Grant County
PUBLIC UTILITY DISTRICT

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April 9, 2015

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
Mail Code: DHAC, PJ-12
888 First Street, N.E.
Washington, D.C. 20426

RE: **Priest Rapids Hydroelectric Project No. 2114**
License Compliance Filing – Calendar Year 2014 Activities Under Priest Rapids Hydroelectric Project

- **Article 401(a)(1) - Downstream Passage Alternatives Plan**
- **Article 401(a)(2) - Progress and Implementation Plan**
- **Article 401(a)(3) - Habitat Plans**
- **Article 401(a)(4) - Artificial Propagation, Hatchery and Genetic Management and Monitoring and Evaluation Plans**
- **Article 401(a)(8) - Priest Rapids Dam Alternatives Spill Measures Evaluation Plan**
- **Article 404 - Fishery Operation Plan**

Dear Ms. Bose,

Please find enclosed the 2014 Calendar Year Activities Under Priest Rapids Hydroelectric Project consistent with the requirements of Article 401(a)(1) Downstream Passage Alternatives Action Plan, Article 401(a)(2) Progress and Implementation Plan, Article 401(a)(3) Habitat Plans, Article 401(a)(4) Artificial Propagation, Hatchery and Genetic Management, and Monitoring and Evaluation, Article 401(a)(8) Priest Rapids Dam Alternatives Spill Measures Evaluation Plan and Article 404 Fishery Operations Plan (collectively referred to as the Fishery Articles) of the Priest Rapids Hydroelectric Project License (Project).

On June 15, 2012 the Federal Energy Regulatory Commission (FERC) issued an Order modifying and approving Public Utility District No.2 of Grant County, Washington's (Grant PUD's) May 1, 2012 request to modify the filing protocol and deadlines for the Fishery Articles. Under this Order, Grant PUD is required to file an annual report with FERC by April 15.

Grant PUD distributed this annual report to members of the Priest Rapids Coordinating Committee including National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, Colville Confederated Tribes, Yakama Nation and the Columbia River Inter-Tribal Fish Commission on February 26, 2014 for review and comment. After a 30 day comment and review period, no comments were received.

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FERC staff with any questions should contact Tom Dresser at 509-754-5088, ext. 2312.

Respectfully,

Ross Hendrick
License Compliance Manager

Enclosures: Calendar Year 2014 Activities under Priest Rapids Hydroelectric Project

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CALENDAR YEAR 2014

ACTIVITIES UNDER PRIEST RAPIDS HYDROELECTRIC PROJECT LICENSE (FERC NO. 2114)

Public Utility District No. 2 of Grant County, Washington

April 2015

Executive Summary

Public Utility District No. 2 of Grant County, Washington (Grant PUD) owns and operates two hydroelectric dams on the Columbia River; Wanapum and Priest Rapids, known altogether as the Priest Rapids Project (Project), and is operated under the terms and conditions of the Federal Energy Regulatory Commission (FERC) Hydroelectric Project License No. P-2114 issued by FERC on April 17, 2008.

Grant PUD operates the Project through the coordinated operation of the seven-dam system and other Columbia Basin entities with current operational agreements with the fishery agencies and other operators to provide protection and improvement for a range of fisheries and other resources within and downstream of the Project. These agreements include the Hanford Reach Fall Chinook Protection Program Agreement, the Hourly Coordination Agreement, and the Priest Rapids Project Salmon and Steelhead Settlement Agreement (SSSA). The Project is also subject to the requirements of the FERC license and related laws and regulations, as well as to the requirements (incorporated by reference in the license) of the Biological Opinion (BiOp) of the Priest Rapids Project issued by the National Marine Fisheries Service (NMFS) for its effects on anadromous salmonids, the Clean Water Act Section 401 Water Quality Certification (WQC) issued by the Washington State Department of Ecology (WDOE), and the BiOp for the Priest Rapids Project issued by the United States Fish and Wildlife (USFWS) regarding the effect of the Project on bull trout.

This report is intended to fulfill the annual reporting requirement for the following License Articles:

- 401(a)(1) - Downstream Passage Alternatives Action Plan, including:
    - NMFS BiOp: 1.2 (Wanapum) and 1.11 (Priest Rapids)
    - NMFS and USFWS Fishway Prescriptions: 8 (Wanapum) and 14 (Priest Rapids);
- 401(a)(2) - Progress and Implementation (P&I) Plan, including:
    - 401(a)(3) - Habitat Plan[1];
    - 401(a)(6) Avian Predation Control Program[1]
    - 401(a)(7) – Northern Pikeminnow Removal Program[1]
    - NMFS BiOp: 1.33
    - NMFS and USFWS Fishway Prescription: 24
- 401(a)(4) - Artificial Propagation, Hatchery and Genetic Management, and Monitoring and Evaluation (for all species)
- 401(a)(8) - Priest Rapids Dam Alternative Spill Measures Evaluation; and
- 404 - Fishery Operations Plan Report.

These license articles require that annual plans and reports be filed with FERC to document compliance with the requirements of the Project License and to propose plans for the coming year.

[1] In FERC's approval of the following individual management plans, FERC directed Grant PUD to provide an annual account of the respective implementation activities in the annual P&I Plan

On May 1, 2012, Grant PUD filed a request with FERC to combine these individual reports into one comprehensive report and change the filing deadline to April 15 annually. The combination of the reports and revised filing date would ease coordination with the natural resource agencies and result in a more efficient review and approval process. FERC issued an Order on June 15, 2012 approving Grant PUD's request.

This report provides a description of the activities related to the implementation of protection, enhancement and mitigation measures required within the FERC License and issued orders, BiOp (NMFS & USFWS), and SSSA for the Project completed during the calendar year January 1, through December 31, 2014. Information incorporated into this report is based upon activities occurring within the Priest Rapids Coordinating Committee (PRCC) and related subcommittees (Hatchery and Habitat) associated with achieving performance standards for:

- juvenile salmonids, juvenile and adult salmonids passage measures;
- predator control programs;
- No-Net-Impact and habitat funds, and
- hatchery supplementation and monitoring and evaluation.

Specific details on the suite of activities covered by this report can be found in Sections 2 through 5 below.

The activities and plans covered in this report occurred in consultation with the PRCC and its hatchery and habitat subcommittees and the Priest Rapids Fish Forum (PRFF). The PRCC and its hatchery and habitat subcommittees are made up of representatives from NMFS, USFWS, Washington Department of Fish and Wildlife (WDFW), Yakama Nation (YN), Confederated Tribes of the Umatilla Reservation (CTUIR), the Colville Confederated Tribes (CCT) and Grant PUD.

On February 27, 2014, a horizontal fracture was discovered in the spillway monolith No. 4 at Wanapum Dam. The fracture opened a crack on the upstream face of the structure approximately 2 inches high by 65 feet long on the spillway monolith. Grant PUD immediately initiated its Emergency Action Plan (EAP; level B) and began to draw the Wanapum Reservoir down in a steady controlled state. Initial calls were made to National Oceanic Atmospheric Administration (NOAA) Fisheries and USFWS on February, 28, 2014 informing them of potentially developing fish passage issues at Wanapum Dam and concerns related to the developing situation at Wanapum monolith spillway 4. By March 4, 2014, the Wanapum Reservoir had been lowered to a safe operating elevation range between 545 feet and 541 feet above mean sea level.

To address fish passage at Wanapum Dam as a result of the Wanapum spillway fracture, Grant PUD developed an Interim Fish Passage Operations Plan (IFPOP), which was intended to provide upstream passage for adult salmonids, steelhead, bull trout, and Pacific lamprey through or around the Project. Development of the IFPOP occurred in consultation with the NOAA Fisheries, USFWS, and the PRCC. Grant PUD submitted the IFPOP to FERC on March 21, 2014. FERC issued an order approving the IFPOP on March 26, 2014, and required Grant PUD to file status updates (May 1, June 5, September 12, and November 21, 2014) that documented its consultation with the PRCC and resource agencies and actions taken. In addition, Grant PUD was required to include changes to the plan, meeting minutes, copies of agency correspondence, and any other documentation of consultation. This information can be viewed at IFPOP and

IFPOP status reports. Emergency ESA consultation required as a result of the fracture on monolith No. 4 at Wanapum Dam will be addressed via a separate biological assessment due to be submitted to FERC on June 12, 2015, and through after-the-fact BiOps with NOAA Fisheries and USFWS.

In addition to fulfilling the annual reporting requirement of the License Articles identified above, Grant PUD has included information related to the emergency actions and activities implemented during 2014 as a result of the fracture discovered on monolith No. 4 of the Wanapum Dam spillway. As a result of emergency actions taken to assure dam safety, dam stability, and subsequent repair activities; Grant PUD was required to modify planned evaluations and studies, develop and install emergency passage measures at Wanapum Dam for adult anadromous salmonids and Pacific lamprey, and develop and install trap and transport measures at the Priest Rapids Dam Off Ladder Adult Fish Trap.

Grant PUD has met the survival standards for yearling Chinook (86.59%; Anglea et al. 2003, 2004a, 2004b, and 2005) and sockeye salmon (91.6%; Skalski et al. 2009b and 2010). Meanwhile, the juvenile steelhead performance standard for the Project has not been achieved (currently 81.05%; required standard is 86.49%; Skalski et al. 2009, 2010, and 2011). Through research funded via the No-Net-Impact Fund (NNI) and funding from others sources, Grant PUD has been able to identify that Caspian terns (*Hydroprogne caspia*) are having a major impact on Grant PUD's ability to meet survival standards for juvenile steelhead. For example, Evan et al. (2013) reported that annual consumption on Upper Columbia River steelhead by terns has averaged 15.7% for years 2008 through 2010 (95% CI 14.1-18.9%). Additional details can be reviewed in Section 2.1.

The remaining sections within Section 2 provides details on turbine operation (Section 2.3), fish bypass operations (Section 2.4), sluiceway operations at both dams (Section 2.5), total dissolved gas abatement (Section 2.6), avian and northern pikeminnow control programs (Sections 2.7 and 2.8), adult counting (Section 2.9), and adult steelhead downstream passage (Section 2.10).

Grant PUD also provides additional financial capacity to undertake measures to improve survival of juvenile salmonids prior to the time when the Project attains applicable juvenile Project survival standards via a NNI fund. The total contribution into the NNI Fund since 2006 is $17,638,287.02 (2006-2014). NNI Funds have been utilized by the PRCC and Grant PUD to fund 21separate projects ranging from predator research (e.g. Caspian terns as mentioned above), adult fish passage, habitat restoration, instream flow enhancements, avian predator evaluations, land acquisitions, fish screen monitoring, diversion assessment, and various research activities. Current expenditures for the 21projects total $7,291,132.41, with 10 of the 21projects currently active.

Information specific to Wanapum Dam is covered within Section 3 of this report. Section 3.1 discusses operation of the Wanapum Fish Bypass (WFB), which was completed in early 2008 and began operation during the start of the annual fish-spill program on April 30, 2008. During 2014, outflow from the WFB ranged between 3-5 kcfs, as a result of the drawdown of the Wanapum reservoir associated with the fracture. Based on an ogee crest elevation of 527.7 ft., approximately 13-17 feet of river flow occurred over the crest in 2014 during the drawdown. Some water compression due to acceleration was expected, however expected flow over the ogee was likely in the range of 4-6 feet. Sections 3.2 and 3.3 provide information related to the Wanapum advanced hydro turbines and Wanapum fish-spill, respectively.

Section 4 provides details related to Priest Rapids Dam. The Priest Rapids Fish Bypass (PRFB) was completed in April 2014 and began operation on April 18, 2014. The PRFB was designed to operate at a fixed flow volume of 26 kcfs, with exact flow volume determined by forebay elevation. During 2014, acoustic tag technology was used to evaluate approach, behavioral, and survival estimates for juvenile steelhead and yearling Chinook as they approached and passed through the PRFB. Along with survival estimates for salmonid and steelhead smolts using the PRFB as a passage route, the passage route efficiency (FPE) of the PRFB for yearling Chinook and juvenile steelhead passing through the PRFB was 38.1% and 47.2%, respectively (Hatch et al. 2015). Survival estimates for yearling Chinook and steelhead were derived via a paired-release study. Based on detection histories, the PRFB passage survival estimate was 99.8% for yearling Chinook and 99.6% for steelhead.

The remaining sections within Section 4 provide details on the fish spill program at Priest Rapids Dam (Section 4.2), turbine operations (Section 4.3), adult PIT tag detection histories (Section 4.4), and off ladder adult fish trap modifications (Section 4.5) to facilitate emergency fish passage measures associated with the Wanapum fracture.

Substantial progress was made in 2014 on several hatchery program facilities which include the following: Nason Creek spring Chinook Acclimation Facility, Carlton summer Chinook Overwinter Acclimation Facility, and the Penticton Sockeye Hatchery (Section 5.3). Significant program investments (capital construction, operations and maintenance, and monitoring and evaluation) were made in 2014 and totaled $16,011,588, including investments in construction of the hatchery facilities listed above. A total of 7,710,103 fish were released in 2014. Between 2004 and 2014 a total of $119,103.676 were invested in support of Grant PUD's hatchery mitigation programs. Details of specific hatchery supplementation and associated monitoring and evaluation programs are covered in Sections 5.5 through 5.16.

Section 6 of this report section summarizes activities for the Priest Rapids Coordinating Committee Habitat Subcommittee beginning in 2005 through 2014. Since 2006, 75 total projects have been approved for funding using one of the three funding accounts (601, NNI Fund, 602, Habitat Supplemental Fund, 603, Habitat Conservation Fund). Of those, 38 are completed and 37 are currently active and underway. Fifteen new projects were approved in 2014 by the PRCC and/or PRCC Habitat Subcommittee with five from Fund 601, nine from Fund 602, and one from Fund 603. The 2015 deposit for the NNI-601 is $1,944,780.95; the Habitat Supplemental-602 is $1,029,001.58; and Habitat BiOP-603 is $367,582.44.

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1.0 Introduction

Public Utility District No. 2 of Grant County, Washington (Grant PUD) owns and operates two hydroelectric dams on the Columbia River; Wanapum and Priest Rapids, known altogether as the Priest Rapids Project (Project), and is operated under the terms and conditions of the Federal Energy Regulatory Commission (FERC) Hydroelectric Project License No. P-2114 issued by FERC on April 17, 2008.

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    - 401(a)(3) - Habitat Plan[2];
    - 401(a)(6) - Avian Predation Control Program[1];
    - 401(a)(7) - Northern Pikeminnow Removal Program[1];
    - NMFS BiOp: 1.33;
    - NMFS and USFWS Fishway Prescription: 24;
- 401(a)(4) - Artificial Propagation, Hatchery and Genetic Management, and Monitoring and Evaluation (for all species);
- 401(a)(8) - Priest Rapids Dam Alternative Spill Measures Evaluation; and
- 404 - Fishery Operations Plan Report.

[2] In FERC's approval of the following individual management plans, FERC directed Grant PUD to provide an annual account of the respective implementation activities in the annual P&I Plan

These license articles require that annual plans and reports be filed with FERC to document compliance with the requirements of the Project license and to propose plans for the coming year.

On May 1, 2012, Grant PUD filed a request with FERC to combine these individual reports into one comprehensive report and change the filing deadline to April 15 annually. The combination of the reports and revised filing date would ease coordination with the natural resource agencies and result in a more efficient review and approval process. FERC issued an Order on June 15, 2012 approving Grant PUD's request.

The activities and plans covered in this report occurred in consultation with the Priest Rapids Coordinating Committee (PRCC) and its hatchery and habitat subcommittees and the Priest Rapids Fish Forum (PRFF). The PRCC and its hatchery and habitat subcommittees are made up of representatives from NMFS, USFWS, Washington Department of Fish and Wildlife (WDFW), Yakama Nation (YN), Confederated Tribes of the Umatilla Reservation (CTUIR), the Colville Confederated Tribes (CCT), and Grant PUD.

In addition to fulfilling the annual reporting requirement of the License Articles identified above, Grant PUD has also included information related to emergency actions and activities implemented during 2014 as a result of the fracture discovered on monolith No. 4 of the Wanapum Dam spillway. As a result of the emergency actions taken to assure dam safety, dam stability, and repair activities that followed; Grant PUD was required to modify planned evaluations and studies, develop and install emergency passage measures at Wanapum Dam for adult anadromous salmonids and Pacific lamprey, and develop and install trap and transport measures at the Priest Rapids Dam Off Ladder Adult Fish Trap.

Emergency activities associated with the Wanapum fracture occurred in consultation with NOAA Fisheries, USFWS and the PRCC and are covered in specific detail through the Interim Fish Passage Operation Plan approved by FERC on March 26, 2014, and required status updates submitted on May 1, June 5, September 12, and November 21, 2014 (IFPOP and IFPOP status reports). Grant PUD filed a letter with FERC on January 30, 2015 (FERC letter) requesting that FERC determine that the emergency response will be under control as of May 1, 2015 and is ready for ESA analysis, and to end implementation of the IFPOP. Grant PUD also indicated in the letter that it would provide a draft biological assessment for FERC review and approval on June 12, 2015.

1.1 Purpose of Report

This report provides a description of the activities related to the implementation of protection, enhancement, and mitigation measures required within the FERC License and issued orders, BiOps (NMFS & USFWS), and SSSA for the Project completed during the calendar year January 1, through December 31, 2014. Information incorporated into this report is based upon activities occurring within the PRCC and related subcommittees (Hatchery and Habitat) associated with achieving performance standards for:

- juvenile salmonids, juvenile and adult salmonids passage measures;
- predator control programs;
- No-Net-Impact and habitat funds;
- hatchery supplementation and monitoring and evaluation; and to

- provide summary information which identifies actions and activities required as a result of the Wanapum Fracture.

Specific details on the suite of activities covered by this report can be found in Sections 2 through 5 below.

1.2 Roles and Responsibilities of the Priest Rapids Coordinating Committee

As defined in the SSSA, the PRCC has the role and responsibility to coordinate the implementation of the adaptive management programs contained in the SSSA. Specific roles and responsibilities identified within the SSSA include (but are not limited to) the following;

- Approve or modify annual Progress & Implementation (P&I) Plans; approve or modify the Performance Evaluation Program; review Performance Evaluation Reports;
- Advocate decisions of the Committee in all relevant regulatory forums;
- Establish such subcommittees as it deems useful;
- Coordinate adaptive management programs contained in the SSSA including Hatchery and Habitat subcommittees (Section 5.1);
- Make decisions (except for the implementation of the anadromous fish activities set forth in Appendix A of the SSSA) related to the implementation of SSSA (Section 5.4);
- Serve as a forum to coordinate the implementation of the SSSA and to consider issues that arise (Section 5.5.1);
- Assesses new information as it becomes available through the implementation of this Agreement or otherwise (Section 5.5.2);
- May from time to time recommend to FERC amendments to the new license to reflect the best available scientific information on means and measures to achieve the applicable performance standards for the Project (Section 5.5.2);
- Coordinate as appropriate the design and implementation of research and monitoring programs consistent with SSSA (Section 5.5.3);
- Coordinate activities listed above, the sharing of data and information, and the conduct of other activities under the SSSA with related activities associated with other hydropower operations on the Columbia River in order to promote efficiencies and the use of best available scientific information and analysis in the implementation of the SSSA, including, but not limited to, participation in studies relating to the assessment of Project related juvenile and adult delayed mortality (Section 5.5.3);
- Seek to resolve disputes at the subcommittee level (Section 6.3); and
- Conduct other business as may be appropriate for the efficient and effective implementation of these measures.

1.2.1 Priest Rapids Coordinating Committee

Grant PUD continued to support the PRCC (per Term &Condition (T&C) 1.35). Over the course of 2014, PRCC representatives were involved in a total of 45 meetings, conference calls and or WebEx conferences (Table 1). A majority of these meetings, conference calls and WebEx

conferences were directly related to the emergency actions that were taken to provide adult anadromous fish and Pacific lamprey passage at Wanapum Dam during the reservoir drawdown prompted by the fracture. During emergency ESA consultation, Grant PUD consulted with National Oceanic Atmospheric Administration (NOAA) Fisheries, USFWS and the PRCC on the development of an Interim Fish Passage Operation Plan (IFPOP), and the design, development, and installation of Wanapum Fishway Exit Passage Systems (WFEPS), evaluations to assess the successful operation of the WFEPS, modification of previously planned juvenile steelhead and yearling Chinook survival and behavior evaluations, and a trap and transport program.

Meeting agendas and minutes for 12 monthly PRCC meetings can be viewed at Priest Rapids Coordinating Committee. Other meeting materials (summaries, presentations, etc.) related to the Interim Fish Passage Operation Plan can be reviewed at IFPOP and IFPOP status reports.

Two Statement of Agreement (SOA) documents were approved by the PRCC during 2014. SOA 2014-02 provided guidance on what specific evaluations and action would be implemented in 2014 as part of Grant PUD's existing requirements or as a result of the Wanapum spillway fracture and Wanapum reservoir drawdown. Under SOA 2014-02, NOAA Fisheries, USFWS, PRCC and Grant PUD agreed to the following;

- That a Wanapum Reservoir juvenile acoustic tag survival evaluation (presence/absence) is necessary to inform NOAA Fisheries, PRCC, and Grant PUD of the potential impacts on the juvenile salmon and steelhead run at large as it relates to the necessary drawdown of Wanapum Reservoir and stabilization of Wanapum Spillway monolith No. 4.
    - The juvenile salmonid and steelhead acoustic tag survival evaluation conducted within the Wanapum Reservoir will include 2 species (steelhead and yearling Chinook). Releases will occur in the tailrace of Rock Island Dam with presence/absence detections occurring at transects located at various locations within Wanapum Reservoir (e.g. Crescent Bar, Sunland Estates and in the Wanapum Forebay).
    - An effort will be made to collect route-specific information related to the Wanapum Spillway, Wanapum Fish Bypass, and Wanapum Powerhouse. However, the PRCC understands that both upstream (forebay) and downstream (tailrace) areas of Wanapum Dam will need to remain clear to facilitate repair activities.
    - Release groups will be appropriately sized to achieve at least a Standard Error (SE) of ±2.5%, with a 95% Confidence Interval within the Wanapum Reservoir and Wanapum Project.
    - Results from the Wanapum acoustic tag survival evaluation will be used to inform ESA consultations and will not be used in current NNI-Fund calculations as defined in SSSA. If additional mitigation is determined to be necessary, the PRCC and PRCC Policy Committees will determine the most appropriate means and methods.
    - NNI Funds in a total amount not to exceed $225,000 will be used to facilitate implementation of the Wanapum Reservoir juvenile steelhead and yearling Chinook acoustic tag survival evaluation. Data collected through this effort would

be used to facilitate the PRCC's decision making process during the juvenile salmonid and steelhead outmigration.

- That juvenile acoustic tag survival evaluations for other covered species (e.g. sockeye, summer Chinook sub-yearlings) per the SSSA, within the Wanapum Reservoir, may not be feasible during 2014.
- That if the Wanapum Reservoir acoustic tag survival evaluation for juvenile steelhead and yearling Chinook is conducted, the need to apply additional Passive Integrated Transponders (PIT -tags) in migrating juvenile salmon and steelhead (at other upstream locations and conduct additional analysis) would be considered a secondary priority and may not be feasible.
- That the Priest Rapids Reservoir survival and Priest Rapids Fish Bypass survival and behavior evaluations (if valid) will be counted as progress towards meeting performance standards in the Priest Rapids Project for juvenile steelhead and yearling Chinook. The PRCC will determine how valid results would be incorporated into future performance standards calculations.
- If through implementation of the HRFCPA; the Priest Rapids Reservoir survival and Priest Rapids Fish Bypass survival and behavior evaluations are invalidated (e.g. SE falls outside 2.5%); the PRCC will examine the root cause and extent of the invalidation. Based on this assessment, the PRCC may determine that study results could be included in survival standard calculations.
- That an adult salmonid evaluation using active tags is necessary to inform NOAA Fisheries, PRCC and Grant PUD on the Wanapum fishway exit modifications.
- That an adult salmonid observational evaluation needs to occur at both the Wanapum left and right bank ladder exit modifications. Observers would be stationed at each modified exit of Wanapum Dam and would collect information during peak passage times. Information on adult salmonid passage over the false weir, through the flume and entry into the forebay would be documented via direct observations and video sampling.
- That in addition to an adult salmonid evaluation using active tags, PIT-tags will also be applied to further inform NOAA Fisheries, PRCC and Grant PUD on the Wanapum fishway exit modifications and travel time through the Priest Rapids Project (Priest Rapids Dam to Rock Island Dam). The application of PIT-tags at the Priest Rapids Off-Ladder Adult Fish Trap would be given priority over PIT tagging at other locations.
- If this SOA is approved, each PRCC member agrees that they will inform and facilitate communication within their respective agency and will support the actions identified within this SOA. The PRCC also agrees to support/advocate on behalf of Grant PUD to secure the necessary tags, equipment and permits, if necessary.
- Nothing in this SOA is intended to nor shall in any way abridge, limit, diminish, abrogate, adjudicate, or resolve any Indian or Tribal right reserved or protected in any treaty, executive order, statute or court decree under Federal or state law, including but not limited to the rights of the Wanapum to its subsistence and ceremonial fisheries pursuant to RCW 77.12.453

As a result of the second SOA (2014-04), the PRCC agreed to move the year 2016 sockeye survival study to year 2015 (see details below).

