) Non-Covered Species. Biological Objectives for non-Covered Species are included in the fish management plan outlined in Appendix C. The Biological Objectives are not prioritized as written, except where specifically identified.

4) **Fish Management Forums**

- a) Priest Rapids Coordination Committee (PRCC). As used in this Certification, the PRCC is the forum formed under the Salmon Agreement for purposes of coordinating and implementing that agreement. For purposes of this Certification, Grant PUD will consult with the PRCC and other interested tribes and agencies with fish management authority on Covered Species. For any plans or reports required per the Salmon Agreement, Grant PUD shall provide copies to Ecology, which shall include documentation of consultation with the above entities, copies of comments received by the entities, descriptions of how the comments were accommodated, descriptions of the basis for any disagreements, and the position and rationale of the entities on that issue. In its decision-making on Covered species, the PRCC shall consider the effects of proposed actions on Non-Covered Species.
- b) Priest Rapids Fish Forum (PRFF). The PRFF is to consist of Grant PUD and the tribes and agencies with fish management authorities for protection of the non-Covered species. Grant PUD shall consult with the PRFF as provided in this Certification with respect to the non-Covered species. Where Grant PUD is required to consult with the PRFF, it shall be by the process described below, under Section 6.

- c) Coordination between PRFF and PRCC. In the event that conflict or the potential for conflict arises between actions contemplated or required for Covered Species and actions contemplated or required for non-Covered Species. Grant PUD shall notify in writing members of the PRFF and PRCC and initiate the consultation process.
- d) Tribe Participation. A decision by a tribe not to participate in or withdraw from the PRFF at any time shall not be construed in any manner to waive, abridge, or limit any Indian or tribal right reserved or protected in any treaty, executive order, statute or court decree under Federal or state law.

5) Attainment of Biological Objectives

- a) Implementation Measures. Initial Implementation Measures for Covered Species are described in the Salmon Agreement. Grant PUD shall undertake all reasonable and feasible measures to achieve the survival standards set forth in such agreement by 2013. These initial and any subsequent Implementation Measures may be modified or supplemented as part of the Adaptive Management process. Changes shall occur through consultation with the PRFF or PRCC, as appropriate for the fish species. For non-Covered Species, Grant PUD shall initiate the consultation process (described below) in a timely manner following receipt of a written request for modification or supplementation by a PRFF member. Grant PUD shall incorporate Implementation Measures and any modifications into the appropriate Fish Management Plan(s).
- b) Fish Management Plans. Grant PUD shall, within six months of effective date of the New License, submit to the PRFF draft management plans for white sturgeon, Pacific lamprey, bull trout, and native resident fish. Such initial plans shall be in accordance with the Biological Objectives and Implementation Measures identified in the fish management plans outlined in Appendix C of this Certification. Grant PUD shall consult with the PRFF and submit final plans no later than 12 months after the effective date of the license. Grant PUD shall implement the actions identified in the approved Fish Management Plans. Implementation shall occur within the timeframes described in the Fish Management Plans, unless otherwise agreed to by the PRFF. Fish Management Plans may be updated periodically following the consultation process (described below) as appropriate to address changes to the implementation measures above, and other relevant changes such as changes in conditions or technology.
- c) Year Five Biological Objectives Status Report. By no later than August 30 of Year Five, Grant PUD shall, through consultation with the PRFF, develop a Biological Objectives Status Report and provide a copy to Ecology, that:
 - Summarizes the results of monitoring and evaluation program, and evaluates the need for modification of the program;
 - Describes the degree to which each Biological Objective has been achieved, and if not, the prospects for achieving those objectives in the next reporting period;
 - Reviews management options (both operational and structural) taken to meet those Biological Objectives, and;
 - Recommends any new or modified implementation, monitoring and/or evaluation measures that are needed to meet any of the Biological Objectives, to the extent reasonable and feasible. Such recommendations shall contain a schedule for timely implementation.

- Ecology will issue a decision to approve or remand for further development the report and recommendations.
 - Grant PUD shall implement the measures identified in the final report.
- d) Year Ten Biological Objectives Status Report. By August 30 of Year Ten, Grant PUD shall, following consultation with the PRFF, provide Ecology with a report containing the information required in the Year Five Report, but covering the first ten years after the effective date, and including any additional information necessary to make a determination on whether any or all of the Biological Objectives have been achieved. The Year Ten report shall include recommendations for future status reports and monitoring regarding biological objectives. Ecology will issue a decision to approve or remand for further development the report and recommendations.
- e) Biological Objective Not Met. Following the issuance of the Year Ten status report, if Ecology concludes that a Biological Objective for Non-Settlement Species has not been met, Grant PUD shall continue to implement the Adaptive Management process in accordance with this section (and Subsection 6.1 21) until the Biological Objective has been attained or is modified. A Biological Objectives Status Report shall be prepared in consultation with the PRFF and PRCC and submitted to Ecology by August 30 every five years for the remaining life of the new license (and annual renewals of that license) until all Biological Objectives are met. Grant PUD shall implement the measures identified in these reports.
- f) Biological Objectives Met. Once a Biological Objective (including any modified Biological Objectives per g below or any new Biological Objectives per h) is met as determined by Ecology, the actions needed to maintain attainment of the Biological Objective shall be continued through the term of the New License. Monitoring shall be continued and the results posted annually on Grant PUD's website or equivalent no later than August 30 of each year. Biological Objectives Status Reports shall be prepared by Grant PUD in consultation with the PRFF by August 30 every ten years. In the event that Grant PUD has reasonable basis to know that any of the Biological Objectives ceases to be met, it shall provide written notification to all PRCC and PRFF members and to Ecology as soon as it has knowledge of that situation. Monitoring to determine attainment of Biological Objectives shall continue throughout the life of the New License, including any subsequent annual licenses.
- g) Modification of a Biological Objective. If, at any time following the issuance of the Year Ten Biological Objectives Status Report, the PRFF or PRCC concludes that a Biological Objective cannot be met in part or whole despite its having undertaken all reasonable and feasible measures to meet that objective, the PRFF or PRCC may petition Ecology to approve a change in a Biological Objective, either to modify or eliminate the objective. Grant PUD shall draft the report in consultation with the PRFF or PRCC (as appropriate) and provide a report on such consultation to Ecology.
- h) New Biological Objectives. New Biological Objectives may be developed as determined to be necessary by the PRFF or the PRCC, or by Ecology, under Subsection 6g below.

6) Consultation with PRFF

Grant PUD is to consult with the PRFF as part of the development or modification of Biological Objectives, Implementation Measures, Fish Management Plans, and Biological Objectives Status Reports as provided below:

- a) PRFF Formation. Grant PUD shall contact the tribes and agencies with fish management authority and request the name of the designated staff person and alternate(s) to participate in the PRFF meetings as voting members. To be a member, entities should agree to participate and to attempt to resolve issues by consensus. Grant PUD shall provide the name(s) to Ecology, and provide updates as the names change.
- b) PRFF Authorities under this Certification. For purposes of this Certification, the PRFF shall serve as a forum to implement this section 6.2 of the Certification for non-Covered species and to consider issues that arise as part of that implementation. Specifically, Grant PUD shall consult with the PRFF on the following: modification or addition of Biological Objectives; development, implementation, and modification of Implementation Measures; development, implementation, and modification of the fish management plans; development of the Biological Status Reports; and such other matters as Ecology may designate by order. This Certification does not prevent Grant PUD from consulting with the PRFF on issues outside this Certification at their own discretion.
- c) PRFF Membership and Support. Grant PUD shall convene the entities eligible to participate on the PRFF. Those willing to participate, on a part or full time basis, shall be deemed the members of the PRFF. The members may establish operating procedures, which they may adjust from time to time, consistent with this Certification, as they determine will assist in the orderly, effective and efficient administration of its actions with respect to activities under this Certification. The operating procedures are intended to provide general methods of coordination among members of the PRFF. The procedures cannot supersede any aspects of this Certification.
- d) Facilitation. Grant PUD shall provide such facilitation, administrative and clerical support to the PRFF as is reasonably needed to accomplish the requirements of this section of the Certification. Within three months following issuance of the New License, Grant PUD shall convene the PRFF for the purpose of selecting, by consensus, a neutral third party to facilitate, administrate and provide clerical support for the PRFF meetings. The facilitator shall be the official contact person of the PRFF members to the stakeholders. Grant PUD shall provide draft notes of each meeting for comment to PRFF members, and incorporate comments provided by reviewers into the final meeting notes.
- e) Document Preparation and Review. For all documents that Grant PUD is required to prepare under this section and for proposals for modifications or additions to Biological Objectives, Grant PUD shall prepare a draft of the report or proposal and submit it to all PRFF members and interested parties for review and comment. Grant PUD shall prepare the documents sufficiently in advance to allow adequate time for review in order to meet the timelines of this Certification. Any documents developed in association with the documents identified above shall also be provided in a timely manner. In scheduling for member review of the draft final Biological Objectives Status Reports, the review period shall be up to 60 days, with an option for a 45-day extension (determined by the PRFF), with the final report due 120 days after the draft was released.

Members of the PRFF (including Grant PUD) are expected to use the most current and best available scientific information and analysis as the standard of care for preparing and reviewing documents and implementing this Certification. In the event that members advocate two or more alternatives to a study methodology or measure, the members are expected to evaluate and select the action based on the following criteria: 1) likelihood of biological success; 2) time

required to implement; and 3) cost effectiveness of solution, but only where the parties agree that two or more alternatives are comparable in their biological effectiveness.

After completion of discussions on a document required under this Certification, Grant PUD shall submit the final document to Ecology. If consensus was not reached, the document shall include all comments and alternative recommendations from PRFF members. Grant PUD shall provide additional existing documentation to Ecology, upon request.

Grant PUD shall provide PRFF members copies of all submissions made to Ecology.

- f) Regular PRFF Meetings. Where consultation with the PRFF is required in this section, Grant PUD shall convene a meeting(s) of the PRFF, with sufficient time in advance to meet its deadlines for submittal of the documents and implementation of the measures. The timeline is subject to review and approval by Ecology. Meetings shall be open to interested parties to observe, with time to comment, following rules established by the PRFF in the operating protocols. The document(s) to be discussed shall be provided sufficiently in advance for thorough review by the members prior to the meeting. An agenda shall be provided to all members and interested parties at least seven days prior to each meeting. The agendas shall list the subjects to be discussed, indicating the issues to be decided at the meeting. When a member is unable to have either its designated representative or alternate at a meeting, or needs additional time to determine its organization's position on a proposed decision or recommendation, and would like additional time, Grant PUD shall reschedule final action, one time for each member, on any such decision or recommendation. The total delay for the proposed decision or recommendation shall not exceed 60 days.

The meeting or meetings shall be used to discuss items on the agenda and, where needed, attempt to reach consensus among members of the forum. Consensus shall mean the unanimous agreement of all members present in person or by phone. Voting shall be recorded and confirmed by meeting notes. Multiple meetings may be held to thoroughly discuss the issues, before a final determining vote is made. Nothing herein prohibits members from meeting separately and/or with technical experts to discuss issues.

Within ten days following each meeting, the facilitator shall distribute a draft meeting notes to PRFF members and other attendees identifying attendees (present either in person or by phone) and summarizing discussions, listing any decisions made at that meeting, and listing any new action items. Attendees may provide corrections to the facilitator, who may either amend the document or attach the proposed corrections, and then distribute the final document with any attachments to Ecology, PRFF members and interest stakeholders within 30 days following the meeting date.

- g) Final Determination. Unless otherwise provided for herein, a decision made by consensus of the PRFF shall be final and shall not require Ecology's approval. Implementation measures and fish management plans agreed to by consensus shall not require Ecology approval; biological status reports, determination of whether a Biological Objective has been attained or not, and changes to Biological Objectives shall require Ecology approval even if agreed to by consensus. However, Ecology reserves the right to overrule a decision made by consensus if it determines that such decision is inconsistent with state water quality standards or other appropriate requirements of state law.
- h) Immediate or Urgent Near Term Action. If, at any time, a member of the PRFF or PRCC determines that immediate or urgent near term action is needed by Grant PUD for protection of an aquatic resource affected by the Project, they may contact Ecology in writing or by e-mail.

The member may contact Ecology or any other member of the PRFF or PRCC, as well. Once notified by Ecology, Grant PUD shall contact the other members of the PRFF or PRCC (as appropriate) within 48 hours to notify them of the request and ask for comment and/or recommendations. Grant PUD shall provide such information to Ecology immediately upon receiving any comments or recommendations. Grant PUD shall also provide information about any potential conflicts of any proposed actions with other state, federal or tribal laws. If, based on the information available, Ecology determines that immediate action is needed to protect the resource, and such action does not conflict with another law, Grant PUD shall immediately perform such action.

6.3 HANFORD REACH

1) Purpose

The general purpose of this section 6.3 is to support the protection of fall Chinook in the Hanford Reach, including spawning and rearing. The Hanford Reach Agreement and the Salmon Agreement provide a basic framework for future investigations, management decisions, and actions under this section. It is expected that the studies and other actions required herein will be available to assist in decision-making among system operators and other stakeholders that may occur in conjunction with the 2014 re-opener date of the Hanford Reach Agreement.