> *(3) The PRCC agrees that the survival check-in evaluation for juvenile sockeye will occur during the spring outmigration of 2016. The PRCC further agrees that the survival estimate developed for juvenile sockeye in 2016 will be used in conjunction with the survival estimates generated in 2009 and 2010 (Skalski et al. 2009b and 2010) to satisfy a three-year average survival assessment. The PRCC further agrees that if the juvenile project-level standard (86.5%) is not achieved for sockeye; Grant PUD will develop a juvenile sockeye performance standard action plan and convene the PRCC review and determine necessary steps to increase survival through the PRP. (SOA 2013-09)*

PRCC Hatchery Subcommittee 2014 meeting schedule and approved statement of agreements are found in Section 5.1 and the PRCC Habitat Subcommittee activities can be found in Section 6.0.

Table 1 Priest Rapids Coordinating Committee Meetings, Conference Calls and Webex Conference conducted during 2014.

Date	Communication Type	Topic
1/29/2014	Monthly PRCC Meeting	General Committee Business
2/26/2014	Monthly PRCC Meeting	General Committee Business
3/17/2014	Conference Call	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
3/24/2014	Conference Call	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
3/26/2014	Monthly PRCC Meeting	Status update on progress and implementation of the Wanapum Interim Fish Passage Operations Plan. Discussion of conducting a survival evaluation on Wanapum reservoir to inform the emergency ESA consultation process.
3/31/2014	Conference Call	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
4/3/2014	Conference Calls	Individual calls with members of the PRCC to discuss Statement of Agreement 2014-02 (SOA 2014-02). This SOA documented the evaluations that would be conducted in 2014.
4/4/2014	Conference Call	Review, Discussion and Approval Statement of Agreement 2014-02 (SOA 2014-02). This SOA documented the evaluations that would be conducted in 2014.
4/14/2014	PRCC-HCP Conference Call	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
4/14/2014	Conference Call	Decision on operations of Priest Rapids right-bank ladder operations (ladder flow only) and approval by a majority vote on criteria used to evaluation “proof of concept” of Wanapum Fishway Exit Passage Systems (see Section 5 above and Appendices B, C & D).
4/21/2014	Conference Call/WebEx	Joint PRCC-HCP meeting to provide updates on the Wanapum Fishway Exit Passage System Operations, fish behavior data, travel time and conversion rates.
4/21/2014	Conference Call/WebEx	Status update on progress and implementation of the Wanapum Interim Fish Passage Operations Plan.
4/22/2014	Conference Call	Status update on Wanapum Spillway Monolith No. 4 fracture activities.

4/28/2014	PRCC-HCP Conference Call/WebEx	Joint PRCC-HCP meeting to provide updates on the Wanapum Fishway Exit Passage System Operations, fish behavior data, travel time and conversion rates.
4/28/2014	Conference Call	Status update on progress and implementation of the Wanapum Interim Fish Passage Operations Plan. Discussion on ladder operations at Priest Rapids Dam.
4/28/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
5/1/2014	Conference Call	PRCC agreed to maintain ladder flows and Priest Rapids Off-Ladder Adult Fish Trap (OLAFT) would remain at status quo until May 5. PRCC also agreed to defer the decision to tag 10-20 spring Chinook with acoustic & PIT-tags to evaluate trap and transport program and that the trap and transport program would continue and be revisited on a weekly basis.
5/5/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
5/5/2014	Conference Call	PRCC members discussed additional modifications to the Wanapum Fishway Exit Passage Systems. This included the addition of spiral chutes on both left and right bank, anti-jump ramp on the left bank and perf plating to on the upper 3-4' of the false weir to preclude adult lamprey of attaching. The PRCC also agreed to shut down the Priest Rapids OLAFT on May 5 through May 7, in order to install a swing gate. This would allow for multiple loading if necessary for the adult sockeye and summer Chinook runs. There was also concern with delay occurring as a result of the OLAFT operations.
5/6//2014	Conference Call	PRCC agreed to suspend trap and transport for spring Chinook and allow volitional passage at all Priest Rapids Project fish ladders.
5/12/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
5/19/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
5/19/2014	Conference Call	PRCC agreed to modifications to the Wanapum Fishway Exit Passage Systems discussed on May 5, with the exception of the spiral chute.
5/28/2014	Meeting	Status update on the progress and implementation of the Wanapum Interim Fish Passage Plans.
6/2/2014	PRCC-HCP Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
6/16/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
6/25/2014	Monthly PRCC Meeting	Status update of fish passage measures implemented at Wanapum Dam and adult lamprey passage plan.
6/30/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
7/14/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
7/23/2014	Monthly PRCC Meeting	Status update of fish passage measures implemented at Wanapum Dam and presentation of preliminary yearling Chinook and juvenile steelhead survival estimates.
7/28/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
8/11/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
8/25/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.

8/27/2014	Monthly PRCC Meeting	Status update of fish passage measures implemented at Wanapum Dam and adult lamprey passage.
9/8/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
9/22/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
9/24/2014	Monthly PRCC Meeting	Status update of fish passage measures implemented at Wanapum Dam.
10/6/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
10/20/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
10/29/2014	Monthly PRCC Meeting	Status update of fish passage measures implemented at Wanapum Dam and refill planning.
11/3/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
11/17/2014	Letter and email Communication	Communication on timing of potential initial pool raise and scheduling of demobilization of Wanapum Fishway Exit Passage Systems and ladder outage timing.
11/17/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
12/1/2014	Conference Call/WebEx	Joint briefing on the progress and implementation of the Wanapum and Rock Island Interim Fish Passage Plans.
12/16/2014	Monthly PRCC Meeting	Status update of fish passage measures implemented at Wanapum Dam and refill planning.

Table 2 Statement of Agreements approved by the Priest Rapids Coordinating Committee.

Years	Title of Statement of Agreement	Date Approved
2014-02	Evaluations to be implemented in 2014 as part of existing requirements or as a result of the Wanapum Spillway Fracture and Wanapum Reservoir Drawdown.	4/11/2014
2014-04	Change Sockeye Survival Study from year 2016 to 2015	10/29/2014

1.3 Adaptive Management

The protection, mitigation, and enhancement (PME) measures contained in the SSSA and BiOp are implemented according to the principals of adaptive management. In the SSSA, adaptive management is an active systematic process for continually improving management policies and practices by sequential learning from the outcomes of operational programs. Adaptive management employs management programs that are designed to experimentally compare selective policies or practices by evaluating alternative hypotheses about the system being managed. The sequence of adaptive management steps include: (1) problem assessment, (2) project design, (3) implementation, (4) monitoring, (5) evaluation, and (6) adjustment of future decisions. Adaptive management is not considered complete until the planned management actions have been implemented, measured and evaluated and the resulting new knowledge has been fed back into the decision-making process to aid in future planning and management. The fundamental objective of adaptive management with respect to the Project is to achieve the passage performance standards by 2013.

The Grant PUD and the PRCC have been utilizing this approach over several decades and included such an approach in the issued 2004 & 2008 NMFS BiOps, SSSA, WQC, the FERC

License and Orders. Key examples of application of the approach include implementation of juvenile salmonid behavior and survival evaluations; calculation of NNI Funds; predator control programs; planning, designing, prototype testing construction and biological testing as it relates to the Wanapum Fish Bypass (WFB); design and construction of the Priest Rapids Fish Bypass (PRFB); and implementation of the various hatchery and habitat programs. Specific details are provided Sections 2 through 5 below.

1.4 Performance Evaluation Program

The 2008 NOAA Fisheries BiOp (T&C 1.33; T&C 1.33) requires Grant PUD to prepare an annual summary report (Performance Evaluation Program) which reflects all activities and progress during the previous calendar year. The purpose of this report is to provide a reliable technical basis to assess the degree to which Grant PUD is improving juvenile and adult passage survivals, habitat productivity improvements, and supplementation for the listed anadromous fishery resources affected by the Project. This annual report is also required to include results of monitoring, modeling, or other analyses that take place in the calendar year to evaluate the degree to which the actions are likely to improve juvenile and adult survivals. In addition, where appropriate, the Performance Evaluation Program is supposed to measure and evaluate individual actions within each category, assess the contribution of the action to the desired objective, and provide a basis for identifying new options and priorities among those options for further progress in meeting objectives. Grant PUD believes that this report fulfills the requirement of T&C 1.33, as specific programs and updates to those programs are illustrated below in Sections 2 through 5.

Grant PUD is required to coordinate the design of its Performance Evaluation Program with the development of relevant parallel monitoring or evaluation systems by other hydropower operators in the Columbia Basin and the Northwest Power and Conservation Council (T&C 1.34; 2008 NOAA BiOp). The purpose of this coordination is to promote technical consistency and compatibility among efforts to:

- contribute to a comprehensive evaluation of stock performances throughout the Columbia Basin
- promote the use of the best available science; and
- provide opportunities for the efficient sharing of monitoring activities, data management systems, analytical modeling, and other activities.

Grant PUD regularly and routinely participates in local forums to promote technical consistency and compatibility among efforts to contribute to a comprehensive evaluation of stock performances throughout the Columbia Basin. For example, technical and policy staff from the Public Utility Districts of Chelan, Douglas and Grant Counties (PUDs) meets regularly to discuss potential fish evaluations and resource issues. Grant PUD staff also participates in Chelan and Douglas PUD's respective Habitat Conservation Plan (HCP) Hatchery and HCP Habitat subcommittees to coordinate among the various programs. These meetings have led to the development of several hatchery sharing agreements among the PUDs as well as the development of consistent monitoring and evaluation programs related to hatchery supplementation.

Grant PUD staff also participates in several regional forums to discuss and share ideas on a broad spectrum of fish protection and enhancement issues. These forums include:

- Priest Rapids Coordinating Committee;
- Anadromous Fish Evaluation Program (AFEP) ACOE Columbia River Basin Symposia
- Inland Avian Predation Working Group; trying to address Caspian Tern predation on juvenile salmonids migrating through the mid-Columbia River and other areas of the Columbia River);
- Fish Tagging Forum;
- Washington/British Columbia Chapter, American Fisheries Society conferences (as presenters and session organizer);
- Hydro-Vision (national conference; presenter);
- Hydro Research Foundation Fellowship Program;
- HydroVision International 2015 Technical Papers Committee
- Priest Rapids Fish Forum, Regional Lamprey and White Sturgeon Technical Workgroups;
- Regional Bull Trout Recovery forums;
- Army Corps of Engineers (CORPS) year-end Total Dissolved Gas (TDG) monitoring meeting;
- 100th Meridian Columbia River Basin Team for aquatic invasive species;
- Fall Chinook Work Group;
- Upper Columbia Salmon Recovery Board meetings, workshops (presenter at habitat workshop) and technical teams; and
- Wenatchee Watershed Planning Unit meetings.

2.0 Priest Rapids Project

2.1 Progress in Achieving Performance Standards

Grant PUD is required to make steady progress towards achieving a minimum 91 percent combined adult and juvenile salmonid survival performance standard at the Priest Rapids and Wanapum developments (i.e., each dam). The 91 percent standard includes a 93 percent development-level (reservoir and dam) juvenile performance standard. NMFS recognized that it is not currently possible to measure the 91 percent combined adult and juvenile survival standard.

Over the last decade, Grant PUD has conducted dam and reservoir smolt survival evaluations, evaluating progress towards meeting a 93 percent juvenile development passage survival. This standard can be measured at each development individually, or as a composite of survival at the two developments. To evaluate steady progress toward achieving the 93% juvenile salmonid development survival requirement and to strive toward achieving passage performance standards, Grant PUD has included a proposed decision process below (Figure 1). Grant PUD is using the proposed decision flow chart presented below as a basic approach as it strives to maintain and meet performance standards for the Project. As discussed above and as defined in the SSSA, adaptive management is a key component for continually improving management

policies and practices by sequential learning from the outcomes of operational programs, such as evaluation of juvenile salmonid passage survival at the Project.

As discussed in Section 1, a horizontal fracture was discovered in monolith 4 of the Wanapum Spillway on February 27, 2014. To address upstream passage for adult salmon, steelhead, bull trout and Pacific lamprey through or around the Project, Grant PUD in consultation with NOAA Fisheries, USFWS, and PRCC developed an IFPOP. In addition, Grant PUD in consultation with NOAA Fisheries and the PRCC needed to modify previously planned juvenile steelhead and yearling Chinook survival and behavior evaluations scheduled to occur during the spring of 2014.

On April 11, 2014, NOAA Fisheries, PRCC, and Grant PUD approved a SOA that provided guidance on what specific evaluations and actions would be implemented in 2014 as part of Grant PUD's existing requirements or as a result of the Wanapum Spillway Fracture and Wanapum Reservoir Drawdown. The details of SOA 2014-02 can be reviewed in Section 1. Included below are the results of the evaluations (survival and behavior) that Grant PUD conducted as a result of SOA 2014-02.

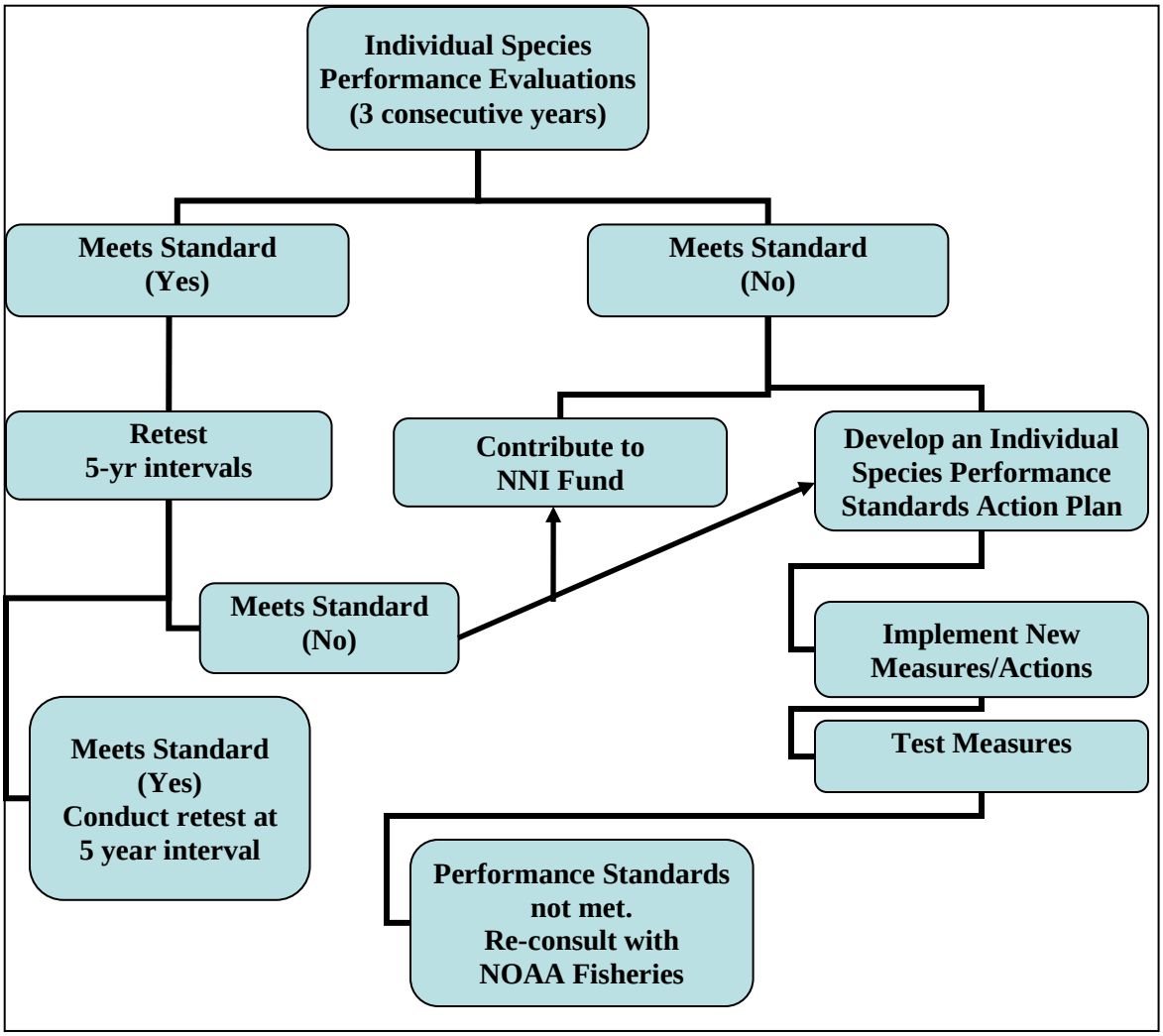

Figure 1 **Flow chart showing proposed decision process used to achieve juvenile salmonid Project survival replacement for the Priest Rapids Project.**

2.1.1 Yearling Chinook

Performance standards for yearling Chinook were met for the Project in 2005. The three year (2003-2005) consecutive arithmetic average of 86.59% exceeded the standard of 86.49% (Anglea et al. 2003, Anglea et al. 2004a and 2004b, Anglea et al. 2005). These results were formally accepted by the PRCC and approved by NMFS on September 28, 2005.

Per Section 15.7.2 (Timing and recalibration) of the SSSA, the survival estimates for yearling Chinook were to be adjusted at five-year intervals (2010, 2015, 2020, etc.). Because of concern over juvenile steelhead survival through the Project, the PRCC agreed that the yearling Chinook evaluation originally scheduled for 2010 would occur in 2014 (SOA 2011-06).

Based on SOA 2011-06, Grant PUD was preparing to conduct a survival and behavior evaluation for yearling Chinook for the Project in 2014. Under the approved study plan, the intent was to collect survival data at the Project level (Rock Island Tailrace to Priest Rapids Tailrace), development level (Wanapum Dam and Reservoir and Priest Rapids Dam and Reservoir), route-specific level at each dam (bypasses, turbine, and/or spillway) and survival and behavior data associated with the Wanapum Fish Bypass and the newly installed Priest Rapids Fish Bypass.

As a result of the fracture discovered on monolith No. 4 of the Wanapum Spillway, the PRCC and Grant PUD needed to modify the survival and behavior portion of the evaluation that was originally planned for the Wanapum Development (reservoir and dam) and determine if and how the collected data sets would be used (achieving performance standards, NNI calculations, emergency ESA consultation, etc.).

Due to the uncertainty of passage conditions through the Wanapum Reservoir and the potential for limited ability to install equipment at Wanapum Dam to monitor route-specific passage and survival; NOAA Fisheries, the PRCC, and Grant PUD agreed to slight modifications of the previously approved study plan. These modifications included the number of tags to be released into the Wanapum Reservoir (which was reduced), location of receivers and nodes in the Wanapum Forebay, and agreement that survival information collected in Wanapum Forebay and at Wanapum Dam would be used to inform the emergency ESA consultation (SOA 2014-02). NOAA Fisheries, PRCC, and Grant PUD further agreed that survival information gleaned from the yearling Chinook evaluation conducted in the Wanapum Reservoir would not be used in recalculation of NNI account per Section 15 of the SSSA (SOA 2014-02). NOAA Fisheries, the PRCC, and Grant PUD also agreed that the yearling Chinook survival and behavior evaluation as originally planned and approved in the Priest Rapids Reservoir and in relation to the Priest Rapids Fish Bypass, would occur as planned. The PRCC also agreed that performance standard results collected from the Priest Rapids Development would be used to determine NNI contributions for yearling Chinook.

2.1.1.1 Yearling Chinook Study Results

The survival estimate for yearling Chinook migrating through the Project in 2014 was 90.8%, which is 4.3% above the required juvenile salmon and steelhead project passage survival standard of 86.49% (NOAA Fisheries 2008). Observed development-level (reservoir and dam) passage survival for yearling Chinook migrating through Wanapum was 94.5%, while survival through Priest Rapids was 96.1%. The Wanapum and Priest Rapids dams (“concrete”) passage survival was 98.8% and 97.1%, respectively.

Based on point estimates[3], survival for yearling Chinook utilizing the various passage routes at Wanapum and Priest Rapids dams (bypass, spillway, and powerhouse) was greater than 96%, with the exception of powerhouse survival at Priest Rapids Dam (92.6% Table 3). Although the fracture at Wanapum impacted day to day operation of the powerhouse, WFB, and spillway, observed survival at Wanapum Dam exceeded 97.0%. Specific details on the behavior and survival evaluation and can be reviewed in Hatch et al. (2015) and Skalski et al. (2014).

Table 3 Route specific survival estimates for yearling Chinook migrating through Wanapum and Priest Rapids dams in 2014. Survival estimates (point estimates) are based on the proportion of fish that were detected downstream that had been assigned a given passage route.

	Wanapum Dam		Priest Rapids Dam	
Passage Route	**Number Passed**	**Detected Downstream (%)**	**Number Passed**	**Detected Downstream (%)**
Wanapum Fish Bypass or Priest Rapids Fish Bypass	27	96.3	415	99.8
Spillway	99	97.0	293	98.0
Powerhouse	225	98.2	352	92.6

2.1.2 Juvenile Steelhead

Grant PUD and the PRCC have been overseeing rigorous investigations on the downstream passage behavior and survival of juvenile steelhead through the Project since 2004 (Robichaud et al. 2005, Sullivan et al. 2009, Thompson et al. 2012, Timko et al. 2007, 2008, 2010, and 2011, Wright et al. 2010). As reported in previous annual progress and implementation reports (2006, 2007, 2008, 2009, 2010) the juvenile steelhead performance standard for the Project has not been achieved (currently 81.05%; required standard is 86.49% (Skalski et al. 2009, 2010, and 2011).

In 2012, Grant PUD in consultation with NOAA-Fisheries and the PRCC developed a Juvenile Steelhead Performance Standard Action Plan (SAP). The SAP was developed to document progress towards achieving the juvenile steelhead survival standards for the Project, as required under Terms and Conditions 1.2 and 1.11 of the 2008 NMFS BiOp and assist with determining what additional measures and/or studies may be necessary to improve juvenile steelhead survival.

Since the development of the SAP, Grant PUD and PRCC has conducted several evaluations funded through the No-Net-Impact fund (NNI fund) to determine potential reasons for lower than expected juvenile steelhead survival within the Project (Thompson et al. 2012, Oregon State University and Real Time Research, *in press*). A major finding of these evaluations has indicated that one of the primary reasons for lower than expected survival for juvenile steelhead migrating through the Project is avian predation due to Caspian terns (*Hydroprogne caspia*; terns).

[3] Point Estimates are based on proportion of fish that are detected downstream at one or more locations that had been assigned a given passage route at each dam.

Evans et al. (2011 and 2013) and Hostetter et al. (2012) reported that juvenile steelhead are preferred and more likely to be predated upon by terns, compared to all other salmonids in the Columbia River Basin. Roby et al. (2011) further reported that juvenile steelhead migrating through the Project (mid-Columbia) are preyed upon by terns that have established a nesting colony within the Columbia Plateau, Goose Island, Potholes Reservoir, approximately 30 miles from the Project. Evans et al. (2013) estimated that predation rates by Caspian terns (nesting on Goose Island) on steelhead smolts tagged and released by Grant PUD during these years of study (2008-2010) ranged from 12.8% to 20.8%, indicating that predation by Caspian terns was a substantial source of smolt mortality within the Project.

The Goose Island tern nesting colony has grown by over 60% since 2007 and peaked at 600 breeding pairs in 2011 (Lyons et al. 2012). Studies have shown that this colony represents a large threat to the out-migration of listed Upper Columbia River (UCR) steelhead. Evan et al. (2013) reported that annual consumption on UCR steelhead by terns has averaged 15.7% for years 2008 and 2010 (95% CI 14.1-18.9%) at the Goose Island tern colony alone.

In light of the information presented above and the 2008 BiOp issued by NOAA-Fisheries (as updated by the 2010 and 2014 Supplemental BiOps; http://www.salmonrecovery.gov/BiologicalOpinions/FCRPSBiOp.aspx.) for the Federal Columbia River Power System (FCRPS); the U.S. Army Corps of Engineers (Corps), U.S. Bureau of Reclamation (USBR), and Bonneville Power Administration (BPA) were tasked with the development of an Inland Avian Predation Management Plan (IAPMP) and associated Environmental Assessment for managing avian predators that prey on ESA-listed fish in the Columbia and Snake rivers. Under this Federal BiOp, the Corps, USBR, and BPA (referred to as action agencies) were directed to address inland avian predation through several Reasonable and Prudent Alternative elements which included the following;

- RPA 47: The Action Agencies will develop an avian management plan for Corps-owned lands and associated shallow-water habitat.
- RPA 68: The Action Agencies will monitor avian predator populations in the mid-Columbia River and evaluate their impacts on out-migrating juvenile salmon and steelhead and develop and implement a management plan to decrease predation rates, if warranted.

Although the FCRPS BiOp for the federal system is completely separate from the BiOp for the Priest Rapids Project, actions implemented under the FCRPS BiOp by the action agencies have initially resulted in positive benefits for juvenile steelhead migrating through the Priest Rapids Project. Under the IAPMP, a colony-based habitat management action was implemented on Goose Island (Potholes Reservoir in Grant County, Washington; federal lands) in 2014. The action implemented was called dissuasion, which consisted of a passive technique employed to preclude nesting of all Caspian terns on Goose Island. The basic approach was to set up a grid comprised of stakes, ropes, and flagging over the area previously used as a nesting area by terns. Researchers then evaluated the efficacy of Caspian tern management actions on Goose Island for reducing predation on ESA-listed salmonids.

In addition to the management activities implement by the action agencies, the PRCC and Grant PUD have committed to providing $2,586,977.00 via the NNI Fund to further research on the potential to impact juvenile salmonids migrating through the Project. Specific project tasks for research include the following;

1). Monitor Caspian terns nesting on Goose Island/Potholes Reservoir, including colony size, colony attendance, nesting habitat use, nesting success, and movement rates of Caspian terns to and from other locations/colonies;
2). Determine foraging behavior and dispersal patterns (spatial and temporal) of Caspian terns nesting on Goose Island;
3). Determine predation rates by Goose Island Caspian terns on particular species and stocks of juvenile salmonids from the Columbia River;
4). Determine diet composition and smolt consumption by Caspian terns nesting on Goose Island;
5). Monitor effects of management (nest dissuasion activities) on Caspian terns and other non-target species at Goose Island-Potholes Reservoir;
6). Determine dispersal patterns of Caspian terns following nest dissuasion activities on Goose Island-Potholes Reservoir;
7). Determine changes in predation rates on smolts by Caspian terns following nest dissuasion on Goose Island-Potholes;
8). Determine total smolt mortality in the Priest Rapids Project and in the McNary-John Day Project in relation to avian predation: spatial and temporal losses of acoustic-tagged smolts.

Based on the research funded by the PRCC and Grant PUD via the NNI Fund and efforts implemented by the action agencies under their FCRPS BiOp, several key results have been documented and include; (1) dissuasion is successful in preventing terns from nesting on Goose Island, (2) satellite telemetry is a powerful tool for monitoring Caspian tern dispersal and behavior following management activities at a breeding colony, (2) tracking of Caspian terns satellite-tagged on Goose Island has indicated that in the first year of management displaced terns were reluctant to leave the region and many remained associated with Goose island, (4) use of traditional foraging areas by Goose Island terns (i.e. Priest Rapids Project) was reduced by almost half, and (5) a 12.7% reduction in predation rates on juvenile steelhead by Caspian terns was observed when pre-management activities (2008-2013) are compared to post-management activities (2014). Grant PUD and the PRCC will continue to support research activities funded via the NNI Fund to January 1, 2016.

As discussed in Section 2.1.1 (Yearling Chinook) above, the Wanapum Spillway fracture caused a high level of uncertainty as it related to passage conditions through the Wanapum Reservoir and at Wanapum Dam. Therefore, as discussed above, NOAA-Fisheries, the PRCC, and Grant PUD made modifications to the previously approved juvenile steelhead study plan. As with the yearling Chinook evaluation, the steelhead evaluation included a reduction in the number of tagged steelhead released into the Wanapum Reservoir, and locations of receivers and nodes in the Wanapum Forebay were modified. A primary concern and need was the collection of survival information collected in Wanapum Forebay and at Wanapum Dam which would be used to inform the emergency ESA consultation process (SOA 2014-02). Also, as mentioned above, NOAA-Fisheries, PRCC, and Grant PUD agreed that survival information gleaned from the juvenile steelhead evaluation (conducted in the Wanapum Reservoir) would not be used in recalculation of NNI account per Section 15 of the SSSA (SOA 2014-02). Meanwhile, the juvenile steelhead survival and behavior evaluation as originally planned and approved in the Priest Rapids Reservoir and in relation to the Priest Rapids Fish Bypass would occur as planned. The PRCC also agreed that performance standard results collected from the Priest Rapids Development would be used to determine NNI contributions for juvenile steelhead.

2.1.2.1 Juvenile Steelhead Study Results

The survival estimate for juvenile steelhead migrating through the Project in 2014 was 89.3%, which is 2.8% above the required juvenile salmonid and steelhead project passage survival standard of 86.49% (NOAA-Fisheries 2008) and 8.25% above the three consecutive year average observed in 2008-2010 (81.05%). Observed development-level (reservoir and dam) passage survival for juvenile steelhead migrating through Wanapum was 92.9%, while survival through Priest Rapids was 96.1%. Passage survival past Wanapum and Priest Rapids dams ("concrete") was 97.8% and 98.5%, respectively.

Based on point estimates[4], survival for juvenile steelhead utilizing the various passage routes at Wanapum and Priest Rapids dams (bypass, spillway and powerhouse) was greater than 97%, with the exception of powerhouse survival at Wanapum and Priest Rapids Dam (94.1% and 93.8% respectively% Table 4). Although the fracture at Wanapum impacted day to day operation of the powerhouse, WFB, and spillway, observed survival at Wanapum Dam was 97.8%. Specific details on the behavior and survival evaluation and can be reviewed in Hatch et al. (2015) and Skalski et al. (2014).

Table 4 Route specific survival estimates for juvenile steelhead migrating through Wanapum and Priest Rapids Dams in 2014. Survival estimates (point estimates) are based on the proportion of fish that were detected downstream that had been assigned a given passage route.

	Wanapum Dam		Priest Rapids Dam	
Passage Route	**Number Passed**	**Detected Downstream (%)**	**Number Passed**	**Detected Downstream (%)**
Wanapum Future Unit Bypass or Priest Rapids Top-Spill Bypass	36	100.0	507	99.6
Spillway	164	99.4	236	97.0
Powerhouse	152	94.1	276	93.8

2.1.3 Juvenile Sockeye

Grant PUD conducted two consecutive years of paired release-recapture evaluations to estimate juvenile sockeye survival through the Wanapum and Priest Rapids developments. The two year arithmetic average performance standard for sockeye smolt passage through the Project was 91.6% (Skalski et al. 2009b; Skalski et al. 2010). As a result of the high survival observed for juvenile sockeye, the PRCC agreed to defer the third year of juvenile sockeye survival evaluation until 2016, which would also serve as the initial five year check-in study for sockeye (SOA 2011-06). The PRCC and Grant PUD also agreed that for 2012 through 2016, the NNI Fund will be based on the current two year survival average for sockeye and for 2017 (and beyond), the NNI Fund will be based on a new three sockeye survival average, based on 2016 study results, if validated by the PRCC (SOA 2011-06).

[4] Point Estimates are based on proportion of fish that are detected downstream at one or more locations that had been assigned a given passage route at each dam.

In October 2014, the PRCC modified the juvenile sockeye salmon survival and behavior evaluation per SOA 2014-04. The schedule modification move the third year of juvenile sockeye survival evaluation from 2016 to 2015.

2.1.4 Sub-yearling Chinook

In 2008 and 2009, Grant PUD conducted two pilot sub-yearling acoustic tag survival evaluations in the Project Area. Based on the results of the pilot evaluations, the PRCC and Grant PUD agreed that technology and/or methodology was not available to conduct sub-yearling summer Chinook survival evaluation. Limiting factors associated with this study included battery life (related to active tags) and variety of life-history strategies illustrated within a population of sub-yearling Chinook.

Currently, survival evaluations for sub-yearling Chinook are scheduled to occur over a three year consecutive timeframe period starting in 2016 (per SOA 2011-06; 2016-2018). The PRCC will determine the feasibility prior to conducting sub-yearling Chinook survival evaluations (September of 2015). Per SOA 2011-06, the PRCC agreed that if sub-yearling Chinook standards are met based on a 2 year consecutive average, the PRCC may consider deferring the third year of study, with a 5 year check-in to occur in 2023.

2.1.5 Coho

In August 2007, Grant PUD and the PRCC approved a ten year SOA 2007-5 (2007-2017), which established coho as a “Covered Species”, per the definition within the SSSA. Under the SOA, the PRCC and Grant PUD agreed to specific measures and items that would be implemented over the 10 year term of the SOA. This SOA expires in 2017 and will need to be revisited in first quarter 2016.

2.1.6 Schedule

Grant PUD and the PRCC developed a performance standard survival evaluation schedule in December of 2011 (SOA 2011-06; 5). In October 2014, the PRCC modified the juvenile sockeye salmon survival and behavior evaluation per SOA 2014-04. The schedule modification move the third year of juvenile sockeye survival evaluation from 2016 to 2015.

Table 5 Performance Standards Survival Evaluation Schedule for Covered Species migrating through Priest Rapids Project 2014 – 2021.

Species	2014[1]	2015	2016	2017	2018	2019	2020	2021
Spring Chinook	X[2]	.	.	.	.	X[3]	.	.
Steelhead	X[4]	X[5]	X[6]	.	.	.	.	X[7]
Sockeye		X[8]		.	.	.	.	X[9]
Summer Chinook		.	X[10]			.	.	.

[1] PRCC may need to modify the survival evaluation check-in schedule for spring Chinook and steelhead survival evaluations, if the Priest Rapids Top-spill is **NOT** completed prior to the outmigration in spring of 2014.
[2] 2014 would serve as the 5 year check-in for yearling Chinook and would occur after completion of the Priest Rapids Top-spill.
[3] 2019 would be a 5 year check-in for yearling Chinook if standards are met in 2014.
[4] 2014 would serve as the first year of a 3 year consecutive evaluation for summer steelhead.
[5] 2015 would serve as the second year of a 3 year consecutive evaluation for summer steelhead.
[6] 2016 would serve as the third year of a 3 year consecutive evaluation for summer steelhead.
[7] 2021 would serve as the 5 year check-in for juvenile steelhead if standards are achieved during 2014-2016.
[8] 2016 would serve as the 5 year check-in for sockeye survival.
[9] 2021 would serve as the 5 year check-in for sockeye if survival standards are met in 2016.
[10] During 2016-2018, Grant PUD would conduct three consecutive years of survival evaluations for sub-yearling Chinook (if feasible).

2.2 No-Net-Impact Fund

Grant PUD and the PRCC recognized that the performance standards for the Project may not be achieved for certain stocks through 2003 Project operations. The purpose of the NNI is to provide Grant PUD and the PRCC with financial capacity to undertake measures to improve survival of juvenile salmonids prior to the time when the Project attains applicable juvenile Project survival standards.

The NNI Fund is intended to provide near-term compensation for annual survivals that are less than the survival objectives in the performance standards for the Project for spring Chinook, steelhead, summer Chinook, and sockeye. Grant PUD's annual contributions to the fund will be reduced as progress towards meeting performance standards for each is achieved. Once Grant PUD and the PRCC determine that performance standards have been achieved on a species-by-species basis, the NNI Fund annual contributions for that species will be terminated.

To evaluate steady progress toward meeting performance standards and to adjust the NNI Fund, Grant PUD, in consultation with the PRCC, conduct survival studies within the Project. The results of these studies are used to estimate survival rates based on an arithmetic three-year average of the annual estimates. Table 5 includes a planned implementation schedule for conducting these evaluations. The annual contribution made into the NNI account prior to February 15, 2014 was $1,909,231.30.

The total contribution into the NNI Fund made by Grant PUD since 2006 is $15,693,506.07 (2006-2014). NNI Funds have been utilized by the PRCC and Grant PUD to fund 20 separate projects ranging from predator removal, adult fish passage, habitat restoration, instream flow enhancements, avian predator evaluations, land acquisitions, fish screen monitoring, diversion assessment, and various research activities. Current expenditures for the 21 projects total $7,291,132.41, with 10 of the 21 projects currently active.

2.3 Description of Turbine Operating Criteria and Protocols

Project turbines are operated in a protocol referred to as "Fish Mode" and also "Ganging Units" during the juvenile salmonid out-migration season (typically mid- to late-April through mid- to late-August), based on smolt index counts conducted by WDFW at the Rock Island Smolt Monitoring Station, in order to maximize turbine passage survival rates of juvenile salmonids. Fish Mode was the result of using Hill Curves, Theoretical Avoidable Losses calculations, turbine discharge rates, head, and fish survival curves (based on 1996 and 2005 balloon-tag evaluations of salmonid smolts through the turbines) to determine the operating range of the turbines and maintain a minimum fish survival rate of 95 percent. For Wanapum Dam, this means an operating range of 11.8 to 15.7 thousand cubic feet per second (kcfs) per turbine, and for Priest Rapids Dam, turbine units are operated between 11.2 to 17.5 kcfs. Upon further investigation of the issue concerning smolt-passage survival through turbines, it was determined that passage survival rates for out-migrating juvenile salmonids are influenced not only by how a turbine is operated (i.e. Fish Mode), but also how the dam's powerhouse, overall, is operated. This determination led to the concept of "ganging" turbine units in conjunction with operating turbines in Fish Mode. Ganging units is defined as concentrating operating turbines into blocks of adjacent units, thus reducing the edge-effect in regard to predation by fish and birds on salmonid smolts as they exit a turbine's draft tube (LGL Limited, 2003).

When the turning off and on of turbine units is required, ganged units closest to the spillway are operated first and shutdown last because it has been demonstrated that juvenile salmonids are drawn to passing through turbines closest to the spillway and that their survival is highest when passing through blocks of turbines being operated in Fish Mode.

Turbines furthest from the spillways (Unit 1 at Wanapum and Unit 10 at Priest Rapids) are the first turbines to discontinue operation during daylight hours when the powerhouses are operating at less than full capacity during juvenile and adult fish-migration seasons. The discharge from these turbines may adversely affect adult salmonids' ability to efficiently locate the entrances to the adult fishways adjacent to these turbine discharges.

2.3.1 Turbine Operation and Inspection Schedule

Turbines are operated as needed for producing electricity and do not have an operation season or schedule. Turbines are inspected as necessary based on the number of hours operated and other associated stresses.

2.4 Description of Fish Bypass Operating Criteria and Protocols

The WFB was designed to operate at five different flow volumes: 20 kcfs, 15 kcfs, 10 kcfs, 5 kcfs and 2.5 kcfs. In the past six years (2008–2013), the WFB has been operated at 20 kcfs during the downstream migration of juvenile salmonids. In 2008, the PRCC established that the bypass would be operated at 15 kcfs if future tailwater conditions were less than 488.0 ft. in elevation or tailwater discharge is less than 60 kcfs. With a tailwater below 488.0 ft., the outflow from the WFB at 20 kcfs becomes unstable and starts to undulate. This undulation causes a condition that is believed to be less conducive for migrating juvenile smolts, with a likely increase in total dissolved gas (TDG) that could ultimately decrease survival. At this described lower tailwater elevation, when the outflow from the WFB is reduced, this undulating jet of water is returned to a surface-skimming flow, which entrains less air and is better for fish passage survival. Grant PUD will maintain the Wanapum tailwater elevations to stay within the

range of 488.0 ft. to 498.0 ft. during the smolt out-migration season during non-extreme river condition periods.

The WFB was operated continuously during the juvenile salmonid out-migration season in 2014 (April 17–August 28). As a result of the fracture on the Wanapum spillway and the need to lower the Wanapum reservoir to stabilize the spillway, flow through the WFB was between 3-5 kcfs during the downstream migration of juvenile salmonids. In the event of inadvertent spill, water was spilled through the tainter gates in a manner agreed upon by the PRCC spill representatives.

Non-turbine surface-spill passage route at Priest Rapids Dam during in April 2014 was through the newly completed Priest Rapids Fish Bypass. The Priest Rapids Fish Bypass was operated at ~26 kcfs (8.5 kcfs/gate) during the downstream migration of juvenile salmonids through the entire fish-spill season (April-August, 2014). In the event of inadvertent spill, water was spilled through the tainter gates in a manner agreed upon by the PRCC spill representatives.

Grant PUD in consultation with the PRCC fish-spill representatives, used and will continue to use the smolt index counts from the Rock Island Smolt Monitoring Station to determine when annual spring fish-spill at both developments is initiated (before 2.5 percent of the juvenile spring migrants have passed the Project; typically mid- to late-April) and summer fish-spill is terminated (when over 95.0 percent of the summer juvenile migrants have passed; typically mid- to late-August). Typically, the end of the spring fish-spill overlaps with the beginning of the summer fish-spill, providing continuous fish-spill from April to August.

2.4.1 Fish Bypass and Spillway Operation and Inspection Schedule

The spillways are operated on the schedule outlined above during the juvenile salmonid out-migration season, and are operated on an as-needed basis during the remainder of the year. Inspections typically occur during the late summer/early fall low river-flow period, with any necessary maintenance occurring during the low river-flow winter months when the tainter gates are unlikely to be needed.

2.5 Description of Sluiceways Operating Criteria and Protocol

The sluiceway at Wanapum Dam is fully opened to provide an adult salmonid fish fallback route when the WFB is closed at the end of the juvenile salmonid out-migration season, typically in mid- to late-August. The WFB serves as the adult salmonid fallback route while it is in operation. The sluiceway remains open until November 15 of each year. The sluiceway at Priest Rapids Dam, at gate 22 of the PRFB, operated as a surface-spill sluiceway following the end of the salmonid out-migration, typically in mid to late-August, to provide an adult salmonid fallback route, and remains fully open for adult fallback until November 15 of each year.

2.5.1 Sluiceway Operation and Inspection Schedule

The sluiceways are operated on the schedule outlined in the above section. Inspections occur during the non-operation periods.

Construction activity for the PRFB was completed by April 1, 2014, which included the modification of the tainter gate 22 to operate as a “sluice-gate” when needed. Modified gate 22 (of the PRFB) was operated from August 29–November 15 for adult salmonid/steelhead fallback. Gate 22 will be used for adult steelhead fallback in 2015.

2.5.2 Adult Fishways Operating Criteria, Protocols and Schedule

Fishway ladders are operated with a water depth over weirs of 1.0-1.2 ft. Debris from trash racks and picketed leads is quickly removed from ladder exits when water surface differentials exceed 0.5 ft., or as debris begins building up at the exit from the fish ladder. All submerged orifices and overflow weir crests are cleared of debris prior to the adult fish migration season and are kept free of debris during the fish-passage season. Fishway entrances are operated with a head differential range of 1.0 to 2.0 ft.

Grant PUD operates the fishways within the criteria ranges outlined above, and targeted heads are maintained whenever possible. When targeted heads cannot be maintained, the fishways are operated at maximum capable output to meet entrance and channel flow requirements.

Collection channel transport velocities of 1.5 to 4.0 feet per second (fps) (target 2.0 fps) are maintained through the powerhouse collection channels and through the lower end of the fish ladders. All collection channel orifice gates remain closed during the adult fish-passage season, per agreement with the PRCC.

Fishway inspections are conducted by a dam operator at least once per day (walk-through) to ensure that fish facilities are operating within criteria limits. A daily log of the inspections is compared with the computerized printout to assure correct calibration of the fishway control system. At the discretion of NOAA Fisheries or the Fish Passage Center (FPC), at least one inspection of the fishways is conducted by one of these agencies each month during the adult fish-passage season (April 15–November 15).

As reported throughout this document, a horizontal fracture was discovered in the spillway monolith No. 4 at Wanapum Dam in February 2014, resulting in Grant PUD immediately initiating its Emergency Action Plan (EAP; level B) and drawing the Wanapum Reservoir down in a steady controlled state to a safe operating elevation range between 545 feet and 541 feet above mean sea level. While fish ladder entrances on the downstream of Wanapum Dam remained operational (due to tailwater elevation), the fish ladder exits in the forebay of Wanapum Dam were dewatered, preventing upstream-migrating fish from passing Wanapum Dam. Both fish ladders at Priest Rapids Dam are operational and were not impacted as a result of the Wanapum Reservoir drawdown.

In response to the adult fish passage issues at Wanapum Dam resulting from the Wanapum Spillway Fracture, Grant PUD developed an IFPOP, which was intended to provide upstream passage for adult salmonids, steelhead, bull trout, and Pacific lamprey through or around the Project. The development of the IFPOP occurred in consultation with the NOAA Fisheries, USFWS, and PRCC. Grant PUD provided status updates to FERC on May 1, June 5, September 12, and November 21, 2014 (IFPOP Status Reports).

To restore adult fish passage at Wanapum Dam, Grant PUD installed Fishway Exit Passage Systems (FWEPS) at the left-bank (LB) and right-bank (RB) fishway exits of Wanapum Dam. The LB-FWEPS was placed in operation on April 15, 2014, while the right bank ladder was fully operational on April 26, 2014.

The modifications, made to both the Wanapum left and right bank fishway exits, required the installation of weir boxes fabricated from steel plating and measured to an overall size of 16 feet x 7 feet x 7.33 feet (Figure 2). The weir boxes were installed near the exit of each ladder and were supplied with approximately 40 cfs of water via four 90 hp electric submersible pumps in

the forebay at each ladder (n=8). The weir boxes had a false weir designed to attract fish from the ladder pools and lamprey passage plates were added on either side of the weir to facilitate adult lamprey passage.

The weirs directed approximately 90% of the flow down the fish ladder (approximately 35 cfs per ladder), while the remaining 10% of the flow was used to provide water upstream for the fish exit flume (approximately 5 cfs per flume). An adjustable weir, incorporated into the design allowed for the adjustment of water that was pumped into the fish ladder versus into the forebay flume. Once fish passed over the top of the weir box, they passed through a flume and spiral chute and entered the Wanapum forebay at a height of approximately 3.0–5.0 feet depending on reservoir pool elevation (Figure 2-Figure 4).

Figure 2 **Photograph of jump curtain installed at the Left Bank Wanapum Fishway Exit Passage System and the system in operation.**

Figure 3 **Photograph of approach ramp/anti-jump ramp and lamprey ramp (upper right hand corner) installed at the Left Bank Wanapum Fishway Exit Passage System. The approach ramp/anti-jump ramp was installed on June 12, 2014.**

Figure 4 **Photograph of installed spiral chute at the Left Bank Wanapum Fishway Exit Passage System. The spiral chutes were installed on the left and right bank fishway exit passage systems on June 12 and June 19, 2014 respectively.**

In preparation for a partial refill of the Wanapum Reservoir, demobilization activities began at the RB-WFEPS on November 17, 2014 and consisted of shutting down two of the four 90 hp pumps (to keep flow through fishway), and then removing the spiral chute and all supporting structures related to the spiral chute. After the work was completed, the RB fishway flow was restored to provide adult fish passage. On November 18, 2014, Grant PUD began the removal of the entire WFEPS from the LB Wanapum fishway. Once all infrastructure was removed, the left bank ladder remained dewatered for annual operation and maintenance activities.