2) Hanford Reach Agreement and Salmon Agreement

Grant PUD shall continue to operate under the Hanford Reach Agreement and Salmon Agreement in managing flow and flow fluctuations (e.g., ramping rates) to address fish resource impacts downstream of the Priest Rapids dam, including the Hanford Reach, unless otherwise modified under this Certification. If either agreement is replaced, modified, or terminated, Project operations shall, to the extent reasonable and feasible and within Grant PUD's control, continue to provide at least an equivalent level of protection of water quality, including protection of existing and/or designated uses, as provided under the existing agreement. To ensure such level of protection, if either agreement is replaced, modified or terminated, Grant PUD shall, within three months of such replacement, modification or termination, submit to Ecology for approval, a project operations plan that will provide at least an equivalent level of protection of water quality, including protection of existing and/or designated uses, as provided under the existing plan.

3) Obligation to Address Impacts to the Hanford Reach

If the best available science shows that flow fluctuations allowed under the existing Hanford Reach Agreement, or as exist if such agreement is replaced, modified, or terminated, are causing significant harm to designated uses in the Hanford Reach, and the Project contributes to such flow fluctuations, then the Grant PUD shall to the extent reasonable and feasible adaptively manage Project operations to address its contribution. Such measures shall be taken as part of an adaptive management process and, to the maximum extent possible, incorporated into and coordinated with measures identified in the Hanford Reach Agreement and Salmon Agreement.

4) Consultation

Grant PUD shall undertake actions required in this section in consultation with an advisory group called the Fall Chinook Work Group (FCWG). The FCWG shall consist of all members of the PRCC, parties to the Hanford Reach Agreement, and other interested stakeholders. Grant PUD shall record minutes of all meetings of the FCWG, circulate draft minutes to work group members for comment, and incorporate comments in the final minutes. Grant PUD shall include, with any plans or reports required in this section, documentation of consultation with the FCWG, copies of comments received by the members, descriptions of how the comments are accommodated, descriptions of the basis for any disagreements, and the position and rationale of the members on that issue. Ecology shall give deference to decisions made by consensus of the FCWG on items required in this section of the Certification when evaluating compliance with water quality standards (including Biological Objectives). If the PRCC ceases to exist or to operate effectively on subjects of this Certification, consultation may default to another working group, at the discretion of Ecology. All deadlines provided in this section may be extended upon written approval of Ecology.

5) Study of Grant PUD Contribution to Flow Fluctuation in the Hanford Reach

No later than six months after the effective date of the New License, Grant PUD shall develop, in consultation with the FCWG and Ecology, and submit to Ecology a report which evaluates the extent to which the Project contributes to daily flow fluctuations below the Project in the Hanford Reach of the Columbia River. Flow fluctuation is defined as the difference between the highest and lowest water elevations in daily water levels over a twenty-four hour period beginning at midnight below the tailrace of the Project. Grant PUD shall determine the contribution of the Project, if any, by comparing the flow fluctuation existing under the Project to the modeled flow fluctuation that would exist if the dams and reservoirs were absent. Ecology will review this report and may, if necessary, require supplementation or revision.

6) Studies Related to Monitoring and Better Understanding of Impacts on Fall Chinook in the Hanford Reach

The studies provided for in this subsection (6) are intended to complement existing and proposed studies on Project impacts of operations under the Hanford Reach Agreement on fall Chinook in the Hanford Reach.

- a) Study Identification. No later than three months of issuance of the New License, Grant PUD shall convene the FCWG for purposes of identifying additional studies that are of significant importance to monitor and better understand impacts on fall Chinook of flow fluctuations resulting from operations under the existing provisions of the Hanford Reach Agreement. Studies identified shall include a controlled flow study to evaluate effects of different flow fluctuation bands and timing on Fall Chinook. Generally, priority should be given to studies that are capable to be completed prior to the 2014 re-opener of the Hanford Reach Agreement, but longer term studies of significant priority are also eligible for inclusion.
- b) Comment Period on Study Plan. No later than six months after license issuance, Grant PUD shall circulate for a minimum 60-day comment period a draft plan to the FCWG that identifies,

with priorities, the studies identified above, including study proposals and priorities proposed by FCWG members.

- c) Study Plan. Following receipt of the comments, Grant PUD shall further consult with FCWG members to reconcile or to narrow differences, and thereafter, within one year of license issuance, submit a proposed study plan to Ecology for its approval, with copies to the FCWG. The proposed plan shall include, among other things, a detailed responsiveness summary for any study proposals that Grant PUD has not accepted or has modified. The plan shall also identify how Grant PUD proposes funding each study.
- d) Studies Proposed to be Funded in Part or Whole by Other Entities. Following Ecology's approval or modification of the study plan, Grant PUD shall proceed to identify the funding source or sources for the proposed studies that Grant PUD will not solely fund. As soon as such funding has been identified, Grant PUD shall notify Ecology in writing. If Grant PUD cannot secure adequate funding for a study, it shall so report to Ecology no later than 90 days following Ecology's decision on the proposed study plan. The report shall identify all efforts Grant has made to obtain such funding. Ecology will then provide directions, such as requiring Grant PUD to: a) pursue further funding efforts; b) develop an alternative study design for which funding may be available; c) fund the study itself; d) table the study to a later date; or e) drop the study from the plan..
- e) Draft Study Design. Within 120 days after Ecology identifies the studies necessary to inform compliance of the Project with water quality standards (and funding has been obtained, if non-Grant PUD funding is needed), Grant PUD shall submit to Ecology and the FCWG a draft study design and schedule for each study. The FCWG shall have a minimum 60-day comment period, which Ecology may extend in writing.
- f) Final Design. Within 60 days after the end of the comment period, Grant PUD shall provide a final study design and schedule (with a responsiveness summary) to Ecology for its approval, with copies to the FCWG. Upon Ecology approval or modification, Grant PUD shall implement the study as per the approved design and schedule.
- g) Report. Within 60 days of the end of the study, Grant PUD shall provide a report of the study results, in accordance with the schedule within the final approved plan. The plan shall be provided to the FCWG for review and comment. After consultation with the FCWG, Grant PUD shall submit the final report to Ecology.

7) **Potential Implementation Measures for Fall Chinook.**

Based on the results of the above studies and other existing information on impacts of flow and flow fluctuations on fall Chinook Grant PUD, in consultation and coordination with the FCWG, shall evaluate potential measures to avoid, reduce, or mitigate such adverse impacts and, if appropriate, provide for implementation of such reasonable and feasible measures in cooperation with other affected entities.

- a) Implementation Feasibility Study. Within three years of license issuance, Grant PUD shall, in consultation with the FCWG, prepare a study report that includes the following:
 - A comprehensive list of potential measures that may avoid, reduce, or mitigate the adverse impacts on fall Chinook in the Hanford Reach.
 - An evaluation of each measure in terms of its reasonableness and feasibility. The evaluation shall consider benefits and effectiveness of the measure and costs of

implementation, including any non-monetary costs, such as impacts to other environmental resources, recreational impacts, and impacts on historical and cultural resources. Other factors *may* include, for example, regional factors such as hydropower flexibility and reliability, transmission constraints, and tradeoffs related to replacement of energy. Feasibility shall be determined in accordance with such guidance as is developed by Ecology or as determined by Ecology to be relevant. The evaluation shall also consider Grant PUD's existing obligations and the results of the study described in Subsection 5 above. The evaluation shall include a list of measures that Grant PUD concludes are reasonable and feasible.

- A tentative schedule for implementation of each reasonable and feasible measure.
 - Grant PUD shall submit a draft copy of the study to the FCWG for a comment period of no less than 90 days. Grant PUD shall incorporate the comments and submit the report to Ecology for review and approval within 60 days of the end of the comment period. After Ecology reviews the report, Ecology may require further supplementation or approve the report subject to modifications. Ecology shall make the final determination of which measures are deemed reasonable and feasible for Grant PUD to accomplish and implement.
- b) Implementation Plan. Within six months of Ecology's approval or modification of the implementation feasibility study report, Grant PUD shall prepare and submit for Ecology approval a plan to implement such measures that were approved for implementation. Such plan shall be developed in consultation and coordination with the FCWG, who shall be provided a 60-day comment period on a draft plan. If a measure involves a cooperative effort among other mid-Columbia hydropower owner/operators, the plan shall identify steps to be taken to obtain such agreement or cooperation. To the extent that Grant PUD believes that the Hanford Reach Agreement prevents implementation of any such new management measures prior to 2014 and delay of implementation would not significantly adversely affect the fall Chinook resource, Grant PUD may request Ecology to so delay implementation.
- c) Implementation. Upon Ecology's final approval or modification of the implementation plan(s), Grant PUD shall proceed as provided in any approved implementation plan to implement or work with other entities to seek to implement the measures, as determined by Ecology. Grant PUD shall coordinate with the FCWG on the implementation of the measures identified above. If it is not possible to reach agreements with other entities that are necessary for full implementation of a measure, Grant PUD shall implement such measure to the extent that the measure addresses Grant PUD's proportionate responsibility for the impact.

6.4 TOTAL DISSOLVED GAS

1) General Conditions

- a) Standards. The primary purpose of the following conditions is to achieve water quality numeric criteria for TDG, while protecting aquatic uses. The Project shall comply with the standards found in WAC 173-201A, as further described in this Certification. Upon completion of the compliance period, Grant PUD shall operate the project in full compliance with the state water quality standards.

- b) Fish Spill Season. For purposes of compliance, the “fish spill” season, found in Ecology regulations (WAC 173-201A), shall be designated to occur from April 1 through August 31; and “non-fish spill” season shall be designated to occur from September 1 to March 31, unless otherwise specified in writing by Ecology. Should spill for fish cease to be required by the fish agencies, the regulatory exemption for elevated levels of TDG occurring during fish spill shall no longer be applicable.
- c) Minimizing Spill. Grant PUD shall manage spill at Wanapum and Priest Rapids dams toward meeting water quality criteria for TDG, as reasonable and feasible, and without further damaging aquatic life, as follows:
 - Minimize voluntary spill through operations, including to the extent practicable, by scheduling maintenance based on predicted flows;
 - Avoid spill by continuing to participate in the Hourly Coordination Agreement, of any successor agreement to which Grant PUD is a party, to the extent the agreement reduces TDG; and
 - Maximize powerhouse discharge, especially during periods of high river flows.
- d) Elevated Incoming TDG Levels. Even though TDG levels in the tailrace exceed numeric criteria, a dam may be deemed in compliance with the water quality standards for TDG, if both the following apply:
 - TDG levels in the dam’s forebay exceed 110% during non-spill season or 120% during fish spill season, and
 - The dam does not further increase TDG levels in the tailrace.
- e) Changes in Operation or Structure. Grant PUD shall provide Ecology with the opportunity to review and condition any non-routine operational or structural changes affecting TDG that are not identified in this Certification. If Grant PUD, at any point, considers or chooses not to implement any of the measures identified in Table 1, Grant PUD shall immediately notify Ecology and include proposed alternative(s) that will produce levels of TDG equal to or less than those estimated to be produced by the measures to be replaced. These measures should be implementable in a similar timeframe. They should also provide equal or better protection for aquatic species, as determined by the PRFF and PRCC.
- f) TDG TMDL. The Project shall be deemed in compliance with the TDG TMDL while it remains in compliance with the terms of this Certification.

2) **General Interim Conditions**

- a) Implementation Measures. In order to attain compliance with the State Water Quality numeric criteria, Grant PUD shall implement the measures identified in Table 1 in accordance with the schedule shown in that table. Grant PUD shall also implement the studies in Subsections 3 through 9 to evaluate compliance with the predicted TDG levels. If, after any of these studies, Ecology determines that additional measures are needed, Grant PUD shall perform a feasibility study to identify appropriate measures and implementation, as described in Subsection 12. Where compliance is not attained, or does not appear likely to be attained, additional adaptive management measures may be required.

- b) TDG Target Values. Table 1 describes the target levels predicted to result from implementation of the various compliance activities (e.g., installation of fish bypass). The values in Table 1 were derived from the study results, shown in Appendix B and described in the Findings for TDG (Section 5.0 1). Note that the target values will be based on the new FMS (see Section 5.0 1c for description), to be established below (Subsection 10a), whereas the predicted values were based on measurements made existing FMSs.

Table 1: TDG Compliance Schedule and Activities <i>with</i> Target TDG Values					
		During Non-Fish Spill, Throughout Reservoir	During Fish Spill, at Downstream Dam	During Fish Spill in Tailrace, 12 hours	During Fish Spill in Tailrace, single hour
	TDG Numeric Criteria* (% TDG)	110%	115%	120%	125%
Compliance Schedule	Compliance Activities				
Wanapum Dam					
Current	Dam with deflectors	98.6	118	120	125
2007	Unit #11 Bypass	98.7	116.5	120	125
2012	Bypass and Adv. Turbines	99.2	115	120	125
Year 10		100%	115	120	125
Priest Rapids Dam					
Current	Dam	97.6	115	121.0	125
2010	Bypass Facility	98.1	115	120	125
Year 10		100%	115	120	125
Notes:					
*For flows less than 7Q10 (264 kcfs).					

3) Wanapum Dam Bypass Installation and Studies

- a) Installation. Grant PUD shall complete the installation of the Future Unit #11 Fish Bypass Facility at Wanapum Dam in accordance with a FERC Order, as conditioned by Ecology's certification and Order No. 1951 (February 8, 2005). The installation is expected to be completed in 2007 or early 2008.
- b) Change in Fish Bypass Operational Flows at Wanapum Dam. Modeling calculations provided by Grant PUD in Table 1 are based on an assumption that the fish bypass facility will pass 20 kcfs at optimum operating capacity. If the operation is at less than 20 kcfs, Grant PUD shall proceed with measures to offset any resulting increases in TDG, subject to Ecology review and approval.