The Wanapum refill was initiated on November 25, 2014 and a Wanapum Reservoir Elevation of 561.82 feet was achieved on December 1, 2014. While repairs continued, Grant PUD operated the Wanapum Reservoir within a 4 foot operating range (558 ft. – 562 ft.). Normal reservoir operation level of 571.05 feet was achieved on March 21, 2015.

In regards to adult fish passage at Wanapum Dam, per Grant PUD's requirements under the USFWS BiOp for bull trout (2007), at least one fish ladder needs to be operational year-round. Currently the Wanapum right-bank Fish Ladder is fully operational and providing fish passage. The Wanapum left-bank Fish Ladder is currently dewatered for typical annual O&M. Both adult fish ladders at Wanapum Dam will be operational by April 1, 2015.

Monthly ladder inspections occurred at Wanapum Dam on April 15, May 7, May 15, May 21, June 4, June 15, June 18, July 2, July 23, July 31, August 20, August 27, September 14, and October 9 of 2014. Monthly ladder inspections occurred at Priest Rapids Dam on April 15, May 15, May 21, June 15, June 18, July 2, July 23, July 31, August 27, September 14, and October 9 of 2014. Inspection results are made available to Grant PUD, and solutions are found for problem-areas and immediately resolved after the inspection is completed.

2.5.3 Left Bank Adult Fishway at Wanapum Dam

The left-bank adult fishway at Wanapum Dam is comprised of a powerhouse collection channel and the connecting east-shore ladder. The ladder has two slotted fish entrances (SE1 and SE2) but only one (SE2) is kept open. The collection channel consists of 20 leaf-gate orifices (OG1-20). The SE3 entrance is now located at the OG-20, and it will remain open during the adult-passage season. All collection channel orifice gates remain closed during the adult passage season. The auxiliary water at Wanapum Dam is comprised of a combination of gravity flow originating from the forebay through two inline valves, and pumped water from two turbine-driven pumps drawing water from the tailrace. Both gravity and pumped water empty into the attraction water supply channel before being directed into left-bank diffusion chambers (LDC) in the powerhouse collection channel (LDC27-50), junction pool (LDC24-26), and ladder (LDC2-23). Butterfly valves control auxiliary water to LDC25-50 and chimneys control auxiliary water to LDC2-24. At the ladder exit, butterfly valve LV7 provides forebay gravity water to diffusion chamber LDC1. Grant PUD operates the diffusion chambers to keep the ladder within required fishway criteria during the fish passage period.

2.5.4 Right Bank Adult Fishway at Wanapum Dam

The fishway, adjacent to the spillway, has three fish entrances (REW1, RSE2, and REW3) but only one (RSE2) is used. REW2 was changed to a slotted entrance (RSE2) in 1996, while REW1 remains as a backup mechanical gate. REW3 faces the spillway and is bulkheaded. Right-bank auxiliary water at Wanapum Dam is supplied by the gravity supply conduit through two inline valves fed by the forebay. The lower diffusion chambers (RDC25-32) are fed by individual

butterfly valves from the attraction water supply channel. Water is provided to the remaining lower ladder diffusion chambers (RDC2-24) by attraction water supply channel chimney overflow. The upper ladder diffusion chamber RDC1 is fed by the forebay through butterfly valves RV9 and 10. Grant PUD operates the diffusion chambers to keep the ladder within required fishway criteria during the fish passage period.

2.5.5 Fishway Inspections and Dewatering

Dewatering of the fishways for inspection and maintenance is conducted during the periods of minimum fish migration. In order to shorten the ladder shutdown periods, dewatering operations are carefully planned in advance. A schedule for the inspection and maintenance is worked out in cooperation with the PRCC, PRFF, and the FPC. The required frequency of the dewatering for maintenance is determined from Grant PUD's experience gained through yearly inspections.

During all dewatering that may involve fish handling, trained personnel are present to provide technical guidance and assure sound fish handling. Every effort is made to remove fish prior to the system becoming fully dewatered. All adult anadromous species recovered are released upstream of the dam.

2.5.6 Normal Winter Maintenance Period (December 1 – February 28)

The fishways may be dewatered to allow annual maintenance of fish facility equipment, including pumps, diffuser gratings, valves, and orifice and entrance gates as necessary to assure their readiness during the adult fish-migration period. All fishway dewatering events are recorded and a report is completed by the project biologist or technician. Fish biologists or technicians are present at all dewatering events to ensure proper fish handling procedures are followed.

2.5.7 Scheduled Maintenance

Maintenance which requires dewatering, or will have a significant effect on fish passage, is completed during the winter maintenance period of December 1 through February 28. Maintenance of facilities that do not affect fish passage may be conducted during the rest of the year. Concurrent outages of both fishways are avoided whenever possible to provide an upstream fish passage route at the dams at all times. When facilities are not being maintained during the winter maintenance period, they are operated according to the normal operating criteria, unless otherwise coordinated with NOAA Fisheries, FPC, PRCC, and the PRFF.

2.5.8 Unscheduled Maintenance

Unscheduled maintenance that significantly impacts the operation of a fish-passage facility is coordinated with FPC, NOAA Fisheries, PRCC, and the PRFF. The decision on whether to dewater the ladder and make repairs during the fish passage season or wait until the winter maintenance period is made after consultation with the FPC, NOAA Fisheries, PRCC, and the PRFF. If part of a fish-passage facility malfunctions or is damaged during the fish-passage season and the facility can still be operated within criteria without any detrimental effect on fish passage, repairs are not conducted until the winter maintenance period or until minimal numbers of fish are passing the dam. If part of a facility that may significantly impact fish passage is damaged or malfunctions, it is repaired as soon as possible.

2.6 Total Dissolved Gas Abatement

On January 30, 2009, Grant PUD submitted to FERC and the WDOE a final Gas Abatement Plan (GAP), developed in consultation with the PRCC and WDOE (Hendrick 2009). On July 10, 2009 FERC approved and modified the GAP; the modification required FERC approval of annual updates to the plan. On January 7, 2014 Grant PUD submitted its updated GAP to FERC for approval (Keeler 2014). FERC approval of the GAP for 2014 was received on March 6, 2014. The 2014 update to the original 2009 GAP included details on operational and structural measures that Grant PUD planned to implement over the next five years. These measures are intended to result in compliance with WDOE's water quality standards for TDG at the Project.

In accordance with the GAP, Grant PUD monitored TDG levels in the forebay and tailrace of both Wanapum and Priest Rapids dams during the fish-spill season, as well as used data from the CORPS Pasco TDG monitor as Grant PUD's next downstream forebay TDG compliance point.

Exceedances of the TDG standard were average to slightly above average during the 2014 fish-spill season, with a total of 84 exceedances of the 115/120 %SAT standard (based on daily average of the 12-highest consecutive hourly readings). There were 44 exceedances of the 1-hour 125 %SAT standard; all of which occurred at either the Wanapum Dam tailrace (25) or Priest Rapids Dam forebay (19) fixed-site monitoring stations (FSM stations), and all occurred during times of involuntary spill. The Priest Rapids forebay FSM station accounted for the majority of TDG exceedances in 2014 (56 of 84 or >66%), all of which can be attributed to river flow in excess of Wanapum Dam's 2014 hydraulic capacity (~158.5 kcfs). Involuntary spill was required when flows exceeded Wanapum Dam's hydraulic capacity, which contributed to elevated TDG levels. Because of the short distance between Wanapum and Priest Rapids dams (18 river miles (RM)), TDG levels did not have a chance to dissipate below the 115 %SAT by the time they reached the Priest Rapids Dam forebay FSM station. Furthermore, of the 56 exceedances recorded at the Priest Rapids Dam forebay FSM station, 24 (or 43%) corresponded with incoming TDG levels 115 %SAT or above recorded during the same time period at the Wanapum Dam forebay FSM station. Additionally, several other factors unique to the 2014 fish-spill season could have potentially contributed to some of the exceedances of the TDG standards at the compliance points. For instance, during the entire 2014 fish-spill season, the Wanapum Reservoir was drawn down more than 20 feet below its normal minimum operating level (and up to 26 feet below its normal operating level) to allow repairs to be made to the spillway sections of Wanapum Dam in response to the above described fracture. Some of the exceedances of TDG during the 2014 fish-spill season could be attributed to several unique factors associated with this incident, including differences in Project operations because of the discrepancy in operating ranges (3-4 ft. during 2014 vs. normal year of 10-11 ft.), differences in fish-spill operations, and differences in upstream operations.

Grant PUD strives to meet TDG standards, as well as achieve juvenile and adult salmonid and steelhead fish passage and survival standards for the Project, all while meeting regional energy loads and demands. Grant PUD attempted to reduce TDG, when feasible, by implementing operational TDG abatement measures in 2014, including attempting to maximize turbine flows by setting minimum generation requirements (and thus maximizing turbine flows and reducing involuntary spill), participation in regional spill/project operation meetings, implementation of the regional Spill Priority List, and continuing to preemptively spill based on anticipated high flow/low power load time periods. Examples of structural abatement measures include the construction of spillway deflectors at Wanapum Dam (2000), the construction of the WFB

(2008), and the construction of the PRFB (2014). Grant PUD believes that by implementing these measures over the next three years (as part of the ten-year compliance schedule that began in 2008) it is implementing the most current reasonable and feasible measures to alleviate for elevated TDG levels that occur during the fish-spill season. In accordance with the GAP and Section 6.4.11(c) of the WDOE 401 Water Quality Certification, Grant PUD provided the WDOE and PRCC with a summary report of TDG monitoring efforts during the 2014 fish-spill season (Keeler 2014a). This report can be viewed at: Water Quality Monitoring Data).

2.7 Avian Predation Control at Wanapum and Priest Rapids Dam

Grant PUD is required to implement and fund an avian predation control program at the Project (T&C 1.9 & 1.19; NMFS 2008). The overall goal is to reduce avian-related mortalities to salmon and steelhead populations affected by the Project. A specific measure identified includes installation of avian arrays/wires across the Wanapum and Priest Rapids powerhouse tailrace areas, and assure/maintain them in good condition to exclude avian predators. Arrays at both facilities were completed prior to the 2009 smolt out-migration and Grant PUD maintains a cooperative work agreement with the United States Department of Agriculture Wildlife Services (Wildlife Services) to repair, replace, and maintain avian wire arrays at both developments. Wildlife Services also collects data to evaluate the avian predator control program.

2.7.1 Avian Predator Control Methods in 2014

Grant PUD has entered into a five year cooperative work agreement with Wildlife Services to conduct bird hazing and other wildlife control duties. Four Wildlife Services crews worked two shifts at Wanapum and Priest Rapids dams during the day beginning on April 21, 2014. Throughout the peak salmonid smolt migration, April 26, 2014 through June 22, 2014, four additional Wildlife Services personnel worked weekend shifts at both Wanapum and Priest Rapids dams. Wildlife Services haze birds with pyrotechnics to move the threat away from the developments seven days a week for approximately 16 hours per day during peak salmonid migration. Piscivorous waterbirds were killed when hazing actions were unsuccessful at deterring foraging birds. Avian control measures were completed on July 27, 2014.

During the 2014 avian control effort, 6,350 birds were hazed, 39% of which were Caspian terns (*Hydroprogne caspia*) and 1,032 birds were killed (Table 6). Table 6 shows the overall season results.

Table 6 Total control actions made by Wildlife Services through the Priest Rapids Project, mid-Columbia 2014.

		Hazed		Killed	
Common Name	**Scientific Name**	**Wanapum**	**Priest Rapids**	**Wanapum**	**Priest Rapids**
Caspian tern	*Hydroprogne caspia*	1,453	1,003	0	0
Common merganser	*Mergus merganser*	92	163	24	14
Double-crested cormorant	*Phalacrocorax auritus*	85	178	13	23
Gull, California	*Larus californicus*	1,369	385	371	113
Gull, Herring	*Larus argentatus*	27	17	6	8
Gull, Ring-billed	*Larus delawarensis*	679	899	193	267

2.7.2 Avian Control Efforts Proposed for 2015

As a continuation of the current five year cooperative work agreement with Wildlife Services personnel, bird hazing efforts will be conducted in both tailrace and forebay of Wanapum and Priest Rapids dams in 2015. In addition, Wildlife Services has been contracted with and is scheduled to repair and replace avian wires at Priest Rapids Dam in March of 2015. Some of the avian wires were removed during construction of the Priest Rapids Fish Bypass.

2.8 Northern Pikeminnow Removal at Wanapum and Priest Rapids Dam

Grant PUD is required to implement and fund a northern pikeminnow removal program at the Project (T&C 1.10 & 1.18; NMFS 2008). The long-term program goal is aimed at reducing juvenile salmon and steelhead mortality associated with predation by northern pikeminnow at the Project, thus improving juvenile passage survival.

2.8.1 Efforts in 2014

During the 2014, 116,698 northern pikeminnow were removed by the following methods:

- 9,168 in the set-line fishery;
- 101,830 in the beach seine fishery;
- 1,500 in the electrofishing fishery; and
- 4,200 in the angling fishery.

The average length of northern pikeminnow removed in 2014 varied between fisheries. The average length for the set line fishery was 280 mm ± 64 mm (n=1,693). Northern pikeminnow caught in the beach seine fishery ranged from 12.5 to 200 mm (0.5~8") with an average of about 19.1 mm (0.75"). Northern pikeminnow caught in the electrofishing fishery were not subsampled. The average length of northern pikeminnow removed in the angling fishery was 370 mm ± 54 mm (n=738).

2.8.2 Efforts Proposed in 2015

Grant PUD will continue to use set lines, beach seines, angling, and electrofishing as proven, cost effective methods of pikeminnow removal in 2015.

2.9 Adult Fish Counting

Grant PUD is required to maintain video adult fish counting equipment at both dams to provide reliable fish count information, and to submit annual reports for inclusion in regional databases (T&C 1.2; NMFS 2008). The video fish-counting (VFC) system configuration at each dam has digital video cameras in each fishway streaming data to digital video recorders (DVRs) at each dam. These DVRs are networked and accessed by fish counters via PCs from the fish-counting room at Wanapum Maintenance Center. Data from the DVRs are played back in fast-forward mode on the PCs until fish are observed, and then slowed down to identified to species and counted by the fish counters via a separate tallying program. At the end of each day, fish counts from Priest Rapids and Wanapum dams are posted to Grant PUD's web page (Grant County PUD Fish Counts). The Project fish-counting season runs April 15 through November 15, annually.

Due to the Wanapum Spillway fracture causing lower forebay elevations, the Wanapum Dam fishways were not adequate to support adult fish counting in 2014. Therefore, adult fish counting

only occurred at Priest Rapids Dam in 2014. Grant PUD continues to investigate equipment and methods to help remedy periodic slowdown of video playback during heavy use. There were no data-accuracy problems experienced in 2014. The Fish Counters took a quality control test and all Fish Counters were within acceptable levels of accuracy. Daily fish counts for 2014 and an annual summary can be viewed at Grant PUD Fish Counts.

2.9.1 2015 Video Fish Counting Operations

Grant PUD will continue to count fish at Priest Rapids and Wanapum Dams in 2015 using the same basic methodology used in 2014. In 2014, the fish crowder's backgrounds at Priest Rapids Dam were modified to improve removal for cleaning. Upgrades to the video fish counting computers are anticipated prior to the 2015 fish counting season. Daily fish counts for 2015 will be posted daily at Grant County PUD Fish Counts throughout the fish count season (approximately April 15 through November 15).

2.10 Adult Steelhead Downstream Passage

Grant PUD is required to operate the project sluiceways at both dams continually from the end of summer fish-spill until November 15 to provide a safer passage route for adult steelhead fallbacks (Term &Condition 1.23; NMFS 2008). If in-season monitoring indicates that these time frames could be modified to improve adult downstream fish passage, Grant PUD is required to discuss in-season study results with the PRCC, and upon approval by NMFS, modify the time frame for operating project sluiceways.

During 2014, summer fish-spill ended on August 28, 2014 at Wanapum Dam and on August 29, 2014 at Priest Rapids Dam. Immediately following the end of summer fish-spill, the sluiceway at Wanapum Dam and Gate 22 at Priest Rapids Dam (see 2.5.1 above) were opened and operated 24/7 through November 15, 2014.

3.0 Wanapum Dam

Wanapum Dam is an 8,637-foot-long by 186.5-foot-high dam spanning the Columbia River, and creates a 14,680-acre reservoir. The dam consists of left and right embankment sections; left and right concrete gravity dam sections; a left bank and right bank fish passage structure, each with an upstream fish ladder; a gated spillway; an intake section for future generating units; a downstream fish top-spill bypass structure in one of the unused intake sections (unit No. 11); and a powerhouse containing 10 vertical shaft integrated Kaplan turbine/generator sets with a total authorized capacity of 1,038 MW.

3.1 Wanapum Fish Bypass

As previously reported in the 2014 progress and implementation report, the WFB was completed in early 2008 and began operation during the start of the annual fish-spill program on April 30, 2008 (Figure 5 and Figure 6). The WFB was designed to operate at different flow volumes (20, 15, 10, 5, and 2.5 kcfs); however extending the operation of the WFB where flow is less than 20 kcfs has not been discussed, except for those periods that the Wanapum tailrace elevation falls below 488 ft. As reported in the past, when tailwater drops below an elevation of 488.0 feet, the outflow from the WFB (at 20 kcfs) becomes unstable and starts to undulate, causing a condition that is believed to be less conducive for migrating juvenile smolts and also possibly producing greater TDG. At this lower tailwater elevation, when the outflow from the WFB is reduced, this undulating jet (of water) is returned to a surface-skimming flow, which is better for fish passage. Grant PUD, in consultation with the PRCC, agreed to maintain the Wanapum tailwater

elevations to stay within the range of 488.0 to 498.0 feet during the salmonid out-migration season during non-extreme river condition periods.

During 2014, outflow from the WFB ranged between 3-5 kcfs, as a result of the drawdown of the Wanapum reservoir as a result of the fracture discovered on monolith 4 of Wanapum Dam. Based on an ogee crest elevation of 527.7 ft., approximately 13-17 feet of river flow occurred over the crest in 2014 during the drawdown. Some water compression due to acceleration was expected, however expected flow over the ogee was likely in the range of 4-6 feet.

Figure 5 Aerial photograph of Wanapum Dam, mid-Columbia River, WA.

Figure 6 Photograph of Wanapum Dam Fish Bypass facility, looking downstream, mid-Columbia River, WA.

3.2 Wanapum Advanced Hydro Turbines

On October 2, 2003, and supplemented on April 5 and May 28, 2004, Grant PUD filed an application to amend its license for the Project seeking authorization to replace the 10 turbines at Wanapum Dam. The Advanced Turbine replacement was proposed to provide increased power and hydraulic capacity, equal or improved survival of juvenile salmon passing through the units, and improved water quality by reducing the amount of spill over the dam during periods of high flow. The decision criteria for proceeding with the replacement of the remaining nine units over the next eight years was based on whether the new Advanced Turbine testing results demonstrated equal or better fish survival than the existing turbines. Pursuant to FERC's July 23, 2004 Order, Grant PUD installed and tested an Advanced Turbine at Unit 8.

Consistent with the requirements of the BiOp and related FERC Order, a study was designed and conducted to test the hypothesis that survival of Chinook salmon smolts through a new Advanced Turbine would be equal to, or greater than, passage survival through an existing unit. On October 11, 2005, Grant PUD filed a report on the results of biological testing of the first installed Advanced Turbine unit, and in December 2005, FERC authorized continued installation of Advanced Turbines at the Wanapum Development (FERC 2005). Grant PUD completed the Advanced Turbine Upgrades at Wanapum Dam putting the tenth turbine into operation in October, 2013.

Sections 6.4.4(b) and 6.4.9 of the Project's 401 WQC (WDOE 2008), as well as Section II of the individual 401 WQC (WDOE 2004) for the Advanced Turbine installation project, required Grant PUD to conduct a field study to evaluate TDG after the installation of the tenth Advanced Turbine to determine the effect, if any, the Advanced Turbines have on TDG below Wanapum Dam. Article 401(a)(17) of the FERC License (FERC 2008) required FERC approval of the study plan prior to implementation. Grant PUD filed its Final Wanapum Dam Advanced Turbine Total Dissolved Gas Evaluation Study Plan (Keeler 2012) on September 28, 2012; FERC approved the study plan on March 8, 2013. Results from the study indicated that the difference in TDG levels downstream of the turbines did not materially increase when compared to upstream TDG levels during three specific testing conditions (Keeler 2014b), which included high, average, and minimum turbine operating conditions. The final report on this study was filed with FERC on February 20, 2014.

Previous data (collected in 2008) indicated that the steelhead survival point estimate of passage through the Wanapum powerhouse was 95.2% (all turbines combined and based on the percentage of tags detected downstream that passed through the powerhouse). Survival estimates in 2009 and 2010 for juvenile steelhead were 92.9% and 91.4% respectively. Survival estimates for sockeye passing through the powerhouse was 96.2% in 2009 and 92% in 2010.

3.2.1 Description of Turbine Operating Criteria and Fishery Operations

Per Term and Condition 1.8 (NMFS 2008), Grant PUD operates the Wanapum turbines in a protocol referred to as "Fish Mode" and also "Ganging Units" during the juvenile salmonid out-migration season (typically mid- to late-April through mid- to late-August), based on smolt index counts conducted by WDFW at the Rock Island Smolt Monitoring Station, in order to maximize turbine passage survival rates of juvenile salmonids. Fish Mode was the result of using Hill Curves, Theoretical Avoidable Losses calculations, turbine discharge rates, head, and fish survival curves (based on 1996 and 2005 balloon-tag evaluations of salmonid smolts through the turbines) to determine the operating range of the turbines and maintain a minimum fish survival

rate of 95 percent. For Wanapum Dam, this means an operating range of 11.8 to 15.7 kcfs per turbine, and for Priest Rapids Dam, turbine units are operated between 11.2 to 17.5 kcfs.

Recent investigation of smolt passage survival through turbines determined that passage survival rates for out-migrating juvenile salmonids was influenced not only by turbine operation (i.e. "Fish Mode"), but by powerhouse operation. These determinations led to the concept of "ganging" turbine units in conjunction with operating turbines in fish mode. "Ganging units" is defined as concentrating operating turbines into blocks of adjacent units, thus reducing the "edge-effect" that may increase predation risks to smolts as they exit the turbine draft tube and enter the tailrace. Thompson et al. (2012) results showed that a high concentration of northern pikeminnow, along with some walleye and bass (smallmouth and largemouth), exist in the immediate tailrace of Wanapum Dam and are actively foraging on smolts. Turbines furthest from the spillways (Unit 1 at Wanapum and Unit 10 at Priest Rapids) are the first turbines to discontinue operation during daylight hours when the powerhouses are operating at less than full capacity during juvenile and adult fish-migration seasons. The discharge from these turbines may adversely affect adult salmonids' ability to efficiently locate the entrances to the adult fishways adjacent to these turbine discharges.

3.3 Wanapum Fish-Spill

The 2014 fish-spill season began on April 17, 2014 and concluded on August 28, 2014. The fish-spill periods were very closely matched with the juvenile migration timing, and greater than 90 percent of the yearling spring outmigrants passed during the spring fish-spill period between April 17 and June 14. The combined spring and summer fish-spill periods from April 17 – August 28 encompassed greater than 97 percent of the entire 2014 summer outmigration.

In 2014, the intent was to pass all out-migrating salmonids and steelhead through the WFB. However, involuntary spill and the need for additional fish-spill (provided via tainter gates 12 and 13) as a result of the Wanapum Reservoir drawdown required Grant PUD to spill through the spillway at Wanapum Dam.

As a result, Grant PUD was able to collect information on FPE for yearling Chinook and juvenile steelhead passing through the Wanapum spillway and derive survival estimates for both species passing via the spillway. Based on detection histories, FPE for both yearling Chinook and for steelhead passing through the spillway was 27.5% for yearling Chinook and 45.3% for juvenile steelhead. Passage survival for yearling Chinook and steelhead passing through the Wanapum spillway was 97.0% and 99.4% respectively (Table 7and Table 8).

Table 7 Route-specific survival estimates for yearling Chinook migrating through Wanapum Dam in 2014. Survival estimates (point estimates) are based on the proportion of fish that were detected downstream that had been assigned a given passage route.