- c) Field Study. After construction of the Future Unit #11 Fish Bypass Facility, Grant PUD shall, no later than June 30, 2009, complete a field study of controlled operating conditions to quantify the TDG exchange associated with the bypass channel chute, as described in Subsection 8. Grant PUD shall provide a draft study plan to Ecology for review by December 30, 2008 and a final study plan, incorporating Ecology's comments, by March 30, 2009. The draft report shall be provided by September 30, 2009 and the final report, incorporating Ecology's comments, by December 31, 2009.
- d) Performance Criteria. If the bypass does *not* meet the performance criteria in Table 1, Grant PUD shall conduct a feasibility study with subsequent implementation in accordance with Subsection 12.

4) Wanapum Dam Turbines Installation and Studies

- a) Installation. Grant PUD shall continue with installation of the Advanced Turbines at Wanapum Dam pursuant FERC Orders, as conditioned by Ecology's 401 certification and Order No. 1026 (March 12, 2004). The installation is expected to be completed by 2012.
- b) Field Study. Following installation of the 10th advanced turbine at Wanapum Dam, Grant PUD shall re-evaluate the performance, using a study as described in Subsection 9 below, to compare performance with that predicted in Table 1. Grant PUD shall provide the draft study plan to Ecology by July 30, 2012 and the final study plan, incorporating Ecology's comments, by September 30, 2012. Grant PUD shall implement the study, and provide the draft report to Ecology by August 30, 2013. After Ecology's review, Grant PUD shall incorporate Ecology's comments into the final report by September 30, 2013.
- c) Performance Criteria. If the turbines do *not* meet the performance criteria in Table 1, Grant PUD shall investigate modifications to address the performance issue(s) for Ecology's review. If, after review and/or implementation of these modifications, the turbines still do not meet the performance criteria in Table 1, Grant PUD shall perform a feasibility study and subsequent implementation, in accordance with Subsection 12.

5) Wanapum Dam Year 8 Study

Six months prior to Year 8 after license issuance, Grant PUD shall provide to Ecology a written evaluation of whether the dam is fully in compliance with TDG standards or is reasonably expected to be fully in compliance by Year 10 of the license. If standards are not fully met or expected to be fully met by Year 10, Grant PUD shall prepare and submit to Ecology a feasibility study as described in Subsection 12 below, prior to the beginning of Year 8, followed by preparation of an implementation plan and implementation of identified measures, as needed.

6) Priest Rapids Dam Bypass Installation and Studies

- a) Investigation and Installation. Grant PUD is to investigate design options, including computational and model studies, and install and complete the bypass facilities by December 31, 2010. Modeling calculations provided by Grant PUD in Table 1 are based on an assumption that the fish bypass facility will pass 40 kcfs at optimum operating capacity. If the operation is to be less than 40 kcfs, Grant PUD shall incorporate measures to offset any resulting increases in TDG, subject to Ecology review and approval.

- b) Field Study. Within one year following construction of the bypass, Grant PUD shall complete a short-duration field study of controlled operating conditions to quantify the TDG exchange associated with the bypass channel chute at Priest Rapids Dam, as described in Subsection 8 below. Grant PUD shall provide a draft study plan to Ecology for review by December 31, 2010 and a final study plan, incorporating Ecology's comments, by March 30, 2011. The draft report shall be provided by October 30, 2011 and the final report, incorporating Ecology's comments, by December 31, 2011.
- c) Performance Criteria. If the bypass does *not* meet the performance criteria in Table 1, Grant PUD shall conduct a feasibility study with subsequent implementation in accordance with Subsection 12.

7) Priest Rapids Year 5 Study

Six months prior to Year 5 after license issuance, Grant PUD shall provide to Ecology a written evaluation of whether the dam is fully in compliance with TDG standards or is reasonably expected to be fully in compliance by Year 10 of the license. If standards are not fully met or expected to be fully met by Year 10, Grant PUD shall prepare and submit to Ecology a feasibility study, as described in Subsection 12 below, prior to the beginning of Year 5, followed by preparation of an implementation plan with implement as needed.

8) Content of Bypass Studies and Reports

- a) TDG Study. After construction of the Bypass Facility, Grant PUD shall, in accordance with the above schedule, complete a short duration field study of controlled operating conditions to quantify the TDG exchange associated with the bypass channel chute. The purpose of this study is to provide details regarding TDG production by the bypass channel chute and entrainment of powerhouse water into the spillway at the FMS. Information collected during the short-term fixed array studies would provide the basis for interpreting data routinely collected at FMSs located above and below Wanapum Dam and to evaluate actual performance with engineering and model predictions in Table 1.
- b) Fish Passage and Survival Studies. Grant PUD shall consult with the PRFF and PRCC to identify and implement appropriate studies to evaluate fish passage and survival.
- c) Report. Grant PUD shall provide Ecology with a summary of the results of the TDG study in accordance with the above schedules. The summary shall identify any situations where the management activities related to meeting TDG criteria are impacting the achievement of fish passage or survival objectives. If the fish passage facility does not meet the calculated TDG levels in Table 1 or it detracts from achieving the dam passage survival standard, the report shall include proposed modifications to the design that address the performance issues identified in the study. A draft of the summary shall be submitted to PRFF and PRCC for consultation. Grant PUD shall provide the summary and results of the consultation to Ecology.

9) Content of Turbine Studies and Reports

- a) TDG. At a minimum, Grant PUD shall collect the following information on TDG. Additional information will be required by Ecology as part of this study.

- **Spill.** During the fish spill season, compile data collected from the FMSs in the forebay and tailwater of the dam and at the tailrace monitoring location. Transect studies may be needed as well.
 - **Turbine-Generated TDG.** Perform a transect study to evaluate TDG across the powerhouse channel and at the tailrace monitoring station during periods when the dam is not spilling. During the study, the turbines shall be operated between minimum and maximum capacity within the cavitation limits and normal operating elevations. The test shall be designed to determine whether the new turbine will materially affect TDG during normal operations.
- b) **Fish Survival.** Develop and implement a fish survival study and final report, in consultation with the PRCC and PRFF, to determine whether the survival for migrating smolts transported through the turbines is equivalent to or better than survivals associated with the previous units.
- c) **Report.** The report shall include the results of both the TDG studies and the fish survival study.

10) Compliance Monitoring

- a) **Compliance Monitoring Locations for Forebay and Tailrace.** Grant PUD shall measure compliance with the TDG criteria at the FMS in the forebays of the Priest Rapids and Wanapum dams, and tailwaters of Wanapum and Priest Rapids dams. For Wanapum dam, the tailrace and 110% FMSs shall be located 2000 feet downstream of the dam. For Priest Rapids dam, the tailrace and 110% FMS shall be located 1500 feet downstream of the dam. If monitoring for TDG is not feasible in these locations, as demonstrated by Grant PUD and approved by Ecology, then Grant PUD shall identify alternative monitoring locations, subject to approval by Ecology. TDG monitoring may rely on the regression relationship (indexing) between the FMS locations and beginning of the compliance area below each development. Grant PUD shall, within one year after issuance of the New License, propose a method and schedule for Ecology's approval for establishing the new FMSs, with indexing as needed, and implement in accordance with that schedule.
- b) **Priest Rapids Dam Downstream Interim Compliance Point.** The Pasco site (FMS RM 329.1) shall serve as an interim compliance point (until an alternate location is identified and approved) for the 115% criterion defined in the water quality standards as the "forebay of the next dam downstream" for the Priest Rapids dam. This location was chosen to measure mixed river gas conditions before dilution or concentration with the waters of the Snake River. This site is currently maintained by the next downstream operator (Corps). If no alternative location is found, Grant PUD shall develop a contingency plan for access, maintenance, and data management for the site, in the unlikely event the Corps will no longer maintain the Pasco FMS.
- c) **QA/QC.** Grant PUD shall maintain a TDG monitoring program at its FMS locations. The TDG monitoring program shall be at least as stringent as the quality assurance/quality control (QA/QC) calibration and monitoring procedures and protocols developed by the USGS monitoring methodology for the Columbia River.
- d) **Frequency.** Measurements shall be made hourly at the FMSs throughout the year.

11) Periodic Reporting

- a) Hourly data. Hourly TDG information at the FMS shall be made available electronically to the public as close to the time of occurrence as technology will reasonably allow.
- b) Notification. Grant PUD shall notify Ecology within 48 hours of the beginning of any period of spill for fish. The initial notification may be electronic or written.
- c) Annual Report. By October 31 of each year, Grant PUD shall provide Ecology with an annual summary of the results of the Priest Rapids Project spill and TDG management activities for the previous year. This report shall include:
 - flow and runoff descriptions for the spill season;
 - spill quantities and duration;
 - quantities of water spilled for fish versus spill for other reasons for each project;
 - data from the physical and biological monitoring programs, including:
 - a summary of exceedances of the values shown in Table 1 (or other updated values) for each dam,
 - causes of the exceedances, and
 - a description of what was done to correct the exceedance;
 - progress on TDG implementation measures; and
 - monitoring and compliance for fish passage efficiency and survival under the Salmon Agreement and as otherwise required for non-Covered Species under this Certification.
- d) Fish Survival Reports. Grant PUD shall provide periodic updates to Ecology on progress made to attain the dam passage survival objective under the BiOp Amendment and shall provide to Ecology a copy of the annual and triennial progress and evaluation reports prepared pursuant to the BiOp.
- e) Gas Abatement Plan (GAP). A draft GAP shall be submitted to Ecology annually for review by October 31; Ecology's comments shall be incorporated in the final GAP by February 1 of the relevant year. The GAP shall be revised annually to reflect any of the changes required in accordance with this Certification (e.g., an Implementation Plan; see Subsection 12). The GAP shall include information on any new or improved technologies. The GAP shall be accompanied by an up-to-date operations plan, a fishery management plan, a physical monitoring plan, and a biological monitoring plan (e.g., for gas bubble trauma). The plan should include results of any survival studies for the previous year (per Subsection d above).
- f) Compliance GAPs. Upon attainment of compliance with the TDG standards during non-fish spill season and the special TDG standards during fish spill, beginning in the year of compliance and every ten years thereafter, an updated GAP shall be prepared, and include, in addition to information on any new or improved technologies, a review of reasonable and feasible gas abatement options to further incrementally reduce TDG production. If any reasonable and feasible measures are identified, an implementation plan shall be provided to Ecology for review and approval, and implemented, in accordance with Subsection 12.

12) Feasibility Study and Implementation

- a) Feasibility Study. The feasibility study shall identify all potentially reasonable and feasible measures that could be used to meet standards or, if meeting the standards is not attainable, then to achieve the highest attainable level of improvement. A detailed analysis of each measure examined shall be provided. The feasibility analysis shall include evaluation of alternatives to eliminate or substantially reduce spill resulting from under-utilization of powerhouse capacity.
- b) Implementation Plan. Based on the results of the study, an implementation plan shall be prepared, which shall include a comprehensive, robust strategy for achieving compliance with TDG on as accelerated a schedule as is practicably achievable. After review and approval, including any needed modification, of the implementation plan by Ecology, Grant PUD shall develop the engineering design, as needed, for the modifications proposed to achieve compliance or achieve the highest attainable improvement.
- c) Implementation. The feasibility study, implementation plan, and implementation measures shall be completed on as accelerated a schedule as is practicably achievable, as approved by Ecology.
- d) Incorporation into GAP. The Ecology-approved implementation plan(s) are considered to be conditions of the GAP and shall be incorporated into, and implemented under, the next annual GAP under Subsection 11.

13) Compliance Actions After Year 10

- a) Compliance with Numeric Criteria. If prior to the end of Year 10, Grant PUD has demonstrated to Ecology's satisfaction that the Project is able to meet and continue to meet state TDG numeric criteria consistently with the provisions of this Certification, Ecology will consider the compliance schedule established herein to have been successfully concluded with respect to TDG special conditions numeric criteria and will consider make any appropriate changes to reduce or ease the burden of reporting and monitoring requirements.
- b) Non Compliance with Numeric Criteria. If Grant PUD has not demonstrated that it will consistently meet the TDG numeric criteria at the FMSs after Year 10, Grant PUD shall prepare an updated and revised feasibility study and implementation plan in accordance with the procedures in Subsection 12. Ecology reserves the right to require additional measures and use all available compliance tools, including penalties, as appropriate.

6.5 TEMPERATURE

1) Monitoring

The Priest Rapids Project shall comply with all relevant and applicable state water quality standards and provide a temperature monitoring program through a QAPP developed under the conditions described in Subsection 6.7. However, until (1) such time that EPA approves a TMDL which establishes a project temperature allocation less than 0.3°C, or (2) if one is not timely approved, Ecology establishes such allocation by order, or (3) a new regulation establishes a different standard, the project allocation of 0.3°C shall apply when temperatures are above 18°C (above the Priest Rapids dam) or 20°C (below the Priest Rapids dam).

2) Temperature Modeling

In the sixth year after the new license takes effect, Grant PUD shall run the MASS1 model to evaluate the Project compliance with temperature standards with the data collected in the first five years of the license. Grant PUD shall evaluate, as feasible, the causes of any modeled exceedances. The PUD shall provide a report to Ecology summarizing the results of the ten years of monitoring and modeling (first five years of the license plus five previous years). The input data, modeling, and results shall be subject to a peer review and review by Ecology in a draft report submitted six months prior to the final report is due. Grant PUD shall provide the final report to Ecology in Year Seven.

Ecology may order further modeling or accuracy analysis be done in additional years. Any further temperature modeling of waters within the Project area shall use the best available scientific information, methods, and analysis that are generally accepted in the scientific community for modeling impounded and open-river conditions.

3) Evaluation

Upon receipt of the report in Year 6, Ecology will evaluate whether the project is causing or is likely to cause increases over 0.3°C or is causing or is likely to cause increases in violation of the allowance provided by regulations when temperatures are above 18°C or 20°C. If Ecology so determines, it will order Grant PUD to conduct an evaluation, subject to peer review, of any reasonable and feasible measures that Grant PUD may take to eliminate or reduce such events. Such evaluation shall identify all potentially reasonable and feasible alternatives to eliminate or reduce such increases, the effectiveness and costs of such alternatives, and the potential biological benefits of the temperature reduction. Upon review of such evaluation, Ecology will determine whether any measures are reasonable and feasible to implement, and order any further studies or implementation actions as appropriate. Any implementation actions will use an Adaptive Management approach.

4) Temperature TMDL

Ecology anticipates that the EPA will issue a temperature TMDL for the Columbia River at some future date. Where they are more protective, provisions of the temperature TMDL and implementation plans relevant to Priest Rapids Hydroelectric Project and its operations, including specified time frames for implementing improvement measures, as specified in a future order of Ecology, shall supersede the conditions of this Order. If a TMDL is not timely approved, Ecology reserves its right to establish such allocation by order. Such order will set forth the process for evaluating reasonable and feasible measures to comply with or reduce excursions from the allocation, and following that, the process to implement selected improvement measures and/or, if justified, modify the applicable standard through a use attainability analysis or other process.

Ecology may direct Grant PUD to cease or modify any measure determined to impair the achievement of any TMDL Load Allocation for the Project for temperature or that does not contribute to achieving a Biological Objectives for the Project.

6.6 LOCALIZED PROJECT EFFECTS

Grant PUD shall monitor and study the following parameters, *in accordance with the plan development and procedures of Section 6.7.*

1) DO, pH and Temperature

- a) Long-Term Monitoring. Grant PUD shall continue to monitor pH and DO in the Project for the term of the New License. Monitoring shall be done on a periodic basis, as specified in the Ecology-approved Quality Assurance Project Plan (QAPP), per Section 6.7.
- b) Short-Term Monitoring. Within one year of license issuance, Grant PUD also shall develop and implement a short-term monitoring study for DO, pH and temperature in shallow water habitats, including macrophyte beds, in the reservoirs. Grant PUD shall monitor to determine if the values in the numeric criteria for DO, temperature and/or pH are met in these areas. If measurements reveal values to don't meet the numeric criteria, Grant PUD shall develop a plan, in consultation with the PRFF and PRCC, to determine the impact on aquatic habitat and associated biota and the Project's contribution. If monitoring shows that the Project causes negative impacts to aquatic life, Grant PUD shall, in consultation with the PRFF, identify any actions that are reasonable and feasible to protect aquatic life that may be adversely affected from such Project effects, and develop and implement an appropriate action plan, subject to review and approval by Ecology. Grant PUD shall implement such plan in a timely manner.

2) Fish Ladder Temperature Studies

Grant PUD shall address localized temperature conditions identified at the fish ladders by modifying the fish ladder water supply as described in the FLA Exhibit E-4 pp. 123-133 and Exhibit E-3. Upon issuance of the New License, Grant PUD shall, in consultation with Ecology, the PRCC and PRFF, begin to develop a plan to monitor temperatures above, below and within the fish ladders at the two dams. The plan shall be completed, and the monitoring begin, by spring of Year 2, with the results provided by December of that year. If the results show that the daily maximum or daily average temperatures in the ladder are higher than above or below the ladder, Grant PUD shall, again in consultation with Ecology, the PRCC and PRFF, develop a plan to address elevated temperatures. The plan shall be completed by December of the following year, and implemented in accordance with the Ecology-approved schedule.

3) Fish Spawning, Rearing and Acclimation

For any fish operation with potential impacts on water quality (e.g., facilities for spawning, rearing or acclimation, including net pens) owned by Grant PUD or whose operation and/or maintenance is funded in whole or part by the PUD, and required as a part of the FERC license, the PUD shall obtain and remain in compliance with an up-to-date National Pollutant Discharge Elimination System (NPDES) permit or similar state waste discharge permit, as required by Ecology.

4) Aquatic Invasive Species (AIS)

Within one year following the effective date of the New License, in consultation with the PRFF, Grant PUD shall develop and begin implementation of an AIS Control and Prevention Plan (Prevention Plan) to monitor and manage invasive species within the Project boundary. The

Prevention Plan shall be coordinated with the Ecology's Freshwater Aquatic Weed Control Program and the WDFW Aquatic Nuisance Species Program. The Plan shall focus on prevention by addressing the pathways for invasion of aquatic invasive flora and fauna. The Plan shall include, but not be limited to, the following components:

- a) Education. Identify boat access points and distribute educational materials for distribution during the peak boating season (May 1 - October 30 each year) to educate boaters, conduct voluntary boater surveys, direct voluntary boat inspection demonstrations, and document the findings. Actions shall include:
 - Expand distribution of educational materials and increase signage postings to increase boater awareness of dangers of spreading AIS, including the methods one can take to decrease the spread of AIS (e.g., clean the weeds off the boat and drain the live well before going to a new waterbody);
 - Explain to boaters at boat ramps the requirements of the AIS program and conduct voluntary boat inspection demonstrations for the purpose of identifying and removing aquatic invasive species from boats and trailers; and
 - Hand out prepared surveys to boaters, asking for their participation in filling out and submitting the surveys, and explaining the purpose and benefit of the survey;
- b) Implementation. Measures to prevent the movement of AIS into and out of Project boundary waters via recreational watercraft;
- c) Study. Descriptions of existing control, monitoring measures, and potential methods for mitigating impacts of AIS infestations;
- d) Prevention. Proposed additional prevention, control, and containment measures necessary to prevent infestations and minimize the impact of AIS;
- e) Monitoring. An implementation schedule and provisions for periodic monitoring to track progress toward meeting the goals of the plan.
- f) Rapid Response. An Early Detection and Rapid Response component to include the following elements:
 - Reporting the type, location, and extent of AIS infestations within the Project boundary.
 - Measures to identify new introductions and monitor the spread of existing AIS.
- g) Reporting. By March 1 of each year, Grant PUD shall submit an annual report to WDFW and Ecology to include: the number of boats inspected; the number of boats detected carrying non-native aquatic invasive flora or fauna; a description of new infestations of AIS; a description of existing infestations; a summary of progress made in reducing or eliminating infestations; recommendations for modifying the plan as needed, and information regarding boat travel to and from other water bodies.

5) **Stormwater**

Grant PUD shall comply with state stormwater requirements as they apply to the Project. Provisions shall be made for periodic monitoring of metals, machine oils and other toxic constituents in stormwater runoff at each dam.

6.7 WATER QUALITY MONITORING

1) QAPPs

Within one year after New License is issued, Grant PUD shall prepare a water quality monitoring and quality assurance project plan (QAPP) for each parameter to be monitored and submit the plans to the public for comment and to Ecology for review and written approval. The QAPPs shall follow the Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies (July 2004 Ecology Publication Number 04-03-030) or its successor. The QAPPs shall contain, at a minimum, a list of parameter(s) to be monitored, a map of sampling locations, and descriptions of the purpose of the monitoring, sampling frequency, sampling procedures and equipment, analytical methods, quality control procedures, data handling and data assessment procedures, and reporting protocols.

2) Updates

Grant PUD shall review and update the QAPPs annually based on a yearly review of data and data quality. Ecology may also require future revisions to the QAPP based on monitoring results, regulatory changes, changes in project operations and/or the requirements of TMDLs. Implementation of the monitoring program shall begin as soon as Ecology has provided the PUD with written approval of the QAPP. Changes to the QAPP need written approval by Ecology before taking effect. Ecology may unilaterally require implementation of the QAPP.

3) Reporting Results

Water quality monitoring results, along with a summary report, shall be submitted by March first of each year to the Department of Ecology, Eastern Region Office. Ecology will use the monitoring results to track the project's progress toward meeting and remaining in compliance with state water quality standards.

4) Duration

The monitoring required under this Certification shall continue throughout the life of the New License and any subsequent renewals of that license, unless modified by Ecology.

6.8 CONSTRUCTION ACTIVITIES

- 1) While the existing project is not a construction site, all development or mitigation projects proposed under relicensing must meet the following conditions. These conditions do not supersede separate conditions required for turbine replacement.
- 2) For future construction activities requiring a separate 401 certification (e.g., those requiring an individual 404 permit from the Army Corps of Engineers), Grant PUD shall comply with all conditions in that additional 401 certification.
- 3) All water quality criteria as specified in WAC 173-201A apply to any construction work needed to implement development or mitigation projects required under the new FERC license.
- 4) Unless otherwise stated in another Section 401 certification (see above), the turbidity criteria (WAC 173-201A) may be modified to allow a temporary mixing zone during and immediately after

in-water or shoreline construction activities that disturb in-place sediments. A temporary turbidity mixing zone is subject to the constraints of WAC 173-201A, and is authorized only after the activity has received all other necessary local and state permits and approvals and after the implementation of appropriate best management practices (BMPs) to avoid or minimize disturbance of in-place sediments and exceedances of the turbidity criterion. The temporary turbidity mixing zone for waters with flows greater than 100 cubic feet per second (cfs) at the time of construction is 300 feet downstream of the activity causing the turbidity exceedances.

- 5) For all other future construction activities, a water quality protection plan (WQPP) shall be prepared and implemented for each project involving work in or near water. The WQPP shall include:
 - a) a copy of the Hydraulic Project Approval (HPA) per Ch. 75.20 RCW from WDFW for the project;
 - b) a description of all Best Management Practices (BMPs) to be employed for in and near-water work.
 - c) a plan for sampling and monitoring during construction;
 - d) a plan for implementing mitigation measures should a water quality violation occur; and
 - e) a written procedure for reporting any water quality violations to Ecology.

Grant PUD shall submit each WQPP to Ecology for review and written approval prior to starting work.

6.9 SPILL PREVENTION AND CONTROL

- 1) Discharge of oil, fuel or chemicals into state waters or onto land where such contaminants could potentially drain into state waters is prohibited.
- 2) Grant PUD shall keep records of the amounts of oil used on site for any oil-using components at each development. These records shall be made available to Ecology upon request.
- 3) Grant PUD shall comply with its most recent approved version of the Spill Prevention Control and Counter Measure (SPCC) Plan for the project and shall continue to provide Ecology, Eastern Region Office, Spills and Water Quality Programs, with copies of its most up-to-date versions.
- 4) Grant PUD shall coordinate spill response planning and efforts with other hydroelectric facilities on the Columbia River such as through its participation with the Columbia-Snake River Spill Response Initiative (CSRSPi). Grant PUD shall train employees in the proper response techniques and the proper use and deployment of equipment.
- 5) Activities causing distressed or dying fish, fish kills, or any discharge of oil, fuel, or chemicals into state waters, or onto land where such contaminants could potentially drain into state waters, are prohibited.
- 6) In the event of a discharge of oil, fuel or chemicals into state waters, or onto land where such contaminants could potentially drain into state waters, containment and clean-up efforts shall **begin immediately** and be completed as soon as possible, taking precedence over normal work. Clean-up shall include proper disposal of any spilled material and used clean-up materials.
- 7) Spills into state waters, spills onto land where contaminants could potentially drain into state waters, fish kills, and any other significant water quality problems, shall be **reported immediately** to the Department of Ecology Eastern Regional Office at (509) 329-3400 or to 1-800-258-5990.

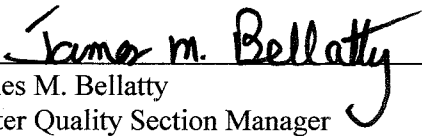
Notification shall include a description of the nature and extent of the problem, any actions taken to correct the problem, plus any proposed changes in operations to prevent further problems.

6.10 PENALTIES AND APPEALS

Any person who fails to comply with any provision of this Certification shall be liable for criminal and civil penalties as provided for under state and/or federal law.

This Certification may be appealed. The appeal must be filed with the Pollution Control Hearings Board, P.O. Box 40903, Olympia, Washington 98504-0903 within thirty (30) days of receipt of this Order. At the same time, the appeal must also be sent to the Department of Ecology, Eastern Regional Office, N. 4601 Monroe, Spokane, Washington 99205-1295. An appeal alone will not stay the effectiveness of this Certification. Stay requests must be submitted in accordance with RCW 43.21B.320. These procedures are consistent with Chapter 43.21B RCW.

Dated this 3rd day of April, 2007, at Spokane, Washington.