	Wanapum Dam	
Passage Route	**Number Passed**	**Detected Downstream (%)**
Wanapum Fish Bypass	27	96.3
Spillway	99	97.0
Powerhouse	225	98.2

Table 8 Route-specific survival estimates for juvenile steelhead migrating through Wanapum Dam in 2014. Survival estimates (point estimates) are based on the proportion of fish that were detected downstream that had been assigned a given passage route.

	Wanapum Dam	
Passage Route	**Number Passed**	**Detected Downstream (%)**
Wanapum Fish Bypass	36	100.0
Spillway	164	99.4
Powerhouse	152	94.1

Grant PUD is currently planning on replacing all of the Wanapum Dam spillway Tainter gate seals as part of the Wanapum Dam Interim Spill Regime Evaluation required under Section 6.2(1) of the WQC and Article 11 of the NMFS and USFWS's Section 18 fishway prescriptions, (all of which have been adopted into Article 406 of the FERC license; FERC 2008). Tainter gate seals are believe to be a potential source of juvenile salmonid mortality during spillway passage. Although the spillway is currently operated during high flow conditions with inadvertent flow, it is a non-turbine passage route alternative in the event the WFB is not operational. Grant PUD received approval by FERC in February 2012 to begin modifications. During scheduled maintenance outages, the current 2 inch protruding bolts will be recessed into the seals. The anticipated schedule for replacing the seals has been included in Table 9, with work anticipated to be completed by fall of 2018.

In consultation with the PRCC fish-spill representatives, smolt index counts from the Rock Island Smolt Monitoring Station are used to determine when annual spring fish-spill at both developments is initiated (before 2.5% of the juvenile spring migrants have passed the Project; typically mid- to late-April) and also when summer fish-spill is terminated (when over 95% of the summer juvenile migrants have passed; typically mid- to late-August). The end of the spring fish-spill typically overlaps with the beginning of summer fish-spill, providing continuous fish-spill from April to August.

The spillways are operated (if needed) on the schedule outlined above during the juvenile salmonid out-migration season, and are operated on an "as-needed" basis during the remainder of the year. Inspections typically occur during the late summer/early fall low river-flow period, with any necessary maintenance occurring during the low river-flow winter months when the tainter gates are unlikely to be needed.

Table 9 Anticipated schedule for implementing the Wanapum tainter gate seal modifications.

Task Name	Start Date	End Date
Engineering	May 25, 2010 to Oct.10, 2011	
Review/Design Seal Assembly	May 25, 2010	Aug. 8, 2010
Analyze Gates per seismicity criteria	Dec. 31, 2010	Jun. 29, 2011
Issue/Review Preliminary Engineering Drawings	Jun. 29, 2011	Jul. 27, 2011
Final Design	Jul. 27, 2011	Oct. 10, 2011
FERC process	Jun. 29, 2011 – Jan. 24, 2012	

Construction Permitting (CORPS, WDFW, WDOE, & WDNR)	July 13, 2011 – Dec. 27, 2011
Contract Prep and Award	Dec. 27, 2012 – Aug. 23, 2013
Construction	Aug. 23, 2013 – May 3, 2018
Demobilization	Apr. 3, 2018 – May 3, 2018

4.0 Priest Rapids Dam

Priest Rapids Dam is a 10,103-foot-long by 179.5-foot-high dam spanning the Columbia River, and creates a 7,725-acre reservoir. The dam consists of left and right embankment sections; left and right concrete gravity dam sections; a left and right fish passage structure, each with an upstream fish ladder; a gated spillway section; and a powerhouse containing 10 vertical shaft integrated Kaplan turbine/generator sets with a total authorized capacity of 855 MW.

4.1 Priest Rapids Fish Bypass

The Priest Rapids Fish Bypass (PRFB) was completed in April 2014 and began operation during the start of the annual fish-spill program on April 18, 2014 (Figure 7 - Figure 9). The PRFB was designed to operate at a fixed flow volume of 26 kcfs, with exact flow volume determined by forebay elevation. During 2014, acoustic tag technology was used to evaluate approach, behavioral, and survival estimates for juvenile steelhead and yearling Chinook as they approached and passed through the PRFB. Along with survival estimates for salmonid and steelhead smolts using the PRFB as a passage route, the passage route efficiency (FPE[5]) of the PRFB was determined.

Hatch et al. (2015) reported the FPE for yearling Chinook and juvenile steelhead passing through the PRFB was 38.1% and 47.2%, respectively. Survival estimates for yearling Chinook and steelhead were derived via a paired-release study. Based on detection histories, the PRFB passage survival estimate was 99.8% for yearling Chinook and 99.6% for steelhead (Table 10 and Table 11).

Grant PUD also conducted a TDG evaluation associated with operation of the PFRB in 2014, in accordance with License Article 401(a)(18) and associated WDOE 401 water quality certification requirements (Condition 6.4.6(b)). A study plan associated with this evaluation (see Hendrick and Keeler 2011) was approved by FERC on June 3, 2011. A draft study report will be available in the fall of 2015, with the final being submitted near the end of 2015.

[5] Fish passage efficiency is defined as an estimate of passage for various species utilizing non-turbine passage routes. This estimate is reported as a percentage.

Figure 7 **Priest Rapids Fish Bypass in operation, looking upstream at gate(s) and spillway improvements, April 2014.**

Figure 8 Priest Rapids Fish Bypass in operation, April 2014.

Figure 9 Priest Rapids Fish Bypass, April 2014.

4.2 Primary Juvenile Passage Options/Priest Rapids Fish-Spill/Spill Program

During the 2014 smolt out-migration season, the PRFB was operated to pass juvenile salmonids and steelhead. The PRFB was designed to operate at a fixed flow volume of 26 kcfs. Fish-spill began on April 18 and ended on August 29, 2014.

During 2014, the intent was to pass all non-turbine out-migrating salmonids and steelhead through the PRFB; however involuntary spill occurred during the outmigration season and resulted in spill through the spillway at Priest Rapids Dam. As a result, Grant PUD was able to collect information on FPE for yearling Chinook and juvenile steelhead passing through the Priest Rapids spillway and derive survival estimates for both species passing via the spillway. Based on detection histories, FPE for both yearling Chinook and for steelhead passing through the spillway was 26.9% for yearling Chinook and 22.0% for juvenile steelhead. Passage survival for yearling Chinook and steelhead passing through the Priest Rapids spillway was 98.0% and 97.0% respectively (Table 10 and Table 11).

Table 10 Route-specific survival estimates for yearling Chinook migrating through Priest Rapids Dam in 2014. Survival estimates (point estimates) are based on the proportion of fish that were detected downstream that had been assigned a given passage route.

	Priest Rapids Dam	
Passage Route	**Number Passed**	**Detected Downstream (%)**
Priest Rapids Fish Bypass	415	99.8
Spillway	293	98.0
Powerhouse	352	92.6

Table 11 Route specific survival estimates for juvenile steelhead migrating through Priest Rapids Dam in 2014. Survival estimates (point estimates) are based on the proportion of fish that were detected downstream that had been assigned a given passage route.

	Priest Rapids Dam	
Passage Route	**Number Passed**	**Detected Downstream (%)**
Priest Rapids Top-Spill Bypass	507	99.6
Spillway	236	97.0
Powerhouse	276	93.8

Juvenile passage in 2015 will be through the newly constructed PRFB. Involuntary spill will be passed through the remaining spillway gates at Priest Rapids. Grant PUD, in consultation with NMFS and the PRCC, will use near real-time TDG and flow information to adjust/modify spill patterns as necessary.

4.3 Priest Rapids Turbine Operation

In 2014, Grant PUD collected information on FPE for yearling Chinook and juvenile steelhead passing through the Priest Rapids turbines and derived survival estimates for both species passing via the turbines. Based on detection histories, FPE for both yearling Chinook and for steelhead passing through the powerhouse was 34.9% for yearling Chinook and 30.9% for

juvenile steelhead. Passage survival for yearling Chinook and steelhead passing through the Priest Rapids turbines was 92.6% and 93.8% respectively (Table 10 and Table 11).

Overall survival at Priest Rapids Dam ("concrete") based on point estimates was greater than 97.0% for both species. Yearling Chinook survival at the "concrete" was 97.1%, while juvenile steelhead was 98.5%.

Term and Condition 1.16 of the BiOp (adapted from Action 18, NMFS 2004), requires Grant PUD to operate the Priest Rapids turbines in non-cavitation mode (i.e. "Fish Mode") and run at least two adjacent turbines at any one time. These turbine operations are in place for 95% of the juvenile spring migration (based on index counts at Chelan PUD's Rock Island Dam), and coordinated with the upstream projects. Grant PUD starts monitoring (Rock Island index counts) on or before April 1 of each year and non-cavitation turbine mode operations is initiated before 2.5% of the spring migration has passed. Non-cavitation turbine mode operations are concluded after 97.5% of the spring migration has passed, or on June 15, whichever occurs first.

At this time, Grant PUD expects installation of "in-kind" Kaplan turbines at Priest Rapids Dam. The expected start date for the Priest Rapids Dam turbine installation project is 2016, with a completion date in 2025. Grant PUD completed the competitive modeling phase of the project in 2014.

4.4 Adult PIT-Tag Detection

Per Term and Condition 1.19 (NMFS 2008), Grant PUD maintained and operated the PIT-tag detection system at Priest Rapids Dam. The PIT-tag detection system was established in the Priest Rapids Dam fishways in spring 2003.

Priest Rapids Dam has two adult fishways, each with multiple non-overflow weirs in the uppermost sections. The adult PIT-tag detection system at Priest Rapids Dam is designed to detect upstream migrating fish bearing an ISO FDX-B PIT-tag (134.2 kHz). The PIT-tag detection system plans and specification document states the system is designed to be 95% efficient for the detection of Digital Angel's PIT-tag model TX1400ST or "supertag". Each fishway has two detection weirs located within the non-overflow sections (Figure 10). Each detection weir has two completely submerged orifices for fish passage equipped with PIT-tag antennae mounted to the upstream face of each orifice. Each antenna is controlled by a Digital Angel FS1001A Stationary Transceiver (Richmond & Anglea, 2008). Grant PUD expects to upgrade the PIT-tag readers and move the antennas during the 2015–2016 winter outage.

In addition to the antennae in the adult fishways, there are three antennae installed at the head of the sorting flume within the Off-Ladder Adult Fish Trap (OLAFT). Only fish that have been trapped and pass through the sorting flume are interrogated by this antenna array. The adult fishways' PIT-tag detection system is functional during all times the adult fishways are passable to fish. The OLAFT's PIT-tag detection system is available only when the trap is being operated. All interrogation data collected at Priest Rapids Dam are uploaded to the Pacific States Marine Fisheries Commission's PIT-tag Information System (PTAGIS) web page, http://test.ptagis.org/ptagis/index.jsp. Biomark, Inc. of Boise, ID remotely monitors the detection system for functionality and performs periodic maintenance checks on-site. All detection data reported within this report were obtained from the PTAGIS web site.

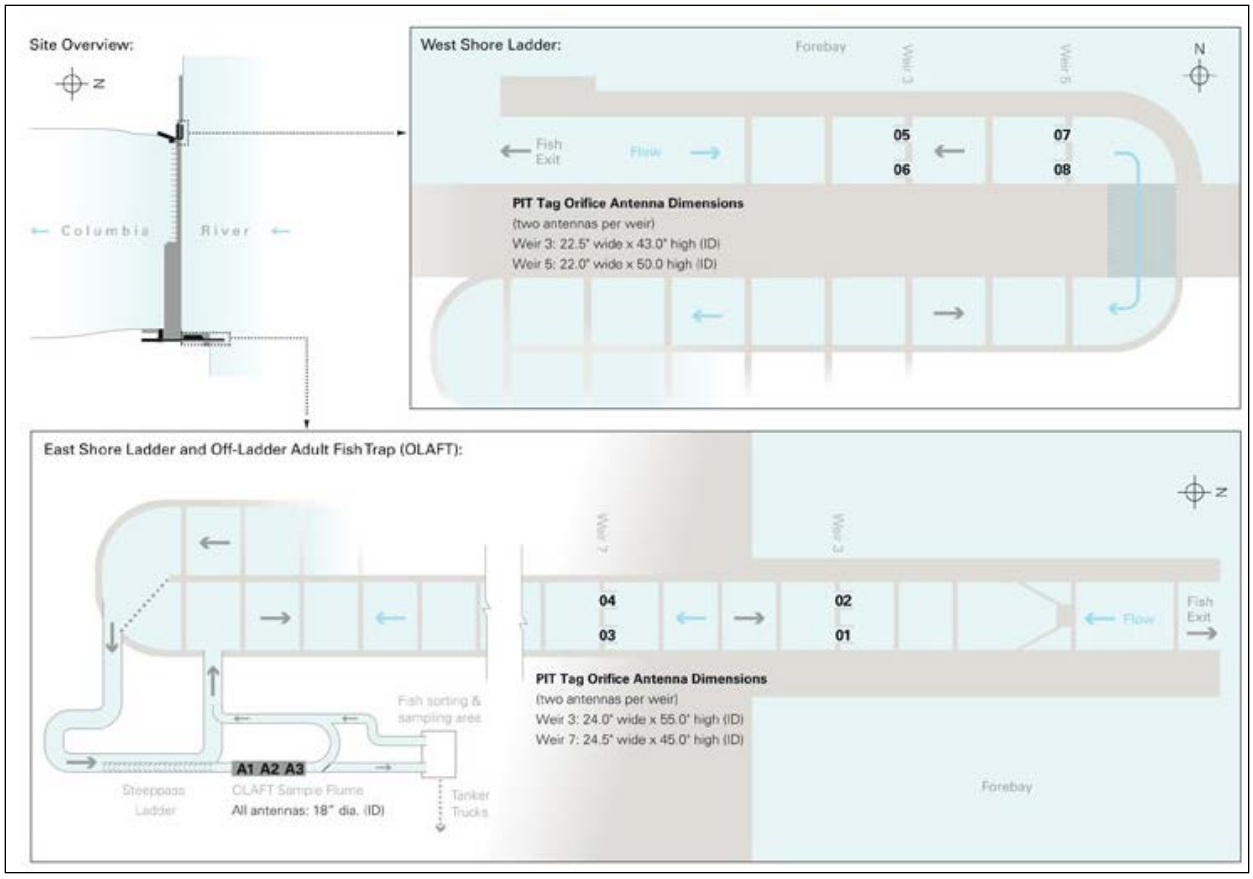

Figure 10 Plan view of upper regions of the fishways at Priest Rapids Dam showing location of PIT-tag detection antennae and associated identification numbers.

4.4.1 2014 PIT-Tag Detection Summary

A total of 27,410 PIT-tag detections were observed at Priest Rapids Dam in 2014. Of these detections, 10,317 were from unique tags within five species of fish. Species of fish carrying PIT-tags identified at Priest Rapids Dam in 2014 were Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), steelhead trout (*O. mykiss*), sockeye salmon (*O. nerka*), and northern pikeminnow (*Ptychocheilus oregonensis*). All detections and associated fish species are summarized in Table 12. In following reports, per request of NOAA Fisheries, Grant PUD will try to determine adult passage survival estimates between Priest Rapids, Wanapum, and Rock Island dams.

Table 12 Summary of PIT-tag detections at Priest Rapids Dam in 2014.

Species	Number of Observations	Unique Tag Codes
Chinook Salmon	8,206	2,937
Coho salmon	3,448	1,244
Steelhead trout	10,750	4,330
Sockeye salmon	4,912	1,772
Northern pikeminnow	50	12
Unknown/ORPHAN	44	22
Totals	**27,410**	**10,317**

4.5 Adult Fish Trap (Off-Ladder Adult Fish Trap/OLAFT)

Temporary modifications to the Priest Rapids Off-Ladder Adult Trap were made during the first quarter of 2014 to facilitate the collection and transport of adult salmonids, steelhead and bull trout (Figure 11). These modifications were made in response to the emergency drawdown of the Wanapum Reservoir, a result of the fracture discovered at monolith No. 4 of Wanapum Dam. Modifications included the installation of a PVC transport chute to direct fish from the OLAFT to the transport vehicles to eliminate the need to physically handle fish. Extension of the existing flume downstream of a false weir, transitioning the flume into pipe, and a pipe turn of approximately 150 degrees allowed for direct fish loading. Prior to diversion and loading of fish onto transport vessels, fish were scanned for PIT-tags via a detection system located in the OLAFT. The modifications were completed on April 11, 2014 and it was put into operation on April 15, 2014.

Figure 11 Modifications implemented at the Priest Rapids Off-Ladder Adult Fish Trap, completed and operational on April 11, 2014.

Additional modifications were made to the Priest Rapids OLAFT on May 22, 2014, which included the addition of a secondary swing gate, which would allow for multiple truck loading (two truck loading capability), as well as restored the original truck loading flume to operable status (Figure 12). Multi-truck loading would be used during the adult sockeye and summer Chinook migration only if a catastrophic failure occurred at both the LB and RB WFEPS.

Trap and transport of adult spring Chinook and steelhead was suspended indefinitely by the PRCC on May 9, 2014, because travel time and conversion rate criteria for spring Chinook migrating from Priest Rapids Dam, through the Wanapum Fishway Exit Passage Systems and past Rock Island were met and exceeded. Further details of the evaluation associated with the trap and transport program can be reviewed at IFPOP and IFPOP status reports.

Before the trap and transport program was suspended, a total of 605 adult spring Chinook and 42 steelhead were collected at the OLAFT and placed into a fish truck for transport and release at Rocky Coulee, approximately three miles upstream of Wanapum Dam. No bull trout were

observed or transported during the trap and transport program, and all other non-target species were sorted through a swing-gate and diverted back to the left bank ladder.

Figure 12 Additional modification implemented at the Priest Rapids Off-Ladder Adult Fish Trap on May 22, 2014 to allow for multi-truck loading.

The WDFW operated the OLAFT at Priest Rapids Dam from early-July through late-October 2014 to sample steelhead trout for the agency's stock-assessment program. The WDFW typically operated the trap on Mondays, Wednesdays, and Fridays of each week for steelhead trout sampling (July 7 – October 31). In addition, WDFW trapped fall Chinook salmon to augment Priest Rapids Hatchery broodstock collection (September 10–October 31). The Yakama Nation Fisheries operated the trap during late June to mid-July to collect adult sockeye for their Lake Cle Elum and Cooper Lake sockeye salmon reintroduction program. The Yakama Nation operated the trap every day with the exception of Fourth of July weekend (June 27-July 10). The OLAFT was completely dewatered and winterized for the season on November 12, 2014.

All temporary modifications that had been implemented at the Priest Rapids OLAFT were removed on December 23, 2014. No significant design improvements to the trapping facilities are anticipated in 2015.

5.0 Hatchery Mitigation Programs

Grant PUD implements 11 hatchery programs as mitigation for the Project effects on anadromous salmon and steelhead that pass through the Project area or are affected by Project operations. Under the 2006 SSSA, Grant PUD agreed to achieve and maintain "no net impact" from the Project on steelhead; spring, summer, and fall Chinook; sockeye; and coho salmon. In part, Grant PUD accomplishes this objective through hatchery propagation. The substantive requirements of the SSSA were incorporated into the WQC conditions, NMFS and USFWS Section 18 prescriptions, and NMFS' 2008 terms and conditions to the incidental take statement for endangered salmon and steelhead. Grant PUD's FERC license requires implementation as defined in these documents and in the Hatchery and Genetic Management Plans (HGMPs) and Artificial Propagation Plans (APPs) required by License Article 401(a)(4).

5.1 Priest Rapids Coordinating Committee Hatchery Subcommittee

The 2008 NMFS BiOp and SSSA were adopted by FERC requiring Grant PUD to continue to support the PRCC Hatchery Subcommittee (PRCC HSC). This includes provision of sufficient facilitation, administration, and clerical support. This committee is the primary forum for implementing and directing supplementation measures for the Project's anadromous fish program. The PRCC HSC is comprised of NMFS, USFWS, WDFW, Confederated Tribes of the Colville Reservation, Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Reservation, and Grant PUD.

During this reporting period the PRCC HSC met monthly except for December (Table 13) and made considerable progress in making decisions related to the White River and Nason Creek spring Chinook programs, and developing monitoring and evaluation implementation plans for all of Grant PUD's programs. Minutes were taken at all meetings and approved by the PRCC HSC. Significant decisions were formalized in one SOA and approval of documents such as implementation and broodstock collection plans were completed during 2014 (Table 14; PRCC SOAs). All SOAs were approved by PRCC HSC consensus. Meeting minutes and statements of agreement for all years can be viewed at Grant PUD's website.

Table 13 Priest Rapids Coordinating Committee Hatchery Subcommittee 2014 meeting schedule.

PRCC Hatchery Subcommittee	January 16, 2014	Meeting
PRCC Hatchery Subcommittee	February 20, 2014	Meeting
PRCC Hatchery Subcommittee	March 20, 2014	Meeting
PRCC Hatchery Subcommittee	April 17, 2014	Meeting
PRCC Hatchery Subcommittee	April 24, 2014	Conference call
PRCC Hatchery Subcommittee	May 22, 2014	Meeting
PRCC Hatchery Subcommittee	June 19, 2014	Conference call
PRCC Hatchery Subcommittee	July 24, 2014	Meeting
PRCC Hatchery Subcommittee	August 21, 2014	Meeting
PRCC Hatchery Subcommittee	September 17, 2014	Meeting
PRCC Hatchery Subcommittee	October 16, 2014	Meeting
PRCC Hatchery Subcommittee	November 20, 2014	Meeting

Table 14 Statement of Agreement approved by the Priest Rapids Coordinating Committee Hatchery Subcommittee in 2014.

Years and SOA #	Title of Statement of Agreement	Date Approved
2014-03	Regarding NTTOC Objective Finalization.	09/17/14

5.2 Planning Documents Summary

All hatchery planning documents and associated M&E plans have been approved by the PRCC HSC and FERC, and have been submitted to NMFS (Table 15). NMFS issued a 13-year Section 10 take permit for the White River and Nason Creek spring Chinook programs in July 2013. NMFS' action on all other permits for Grant PUD-funded programs is pending. During 2014, the

PRCC HSC made progress on requesting alterations to broodstock collection for upper Wenatchee spring Chinook salmon. Permits for all remaining programs are anticipated to be issued in 2015, including the issuance of new Section 10 take permits for White River and Nason Creek spring Chinook programs to accommodate new broodstock collection recommendations. A letter to extend Section 10 take permits for many of the hatchery programs whose permit deadlines expired was received from NOAA Fisheries. This letter is intended to provide coverage until a new permit can be issued.

Table 15 Hatchery planning documents.

Document	Approved by PRCC Hatchery Subcommittee	Submitted to NMFS for approval*	Approved by FERC	NMFS approval/ESA take permit
White River spring Chinook salmon (HGMP)	Aug. 20, 2009	Sept. 15, 2009	Feb. 7, 2012	July 3, 2013
Nason Creek spring Chinook salmon (HGMP)	Aug. 20, 2009	Sept. 15, 2009	Feb. 7, 2012	July 3, 2013
Methow spring Chinook salmon (APP)*	Sept. 16, 2010	June 30, 2009	Dec. 14, 2011	Processing
Okanogan spring Chinook salmon (APP)*	Sept. 23, 2010	Sept. 30, 2009	Dec. 14, 2011	Processing
Wenatchee summer Chinook salmon (HGMP)	Sept. 17, 2009	Sept. 30, 2009	Nov. 15, 2011	Processing
Methow summer Chinook salmon (HGMP)	Sept. 17, 2009	Sept. 30, 2009	Nov. 15, 2011	Processing
Okanogan summer Chinook salmon (APP)*	Dec. 16, 2010	Sept. 30, 2009	Oct. 13, 2011	Processing
Fall Chinook salmon (HGMP & M&E)	Oct. 22, 2009	June 30, 2009	Feb. 7, 2012	Processing
Sockeye salmon (HGMP)	April 22, 2010	Sept. 30, 2009	Nov. 15, 2011	Processing
Coho salmon (APP)*	Oct. 11, 2010	Aug. 31, 2009	Oct. 13, 2011	Processing
Steelhead trout (APP)*	Sept. 23, 2010	Sept. 30, 2009	Dec. 14, 2011	Processing
Monitoring and Evaluation Plan covering all programs	Aug. 20, 2009	June 30, 2009	Approved as part of individual HGMP/APP filings.	N/A

*APPs are explanatory documents that explain the relationship between GPUDs responsibilities within a larger program covered by an HGMP submitted to NMFS by others.