James M. Bellatty
Water Quality Section Manager
Eastern Regional Office
Department of Ecology

REFERENCES

- Anglin, D.R., Haeseker, S.L., Skalicky, J.J., Schaller, H., Tiffan, K.F., Hatten, J.R., Hoarth, P., Nugent, J., Benner, D. Yoskinaka, M. 2006. "Effects of hydropower operations on spawning habitat, rearing habitat, and stranding/entrapment mortality of fall Chinook salmon in the Hanford Reach of the Columbia River." Final Report. Columbia Fisheries Program Office, U.S. Fish and Wildlife Service. Vancouver, Washington.
- Athearn, James, 1999. Risk Assessment for Adult and Juvenile Fish Passage Facilities on the Mainstem Lower Snake and Lower Columbia Rivers Relative to a Potential Zebra Mussel Infestation. CENWD-NP-ET-WR
- Beamesderfer, R.C., J.C. Elliot, and C.A. Foster. 1989. Report A. Pages 5-52. *In*: A.A. Nigro [editor]. Status and habitat requirements of white sturgeon populations in the Columbia River downstream from McNary Dam. Annual Progress Report. Prepared for the U.S. Department of Energy, Bonneville Power Administration, Portland, OR.
- Beamesderfer, R.C., and T.A. Rien. 1993. Dynamics and potential production of white sturgeon populations in three Columbia River reservoirs. Report H. Pages 175-206 *In*: R.C. Beamesderfer and A.A. Nigro (eds.). Volume I, Status and habitat requirements of the white sturgeon population in the Columbia River downstream from McNary Dam. Final Report to Bonneville Power Administration, Portland, Or.
- BioAnalysts, Inc. 2002. "Movements of bull trout within the mid-Columbia River and tributaries, 2002-2003". Final Report. Prepared for the Public Utility No. 1 of Chelan County. Wenatchee, Washington. November 2002.
- BioAnalysts, Inc. 2004. "Movements of bull trout within the mid-Columbia River and tributaries, 2001-2004." Final Report. Prepared for the Public Utility No. 1 of Chelan County. Wenatchee, Washington. May 2004.
- Chelan Public Utility District. 2005. Rocky Reach White Sturgeon Management Plan. Attachment B, Chapter 3 of the Rocky Reach Comprehensive Plan, part of the Rocky Reach Settlement Agreement. FERC Project No. 2145.
- Columbia River Basin Lamprey Technical Workgroup (CRBLTW), April 2005. "Critical Uncertainties for Lamprey in the Columbia River Basin: Results from a Strategic Planning Retreat of the Columbia River Lamprey Technical Workgroup".
- Dauble, D.D., Hanrahan, T.P., Geist, D.R., and Parsley, M.J. 2003. "Impacts of the Columbia River hydroelectric system on mainstem habitats of fall Chinook salmon" *N. Am. J. Fisheries Management* 23:641-659
- Dauble, D.D. and D.G. Watson. 1990. "Spawning and abundance of fall Chinook salmon (*Oncorhynchus tshawytscha*) in the Hanford Reach of the Columbia River, 1948-1988". Pacific Northwest National Laboratory, Richland, Washington. Report to Bonneville Power Administration, Contract No. 1986BP62611, Project No. 198611800. 72 electronic pages. BPA Report DOE/BP-62611-16.
- Dauble, DD. And D.G. Watson, 1997. "Status of fall chinook populations in the mid-Columbia River, 1948-1992." *North American Journal of Fisheries Management* 17:283-300.

Duvall, D., June 2006. "Diel Spawning Behavior and Redd Site Fidelity by the Fall Chinook Salmon at Vernita Bar, Columbia River." Draft Copy. Grant PUD pub.

Ecology, June 2004. "Total Maximum Daily Load for Total Dissolved Gas in the Mid-Columbia River and Lake Roosevelt." Ecology Pub. No. 04-03-022. Pickett, P., Hueda, and M. Herold
Federal Register 63(111): 31647-31674

Final License Application (FLA). Grant PUD, October 2003. Includes:

Exhibit B, "Project Operation and Resource Utilization"

Technical Appendix E-3:

Juul 2003 (A)
Normandeau 2000 (B)
Perkins 2002 (C)
Brush and Juul 2003 (D)

Technical Appendix E-4

McMichael 2002 (B)
Pfeifer 2001 (D)
Stevenson 2003 (E)
McMichael 2003 (N)

Grant PUD, July 31, 2006. "2006 Vernita Bar Fall Chinook Spawning Study Plan." DRAFT.

Grant PUD, August 7, 2006. Letter to Ecology: "RE: Request for Information Relating to Flow Fluctuations in the Hanford Reach"

Gray, R.H. and D.D. Dauble 1977. "Checklist and relative abundance of fish species from the Hanford Reach of the Columbia River." Northwest Sci. 51:208-215.

Hatch, D. R., and B. L. Parker. 1996. Abundance monitoring for Columbia and Snake Rivers, pp. 34-56 in Jackson, A. D., P. D. Kissner, D. R. Hatch, B. L. Parker, M. S. Fitzpatrick, D. A. Close, and H. Li (eds.). Pacific lamprey research and restoration: Annual Report 1996. Report for U. S. Department of Energy, Bonneville Power Administration, Portland, Oregon.

Hoffarth, P., August 2006. "Evaluation of the Effect of Instream Flows on the Ecology of the Hanford Reach of the Columbia River, Relative to Spawning Habitat, Rearing Habitat and Entrapment/Stranding of Fall Chinook Salmon and Other Fish Species". DRAFT Study Plan.

Hoffarth, P., WDFW, July 2006. "2006 Juvenile Fall Chinook Salmon Protection Plan for the Hanford Reach of the Columbia River". Annual Report, Washington Department of Fish and Wildlife, Pasco, WA.

Independent Scientific Group (ISG). 2000. Return to the River: Restoration of Salmonid Fishes in the Columbia River Ecosystem. NWPPC Document 2000-12. Northwest Power Planning Council (NWPPC), Portland, Oregon.

Kraft, C. 1993. Zebra Mussel Update #16. A Newsletter produced by the Wisconsin Sea Grant Institute.

Langshaw, R. March 2006. "Spawning, Incubation and Rearing Period Operations for 2004-2005 under the Hanford Reach Fall Chinook Protection Program". Grant PUD.

- Moser, M.L., P.A. Ocker, L. C. Stuehnerberg and T.C. Bjornn. 2002. Passage efficiency of adult Pacific lampreys at hydropower dams on the lower Columbia River, USA. *Trans Am. Fish. Soc.* 131:956-965.
- Moursund, R. A., D.D. Dauble, and M. D. Bleich, 2000. "Effects of John Day Dam bypass screens and project operations on the behavior and survival of juvenile Pacific lamprey (*Lampetra tridentata*)" Prepared for the U.S. Army Corps of Engineers, Portland District by Pacific Northwest National Laboratory, Richland, WA.
- Moursund, R.A., R.P. Mueller, T.M. Degerman, and D.D. Dauble 2001. "Effects of dam passage on juvenile Pacific lamprey (*Lampetra tridentata*)". Prepared for the U.S. Army Corps of Engineers, Portland District by Pacific Northwest National Laboratory, Richland, WA.
- Moursund, R. A., R. P. Mueller, K. D. Ham, T. M. Degerman, and M. E. Vucelick. 2002. Evaluation of the effects of extended length submersible bar screens at McNary Dam on migrating juvenile Pacific lamprey (*Lampetra tridentata*). Prepared for the U.S. Army of Corps of Engineers, Portland District by Pacific Northwest National Laboratory, Richland, WA.
- Moursund, R. A., M. D. Bleich, K. D. Ham, and R. P. Mueller. 2003. Evaluation of the effects of extended length bar screens on migrating juvenile Pacific lamprey (*Lampetra tridentata*) at John Day Dam in 2002. Prepared for the U.S. Army of Corps of Engineers, Portland District by Pacific Northwest National Laboratory, Richland, WA.
- Mullan, J.W. 1984. Overview of artificial and natural propagation of coho salmon (*O. kisutch*) in the mid-Columbia River. Rept. No. FRI/FAO-84-4, USFWS, Leavenworth, WA.
- Nass, B., C. Sliwinski, K. K. English, L. Porto, and L. Hildebrand. 2003. Assessment of adult lamprey migratory behavior at Wanapum and Priest Rapids dams using radio telemetry techniques, 2001-2002. Report prepared for the Public Utility District No. 2 of Grant County, WA.
- Porto, L. and ten co-authors. 2003. White sturgeon investigations in Priest Rapids and Wanapum Reservoirs on the middle Columbia River, Washington, USA. Report prepared for Public Utility District No. 2 of Grant County. LLG Limited, Sidney, BC. License Application Technical Appendix E-4.F.
- R.L. & L. Environmental Services Ltd. 2000. White sturgeon investigations in Arrow Reservoir and Columbia River, BC., 1999 study results. Report prepared for B.C. Ministry of Environment, Lands and Parks, Nelson, B.C. R.L. & L. Report No. 754F: 38 p. + 4 app.
- Stark, G. M., and J. T. Dalen. 1995. Pacific lamprey (*Lampetra tridentata*) passage patterns past Bonneville Dam and incidental observations of lamprey at the Portland District Columbia River dams in 1993. Report for U. S. Army Corps of Engineers, Bonneville Lock Dam, Cascade Locks, Oregon.
- USFWS 2002. Chapter 22, Upper Columbia Recovery Unit, Washington. 113 p. *In: U.S. Fish and Wildlife Service Bull Trout (Salvelinus confluentus) Draft Recovery Plan*. Portland, Oregon
- Washington Department of Fisheries and Washington Department of Wildlife (precursor to the Washington Department of Fish and Wildlife) and Western Washington Treaty Indian Tribes. 1993. 1992 Washington State Salmon and Steelhead Stock Inventory. Appendix Three, Columbia River Stocks. WDFW, Olympia, WA.

Weitkamp, D. May 17, 2004. Memo to Cliff Sears, Grant County PUD: "Priest Rapids Hydroelectric Project Effects on Dissolved Oxygen, pH and Turbidity and Aquatic Plant Growth" Parametrix Engineers, Kirkland WA

Whiley, T., June 10, 2004. "Review of Data Output from Battelle Model". Ecology Memorandum.

APPENDIX A

Interagency Agreement

**Between
Washington State
Department of Ecology
And
Washington State
Department of Fish and Wildlife**

**Regarding Coordination on
Priest Rapids Hydroelectric Project**

November 2005

**INTER-AGENCY AGREEMENT
Between
WASHINGTON STATE
DEPARTMENT OF ECOLOGY**

And

**WASHINGTON STATE
DEPARTMENT OF FISH AND WILDLIFE**

**REGARDING COORDINATION ON
PRIEST RAPIDS HYDROELECTRIC PROJECT
November 2005**

THIS INTER-AGENCY AGREEMENT (IA) is entered by Washington State Department of Ecology (Ecology) and Washington State Department of Fish and Wildlife (WDFW) (collectively the "Agencies") and describes the commitments and procedures to enhance coordination and cooperation between the agencies with respect to protecting water quality and aquatic species of the State of Washington affected by the Priest Rapids Project.

I. PURPOSE AND SCOPE

A. Ecology expects to issue a section 401 water quality certification (33 USC sec 401) to Public Utility District No. 2 of Grant County, Washington (Grant PUD) in the context of Grant PUD's application to the Federal Energy Regulatory Commission (FERC) for a new long-term license for operation of the Priest Rapids Hydroelectric Project (FERC No. 2114). The 401 certification will assess and address the impacts to water quality resulting from the operation of the Priest Rapids Project and establish conditions to assure compliance with water quality standards, including the protection of designated uses of fish and other aquatic species. In particular, the section 401 certification will require actions or conditions for the protection of salmonids, Pacific lamprey, white sturgeon, bull trout, resident fish, and nonfish aquatic species affected by the project. Barring any unforeseen developments, WDFW and Grant PUD will enter one or more multi-party Settlement Agreements in late 2005 or early 2006. The Settlement Agreement(s) will contain the mutually agreed obligations of Grant PUD for the protection, mitigation, and enhancement of aquatic resources and water quality to be included in the FERC license for the project. Ecology anticipates that substantive and procedural commitments to protect, mitigate impacts to, and enhance aquatic resources, contained in the Settlement Agreement(s), will be incorporated as terms of the section 401 certification, along with other conditions regarding fish resources that may be necessary to protect and maintain the fish and aquatic resources that constitute a designated or existing use under Washington water quality standards.

B. This IA is intended to provide a process for Ecology and WDFW to share technical expertise with respect to compliance with the terms and conditions of the Settlement Agreement(s) and the section 401 certification as relate to the protection of water quality and aquatic species affected by the project. In general, this IA provides that WDFW, as the agency with greater expertise on Columbia River fisheries and aquatic resources, will monitor Grant PUD's implementation of the protection, mitigation, and enhancement measures for salmonids, bull trout, sturgeon, lamprey, and resident fish and periodically report and consult with Ecology on these matters, as provided below. This assistance is intended to minimize the duplication of efforts, and recognizes that WDFW has certain expertise that Ecology does not currently possess. Ecology, as the agency with water quality authority, shall coordinate its implementation of water quality improvements with WDFW. This IA is designed to identify how

responsibilities are to be shared. This agreement does not in any way limit, delegate, or diminish Ecology's legal authority, including but not limited to Ecology's authority to enforce or modify the section 401 certification or the Settlement Agreement(s), issue penalties, or seek any other relief.

II. CRITERIA FOR USE

Priest Rapids Settlement Agreement(s) and Section 401 Certification. This IA shall serve to assist the implementation of the section 401 certification and the Settlement Agreement(s) via collaboration between WDFW and Ecology. However, if either WDFW or Ecology fails to enter or withdraws from the Settlement Agreement(s), this IA shall remain in place, unless formally abrogated under section IV.

WDFW shall:

1. Provide technical support to Ecology with respect to compliance with the terms and conditions of the Settlement Agreement(s) and the section 401 certification that address the protection of fish and other aquatic species affected by the project.
2. Provide written progress reports and, upon request, periodic oral briefings to Ecology regarding this subject. These shall be submitted at a minimum annually, by February 15th of each year following the year of implementation.
3. In the event that urgent problems may arise regarding fish or other aquatic species covered by the Settlement Agreement(s) or 401 certification, promptly notify Ecology's primary contact and keep Ecology informed of actions being taken to address any such problems. WDFW shall to the extent feasible coordinate efforts to address such problems with Ecology.
4. Provide technical expertise for the modification of compliance measures, biological objectives, or water quality standards applicable to the project, if needed.
5. Provide litigation support related to the project in the form of technical advice and expert witnesses with respect to fish and other aquatic species.