5.3 Facility Development Summary

Substantial progress was made in 2014 on several Grant PUD hatchery program facilities (Table 16). Nason Creek spring Chinook Acclimation Facility, Carlton summer Chinook Overwinter Acclimation Facility, and the Penticton Sockeye Hatchery were completed and fish were acclimated, reared, and/or released on station.

Table 16 Facility status for planned species.

Program	Facility status
White River spring Chinook salmon	Based on Statement of Agreement 2013-01, approved by the Priest Rapids Coordinating Committee – Policy Committee on Feb. 8, 2013, no long-term acclimation facility will be constructed prior to 2026.
Nason Creek spring Chinook salmon	COMPLETE. Construction of the Nason Creek Acclimation Facility began in spring 2013 and was completed in fall 2014. The first spring Chinook salmon production for this program (BY13) was transferred to the Nason Creek Acclimation Facility for overwinter acclimation in October 2014. The first smolt release will occur during the spring of 2015.
Methow spring Chinook salmon	Methow Fish Hatchery, a Douglas PUD-owned facility, is operated by the Washington Department of Fish and Wildlife. Grant PUD entered into a new long-term interlocal agreement with Douglas PUD in the 2nd quarter 2013 for spring Chinook production capacity for adult holding, spawning, incubation, rearing, and release. The agreement is good through 2052.
Okanogan spring and summer Chinook salmon	COMPLETE. Chief Joseph Hatchery construction, partially funded by Grant PUD, was completed in May 2013. Production at the facility began in summer 2013 and includes adult holding, spawning, incubation, and early rearing of spring and summer Chinook salmon. Final acclimation and release will occur at various locations in the Okanogan basin beginning in 2015, with the first brood from 2013 anticipated for release in the spring.
Wenatchee summer Chinook salmon	Feasibility analysis for conversion of the Chelan PUD-owned Dryden Pond to an overwinter acclimation facility is in progress. Grant PUD completed permit-level designs in May 2012. Further design progress is dependent on outcome of the feasibility analysis (anticipated in summer 2015). Fish are currently spawned, incubated, and early reared at Eastbank Hatchery. Spring acclimation and release into the Wenatchee River occurs at the existing Chelan PUD-owned Dryden Pond. The first smolt release for Grant PUD's portion of this program occurred in spring 2014.
Methow summer Chinook salmon	COMPLETE. Construction of the Carlton Overwinter Acclimation Facility began in spring 2013 and was completed in summer 2014. Prior to completion, summer Chinook were acclimated and released during the spring of 2014. Grant PUD's summer Chinook production was transferred to the facility from Chelan PUD's Eastbank Hatchery in fall 2014 for overwinter acclimation and release.
Fall Chinook salmon	A major renovation of Priest Rapids Hatchery began in May 2012 and was substantially completed in December 2013. Operation using the new trapping, spawning, and incubation components began in September 2013; and the new raceways and modified rearing ponds were first used in 2014. Additional upgrades are in progress.
Sockeye salmon	COMPLETE. Construction of the Penticton Sockeye Hatchery began in July 2013 and was completed in late summer 2014. The first production at the fry facility began with spawning in 2014.
Coho salmon	Funding agreement only (10-year agreement with Yakama Nation – expires 2018).
Steelhead trout	Production currently occurs at Wells Hatchery, owned by Douglas PUD. Facility modifications and upgrades have been designed, reviewed, and approved. A major renovation of this facility is expected to begin in 2015 with the bid to be awarded in the spring and construction activities to start in June. Dedicated space for Grant PUD's steelhead production is included in the approved design. Acclimation facilities in the Okanogan basin are operational, but Grant PUD is pursuing additional acclimation opportunities and facility upgrades to St. Mary's Acclimation Pond on Omak Creek. Discussions with the Colville Confederated Tribes are also underway to design temporary, mobile acclimation for other sites.

5.4 Number of Fish Released and Dollars Invested Summary

Fish have been produced and released for several of Grant PUD's hatchery programs for multiple years. Significant program investments were made in 2014, including investments in construction of hatchery facilities (Table 17). Expenditures included capital construction, operations and maintenance, and monitoring and evaluation.

Table 17 Approximate number of fish released and estimated dollars invested in support of Grant PUD's hatchery mitigation.

Program	Years that fish were released	Mean number of fish released per year	Number of fish released in 2014	GPUD Program investment ($) in 2014*	GPUD Program investment ($) total*
White River spring Chinook salmon	2004-14	71,743	97,713	$1,030,317	$26,340,011
Nason Creek spring Chinook salmon	2004-05	6,600	0 (~61,000)[c]	$1,330,118	$9,717,154
Methow spring Chinook salmon	2007-14	170,427	181,050	$791,709	$7,464,749
Okanogan spring Chinook salmon	None	0	0	$73,971	$2,817,210
Wenatchee Summer Chinook salmon	2014	181,816	181,816	$436,567	$1,979,806
Methow Summer Chinook salmon	2014	197,391	197,391	$699,754	$6,260,412
Okanogan Summer Chinook salmon	2014	84,703	84,703	$192,702	$7,330,679
Fall Chinook salmon	1985-2014[a]	5,147,819	5,600,000	$2,576,341	$34,049,987
Sockeye salmon	2005-14	734,246	0	$3,486,878	$10,780,700
Coho salmon	2007-14	1,474,116	1,525,035[b]	$655,820	$3,452,003
Steelhead	2005-14	102,778	108,914	$4,737,412	$8,910,966
Total	**2004-14**		**7,710,103**	**$16,011,588**	**$119,103,676**

*ALL COSTS ARE ESTIMATES ONLY AND ARE LIKELY TO BE UNDERESTIMATES. These expenditures do not include Grant PUD staff labor or travel expenditures.

[a] First fish were released in 1972, but data from the earlier releases are not as robust as the later dates.

[b] Coho program and related data reporting runs October 1 through September 30, previous year.

[c] Spring Chinook reared/released at Chelan PUD Chiwawa Hatchery; funded by Grant PUD to meet Nason Creek shortfalls.

5.5 Monitoring and Evaluation Summary

Monitoring and Evaluation (M&E) activities continued for all hatchery programs currently implemented by Grant PUD (Table 18). A revised five-year M&E plan for upper Columbia River (UCR) species was approved by the PRCC HSC in April 2013 (Hillman et al. 2013). A request for proposals to implement the M&E plan in the Wenatchee Basin was also completed during 2013 and contracts to implement the work were signed in 2014. Grant PUD has also invested in studies to help improve the performance of hatchery programs. These studies will help inform optimal size-targets, growth of fish reared in the hatchery, and provide additional tools to improve imprinting.

Table 18 Monitoring and Evaluation activities for Grant PUD hatchery programs, partially and fully funded by Grant PUD. The span years that activities were conducted is in each cell.

Program	Brood Collection	Spawning	Tagging	Release	Juvenile Abundance	Redd Surveys	Carcass Recoveries
White River spring Chinook salmon	97-09	01-13	04-14	02, 04-14	07-14	97-14	97-14
Nason Creek spring Chinook salmon	98-99*, 13-14	02-03*, 13-14	04-05*, 14	04-05*	07-14	98-99*, 14	98-99*, 14
Methow spring Chinook salmon	96-99*, 05-14	96-99, 05-14	01-14	02-14	02-14	96-14	96-14
Okanogan spring Chinook salmon	NA	NA	NA	NA	NA	NA	NA
Wenatchee summer Chinook salmon	13-14	13-14	13-14	14	14	14	14
Methow summer Chinook salmon	13-14	13-14	13-14	14	14	14	14
Okanogan summer Chinook salmon	13-14	13-14	14	NA	14	14	14
Fall Chinook salmon	98-14	98-14	98-14	98-14	98-14	10-14	10-14
Sockeye salmon	04-12, 14	04-12,14	04-13	04-13	04-14	04-14	04-14
Coho salmon	05-14	05-14	06-14	06-14	06-14	06-14	06-14
Steelhead trout (Methow)	05-12	05-12	05-12	05-12	05-12	05-12	05-12
Steelhead trout (Okanogan)	06-14	06-14	07-14	07-14	07-14	07-14	07-14

*Part of the captive brood program

5.6 Upper Columbia River Steelhead Supplementation Plan

Grant PUD is required under T&C 1.25 (NMFS 2008) to consult with the PRCC HSC (subject to NMFS approval) to develop an APP to rear 100,000 yearling UCR steelhead for release in the UCR basin. The PRCC HSC has previously agreed that, on an annual basis, Grant PUD's steelhead compensation responsibilities may be met through funding of the Colville Tribes' 20,000 steelhead program in Omak Creek (Okanogan River) and the 80,000 steelhead program at the WDFW-operated Wells Hatchery owned by Douglas PUD. The PRCC HSC further agreed that as the Omak Creek program develops, appropriate adjustments to the apportionment described above would be determined. This requirement also includes development of a comprehensive M&E program, which includes monitoring in the natural environment and investigating the impacts of the hatchery program on the naturally produced steelhead population. This is subject to PRCC HSC approval, and the M&E program may be implemented in conjunction with ongoing or future M&E programs with other entities such as Chelan and Douglas PUDs through cost-sharing agreements.

5.6.1 Program Background

Originally listed as endangered in 1997, the status of UCR steelhead has changed several times; as of August 15, 2011 the upper Columbia distinct population segment (DPS) for steelhead was listed as threatened by NOAA Fisheries. This DPS includes all naturally spawned anadromous steelhead populations below natural and man-made impassable barriers in streams in the Columbia River Basin upstream from the Yakima River, Washington, to the U.S.-Canada border, as well as six artificial propagation programs: the Wenatchee River, Wells Hatchery (in the

Methow and Okanogan rivers), Winthrop National Fish Hatchery, Omak Creek, and the Ringold steelhead hatchery programs.

Beginning in 2005, Grant PUD released hatchery steelhead into the Methow Basin and co-funded M&E activities as part of its mitigation requirement using facilities at Wells Hatchery. In 2007, Grant PUD released yearling steelhead smolts into the Okanogan Basin as part of a reintroduction program operated by the Colville Tribes at Cassimer Bar. Because of poor survival and inadequate hatchery infrastructure, Cassimer Bar was discontinued after the 2011 release and the entire program was moved to Wells Hatchery. In order to concentrate M&E efforts into a single basin, Grant PUD's steelhead mitigation program has been released wholly into the Okanogan Basin since 2012.

5.6.2 Hatchery Planning Documents

The Wells Hatchery Steelhead HGMP was completed and submitted to NOAA Fisheries in 2011. Currently, NMFS is evaluating the HGMP prior to issuing a new section 10 permit for the Upper Columbia steelhead hatchery programs. An extension to Section 10 permit 1395 was granted by NMFS on September 20, 2013 as the previous permit expired on October 2, 2013. The quantitative objectives for steelhead were approved by the PRCC HSC in January 2009. Grant PUD submitted an APP for both the Wells and Cassimer Bar programs to the PRCC and PRCC HSC on April 17, 2009, and to NMFS on September 30, 2009. The APP was approved by the PRCC HSC on September 23, 2010, submitted to FERC for approval on September 30, 2010, and approved by FERC on December 14, 2011.

An updated HGMP for the Okanogan steelhead program developed by the Colville Confederated Tribes was submitted to the PRCC HSC in July 2013 and approved by the PRCC HSC in August 2013. It was submitted to NMFS in September 2013 and is currently under consideration.

5.6.3 Facilities

Since 2005, Grant PUD has funded releases of yearling steelhead smolts into the upper Columbia Basin (Table 19). Grant PUD finalized a new long-term agreement with Douglas PUD in 2013 that will provide new infrastructure at the Wells Hatchery as part of an overall plan to re-design and modernize the facility. Through the agreement, Grant PUD will provide capital for spawning, incubation, and rearing infrastructure for its 100,000 smolt program. Designs for the modernization were completed in 2014. The construction bid is expected to be awarded in March 2015 with construction to follow in June 2015.

Currently Omak Creek is the only location used for brood collection for the Okanogan program, but as the program expands, other trapping locations and acclimation sites may be used or developed. A spring-time acclimation raceway on Omak Creek near the St. Mary's Mission is currently used for the locally-adapted yearling program. PIT-tag detections in 2014 suggested adult steelhead passage occurred at Mission Falls. This information has initiated acclimation site investigation to occur in 2015 with potential development of portable acclimation infrastructure above the falls in 2016.

5.6.4 Operations and Maintenance

Grant and Douglas PUDs developed a new long-term agreement in 2013 for production of Grant PUD's steelhead mitigation program. This agreement covers reimbursement to Douglas PUD for Grant PUD's proportionate use of the Wells Hatchery facility for its steelhead program,

including operations and maintenance, monitoring and evaluation, and the capital improvements described in Section 5.6.3.

Grant PUD will also continue to fund the Okanogan Basin steelhead program managed by the Colville Confederated Tribes. A new two-year agreement between Colville Confederated Tribes and Grant PUD was signed in 2014 which will extend the program, including brood collection, transport, acclimation (as needed), and all associated M&E activities through March 1, 2016.

In spring 2014, 108,914 BY 2013 steelhead smolts were released into the Okanogan Basin (25,632 in Omak Creek) as part of Grant PUD's mitigation requirement. Eight consecutive brood years have been released into the Okanogan Basin as part of the Colville Confederated Tribes' steelhead program using locally adapted brood. As of January 2015, approximately 25,540 brood year 2014 fish were on-site at the Wells Hatchery as part of the Colville Confederated Tribes' steelhead program, and an additional 97,437 BY 2014 fish at Wells Hatchery are reserved for Grant PUD mitigation requirements. The fish are scheduled for release in spring 2015. Approximately 20,000 PIT-tags and 39,000 coded-wire tags (CWTs) were placed in steelhead parr in October 2014. These fish are rearing at Wells Hatchery and will be released in the spring of 2015.

The mean and total releases for the combined Wells and Omak programs between 2005 and 2014, and annual O&M, M&E, and capital costs are listed below (Table 19).

Table 19 Steelhead released and annual expenditures as part of the Grant PUD's mitigation requirements.

Calendar Year	Numbers of Fish Released	Annual Expenditures*		
		Capital**	O&M/M&E***	Expenditure Totals
2005	100,000	$542	$285,020	$285,562
2006	101,379	$1,626	$297,680	$299,306
2007	127,819	$2,037	$375,355	$377,392
2008	128,415	$6,269	$425,296	$431,565
2009	95,505	$7,510	$504,510	$512,020
2010	97,393	$7,800	$655,405	$663,205
2011	117,963	$8,376	$320,786	$329,162
2012	84,420	$10,619	$564,508	$575,127
2013	65,970	$114,920	$585,295	$700,215
2014	108,914	$4,231,733	$505,679	$4,737,412
Mean	102,778			
Totals	**1,027,778**	**$4,391,432**	**$4,519,534**	**$8,910,966**

*ALL COSTS ARE ESTIMATES ONLY AND ARE LIKELY TO BE UNDERESTIMATES. Does not include Grant PUD staff labor or travel expenditures.
**These are amortized amounts.
***M&E costs include studies and hatchery evaluations.

5.6.5 Monitoring and Evaluation

As part of program expansion, a request to increase the number of brood collection from 16 to 54 has been made to NMFS with a decision pending. After transport from the collection site to Wells Hatchery, the fish are spawned, incubated, and reared prior to transport and released back

into select areas of the Okanogan Basin. The production goal is 20,000 or more smolts to be released into Omak Creek in early May. Excess production above 20,000 fish will be out-planted into other approved tributaries. Current M&E activities conducted are shown in Table 20 and are consistent with Grant PUD's approved M&E Plan.

Table 20 Monitoring and Evaluation activities for Okanogan Basin steelhead, funded by Grant PUD.

Activity	2006	2007	2008	2009	2010	2011	2012	2013	2014
Brood Collection	X	X	X	X	X	X	X	X	X
Spawning	X	X	X	X	X	X	X	X	X
Tagging		X	X	X	X	X	X	X	X
Release		X	X	X	X	X	X	X	X
Smolt Abundance		X	X	X	X	X	X	X	X
Carcass/Tag Recoveries		X	X	X	X	X	X	X	X
Redd Surveys		X	X	X	X	X	X	X	X

5.7 Upper Columbia River Spring Chinook Salmon Supplementation

Upper Columbia River (UCR) Spring Chinook covered under this T&C (1.26; 2008 NMFS) are listed as Endangered (FR Vol. 64, No. 56, March 24, 1999). This Evolutionary Significant Unit (ESU) includes all naturally spawned populations of spring Chinook salmon in all river reaches accessible to spring Chinook salmon in Columbia River tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam in Washington state, excluding the Okanogan River. Hatchery propagation of the White River, Nason Creek, Chiwawa River, Twisp River, Methow River, and Chewuch River spring Chinook stocks is included in the ESU.

5.8 White River Spring Chinook Salmon Program

The 2008 NMFS BiOp (T&C 1.27) required Grant PUD to continue to implement the White River spring-run Chinook salmon program. This included the possible development of rearing and acclimation facilities. The program was to be implemented to produce 150,000 yearling smolts. However, in 2012 the smolt production level was recalculated to a total of 74,556. This recalculation and a subsequent statement of agreement suspending the program through 2026 were approved by FERC in November 2013. Details regarding this agreement are found in Section 5.8.1.

5.8.1 Program Background

The White River spawning aggregate is within the UCR spring Chinook salmon ESU. In 1997, a spring Chinook captive broodstock program was initiated for the White River population as an emergency effort to reduce the risk of extinction. Adult escapement has remained low in the White River, but the captive-brood program is ending. The final egg collection for the first-generation portion of the captive-brood program occurred in 2009. The program was expected to transition to traditional adult-based supplementation at the captive-brood program's planned sunset in 2016. However, in 2012 resource co-managers determined that an adult-based supplementation program as required is not feasible at this time, due primarily to the inability to collect sufficient broodstock to support a 74,556 smolt program. Members of the PRCC Policy group and PRCC approved a statement of agreement in February 2013 (SOA 2013-01) to cease the captive brood program with the last release of fish in 2016 and last monitoring of captive

brood fish in 2019. However, because of a severe outbreak of bacterial kidney disease in the adult broodstock in summer 2014, the PRCC-HSC decided to euthanize all remaining broodstock prior to the 2014 spawn. This action resulted in broodyear 2013 being the final class of the program, which will now sunset in 2015 with monitoring of captive-brood fish through 2018. The statement of agreement also states that Grant PUD will not be responsible for artificial propagation activities in the White River through broodyear 2026. Grant PUD will continue to monitor and evaluate spring Chinook salmon in the White River during this time period to meet the objectives of Grant PUD's M&E Plan. It is anticipated Grant PUD's total mitigation of 223,670 Wenatchee Basin spring Chinook will be met through increased releases from Grant PUD's Nason Creek program. Any shortfalls that occur in the Nason Creek program through 2026 will be met through other hatchery alternatives as agreed to by the PRCC HSC. This has occurred through production of additional spring Chinook salmon in the Chiwawa spring Chinook salmon program. An Order approving these program changes was issued by FERC on November 1, 2013 (P-2114-263).

5.8.2 Hatchery Planning Documents

The quantitative objectives for spring Chinook were approved by the PRCC HSC in January 2009. The overall M&E plan, including White River spring Chinook, was submitted to NMFS on June 30, 2009, approved by the PRCC HSC on August 20, 2009 and submitted to FERC on June 28, 2010. A draft HGMP was submitted to the PRCC HSC on April 17, 2009 and to NMFS on June 30, 2009. The PRCC HSC approved the revised plan on August 20, 2009. The PRCC HSC-approved plan was resubmitted to NMFS on September 15, 2009. NMFS requested additional information from Grant PUD on October 22, 2009. An addendum to the HGMP was provided to NMFS in March 2010 and the application was released for public comment by NMFS March 18, 2010, submitted to FERC on June 28, 2010, and approved by FERC on February 7, 2012. A Section 10 ESA take permit was issued for this program by NMFS in July 2013.

5.8.3 Facilities

Because no permanent facilities will be developed for the White River program through 2026 (SOA 2013-01), a short, six-week period of acclimation for juveniles will occur each year until the captive brood program ceases in 2015. Juveniles will be transferred each March from Little White Salmon National Fish Hatchery (LWSNFH) to temporary tanks placed on Grant PUD-owned property at river mile two of the White River and in net pens in Lake Wenatchee.

5.8.4 Operations and Maintenance

Since 2006, Grant PUD has maintained a contract with the U.S. Department of the Interior for services related to the current captive-broodstock program at LWSNFH near Cook, WA. The captive broodstock were held and spawned at the hatchery and their progeny were early reared there before transport to the White River for spring acclimation and release. Grant PUD also contracts with the WDFW for transportation, final rearing, and release services associated with the White River spring Chinook acclimation program.

5.8.4.1 Broodstock Collection, Rearing, and Spawning

The first- and second-generation components of the White River program are reared at LWSNFH. The last broodyear of the White River spring Chinook program was 2013. No spawning was conducted in 2014. No broodstock have been collected since 2009.

5.8.4.2 Fish Release

White River spring Chinook smolts released during 2014 were from BY 2012 (Table 21). Released fish were adipose-fin present and had a CWT in the base of the adipose-fin tissue. Additionally, approximately 52,000 fish had PIT-tags. A total of 42,000 fish were acclimated in 12 aluminum tanks at Grant PUD's property, located at White River river mile 2, and 55,713 were acclimated in net pens in Lake Wenatchee, at the mouth of the White River. All tank and net-pen fish were released via trucked transport May 6 and May 8, 2014, respectively. Table 21 shows the numbers of White River spring Chinook salmon released by brood year, acclimation type, and location. Program expenditures to date are reflected in Table 22.

Table 21 Numbers of White River Chinook salmon released by brood year, acclimation type, and location.

Brood Year	Release Location	Approximate Number of Fish
2001	Egg basket in White River as fry	1,536
2002	Acclimation tanks in the White River	2,589
2003	Acclimation tanks in the White River	2,096
2004	Acclimation tanks in the White River	1,639
2005	Net pens in Lake Wenatchee	63,779
2006	Direct to White River as subyearlings & yearlings	139,644 and 142,033 respectively
2007	Net pens in Lake Wenatchee & Direct to Lake Wenatchee as yearlings	131,843
2008	Net pens in and at mouth of Lake Wenatchee and in White River	41,603
2009	Acclimation tanks and pens in White River, net pens in Lake and acclimation at River mile 11.5 via side channel and acclimation tanks.	112,596
2010	Acclimation tanks, bridge site	18,850
2011	Acclimation tanks into White and Wenatchee rivers. Net pens into Wenatchee River.	105,000
2012	Wenatchee River	97,713
MEAN (all BY)		71,743
TOTAL		**860,921**

Table 22 Spring Chinook salmon annual expenditures for the White River program as part of Grant PUD's mitigation.

Calendar Year	Annual Expenditures*		
	Capital**	O&M/M&E***	Totals
1997-2007	$255,010	$14,213,321	$14,468,331
2008	$216,105	$2,342,711	$2,558,816
2009	$268,893	$836,973	$1,105,866
2010	$452,926	$1,403,046	$1,855,972
2011	$1,282,984	$1,115,380	$2,398,364
2012	$281,025	$1,128,561	$1,409,586
2013	$0	$1,512,759	$1,512,759
2014	$0	$1,030,317	$1,030,317
Totals	**$2,756,943**	**$23,583,068**	**$26,340,011**

*ALL COSTS ARE ESTIMATES ONLY AND ARE LIKELY TO BE UNDERESTIMATES.
**Does not include Grant PUD staff labor or travel expenditures.
** M&E costs include studies and hatchery evaluations.

5.8.5 Monitoring and Evaluation

Since 2007, smolt abundance and emigration from the White River has been monitored using a rotary screw trap. The trap is located downstream of the Sears Creek Bridge. The trap was operational in early March 2014 and operated with occasional interruptions due to debris and high flows through November 2014.

Preliminary analyses of PIT-tag data suggest survival was low for fish released in the White River and Lake Wenatchee from 2007 through 2014. The PRCC HSC is concerned that precocious male maturation and predation continue to negatively affect survival and emigration as fish migrate through Lake Wenatchee. The final rearing and acclimation strategies described above were designed to address these concerns.

In an effort to reduce precocious maturation, another feeding experiment was conducted in 2014 on BY 2012 juvenile White River spring Chinook salmon at LWSNFH. Size targets were missed going into fall.

Fisheries managers continue to develop an approach for managing spring Chinook in the Wenatchee Basin, which will include the White River program. The concept is to manage the proportion of hatchery and natural-origin fish in the broodstock and on the spawning grounds to limit impacts to the White River spring Chinook spawning aggregate. Information on M&E activities can be found in Table 23.

Table 23 Monitoring and Evaluation activities for the White River spring Chinook, partially or fully funded by Grant PUD.

Activity	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
Brood Collection	X	X	X	X	X	X	X	X	X	X	X	X	X					
Spawning					X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tagging								X	X	X	X	X	X	X	X	X	X	X
Release						X		X	X	X	X	X	X	X	X	X	X	X
Smolt Abundance											X	X	X	X	X	X	X	X
Carcass Recoveries	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Redd Surveys	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

5.9 Nason Creek Spring Chinook Salmon Program

Under T&C 1.28 (2008 NMFS), Grant PUD will continue to implement artificial propagation for spring Chinook salmon in Nason Creek. This includes collection of natural-origin broodstock from Nason Creek in 2013 and 2014, and rearing and acclimation for production and release in 2015. The facility includes a 10% buffer in production capacity beyond the original required production level of 250,000. Because the Nason Creek Acclimation Facility was not operational until the fall of 2014, Grant PUD funded an additional approximately 61,000 smolts for broodyear 2012 (release year 2014) through Chelan PUD's Chiwawa spring Chinook Hatchery Program.

5.9.1 Program Background

The Nason Creek spawning aggregate is within the UCR spring Chinook salmon ESU. In 1997, a spring Chinook captive-broodstock program was initiated for the Nason Creek population in an effort to reduce the risk of extinction. Improvement in adult escapement in Nason Creek has reduced the near-term risk of extinction, so the captive-broodstock program was discontinued. An adult-based supplementation program has been implemented with the intent to increase abundance of naturally spawning spring Chinook salmon in Nason Creek. The program was originally intended to produce 250,000 yearling smolts. However, in early 2012 the smolt production level was recalculated to 149,114. This recalculation and a subsequent statement of agreement suspending the White River spring Chinook program through 2026 were approved by FERC in November 2013. Shortfalls in the White River spring Chinook program through 2026 will be achieved through increased smolt releases (totaling 223,670) from the Nason Creek program. Production shortfalls in the Nason Creek program through 2026 will be supplemented through alternative hatchery production as approved by the PRCC HSC. Currently shortfalls are met by funding the production of additional spring Chinook salmon as part of the Chiwawa Hatchery spring Chinook salmon program.

5.9.2 Hatchery Planning Documents

The PRCC HSC-approved HGMP was submitted to NMFS on September 15, 2009. The HGMP was released by NMFS for public comment on March 18, 2010, and the HGMP was submitted to FERC on June 28, 2010 and approved on February 7, 2012. The HGMP serves as an application

for a Section 10 permit under the Endangered Species Act. A Section 10 ESA take permit was issued for this program by NOAA Fisheries in July 2013.

5.9.3 Facilities

The Nason Creek hatchery program employs adult supplementation technologies to rear, acclimate, and release progeny of Nason Creek spring Chinook salmon. Beginning in 2013, immigrating adults were collected from the adult ladder at Tumwater Dam and by tangle-netting in Nason Creek. Through a long-term hatchery sharing agreement between Chelan PUD and Grant PUD, adult holding, spawning, egg incubation, and initial rearing occurs at the Eastbank Hatchery on the Columbia River near Wenatchee, WA. As sub-yearlings, juveniles were transferred from Eastbank Hatchery to the Nason Creek Acclimation Facility for overwinter acclimation. Overwinter acclimation occurs from October through release the following spring. Construction of the Nason Creek Acclimation Facility began in the spring of 2013 and was completed in the spring of 2014. The progeny of the 2013 broodstock will be the first fish released from the acclimation facility. Releases from the facility will go into Nason Creek at the smolt stage (20 months) in the spring of 2015.

5.9.4 Operations and Maintenance

Approximately 13,200 yearling spring Chinook have been released into Nason Creek as a result of captive broodstock collected in 2002 and 2003 (Table 24). Monitoring and its associated expense were limited because the captive broodstock program was discontinued due to better than expected adult escapement in Nason Creek. However, capital and operations and maintenance expenses continue as the adult-based supplementation program develops (Table 25). Broodstock collection for the adult supplementation program began in 2013. Approximately 45,000 fish were on station at the end of 2014. The first releases for the program will occur in 2015.

Table 24 The number of Nason Creek spring Chinook salmon released by brood year, acclimation type, and location.

Brood Year	Release Location	Number of Fish
2002	Acclimation tanks in Nason Creek	8,956
2003	Acclimation tanks in Nason Creek	4,244
MEAN		6,600
TOTAL		13,200

Table 25 Spring Chinook salmon annual expenditures for the Nason Creek program as part of the Grant PUD's mitigation requirements for the operation of the Priest Rapids Project.

Calendar Year	Annual Expenditures*		
	Capital	O&M/M&E***	Totals
2004-2009**	$1,023,577	$253,683	$1,277,260
2010	$177,359	$80,989	$258,348
2011	$393,551	$103,962	$497,513
2012	$502,910	$79,808	$582,718
2013	$5,714,051	$57,146	$5,771,197
2014	$1,072,874	$257,244	$1,330,118
Totals	**$8,884,322**	**$832,832**	**$9,717,154**

*ALL COSTS ARE ESTIMATES ONLY AND ARE LIKELY TO BE UNDERESTIMATES.
**Breakdown of costs from 2004-2009 unavailable.
***Does not include Grant PUD staff labor or travel expenditures and includes studies.

5.9.1 Monitoring and Evaluation

Grant PUD continued M&E activities for the Nason Creek supplementation program (Table 26). These activities include juvenile monitoring, redd surveys, carcass surveys, and stock assessments. Reproductive success studies funded by Bonneville Power Administration (BPA) are ongoing.

Table 26 Monitoring and Evaluation activities for Nason Creek spring Chinook, partially or fully funded by Grant PUD.

Activity	98	99	00	01	02	03	04	05	06	07-12	13	14
Brood Collection	X	X									X	X
Spawning					X	X					X	X
Tagging							X	X				X
Release							X	X				
Smolt Abundance										X	X	X
Carcass Recoveries	X	X									X	X
Redd Surveys	X	X									X	X
Run Composition/Genetics Evaluations											X	X

5.10 Methow River Spring Chinook Salmon Program

Methow spring Chinook are included in the UCR spring Chinook salmon ESU. In August 2004, Douglas PUD and Grant PUD entered into a 10-year Interlocal Agreement enabling Grant PUD to utilize excess rearing capacity at the Methow Fish Hatchery owned by Douglas PUD and operated by WDFW. Under this agreement, Grant PUD has the ability to request use of excess rearing capacity for five groups of fish. In September 2004, the Chelan/Douglas PUD HCP and

the PRCC HSC agreed upon the framework regarding current and future plans for Douglas PUD to raise mitigation and study fish for Grant PUD.

5.10.1 Program Background

In June 2013, Douglas and Grant PUDs entered into a new long-term agreement for excess capacity at Methow Hatchery for Grant PUD's spring Chinook program. In 2014, the PRCC HSC approved Grant PUD's request to rear up to 201,000 spring Chinook per year at Douglas PUD's Methow Hatchery from 2014 - 2024. This action was subsequently approved by the PRCC.

5.10.2 Hatchery Planning Documents

The Methow spring Chinook HGMP is currently under review by NMFS. Quantitative objectives for the program were approved by the PRCC HSC in January 2009. Grant PUD submitted an APP for its Methow spring Chinook program to the PRCC HSC on April 17, 2009 and to NMFS on June 30, 2009. The APP was approved by the PRCC HSC on September 16, 2010, submitted to FERC on September 30, 2010, and approved by FERC on December 14, 2011. A renewed Section 10 permit for this program is anticipated in 2015.

5.10.3 Facilities

The Methow Hatchery has a long history of operation by WDFW and the current facilities are meeting Grant PUD's program needs. There is no current discussion regarding the potential for extensive upgrades at the hatchery.

5.10.4 Operations and Maintenance

Broodstock collection primarily occurs at Wells Dam around the first of May and lasts up to two months. Monthly health examinations including length and weight samples of juveniles are conducted and growth is monitored regularly.

Approximately 181,050 yearling smolts were released from the Methow Hatchery on behalf of Grant PUD in 2014. This represents the eighth consecutive year fish have been released through cooperative agreement, and over 7 million dollars committed by Grant PUD to the program (Table 27). The 181,050 smolt release was higher than the newly recalculated value because it incorporated Chelan PUDs mitigation fish (approximately 61,000) as payment for the extra Chiwawa hatchery spring Chinook that were provided to Grant PUD. BY 2013 and 2014 fish are currently rearing at Methow Hatchery.

Table 27 Spring Chinook salmon smolts released and annual expenditures for the Methow hatchery into the Methow basin as part of Grant PUD's mitigation requirement.

Calendar Year	Numbers of Fish Released	Annual Expenditures*
		O&M**/M&E***
2005	-	$544,874
2006	-	$500,407
2007	152,451	$490,577
2008	150,509	$599,761
2009	109,488	$512,935
2010	187,865	$976,937
2011	210,336	$691,546
2012	186,029	$1,027,507
2013	185,687	$1,328,496
2014	181,050	$791,709
Mean	170,427	
Total	**1,363,415**	**$7,464,749**

*ALL COSTS ARE ESTIMATES ONLY AND ARE LIKELY TO BE UNDERESTIMATES
**Does not include Grant PUD staff labor or travel expenditures.
***Includes studies and hatchery evaluations.

5.10.5 Monitoring and Evaluation

Under its agreement with Douglas PUD, Grant PUD has co-funded the M&E program for Methow spring Chinook since 2005, as well as other hatchery evaluations, and original and contemporary capital expenses. A list of M&E activities can be found in Table 28.

Table 28 Monitoring and Evaluation activities for the Methow spring Chinook salmon hatchery program that is partially or fully funded by Grant PUD.

Activity	2005	2006	2007 - 2013	2014
Brood Collection	X	X	X	X
Spawning	X	X	X	X
Tagging			X	X
Release			X	X
Smolt Abundance		X	X	X
Carcass Recoveries		X	X	X
Redd Surveys		X	X	X

5.11 Okanogan Basin Spring Chinook

Hatchery compensation for Okanogan Basin spring Chinook is satisfied through an agreement with the PRCC HSC for annual smolt releases of 110,000 into the Okanogan Basin each year through the Chief Joseph Hatchery program, operated by the Colville Confederated Tribes and funded by the Bonneville Power Administration and Grant, Douglas, and Chelan PUDs.

5.11.1 Program Background

Grant PUD began discussions with the Colville Confederated Tribes in 2006 regarding the proposed Chief Joseph Hatchery. In August of the following year, a Memorandum of Understanding was signed with BPA, Chelan PUD, Grant PUD, and Colville Confederated Tribes to fund the Chief Joseph Hatchery through a cost-share agreement.

In 2010, a tri-party agreement with BPA, Colville Confederated Tribes, and Grant PUD was signed allocating funds for the construction and operation of the Chief Joseph Hatchery. Grant PUD funded 18.3% of the proposed construction costs for the facility ($10 million), which was completed in 2013. Grant PUD is also committed to funding 18.3% of the operation, maintenance, repair, and replacement of the facility, which is expected to produce 2.9 million spring and summer Chinook annually. Annual costs to date for the spring Chinook portion of Grant PUD's overall production can be found in Table 29.

Table 29 Spring Chinook salmon annual expenditures for the Okanogan program as part of Grant PUD's mitigation requirement.

Calendar Year	Annual Expenditures*		
	Capital	O&M/M&E**	Totals
2010	$2,173,494	$0	$2,173,494
2011	$39,518	$0	$39,518
2012	$451,142	$0	$451,142
2013	$0	$79,085	$79,085
2014	$0	$73,971	$73,971
Totals	**$2,664,154**	**$153,056**	**$2,817,210**

*ALL COSTS ARE ESTIMATES ONLY AND ARE LIKELY TO BE UNDERESTIMATES
**Does not include Grant PUD staff labor or travel expenditures and includes studies and hatchery evaluations.

5.11.2 Hatchery Planning Documents

Grant PUD submitted an APP for the Okanogan spring Chinook program to the PRCC HSC on April 17, 2009 and to NMFS on September 30, 2009. The APP was approved by the PRCC HSC on September 23, 2010. The HGMP and APP were submitted to FERC on September 30, 2010 and the APP was approved on Dec. 14, 2011.

5.11.3 Facilities

The construction of the Chief Joseph Hatchery, funded under the Northwest Power and Conservation Council's Fish and Wildlife Program (BPA funding) and Grant PUD cost-share, began in June 2010 and was completed in spring 2013. Production of spring and summer Chinook began in July 2013.

A pilot weir on the Okanogan River downstream of Malott, WA was installed and operated during the summer of 2012, 2013, and 2014 for the purpose of testing trapping and passage effectiveness, as well as to evaluate the potential for using a similar structure in adult management of summer Chinook salmon (both hatchery and natural-origin fish). In general, results to date have been positive and plans for trapping operations in 2015 are in development, with a transition from a pilot weir to a permanent weir operated seasonally. Full program reviews between all parties occur annually in March.

5.11.4 Operations and Maintenance

The first spring Chinook broodstock for the Chief Joseph Hatchery was collected in 2013 from Leavenworth stock. Because the facilities were brand new and untested, the first year's brood collection was limited to 60% of total capacity. Approximately 400 male, female, and jack spring Chinook salmon produced 566,854 eggs which suffered 2.9% mortality from ponding, leaving 514,884 eggs as of November 2014 at 25 fish per pound. As part of the M&E program, spring Chinook are 100% adipose clipped and a group of 200,000 fish are CWT tagged and scheduled for release in April 2015.

As part of the integrated spring Chinook program, 199,949 BY 2013 Methow Composite fish were transported to the Riverside acclimation pond in November 2014 at 28 fish per pound, under Permit Number 18928, issued by NMFS and designated as a 10(j) experimental population for the reintroduction of spring Chinook into the Okanogan Basin. These fish will be volitionally released during the last two weeks of April 2015.

The production goal for the 2014 segregated spring Chinook program is 700,000 yearlings to be released in April 2016, or 640 adults with a 50/50 ratio of males and females, based on associated mortalities at different life stages.

During adult holding, *Columnarus* was discovered on the gills. A bath treatment was prescribed, but the pre-spawn mortality reached 66%. Three different spawning events resulted in a final green egg take of 250,800 eggs for the 2014 brood year. In an effort to offset some of the loss from disease, 352,900 surplus eyed eggs were transferred from the Carson National Fish Hatchery to the Chief Joseph Hatchery, resulting in about 603,000 eggs for the 2014 brood year program.

5.11.5 Monitoring and Evaluation

As with proposed design and construction and O&M costs, Grant PUD is committed to funding 18.3% of the M&E costs for the Chief Joseph Hatchery spring Chinook program. As part of the M&E program, the pilot weir on the Okanogan River was installed in August and operated for 34 days, stopping only when water temperatures exceeded 22.5 degrees Celsius. Over 2,300 summer Chinook were trapped and collected, while less than 100 sockeye and steelhead were trapped, suggesting the 2.5 inch and 3 inch picket spacing was adequate for passing steelhead and sockeye salmon but retaining Chinook salmon. In addition to successful weir and trap operation, underwater video and information on run timing and origin data were collected.

5.12 Fall Chinook Protection Program

As part of Grant PUD's fall Chinook Protection Program required under the SSSA, Grant PUD was required to develop and implement a comprehensive Fall Chinook Protection Program for the fall Chinook salmon population in the mid-Columbia region affected by the Project. The Program was comprised of the following components: Program Performance Standards, a Passage Program for the Project, the HRFCPPA, and a Fall Chinook APP (HGMP) as described in the SSSA, including facility improvements to the Priest Rapids Hatchery.

5.12.1 Program Background

As part of its overall fall Chinook Protection Program related to artificial propagation, Grant PUD produces 5 million fall Chinook smolts as mitigation for spawning areas inundated by Project reservoirs. Further, to achieve NNI Grant PUD is required to provide facilities capable of

producing an additional 1 million fall Chinook sub-yearling smolts. This NNI component of the overall production was recalculated from 1 million to 325,543 sub-yearling smolts by the PRCC HSC in early 2012. Grant PUD is also required to compensate for impacts of flow fluctuations within the Hanford Reach, through production of an additional 1 million fry, to take advantage of the available rearing habitat within its reservoirs. Due to the anticipated low survival of fry released into Project reservoirs, the PRCC HSC agreed in spring 2013 to convert Grant PUD's annual 1 million fry obligation to sub-yearling smolt releases of 273,961 (SOA 2013-07). With these adjustments, Grant PUD's total fall Chinook obligation is currently 5,599,504 sub-yearling smolts released annually. These mitigation revisions were approved by FERC on November 1, 2013 (P-2114-263).

Grant PUD continues to consult with the PRCC HSC to review the performance of the Fall Chinook Protection Program, and determine its continued ability to achieve its performance standards.

5.12.2 Hatchery Planning Documents

The Hanford Reach Fall Chinook salmon HGMP and M&E plan was submitted for review to the PRCC HSC on January 1, 2009 and April 17, 2009. The plan was submitted to FERC on August 27, 2010 and approved on February 7, 2012. An approved plan by NMFS will result in an extended Section 10 Permit that will only cover production at Priest Rapids Hatchery and a previous permit issued during 2003 for all non-listed salmonid programs in the upper Columbia River. The permit extension is anticipated to be issued by NMFS in 2015.

5.12.3 Facilities

Grant PUD, in consultation with the PRCC, developed the Priest Rapids Hatchery facilities improvements as outlined in Section 9.6 of the SSSA. Overall design of the renovated facility to produce Grant PUD's mitigation of 5.6 million fall Chinook salmon sub-yearling smolts (plus an additional design capacity for 100,000 smolts) was completed and approved by the PRCC HSC. Construction of the facility, which produces both Grant PUD's current mitigation requirements, and 1.7 million smolts and 3.5 million eyed-eggs for the CORPS, began in spring 2012 and is complete. New components of the facility were operational for all broodstock collection, spawning, and incubation activities in the fall of 2013.

5.12.4 Operations and Maintenance

Historical and current information regarding Priest Rapids Hatchery egg take, release, and associated expenditures are reflected in Table 30.

Table 30 Priest Rapids Hatchery Fish Release and Cost.

			Annual Expenditures		
Brood Year	Grant Fish Released	Other Fish Released	Capital	O&M**/M&E***	TOTAL
1985				$-	
1986				$-	
1987				$-	
1988	5,404,550	0		$-	
1989	6,431,100	0		$-	
1990	5,239,700	93,800		$-	
1991	5,158,700	1,841,400		$-	
1992	5,451,000	1,683,159		$-	
1993	5,008,476	1,697,360		$-	
1994	5,002,000	1,700,000		$-	
1995	5,000,000	1,700,000		$-	
1996	4,944,700	1,699,400		$-	
1997	5,029,070	1,708,530		$-	
1998	4,841,800	1,663,000		$-	
1999	5,156,000	1,700,000		$461,545	$461,545
2000	5,119,100	1,743,450		$598,792	$598,792
2001	5,041,060	1,737,975		$581,134	$581,134
2002	5,071,640	1,705,965		$664,368	$664,368
2003	5,114,560	1,700,000		$501,156	$501,156
2004	4,899,835	1,700,000		$714,149	$714,149
2005	5,180,752	1,695,538		$732,716	$732,716
2006	5,024,634	1,718,467		$746,409	$746,409
2007	4,548,306	0		$821,250	$821,250
2008	5,067,926	1,720,388	$230,336	$737,252	$967,588
2009	5,064,043	1,712,608	$227,367	$543,893	$771,260
2010	5,081,184	1,717,206	$2,044,281	$724,359	$2,768,640
2011	5,271,247	1,785,701	$9,613,911	$922,045	$10,535,956
2012	5,091,902	1,730,959	$9,690,605	$918,078	$10,608,683
2013	5,600,000	1,666,713	$1,658,463	$917,878	$2,576,341
MEAN	5,147,819	1,454,678			
TOTALS	**133,843,285**	**37,821,619**	**$23,464,963**	**$10,585,024**	**$34,049,987**

*ALL COSTS ARE ESTIMATES ONLY AND ARE LIKELY TO BE UNDERESTIMATES
**Does not include Grant PUD staff labor or travel expenditures.
***Includes studies and hatchery evaluations.

5.12.5 Monitoring and Evaluation

Data collection in fulfillment of the Priest Rapids Hatchery M&E Program was initiated in September 2010. Data was collected primarily at the Priest Rapids Hatchery volunteer trap

beginning in September, at the hatchery during spawning, and in the Columbia River during and after spawning. Otolith marks were available to help determine hatchery and natural origin of adults. Annual reports that present the current year as well as previous years data have been completed (Hoffarth and Pearsons 2012 a, b, Richards et al. 2013, Richards and Pearsons 2014). Data collection associated with the hatchery M&E plan will continue in 2015.

Pilot studies were conducted to evaluate alternative means to achieve desired broodstock and offspring characteristics.

5.12.6 Hanford Reach Fall Chinook Protection Program

As in previous years, implementation of the HRFCPPA was very successful for the 2013-2014 flow protection season. Protections for fall Chinook salmon from the 2013 BY began on October 15 and continued through June 19, 2014. Based on HRFCPPA criteria and redd counts in the Vernita Bar index area, spawning began October 23 and continued through November 24, 2014. There was a total of 372 redds counted in the index area during the redd survey on November 24, 2014 and the distribution of those redds resulted in a Critical Elevation of 65 kcfs. Minimum discharge protections were maintained through the End of Emergence on May 20, 2014. Rearing Period protections began at the start of emergence and continued through June 19, 2014. With the exception of three occasions during the Post-Hatch Period, all constraints were met during for the 2013-2014 season. During 2013, discharge at the USGS gage dropped below 65 kcfs on December 1st, 5th, and 18th. While any discharge readings below 65 kcfs could constitute a violation of the minimum discharge requirements, the effect on redds at or above the minimum flow elevations was likely minimal due to the short duration that flows were below 65 kcfs. Typically, in river systems with fluctuating flows, there is a delayed response between stage change and water level within the inter-gravel spaces. Given this time lag response between reduced discharge and dewatering of inter-gravel spaces, combined with the input from groundwater, it is unlikely that redds were exposed for an extended period of time that would lead to dry conditions during the December minimum flow events. Nevertheless, Grant PUD voluntarily considers these violations of the HRFCPPA until the dynamics of inter-gravel water levels are better understood. Grant PUD strives for perfect compliance of the flow constraints under the HRFCPPA and will continue to look for opportunities to improve coordination between the HRFCPPA, operational constraints, and the Mid-C Coordination to meet this goal.

Fall Chinook salmon stranding and entrapment surveys were completed during each Rearing Period in 2011, 2012, and 2013 as part of the follow-up monitoring plan required by the HRFCPPA (see Article 401(a)(5)). A report of results from 2013 (Hoffarth et al. 2013) was filed with FERC in January 2014.

Protections for fall Chinook salmon for the 2014-2015 protection season began on October 15, 2014 and will continue through May or June 2015. Based on redd counts in the Vernita Bar index area, the Initiation of Spawning was determined to be on October 22 for the below 50 kcfs elevation zone and October 29 for the above 50 kcfs elevation zone. The End of Spawning was determined to be November 28, 2014. There was a total of 525 redds counted in the index area during the final redd count and the distribution of those redds resulted in a Critical Elevation of 70 kcfs. Minimum discharge protections were maintained through the writing of this report. Protections for BY 2014 will continue into 2015 and will be reported in the 2015-2016 FERC report.

5.13 Summer Chinook

The objective of the Summer Chinook Protection Program is to achieve NNI from the operations of the Project on summer Chinook salmon populations that pass through the Project. Grant PUD's original summer Chinook mitigation obligation was for artificial propagation of 834,000 juvenile salmonids on an annual basis. This number was recalculated to 659,816 by the PRCC HSC in 2012 and approved by FERC on November 1, 2013 (P-2114-263). These fish are divided for release into each of the Wenatchee, Methow, and Okanogan rivers. Details about each of these individual programs can be found below.