Ecology shall:

1. Respond promptly to WDFW requests for coordination on fish management and water quality issues under the Priest Rapids Settlement Agreement(s) and the section 401 certification.
2. Consult with WDFW on Ecology decisions relating to the project that specifically address or have potential to affect fish and other aquatic species.
3. Coordinate implementation of water quality improvements with WDFW.
4. Provide written progress reports and, upon request, periodic oral briefings to WDFW staff regarding compliance with the section 401 conditions. These shall be submitted at a minimum annually, by February 15th of each year following the year of implementation.

Both Agencies shall:

1. Designate a primary contact for purposes of this Interagency Agreement. This person shall be the one to whom notices are provided.
2. Work together to ensure consistent application of the Settlement Agreement(s) and the section 401 certification with regard to the protection of water quality, fish, and other aquatic species.
3. Generally provide notice to and consultation with each other prior to taking any non-routine regulatory or compliance actions regarding areas covered by this IA. Specifically, it is

intended that the agencies will consult prior to taking action on new section 401 certification or hydraulic permit conditions or enforcement of existing conditions.

4. In the event that a dispute may arise with respect to the implementation of this agreement, the parties will meet to discuss the issue at the lowest possible levels. If such meetings are unable to resolve any issues satisfactorily, disputes may be elevated within the respective agencies, with final resolution, if needed, by agency directors.

III. REVISIONS

- A. Revisions to this IA shall be provided in writing, and agreed to and signed by both parties.
- B. Review of this IA shall occur at a minimum of every five years for updates.

IV. EFFECTIVE DATE AND TERMINATION

This IA is to be effective upon the date of last signature below. This IA contains all the terms and conditions agreed upon by the parties. No other understandings, oral or otherwise, regarding the subject matter of this IA shall be deemed to exist or to bind either of the parties hereto. This IA may be terminated by either party upon a minimum of thirty (30) days written notice to the other party.

IN WITNESS WHEREOF, the parties execute this IA:

WASHINGTON STATE

DEPARTMENT OF FISH AND WILDLIFE

WASHINGTON STATE

DEPARTMENT OF ECOLOGY

JEFF KOENINGS, WDFW Director

Date: _____

JAY MANNING, Ecology Director

Date: _____

APPENDIX B

TDG STUDY RESULTS

**Table of Predicted TDG Levels
for Various Gas Reduction Scenarios
at 90% Powerhouse Capacity and TDG Forebay Levels at Maximum (110%/115%).**

TDG Reduction Scenario	September – March ¹	September – March ¹	April-August, Forebay TDG ²	Assumptions used for 2a. ²	April-August ²	Assumptions used for 3a. ²	April-August ²	Assumptions used for 4a. ²
	1a. Total river flow project can pass without going above 110% spill cap (kcfs)	1b. % of time the 110% TDG standard is met, based on % of time river flows are below 110% spill cap (as defined in 1a)	2a. Predicted TDG at next downstream forebay (%TDG)	2b.Qsp: QPH; Q/unit ³ (kcfs)	3a. Predicted TDG at downstream tailrace fixed site monitor (%TDG)	3b. Qsp: QPH; Q/unit ³ (kcfs)	4a. Predicted TDG at downstream tailrace fixed site monitor (%TDG)	4b. Qsp: QPH; Q/unit ³ (kcfs)
Wanapum Dam								
Without deflectors (prior to 2000)	158.4	95.1	125.0	123; 141; 15.7 ⁴	126.3	123; 141; 15.76	126.3	123; 141; 15.7 ⁴
Existing Dam with deflectors (deflectors installed in 2000)	180.4	98.6	118.0	123; 141; 15.7 ⁴	120	128; 135; 15.1	125	164.5; 99.5; 11.1
Unit #11 Bypass	183.3	98.7	116.5	103 +20 Bypass; 141; 15.7 ⁴	120	124.8 +20 Bypass; 119.2; 13.2	125	161.9 +20 Bypass; 82.1; 9.1
Adv. Turbines	193.2	99	115.7	98; 166; 18.4	120	128.5; 135.5; 15.1	125	164.5; 99.5; 11.1
Bypass & Adv. Turbines	195.5	99.2	115.0	83 +20 Bypass; 161; 17.9	120	124.8 +20 Bypass; 119.2; 13.2	125	161.9 +20 Bypass; 82.1; 9.1
Priest Rapids Dam								
Existing Dam	171.4	97.6	115	109; 155; 17.3	121	107.4; 156.6; 17.4	125	171.6; 92.4; 10.3
By-Pass Facility	171.4	98.1	115	99 +40 Bypass; 125; 13.9	120	83.4 +40 Bypass; 140.6; 15.6	125	161.9 +40 Bypass; 62.1; 6.9
Bypass & Adv. Turbines	186.0	98.9	115	99 +40 Bypass; 125; 13.9	120	83.4 +40 Bypass; 140.6; 15.6	125	161.9 +40 Bypass; 62.1; 6.9

Notes:

- 1 Forebay TDG at 110%.
- 2 Forebay TDG at 115% flows at 7Q10 (264 kcfs), and one turbine down (project operating at 90% of capacity.)
- 3 Qsp = Total spillway flow; QPH = Total powerhouse flow; Q/unit = flow per turbine unit; all values in kcfs.
- 4 Existing turbine flows at Wanapum dam are limited to 15.7 kcfs per unit due to "fish-mode."

TOTAL DISSOLVED GAS MODELING ASSUMPTIONS

Various studies were the basis for the numbers provided in the table provided. The source documents are listed below. All the values in the tables were based on regression equations done by Mike Schneider of the USACE (Corps 2004); the Corps 2004 report was based on a combination of previous studies (e.g. Corps 2000, Corps 2001, and Corps 2003). Some of the values presented in the table came from Ross Hendrick of Grant PUD running the Corps 2004 regression equations based on revised conditions as requested by Ecology (e.g. revised Priest Rapids Bypass flows, "fish-friendly" flows, etc.). Measurements for the studies were made at the interim compliance sites.

The following assumptions were used for the results presented in the table and are the basis for establishing compliance goals and a compliance schedule. Most were either neutral or conservative (worst case) in their estimates of TDG levels.

- 1) TDG levels for fish spill were based on measurements taken from April through August.
- 2) TDG levels for non-fish spill were based on measurements taken from September through March.
- 3) For non-fish spill season, incoming TDG levels of 110% were used. This assumes that upstream projects are operating at the maximum TDG levels allowable under the standards, but not above the standards. This requires the Project to comply with conservative scenarios without mitigating for exceedances caused by another project.
- 4) For the fish-spill season, incoming TDG levels of 115% were used. Again, this assumes that upstream projects are operating at the maximum TDG levels allowable under the standards, but not above the standards. This requires the Project to comply with conservative assumption without mitigating for exceedances caused by another project.
- 5) Since TDG levels generally increase with the amount of flow (which increases spill), the highest flow below the 7Q10 (seven-day average maximum with a ten-year recurrence interval) level were used. A dam is not required to meet numeric criteria when the flows exceed the 7Q10 value; for both the Wanapum and Priest Rapids dams this flow is 264 kcfs.
- 6) It was also assumed that one turbine was not operating. Since there are ten turbines at each dam, one turbine down equals operating at 90% of capacity. This scenario is similar to all ten turbines operating at 90% of capacity (or a similar redistribution of flow used by the project, rather than spilled).
- 7) Bypass flows: The flow in the Wanapum dam bypass was estimated at 20 kcfs. The flow of the Priest Rapids bypass was estimated at 40 kcfs. These TDG levels created by flows through the bypass are, in general, less than the TDG levels that would be generated from an equivalent amount of spill. TDG levels generated by these flows are included in the table. If the flow through a bypass flows is decreased, then (using the same assumptions as above; i.e., 7Q10 flows and one turbine down), the bypass spill will be converted to overall spill, and thereby increase the overall TDG generated.
- 8) Measurement for the fish spill season for the 115% standard for the Priest Rapids dam was made at Pasco rather than the forebay of McNary dam (which is farther downstream.)
- 9) "Tailrace" measurements were made at the interim FMSs: Beverly Bridge (RM 412.2) for Wanapum and Vernita Bridge (RM 388.1) for Priest Rapids.

Sources:

- U.S. Army Corps of Engineers (Corps), 2004. Total Dissolved Gas Abatement Alternatives Evaluation for Wanapum and Priest Rapids Dam. U.S. Army Corps of Engineers, Engineer Research and Development Center, Dallesport, WA. Memorandum prepared for Public Utility District No. 2 of Grant County, Ephrata, WA.
- Corps, 2003. Total Dissolved Gas Exchange at Priest Rapids Dam, July 21-August 4, 2002. Draft Report prepared for Public Utility District No. 2 of Grant County, Ephrata, WA. License Application Technical Appendix E-3.E.
- Corps, 2001. Data Summary for Wanapum Dam Phase 5 Total Dissolved Gas Post-deflector Spillway Performance Test, April 26 – May 3, 2000. U.S. Army Corps of Engineers, Engineer Research and Development Center, Dallesport, WA. Report prepared for Public Utility District No. 2 of Grant County, Ephrata, WA.
- Corps, 2000. Data Summary for Preliminary Screening: Phase 2 Total Dissolved Gas Studies at Wanapum Dam, April 14-May 1, 1999. U.S. Army Corps of Engineers, Engineer Research and Development Center, Dallesport, WA. Report prepared for Public Utility District No. 2 of Grant County, Ephrata, WA.

APPENDIX C

BIOLOGICAL OBJECTIVES and IMPLEMENTATION MEASURES

for

Bull Trout

White Sturgeon

Pacific Lamprey

and

Native Resident Fish

BULL TROUT

DESIGNATED USE: Aquatic Life

BIOLOGICAL OBJECTIVES

- 1) Rearing and migration: No negative effects caused by the Project or Project operations.
- 2) Rearing and migration: Identify and mitigate any unavoidable Project effects on bull trout rearing or migration.

IMPLEMENTATION MEASURES

Grant PUD shall, in consultation with the PRFF, develop and implement a Bull Trout Monitoring and Evaluation Plan (BTMEP) within one year of issuance of the New License. The intent of BTMEP is to monitor and record bull trout observations at the Project. The BTMEP shall include an Adaptive Management element to address changing conditions (such as increasing numbers of bull trout observations at the Project or observed bull trout mortalities or injuries), assess on-going adverse effects, and investigate potential corrective actions, with the goal of achieving the bull trout Biological Objectives.

The following tasks are consistent with achieving the Biological Objectives and shall be incorporated into the BTMEP:

- Task 1: Continue operating the Project's adult upstream fishways and downstream juvenile bypasses.
- Task 2: Identify any adverse Project effects on adult and sub-adult bull trout passage through monitoring and evaluation.
- Task 3: Identify and implement appropriate measures to modify the upstream adult fishway, downstream juvenile bypass, or Project operations if adverse impacts on bull trout are identified.

The BTMP shall include but not be limited to the following Implementation Measures:

- 1) **Reporting.** By March 31 following issuance of the New License, and each year thereafter for the term of the New License, provide an annual report documenting bull trout observations within the past year and summarizing previous years' bull trout observations at the Project.
- 2) **Monitoring.** Record bull trout observations during the following activities: fish counting at fishways, including the counting and reporting of all bull trout life stages moving through Wanapum and Priest Rapids dams between April 15 and November 15 of each year for an experimental period of five years; juvenile bypass activities; gatewell dipping; turbine maintenance activities; fishway maintenance activities; hatchery activities; northern pikeminnow control program activities; and other related activities. If monitoring identifies potential Project effects, in consultation with the PRFF and the USFWS, appropriate actions shall be identified and implemented to modify upstream and downstream passage facilities or Project operations to mitigate the identified Project effects. The Monitoring Plan shall be updated, in consultation with the PRFF, every five years following issuance of the New License. The updated five-year plan should describe any apparent trends in bull trout abundance or

frequency of occurrences in the project area and shall address technological or methodological advances that may allow evaluation of project effects on bull trout.

- 3) **Pit Tagging and Sampling.** Subject to USFWS approval, genetic samples shall be taken of all bull trout over 70 mm handled as part of ordinary Project operations, for use in genetic analysis. Subadults shall be pit tagged when incidentally captured during on-going fish management and project operation activities during scheduled pit tagging operations. Detections shall be noted in the annual report.
- 4) **Adaptive Management.** The BTMEP shall include procedures to expand the scope of the BTMEP to include the development of measures to identify and mitigate Project effects on bull trout, should changing conditions at the Project such as increasing numbers of bull trout observations or observed bull trout mortalities or injuries occur or should technological or methodological advances occur that may allow evaluation of project effects on bull trout.

WHITE STURGEON

DESIGNATED USE: Aquatic Life and Harvest

BIOLOGICAL OBJECTIVES

- 1) Spawning and rearing in Project area¹: Natural reproduction potential reached via natural recruitment.
- 2) Spawning, rearing, and harvest in Project reservoirs: Increase the white sturgeon population in Project reservoirs to a level commensurate with available habitat.
- 3) Adult and juvenile upstream and downstream migration: Provide safe, effective, and timely volitional passage, if reasonable and feasible passage means are developed.
- 4) Until reasonable and feasible means for reestablishing natural production and providing support for migration are available, and recognizing that those means appear unlikely in the foreseeable future, the Biological Objective is sustaining a population at a level commensurate with available habitat through implementation of a white sturgeon supplementation program in the Project reservoirs. The supplementation program will provide an initial foundation for the Monitoring and Evaluation Program, which is designed to a) identify existing impediments to achieving the Biological Objectives, b) sustain the populations until the existing impediments can be corrected, and c) mitigate for population losses due to Project impacts. Timelines proposed for implementation of supplementation program implementation measures are reflected in the table below.

IMPLEMENTATION MEASURES

Grant PUD shall, in consultation with and upon approval of the PRFF, develop and implement a White Sturgeon Management Plan (WSMP) within one year of issuance of the New License. The intent of WSMP is to: (1) identify and address Priest Rapids project effects to white sturgeon; and (2) develop and implement "Implementation Measures" designed to avoid and mitigate for Project effects to white sturgeon. Adaptive Management shall be applied to resolve critical uncertainties.

The following Tasks are consistent with achieving the Biological Objectives and shall be incorporated into the WSMP:

- Task 1. Determine the effectiveness of the supplementation program in creating a sustainable white sturgeon population in the Project reservoirs based on natural production potential and adjust the supplementation program accordingly.
- Task 2. Determine the carrying capacity of available white sturgeon habitat in each reservoir.
- Task 3. Participate and cooperate in the development of any regional white sturgeon management effort initiated for the purpose of addressing flow fluctuation effects on the Hanford Reach white

¹ Within the geographic scope of the Environmental Analysis as defined by FERC in the FEIS for the Project (Section 3.2.1).

sturgeon population as a result of Project operations. If questions arise as to the appropriate level of participation and cooperation, Grant PUD shall request clarification from Ecology.

Task 4. Determine juvenile downstream passage survival.

The WSMP shall include but not be limited to the following Implementation Measures:

1) Reporting

By March 31 following issuance of the New License, and each year thereafter for the term of the New License, provide an annual report summarizing activities undertaken to identify and address impacts of the Project to white sturgeon, including results of those activities. This report shall include a compilation of information on other white sturgeon supplementation programs in the Columbia River Basin in order to assess whether the supplementation program being implemented at the Priest Rapids Project is: (i) consistent with other supplementation programs in the region; (ii) cost effective to implement at the Project; and (iii) whether improvements can be made which are appropriate to implement at the Project.

2) Supplementation Program

a) Broodstock Collection and Breeding Plan

- Following is a prioritized list of broodstock source options that shall be incorporated into a Broodstock Collection and Breeding Plan.
 - Collect brood stock from Project reservoirs.
 - Collect brood stock from nearby reservoirs (Wanapum, Priest Rapids, Rocky Reach, Rock Island, Wells, McNary).
 - Use excess juveniles from the Lake Roosevelt white sturgeon recovery effort.
 - Collect brood stock from the lower Columbia River.
 - Purchase juveniles from a commercial facility.
 - Trap and haul adult or juvenile sturgeon from the lower Columbia River.
- A white sturgeon supplementation program may include, but may not be limited to, the following implementation options.
 - Build new or retrofit existing hatchery facilities to accommodate brood stock, egg incubation and juvenile rearing.
 - Direct release into Project reservoirs juveniles reared at a commercial facility.
 - Direct release into Project reservoirs juveniles or adults trapped and hauled from the lower Columbia River.

3) Juvenile White Sturgeon Stocking

- a) Stock 6,500 yearlings annually in Wanapum Reservoir in Years 3, 4 and 5 to increase the reservoir white sturgeon population.

- b) Stock 3,500 yearlings annually in Priest Rapids Reservoir in Years 3, 4 and 5 to increase the reservoir white sturgeon population.
- c) Stock a total of 10,000 yearlings annually in the Wanapum and Priest Rapids reservoirs from Year 6 through the end of the term of the New License or as adjusted by Grant PUD, in consultation with the PRFF, through the Adaptive Management process consistent with monitoring and evaluation results.

4) Supplementation Program Monitoring and Evaluation

A Monitoring and Evaluation Plan shall include both a sampling program and an emigration rate assessment to determine: supplementation program effectiveness, carrying capacity for each reservoir, and reproduction potential for each reservoir.

- a. Sampling Program. Using active-tagged sturgeon, develop and implement a sampling program for the evaluation of survival rates, growth rates, fish distribution, habitat selection, habitat use, habitat availability, and habitat suitability. The program shall include the following:
 - Monitor to determine program effectiveness in Years 4, 5, 6, 8, and then every 3rd year for the term of the New License.
 - Monitor to determine each reservoir's carrying capacity in Year 3 through the end of the term of the New License.
 - Monitor to determine each reservoir's reproduction potential in Years 8, 9, 10, 13, and 18, and then every 3rd year for the term of the New License.
- b. Emigration Rate Assessment. In Years 4, 5, 6, 14, and 20, active-tagged sturgeon shall be used to assess the emigration rate of white sturgeon out of the Priest Rapids Project.

5) Adult and Juvenile Upstream and Downstream Passage

- a) In a timely manner, but no later than ten years following issuance of New License, determine juvenile white sturgeon emigration rates for the Project.

6) Adaptive Management

- a) The WSMP shall include provisions to resolve critical uncertainties to further achievement of white sturgeon Biological Objectives. In the event that adverse Project effects on white sturgeon spawning, incubation and rearing in the Hanford Reach are identified, the WSMP shall be amended to further investigate and quantify Project effects and to identify potential reasonable and feasible measures to mitigate such effects, taking into consideration the cumulative effects of the river system and using the adaptive management process. Draft plans for the investigation and evaluation shall be developed in consultation with PRFF, and proposed final plans submitted to Ecology for approval or modification.

- b) In the event that reasonable and feasible means for reestablishing natural production and providing support for migration become available, these measures shall be considered by the PRFF and the WSMP amended as appropriate for implementation.
- c) Grant PUD shall consult with the PRFF during the term of the New License to ensure that the juvenile white sturgeon stocking program, indexing program and associated use of active tags (with limited lives) are coordinated to most effectively meet the overall monitoring goals and schedule. Table C-1 demonstrates an estimated long-term schedule, subject to Adaptive Management by Grant PUD, in consultation with the PRFF, to coordinate release, survey, tagging, and monitoring activities. The table demonstrates an estimated long-term schedule, subject to Adaptive Management by Grant PUD, in consultation with the PRFF, to coordinate release, survey, tagging, and monitoring activities.

White Sturgeon Supplementation Program

New License Year	Collect Brood Stock ²	Release Fish in Reservoirs ²	Indexing ³	Track Marked Fish ⁴	Assess Natural Production ⁵
1					
2	X				
3	X	X			
4	X	X	X		
5	X	X	X	X	
6	X	TBD ²	X	X	
7	X	"		X	
8	TBD ²	"	X		TBD
9	"	"			"
10	"	"			"
11	"	"	X		
12	"	"			
13	"	"			"
14	"	"	X	X	
15	"	"			
16	"	"			
17	"	"	X		
18	"	"			"
19	"	"			
20	"	"	X	X	
21	"	"			
22	"	"			
23	"	"	X		
24	"	"			
25	"	"			
Repeat Years 23 to 25 through end of license					

² Collection of brood stock may include capture of mature adults from Project reservoirs, the mid-Columbia River reservoirs (including McNary) or Hanford Reach, the Snake, the lower Columbia River, or the Snake River where appropriate and reasonable. The initial source of brood stock will be determined in year one of the program and collection will begin in Year two.

² A total of 10,000 yearlings will be released in the reservoirs during each of the first three years. Total yearlings released in subsequent years will range from 0 - 10,000, based on the results of the indexing program. Hatchery fish will be acquired through purchase from a commercial hatchery, production from a hatchery or cooperative mid-Columbia hatchery, or other measures. Breeding plans for all options will be developed, in consultation with the PRFF.

³ Indexing will include monitoring of age, growth, habitat, survival, and condition factors of juvenile and adult sturgeon. Results will be used to determine future stocking rates, locations and timing. The frequency of indexing may be adjusted in consultation with the PRFF.

⁴ Active-tagged juvenile and adult sturgeon will be tracked to assess emigration, habitat use, and potential spawning locations.

⁵ Conduct spawning surveys, as recommended by the PRFF to identify natural production in the reservoirs. The PRFF may adjust surveys based on flow conditions or other data.

PACIFIC LAMPREY

DESIGNATED USE: Aquatic Life and Harvest

BIOLOGICAL OBJECTIVES

- 1) Overall Combined Goal: No Net Impact (NNI). Identify, address, and fully mitigate Project effects to the extent reasonable and feasible.
- 2) Adult Upstream and Downstream Migration: Provide safe, effective, and timely volitional passage (as defined by the PRFF).
- 3) Juvenile Downstream Migration: Provide safe, effective, and timely volitional passage (as defined by the PRFF).
- 4) Rearing: Avoid and mitigate Project impacts on rearing habitat.

IMPLEMENTATION MEASURES

Grant PUD shall, in consultation with the PRFF, develop, fund, and implement a Pacific Lamprey Management Plan (PLMP) within one year of issuance of the New License. The intent of PLMP is to: (1) identify and address Priest Rapids Project effects on Pacific lamprey; and, (2) develop and implement measures to mitigate for Project effects to lamprey, including consideration of structural modifications and operational changes found to be effective at improving Pacific lamprey survival and passage at other Columbia River projects, as applicable. Adaptive Management shall be applied to resolve critical uncertainties with the goal of achieving Pacific Lamprey Biological Objectives.

The following Tasks are consistent with achieving the Biological Objectives and shall be incorporated into the PLMP.

- Task 1: Identify and address Project effects on upstream and downstream passage of adult Pacific lamprey.
- Task 2: Identify and address Project effects on downstream passage of juvenile Pacific lamprey.
- Task 3: Identify and address Project effects on the reservoir habitat as used by juvenile Pacific lamprey.
- Task 4: Identify and implement measures to mitigate Project effects on Pacific Lamprey at the Priest Rapids Project.

The PLMP shall include but not be limited to the following Implementation Measures:

- 1) **Reporting**

By March 31 following issuance of the New License, and each year thereafter for the term of the New License, provide an annual report summarizing activities undertaken to identify and address impacts of the Priest Rapids Project on Pacific lamprey, including results of those activities. This report shall include a compilation of information on other Pacific lamprey passage and survival investigations and measures being undertaken in the Columbia River Basin in order to determine if adult and juvenile measures being investigated and/or implemented at the Priest Rapids Project are: (i) consistent with similar measures taken at other projects; (ii) appropriate to implement at the Priest Rapids Project; and (iii) cost effective to implement at the Priest Rapids Project.

2) Adult Upstream and Downstream Passage

- a) Maintain adult fishways to support adult Pacific lamprey passage. These fishways shall be maintained in a manner not inconsistent with anadromous fish passage criteria described in the annual Fishway Operations Plan and those criteria specified in the Anadromous Salmonid Passage Facility Guidelines and Criteria Plan (NOAA Fisheries) including future updates.
- b) Develop adult lamprey passage criteria that are not inconsistent with the anadromous fish passage criteria. Criteria will include consideration of success achieved at other Columbia River Basin projects and of Priest Rapids Project-specific conditions.
- c) Continue to operate and maintain fish count systems at the Priest Rapids Project to include counting adult Pacific lamprey (not inconsistent with methodologies used to enumerate salmonids and other fishes) migrating through the right and left bank fishways at both Priest Rapids and Wanapum dams. These count systems shall be upgraded as fish count systems technology becomes available, and is reasonable and feasible to implement at the Project.
- d) Within one year of issuance of a New License, develop, in consultation with the PRFF, and implement a comprehensive evaluation of adult lamprey passage of the Priest Rapids Project. A comprehensive evaluation shall ensure that any gaps in knowledge regarding Project effects on adult lamprey passage, not captured in adult lamprey passage evaluation completed by Grant PUD as part of its FLA proposal, shall be evaluated. Development of the adult lamprey passage evaluation shall include but not be limited to an inspection of the Project passage facilities by PRFF members. Within four years of license issuance Grant PUD should have a determination as to whether the FLA-proposed modifications significantly improve adult passage. If not, then Grant PUD shall develop and implement additional measures in consultation with the PRFF.
- e) Within two years of issuance of a New License and after consultation with PRFF, implement improvements to the junction pool and the diffusion gratings as identified in the FLA for Priest Rapids dam
- f) Within one year of completion of fishway modifications at Priest Rapids dam (diffusion gratings and junction pool, if implemented), implement an evaluation program, such as through the use of radio telemetry (or other appropriate technologies) to evaluate the effectiveness of fishway modifications on lamprey.
- g) Within seven years of issuance of a New License, implement all modifications identified for the adult fishways Project-wide to improve lamprey passage as identified per the FLA or as amended by the PRFF.

- h) Following implementation of identified fishway modifications, Project-wide, and all evaluation of these fishway improvements, begin investigation of the efficacy and advisability of reducing fishway flows at night during peak lamprey migration periods in an attempt to improve adult lamprey passage efficiency and reduce passage times, or as recommended by the PRFF.
- i) Following attainment of the Pacific Lamprey Biological Objectives, every 10th year during the term of the New License, or as recommended by the PRFF, conduct a monitoring and evaluation study of adult Pacific lamprey passage at the Project consistent with monitoring and evaluation required under Section 5(f) under Certification Conditions, using radio telemetry (or other appropriate technologies). However, if Ecology concludes following issuance of the Year Ten status report that a Pacific Lamprey Biological Objective has not been met (Section 5.3 [5.e] under Certification Conditions), Grant PUD shall continue to implement the Adaptive Management process as described in Section 5.3 (2) under Certification Conditions.
- j) Participate in regional studies and cooperate with other entities performing those studies when useful information may be obtained about project impacts to lamprey. For instance, when fish tagged under another study or studies enter the project boundary, participate in the study by monitoring and reporting on movement of tagged individuals within and through the project area.

3) Juvenile Downstream Passage and Reservoir Rearing

- a) In a timely manner, but no later than 10 years following license issuance, identify and mitigate Project effects on juvenile Pacific Lamprey with the intention of meeting juvenile lamprey passage criteria referred to in c) below.
- b) In a timely manner, but no later than 10 years following license issuance, determine juvenile Pacific lamprey presence/absence, habitat use, and relative abundance within the Priest Rapids Project.
- c) Develop juvenile lamprey passage criteria. Criteria will include consideration of a) success achieved at other Columbia River Basin projects and b) Project-specific conditions.
- d) Participate in regional studies and cooperate with other entities performing those studies when useful information may be obtained about Project impacts to lamprey. For instance, when fish tagged under another study or studies enter the Project boundary, participate in the study by monitoring and reporting on movement of tagged individuals within and through the Project area.

NATIVE RESIDENT FISH

DESIGNATED USE: Aquatic Life and Harvest.

BIOLOGICAL OBJECTIVES

- 1) Overall: Maintain native resident fish species diversity.
- 2) Harvest: Maintain harvest opportunities.

IMPLEMENTATION MEASURES

Grant PUD shall provide funds to track native resident fish species diversity and provide mitigation for impacts to and loss of resident fish and harvest opportunities by compliance with Parts A and B as set forth below. Mitigation is for reduced recreational fishing opportunities occurring on native resident fish species within the Project boundary. As described under Parts A and B below, Grant PUD shall provide funding for: (1) a goal of 137,000 pounds of trout to provide recreational fishing opportunities in area waters; and (2) monitoring native resident fish species within the Priest Rapids Project Area for the purpose of depicting trends in species abundance, distribution, and species presence-absence for those native fish species not specifically covered in focused management plans described elsewhere in this Certification.

PART A: Hatchery Infrastructure

Grant PUD shall provide Part A Funds (not to exceed \$1,500,000) to renovate the existing Columbia Basin Hatchery facility to ensure stable operations at current capacity for the term of license. Current capacity is 60,000-70,000 pounds of trout annually, which shall be credited to Grant PUD as mitigation for reduced recreational fishing opportunities occurring on native resident fish species.

Part A funds shall be applied to:

- Renovate existing water delivery system
- Renovate existing raceways
- Renovate hatchery building
- Renovate outbuildings, grounds, stand-by residences
- Purchase of tanker truck.

PART B: Resident Fish Monitoring and Trout Purchase

Grant PUD shall establish and administer a Part B Fund for resident fish monitoring and fish purchase in accordance with applicable provisions of Washington State law. Interest earned on the funds in the Fund shall remain in the Fund. No funds from the Fund shall be used to pay the routine expenses of the members of the PRFF, associated with their participation on the PRFF. Payments shall be calculated based upon 2003 dollars, annually adjusted per U.S. Dept of Labor, Bureau of Labor Statistics Consumer Price Index for the Western Region. Should this index become unavailable, then Grant PUD and WDFW shall identify a comparable index for use by the WDFW and approved by Ecology.

Grant PUD shall make contributions to the Fund annually on or before February 15th of each year in the amount of \$100,000 per year. Grant PUD shall manage the Fund according to generally accepted accounting standards.

Funds shall be used to purchase, produce, transport or otherwise obtain trout to meet the difference between trout production at Columbia Basin Hatchery (60-70,000 pounds) and the 137,000 pounds production goal. Trout purchased with the funds shall be stocked inside the Priest Rapids Project Area (Burkett Lake), as well as into area lakes within Grant County.

Funds from this account shall also be directed towards the monitoring of native resident fish species within the Priest Rapids Project Area. Specifically, these funds shall be used to conduct surveys and inventories of resident fish species within the Priest and Wanapum reservoirs at a frequency of not less than every five years. Data from these surveys shall be used to depict trends in species abundance, distribution, and species presence-absence for those native fish species not specifically covered in focused management plans described elsewhere in the Certification. The goal of the monitoring effort is to detect the presence or absence of large-scale changes in population attributes of the aforementioned native resident species not otherwise covered in species specific management plans. It is expected that funds spent on monitoring shall not be less than that needed to depict trends in species abundance, distribution and absence-presence, as determined on a technical basis by WDFW and approved by Ecology.

In summary, funds shall be applied to:

- Annual purchase or production of trout in the amount necessary to meet the production goal of 137,000 pounds of total annual trout plants. The number of pounds purchased with Part B may vary from year to year as the difference between Columbia Basin Hatchery annual production (60,000 -70,000 pounds) and the total annual goal of 137,000 pounds fluctuates
- Transportation costs associated with planting additional trout in Grant County
- Grant County lake rehabilitations necessary to ensure that trout plants provide high quality fishing opportunities
- Monitoring native resident fish species not otherwise addressed in species-specific management plans contained in the certification or New License
- Generating reports associated with monitoring efforts.

APPENDIX D

SUMMARY OF STUDIES AND REPORTS REQUIRED BY THIS CERTIFICATION

Plans and Reports Due Under this Certification

Note: This list may not be all inclusive.

Product Type	Description	Due Date	Section of Certification
Fish and Aquatic Resources (Section 6.2)			
Covered Species			
Plans, reports, etc.	Per Hanford Reach and Salmon agreements	Per Hanford Reach and Salmon agreements	6.2
Native Resident Fish			
Study Report	Associated with monitoring.	As needed.	Appendix C, Native Resident Fish
Bull Trout			
Report	Annual report documenting bull trout observations	By March 31 of each year during the term of the license.	Appendix C, Bull Trout
Pacific Lamprey			
Study Report	Monitoring and Evaluation study of adult Pacific lamprey passage at the Project	Every 10 th year during the term of the New License, or as recommended by the PRFF	Appendix C, Pacific Lamprey
Report	Annual report of past year's lamprey management activities at the Project, including a summary of past years' activities and a compilation of information of lamprey management activities at other Columbia Basin projects	By March 31 of each year during the term of the license.	Appendix C, Pacific Lamprey
White Sturgeon			
Study Report	Study to document spawning in the Hanford Reach and identify and evaluate Project operation effects on spawning and incubation success in the Hanford Reach	Within one year of license issuance.	Appendix C, White Sturgeon
Study Report	Study to evaluate Project operation effects on white sturgeon larvae and early-age juvenile rearing success in the Hanford Reach	Within one year of license issuance.	Appendix C, White Sturgeon

Product Type	Description	Due Date	Section of Certification
Report	Annual report of past year's sturgeon management activities at the Project, including a summary of past years' activities and a compilation of information of sturgeon management activities at other Columbia Basin projects	By March 31 of each year during the term of the license.	Appendix C, White Sturgeon
All Non-Covered Species			
Plan	Draft Pacific lamprey, white sturgeon, bull trout, and resident fish management plans	Within one year of effective date of the New License	6.2 5) b
Plan	Final Pacific lamprey, white sturgeon, bull trout, and resident fish management plans	Within eighteen months of effective date of the New License	6.2 5) b
Report	Year Five Biological Objectives Status Report	No later than August 30 of the fifth year following the effective date of the New License	6.2 5) c
Report	Year Ten Biological Objectives Status Report	No later than August 30 of the tenth year following the effective date of the New License	6.2 5) d
Report	If a determination of "Biological Objectives Not Met" is made: Biological Objectives Status Report	No later than August 30 of every fifth year for the term of the license following the Year Ten Biological Objectives Status Report, and such other years as Ecology determines	6.2 5) e
Electronic posting	If a determination of "Biological Objectives Met" is made: posting of annual monitoring results	No later than August 30 of every year for the term of the license following the Year Ten Biological Objectives Status Report	6.2 5) f
Report	If a determination of "Biological Objectives Met" is made: Biological Objectives Status Report	No later than August 30 of every tenth year for the term of the license following the Year Ten Biological Objectives Status Report	6.2 5) f

Product Type	Description	Due Date	Section of Certification
Hanford Reach Fall Chinook (Section 6.3)			
Study Report	Flow fluctuations	Within six months of the effective date of the license	6.3 5)
Draft study plan	Fall Chinook study plan	Six months after license issuance; to FCWG	6.3 6) b
Draft study plan	Fall Chinook study plan	One year after license issuance to Ecology	6.3 6) c
Notification	Funding	If applicable	6.3 6) d
Second draft study plan	Fall Chinook study plan	One year plus 120 days	6.3 6) e
Final study design	Fall Chinook study design	One year plus 240 days	6.3 6) f
Study report	Fall Chinook study report	Per study plan	6.3 6) g
Study Report	Measures to avoid, reduce or mitigate loss	Within three years of license issuance	6.3 7) a
Study Report	Measures to avoid, reduce or mitigate loss	Three years plus 150 days	6.3 7) a
Plan	Implementation plan	Within six months of Ecology's approval of report	6.3 7) b
Total Dissolved Gas (Section 6.4)			
Notification	Changes in operation	If and when Grant PUD considers modifications	6.4 1) e
Wanapum Dam			
Ecology review and approval	Changes to bypass operational flows	Operation less than 20 kcfs	6.4 3)

Product Type	Description	Due Date	Section of Certification
Draft study plan	Future Unit #11 Fish Bypass Facility	Dec 30, 2008	6.4 3) c
Final study plan	Future Unit #11 Fish Bypass Facility	March 30, 2009	6.4 3) c
Study	Future Unit #11 Fish Bypass Facility	June 30, 2009	6.4 3) c
Draft report	Future Unit #11 Fish Bypass Facility	October 30, 2009	6.4 3) c
Final report	Future Unit #11 Fish Bypass Facility	December 31, 2009	6.4 3) c
Feasibility analysis	Future Unit #11 Fish Bypass Facility		6.4 3) d; and 12
Draft study plan	Turbines	July 30, 2012	6.4 4) b
Final study plan	Turbines	Sept 30, 2012	6.4 4) b
Study and draft report	Turbines	August 30, 2013	6.4 4) b
Final report	Turbines	Sept 30, 2013	6.4 4) b
Study	Year 8 TDG compliance evidence	December 31 of Year 8	6.4 5)
Priest Rapids Dam			
Design and installation	Fish bypass facilities	December 31, 2010	6.4 6) a
Draft study plan	Fish bypass facilities	Dec 31, 2010	6.4 6) b
Final study plan	Fish bypass facilities	March 30, 2011	6.4 6) b
Draft report	Fish bypass facilities	October 30, 2011	6.4 6) b

Product Type	Description	Due Date	Section of Certification
Final report	Fish bypass facilities	December 31, 2011	6.4 6) b
Feasibility study	Fish bypass facilities	As needed	6.4 6) c and d
Study	Year 5 study	December 31 of Year 5	6.4 6) c
Study	Feasibility study	If needed	6.4 6) c and 12)
Other Conditions			6.4
Report	Indexing monitoring location	If needed, within one year after New License issuance	6.4 10 a)
Plan	Downstream monitoring site contingency	If needed	6.4 10 b)
Website or other technology	Hourly monitoring results	As soon as technologically feasible	6.4 11 a)
Notification	Spill	Within 48 hours	6.4 11 b)
Report	Annual results	October 31 of each year	6.4 11 c)
Reports	Fish survival under BiOp	Annual and triennial	6.4 11 d)
Draft Plan	Gas Abatement Plan (GAP)	October 31 each year for the first ten years; every ten years thereafter	6.4 11 e) and f)
Final plan	Gas Abatement Plan (GAP)	February 1 each year for the first ten years; every ten years thereafter	6.4 11 e) and f)
Temperature (Section 6.5)			
Plan	Monitoring	Annually	6.5 1) and 5.7

Product Type	Description	Due Date	Section of Certification
Study and draft report	Temperature modeling	Year 6	6.5 2)
Report	Temperature modeling	Year 7	6.5 2)
Report	Reasonably and feasible measures	As needed	6.5 3)
Report	Localized temperature	Annually, February 15	6.5 4)
Localized Project Effects (Section 6.6)			
Report	Long-term monitoring results for DO and pH in reservoirs	Periodically, per QAPP	6.6 1) a and 6.7
Plan	Short term monitoring in shallow water habitats	Within one year of license issuance	6.6 1) b and 6.7
Study and report	DO, pH and temperature in shallow water habitats	Per QAPP	6.6 1) b and 6.7
Plan	Fish ladder temperatures	By spring of Year 2	6.6 2) and 6.7
Study and report	Fish ladder temperatures	By Dec of that year	6.6 2) and 6.7
Permit	Fish spawning, rearing and acclimation	As needed	6.6 3)
Plan	Aquatic and Invasive Species (AIS)	Within 1 year	6.6 4)
Report	AIS inspection results and recommendations	March 1, annually	6.6 4) g
Report	Stormwater monitoring	Periodic	6.6 5) and 6.7

Product Type	Description	Due Date	Section of Certification
Water Quality Monitoring (Section 6.7)			
Plan	QAPP for each parameter	Within 1 year	6.7 1)
Plan	Update QAPP	Annually	6.7 2)
Monitoring report	Summary report	March 1, annually	6.7 3)
Construction Activities (Section 6.8)			
Plan	WQPP for construction	If construction planned	6.8 5)
Spill Prevention and Control (Section 6.9)			
Records	Spill use	Continuously available	6.9 2)
Plan	SPCC	As updated	6.9 3)
Report by phone	Spills	Immediately	6.9 6) and 7)