5.13.1 Wenatchee Summer Chinook Program Background

Hatchery mitigation for summer Chinook salmon is used to mitigate for unavoidable losses associated with the Project. This mitigation is intended to result in NNI. In a partnership with Chelan PUD, Grant PUD produces fish at Eastbank Hatchery on the Columbia River (spawning, incubation, and early rearing) with final acclimation and release taking place at the Dryden Pond on the Wenatchee River.

5.13.1.1 Hatchery Planning Documents

Versions of the HGMP were distributed to the PRCC HSC for review and comment in October 2007, June 2008, and on April 14, 2009. The revised HGMP was voted on and approved by the PRCC HSC on September 17, 2009, submitted to NMFS on September 30, 2009, and submitted to FERC on January 28, 2011. The HGMP was approved by FERC on November 15, 2011. Grant PUD is currently operating under an extension of a previous permit and waiting for a response from NMFS relative to a new Section 10 permit (anticipated for issuance in the summer of 2015).

5.13.1.2 Facilities

The PRCC HSC approved the modification of Eastbank Hatchery to accommodate Grant PUD's summer Chinook mitigation for ultimate release into the Wenatchee and Methow river basins. The modifications include the capacity to hold adults, incubate eggs, and rear fish prior to transfer to an acclimation site. Modifications were completed in 2012.

Fish will be transferred from Eastbank Hatchery to Dryden Acclimation Pond adjacent to the Wenatchee River. Grant PUD developed a basis of design (BOD) for modification of the Dryden Acclimation Pond so that it could be used for overwinter acclimation. The BOD was approved by the PRCC HSC on February 27, 2012 and was sent to Chelan PUD for consideration. Chelan PUD does not support modifications of this facility at this time primarily because of concerns related to meeting phosphorous management associated with the Wenatchee River Total Maximum Daily Load requirement administered by WDOE. The WDOE has calculated the maximum allowable phosphorous discharge that would be permitted from the Dryden Pond Facility. Grant PUD has been exploring different cost-effective options, such as development of an ultra-low phosphorous feed and the reduction of fish size, to accommodate the desired number of summer Chinook salmon at Dryden Pond. Grant PUD will acclimate fish during the spring of 2015 with the expectation that a decision on the future of modification and overwintering at Dryden Pond will be made in 2015. This approach was approved by the PRCC HSC in 2009 (SOA-2009-09).

Costs associated with development of Wenatchee summer Chinook salmon facilities are included in Table 31.

5.13.1.3 Operations and Maintenance

Under the long-term hatchery sharing agreement between Chelan PUD and Grant PUD, broodstock for the 2014 program was collected from adult collection facilities on the Wenatchee River. Adults collected were transferred to Eastbank Hatchery where they were held and spawned. Incubation and early rearing also occurred at Eastbank Hatchery until transfer to the Dryden Acclimation Pond in spring 2015 and subsequent release into the Wenatchee River.

Table 31 Summer Chinook salmon released and annual expenditures for the Wenatchee program as part of Grant PUD's mitigation requirement for the operation of Priest Rapids Project.

Calendar Year	Number of Fish Released	Annual Expenditures*		
		Capital	O&M**/M&E*	Totals
1997-2007	--	$130,000	NA	$130,000
2008	--	$32,442	NA	$32,442
2009	--	$159,422	NA	$159,422
2010	--	$344,081	NA	$344,081
2011	--	$58,141	NA	$58,141
2012	--	$300,269	$148,978	$449,247
2013	--	$2,185	$367,721	$369,906
2014	181,816	$0	$436,567	$436,567
Mean	181,816			
Totals	**181,816**	**$1,026,540**	**$953,266**	**$1,979,806**

*ALL COSTS ARE ESTIMATES ONLY AND ARE LIKELY TO BE UNDERESTIMATES
**Does not include Grant PUD staff labor or travel expenditures.
***Includes studies and hatchery evaluations.

5.13.1.4 Monitoring and Evaluation

Grant PUD began contributing to the M&E of the Wenatchee summer Chinook program in 2012. Previously, Chelan PUD had been conducting long-term monitoring of their summer Chinook salmon mitigation program.

5.14 Methow Summer Chinook Program Background

Hatchery mitigation for summer Chinook salmon is used to mitigate for unavoidable losses associated with the Project. This mitigation is intended to result in NNI. The numbers of fish were recalculated in 2012 and this recalculation applies to fish released in 2014. The summer Chinook salmon to be released into the Methow River was recalculated to 200,000. This recalculation was approved by FERC on November 1, 2013 (P-2114-263).

5.14.1 Hatchery Planning Documents

Versions of the HGMP were distributed to the PRCC HSC for review and comment in October 2007, June 2008, and on April 14, 2009. The revised HGMP was voted on and approved by the PRCC HSC on September 17, 2009, submitted to NMFS on September 30, 2009, and submitted to FERC on January 28, 2011. The HGMP was approved by FERC on November 15, 2011. Grant PUD is waiting for a response from NMFS relative to a Section 10 permit (anticipated for issuance in the summer of 2015).

5.14.2 Facilities

The PRCC HSC approved the modification of Eastbank Hatchery to accommodate Grant PUD's summer Chinook mitigation for ultimate release into the Wenatchee and Methow river basins. The modifications include the capacity to hold adults, incubate eggs, and rear fish prior to transfer to an acclimation site. Modifications were completed in 2012.

Fish will be transferred from Eastbank Hatchery to the Carlton Overwinter Acclimation Facility adjacent to the Methow River. The PRCC HSC approved Grant PUD's final design of the Carlton Overwinter Acclimation Facility and construction began in spring 2013. The facility, which was completed in February 2014, is capable of providing overwinter acclimation.

Costs associated with development of Wenatchee summer Chinook salmon facilities are included in Table 31.

5.14.3 Operations and Maintenance

A volitional release of broodyear 2012 summer Chinook from the Carlton Overwinter Acclimation Facility began in early April and ended on 6 May 2014. An estimated 153,780 fish were released during that period. A forced released of about 43,611 fished occurred on 14 May 2014. In total, approximately 197,391 smolts were released from the Carlton Overwinter Acclimation Facility in 2014 (Table 32).

Under the long-term hatchery sharing agreement between Douglas PUD and Grant PUD, broodstock for the program was collected at Wells Dam in 2014. Adults collected were transferred to Eastbank Hatchery where they were held and spawned. Incubation and early rearing will also occur at Eastbank Hatchery. Fish produced from the 2014 broodstock will be transferred to the Carlton Overwinter Acclimation Facility in the fall of 2015 for acclimation and release in 2016.

Table 32 The number of Methow summer Chinook released from the Carlton acclimation complex.

Release Year	Number of Fish
2014	197,391
Mean	197,391
TOTAL	197,291

Table 33 Summer Chinook salmon annual expenditures for the Methow programs as part of Grant PUD's mitigation requirements for the operation of the Priest Rapids Project.

Calendar Year	Annual Expenditures*		
	Capital	O&M**/M&E***	Totals
1997-2007	$130,000	$-	$130,000
2008	$32,442	$-	$32,442
2009	$159,422	$-	$159,422
2010	$356,065	$-	$356,065
2011	$80,400	$-	$80,400
2012	$660,498	$125,038	$785,536
2013	$3,677,041	$339,752	$4,016,793
2014	$186,781	$512,972	$699,754
Totals	**$5,282,649**	**$977,762**	**$6,260,412**

*ALL COSTS ARE ESTIMATES ONLY AND ARE LIKELY TO BE UNDERESTIMATES
**Does not include Grant PUD staff labor or travel expenditures.
***Includes studies and hatchery evaluations.

5.14.4 Monitoring and Evaluation

Grant PUD began contributing to the M&E of the Methow summer Chinook program in 2012 and will continue to fund M&E activities for the duration of the project. Previously, Chelan PUD had been conducting long-term monitoring of their summer Chinook salmon mitigation program.

5.15 Okanogan Summer Chinook Background

Hatchery mitigation for summer Chinook salmon is used to mitigate for unavoidable losses associated with the Project. This mitigation is intended to result in NNI. Grant PUD began discussions with the Colville Confederated Tribes in 2006 regarding a potential cost-share in the proposed Chief Joseph Hatchery. In August of the following year, a Memorandum of Understanding was signed with the BPA, Grant PUD, Chelan PUD, and Colville Confederated Tribes to fund the Chief Joseph Hatchery through a cost-share agreement. In 2010, a tri-party agreement with BPA, Colville Confederated Tribes, and Grant PUD was signed allocating funds for the construction and operation of the Chief Joseph Hatchery. Grant PUD funded 18.3% of the proposed construction costs (Table 34).

5.15.1 Hatchery Planning Documents

Grant PUD submitted an APP for the Okanogan summer Chinook program to the PRCC HSC on April 17, 2009 and to NMFS on September 30, 2009. The APP was approved by the PRCC HSC on September 23, 2010. The HGMP and APP were submitted to FERC on September 30, 2010 and approved by FERC on October 13, 2011.

5.15.2 Facilities

Construction of the Chief Joseph Hatchery funded under the Northwest Power and Conservation Council's Fish and Wildlife Program (BPA funding) and Grant PUD cost-share began in early June 2010. The facility was completed in spring 2013 and production of spring and summer Chinook began in July 2013. Acclimation ponds for the integrated yearling summer Chinook

program are located at Similkameen (designed for 250,000 fish), Riverside (275,000 fish), and Omak (275,000 fish).

A pilot weir on the Okanogan River downstream of Malott, WA was installed and operated during the summer of 2012, 2013, and 2014 for the purpose of testing trapping and passage effectiveness as well as to evaluate the potential for using a similar structure in adult management (both hatchery and natural-origin fish). In general, results to date have been positive and plans for trapping operations in 2015 are in development. A full report will be provided during the Chief Joseph Hatchery annual program review in March.

Table 34 Summer Chinook salmon annual expenditures for the Okanogan program as part of Grant PUD's mitigation requirements for the operation of Priest Rapids Project.

Calendar Year	Annual Expenditures*		
	Capital	O&M/M&E**	Totals
2010	$6,026,506	$0	$6,026,506
2011	$109,572	$0	$109,572
2012	$802,030	$0	$802,030
2013	$0	$199,869	$199,869
2014	$0	$192,702	$192,702
Totals	**$6,938,108**	**$392,571**	**$7,330,679**

*ALL COSTS ARE ESTIMATES ONLY AND ARE LIKELY TO BE UNDERESTIMATES

**Does not include Grant PUD staff labor or travel expenditures and includes studies and hatchery evaluations.

5.15.3 Operations and Maintenance

The first summer Chinook broodstock for the Chief Joseph Hatchery was collected in 2013 and included both hatchery and natural-origin summer Chinook. Grant PUD's mitigation for this program is 278,000 summer/fall Chinook released into the Okanogan or Columbia rivers. In October, approximately 1,045,000 green eggs were collected for the first spawn. Since the facilities were brand new and untested, the first year's brood collection was scheduled to be only 60% of total capacity.

The 2013 brood year integrated program using natural origin return adults is marked with 100% adipose present/CWT. A total of 507,129 yearlings were transferred to the Omak (298,868 fish) and Similkameen (207,078 fish) acclimation ponds in October 2014 at 26.7 fish per pound. The fish will be volitionally released over a 2-week period in April 2015 at a target release size of 10 fish per pound.

The summer Chinook 2013 brood year segregated program using hatchery origin return adults is 100% adipose clipped with a CWT-tagged group of 100,000 fish. At the end of November 2014, 416,816 yearlings at 20 fish per pound were being reared at Chief Joseph Hatchery for release in the spring of 2015.

The 2014 summer Chinook broodstock was affected by the *Columnarus* outbreak, but not to the extent the spring Chinook were impacted. The total green egg take for the integrated natural origin return adults and segregated hatchery origin return adults was 2,390,000 eggs.

5.15.4 Monitoring and Evaluation

As with proposed design and construction and O&M costs, Grant PUD is committed to funding 18.3% of the M&E costs for the spring Chinook program resulting from the Chief Joseph Hatchery.

As part of the M&E program, the temporary, pilot weir downstream of the town of Malott, WA on the Okanogan River was installed in August and operated for the third year in 2014. Over 2,300 summer Chinook were trapped as part of the weir operation while less than 100 sockeye and steelhead were collected, suggesting the 2.5 inch and 3 inch picket spacing was adequate to allow fish passage by these species. In addition to successful weir and trap operation, underwater video and information on run timing and origin data were collected.

5.16 Sockeye Protection Program

Grant PUD, in consultation with the PRCC, has developed and implemented a comprehensive Sockeye Protection Program for the sockeye populations in the mid-Columbia region affected by the Project. This includes a program to achieve NNI resulting from Project operations on sockeye populations that pass through the Project area, and is comprised of the following components: Program Performance Standards, a Passage Program for the Project, 7% compensation provided through an Artificial Propagation Program, and 2% compensation provided through the habitat program described (in the SSSA). Grant PUD's overall requirement is to strive to artificially propagate up to 1,143,000 sockeye smolts. As approved by the PRCC HSC in 2010, Grant PUD is meeting NNI through funding of the Okanagan Nation Alliance's Skaha Reintroduction Program and through development of a new hatchery facility in Penticton, B.C., with capacity for an eight million sockeye egg program. This agreement is in effect through 2021.

5.16.1 Program Background

There are two sockeye populations within the upper Columbia River, the Wenatchee and Okanogan river stocks, neither of which are listed under the Endangered Species Act. These populations are healthy enough to allow tribal fisheries in Washington and Canada, with periodic recreational fisheries in Lake Wenatchee, the mainstem Columbia River, and selected tributaries and lakes.

Recognizing that the Okanogan River, which includes nursery/rearing lakes in British Columbia, is the best option for long-term sockeye mitigation opportunity the PRCC HSC approved in 2008 Grant PUD's plan to fund an experimental program to reintroduce sockeye into Skaha Lake in British Columbia. On October 21, 2010, the PRCC HSC approved extending this sockeye program for an additional five years (SOA-2010-08) and on November 1, 2011, Grant PUD entered into a long-term agreement with the Okanagan Nation Alliance (ONA) to co-fund a new sockeye hatchery, hatchery operations and maintenance costs, and a monitoring and evaluation program. The number of sockeye salmon released and the associated cost of implementation of sockeye mitigation activities, including development of the sockeye salmon facility, were included in Table 35.

5.16.2 Hatchery Planning Documents

The HGMP was developed for the sockeye reintroduction program and the quantitative objectives were approved by the PRCC HSC in January 2009. Grant PUD submitted an HGMP

to the PRCC HSC on April 17, 2009 and to NMFS on September 30, 2009. The HGMP was submitted to FERC January 28, 2011 and approved by FERC on November 15, 2011.

5.16.3 Facilities

Construction of the Penticton Sockeye Hatchery began in July 2013, was completed in 2014, and commissioned in October. Though there is still minor construction that is on-going, this did not affect the ability to collect, spawn, and incubate eggs in 2014. At the end of the calendar year, the remaining construction deficiencies include the HVAC system, degassing tower, alarm system, and SCADA programing. ONA is also creating an asset management plan that will be used for troubleshooting, maintenance, and repairing/replacing parts and equipment. Additionally, there are several staffing positions that need to be filled as a result of the hatchery becoming fully operational.

Table 35 Sockeye fry release into Skaha and/or Osoyoos Lakes funded by Grant PUD as part of the ONA 12-year Reintroduction program.

Calendar Year	Numbers of Fish Released	Annual Expenditures*		
		Capital	O&M/M&E**	Totals
2005	1,205,500	**$-**	$377,203	$377,203
2006	913,440	**$-**	$504,115	$504,115
2007	976,140	**$-**	$263,685	$263,685
2008	584,430	**$-**	$340,137	$340,137
2009	1,065,438	**$-**	$738,056	$738,056
2010	581,262	**$-**	$391,184	$391,184
2011	594,000	**$-**	$553,915	$553,915
2012	552,948	$453,737	$604,921	$1,058,658
2013	869,300	$2,397,663	$669,206	$3,066,869
2014	0	$2,633,741	$853,136	$3,486,878
Mean	734,246			
Totals	**7,342,458**	**$5,485,141**	**$5,295,558**	**$10,780,700**

*ALL COSTS ARE ESTIMATES ONLY AND ARE LIKELY TO BE UNDERESTIMATES

**Does not include Grant PUD staff labor or travel expenditures and includes studies and hatchery evaluations.

5.16.4 Operations and Maintenance

A total of 2,344 adult sockeye were spawned in 2014, resulting in 2,658,680 eggs incubating in 25 Kitoi boxes at the new hatchery. The eggs will be shocked, picked, and thermally marked in order to differentiate between the hatchery and natural-origin populations. Hatchery fry will be released in 2015 upon reaching an approximate weight of 1 gram. Generally these fish spend a year rearing in Skaha Lake before smolting the following spring. As expected with any new facility, a variety of issues have surfaced and are under review by hatchery staff to determine the most effective and efficient way to address the issues, and manage and operate the hatchery.

5.16.5 Monitoring and Evaluation

To ensure that sockeye reintroduction does not negatively affect kokanee populations, fishery agencies (including ONA) developed a comprehensive monitoring and evaluation plan. The plan, approved by the PRCC HSC, includes the same activities as other Grant PUD programs and is partially funded by Grant PUD (Table 36). A suite of additional monitoring activities are also

performed as part of the sockeye reintroduction program which include zooplankton monitoring, genetic assessments, limnological surveys, and in-lake ecological investigations. However, because the results to date have not shown detrimental effects on Skaha kokanee, the Canadian and U.S. committees have agreed to extend the sockeye program for an additional five years beyond the original 2017 termination date. ONA has conducted extensive monitoring of adult sockeye passage at Okanogan Falls Dam. Due to large adult returns and high flow conditions over the last several years, sockeye have ascended the previously impassable Okanogan Falls Dam and utilized newly-available spawning habitat.

A 2-day workshop was held in April of 2014 to summarize and discuss information and data collection to date for the sockeye reintroduction program. In addition, the potential for future range expansion of sockeye into Lake Okanagan was discussed.

Table 36 Monitoring and Evaluation activities for Okanogan River sockeye salmon; partially funded by Grant PUD.

Activity	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
brood collection	X	X	X	X	X	X	X	X	X		X
spawning	X	X	X	X	X	X	X	X	X		X
tagging	X	X	X	X	X	X	X	X	X		X
release	X	X	X	X	X	X	X	X	X	X	X
smolt abundance	X	X	X	X	X	X	X	X	X	X	X
carcass recoveries	X	X	X	X	X	X	X	X	X	X	X
redd surveys	X	X	X	X	X	X	X	X	X	X	X

5.17 Coho Protection Program

A coho salmon reintroduction program intended to develop a locally adapted and naturally spawning population from lower Columbia River stock is being implemented by the Yakama Nation. Grant PUD entered into a 10-year funding agreement with the Yakama Nation to assist in development of the program. This $7.4 million agreement is for the period 2008 - 2018.

As a result of the coho program, coho salmon redds and carcasses have been observed in the Wenatchee and Methow rivers. However, the extent to which natural production is occurring has not yet been determined. As information becomes available, and the future of this population has been reviewed and discussed, a decision can be made regarding the long-term management of UCR coho salmon. Grant PUD will work with the PRCC HSC to adaptively manage the coho program to achieve program goals and objectives. Until that time, survival studies for coho through the Project are not proposed.

5.17.1 Hatchery Planning Documents

The HGMP and APP for the UCR coho reintroduction program were submitted to FERC in February 2011 and approved by FERC on October 13, 2011.

5.17.2 Facilities

Funding provided by Grant PUD and other partners involved with the Mid-Columbia Coho Restoration Program is being used by the Yakama Nation to develop and operate facilities to support the program.

5.17.3 Operations and Maintenance

Hatchery supplementation of coho salmon in the upper Columbia River occurs in two river basins; the Wenatchee and Methow. Adult broodstock for the Wenatchee Basin is collected at Dryden Dam, Tumwater Dam, and the Leavenworth National Fish Hatchery. Adults are transported to the Entiat National Fish Hatchery where they are spawned and the eggs are incubated and hatched prior to release into acclimation ponds the following spring.

Coho salmon broodstock for the Methow Basin is collected primarily at Wells Dam and transported to the Winthrop National Fish Hatchery. However, returns are also collected and spawned at the hatchery. Juvenile coho salmon are held on station until released into acclimation ponds the following spring. The coho reintroduction program and data reporting run on a cycle of October 1 through September 30; therefore, coho program summary information for the current year of this report is incomplete. Annual smolt releases and costs are presented in Table 37.

Table 37 Total number of coho smolts released as part of the Yakama Nation coho reintroduction program.

Year	Numbers of Fish Released	Annual Expenditures*
2007	1,561,768	$0
2008	1,509,093	$43,504
2009	1,424,578	$727,094
2010	1,443,480	$624,459
2011	1,297,974	$665,274
2012	1,529,678	$486,637
2013	1,501,323	$249,215
2014	1,525,035	$655,820
Mean	1,474,116	
TOTAL	**11,792,929**	**$3,452,003**

*Grant PUD funds the activities associated with approximately 373,296 fish annually. These expenditures do not include Grant PUD staff labor or travel expenditures

5.17.4 Monitoring and Evaluation

As part of the reintroduction program, the Yakama Nation has established an extensive M&E program in both basins where hatchery supplementation is occurring. Regular spawning-ground surveys are conducted in main stems and tributaries, while redds and live fish are enumerated and carcasses are collected for tag recovery and acquiring biological data (Table 38). A smolt trap is operated in the Wenatchee River during the juvenile coho salmon out-migration to provide smolt-abundance estimates. Other M&E activities partially funded by Grant PUD are listed in Table 39.

Table 38 Summary of coho redd surveys in the Wenatchee Basin and Methow Basin, 2013 (2014 numbers not yet available).

River	Redds	Carcasses Recovered
Wenatchee	129	32
Methow	50	30

Table 39 Monitoring and Evaluation activities for Wenatchee and Methow coho salmon that are partially funded by Grant PUD.

Activity	2005	2006 - 2013	2014
Brood collection	X	X	X
Spawning	X	X	X
Tagging		X	X
Release		X	X
Smolt abundance		X	X
Carcass recoveries		X	X
Redd surveys		X	X

6.0 Priest Rapids Coordinating Committee Habitat Subcommittee

Since January 2005, the PRCC Habitat Subcommittee has met monthly to undertake and oversee planning and implementation of the necessary program elements to support habitat protection and restoration programs. The committee operates on consensus regarding decisions directly linked to project management. Unresolved disputes may be elevated to the PRCC, which adheres to the 2006 SSSA process for dispute resolution if necessary. Decisions regarding management of anadromous fishery resources in the UCR basin, not directly linked to the Project are the purview of the agencies and Tribes. When carrying out activities that may affect local tributary habitat, the PRCC Habitat Subcommittee should seek advice from local entities, including the Upper Columbia Salmon Recovery Board in development of such activities.

The PRCC Habitat Subcommittee is the primary forum for implementing and directing habitat protection and restoration measures for the Project's anadromous fish programs covered under both the Biological Opinion and the SSSA. Under the provisions of these mandates and obligations, three funds were created by Grant PUD (Section 6.2).

FERC requires Grant PUD to continue to support the PRCC Habitat Subcommittee. This includes provision of sufficient facilitation, administration, and clerical support. Minutes are recorded and approved by the PRCC Habitat Subcommittee. A total of 10 meetings, two conference calls, and one field trip to projects in British Columbia were held by the PRCC Habitat Subcommittee members during calendar year 2014 (Table 40). Agendas and meeting minutes are available at Grant PUD's website.

Table 40 Priest Rapids Coordinating Committee Habitat Subcommittee 2014 meetings.

PRCC Habitat	January 9, 2014	Meeting
PRCC Habitat	February 13, 2014	Meeting
PRCC Habitat	March 13, 2014	Meeting
PRCC Habitat	April 10, 2014	Meeting
PRCC Habitat	May 8, 2014	Meeting
PRCC Habitat	May 14, 2014	Conference Call

PRCC Habitat	June 12, 2014	Meeting
PRCC Habitat	July 10, 2014	Conference Call
PRCC Habitat	September 11, 2014	Meeting
PRCC Habitat	October 8-9, 2014	Field Trip
PRCC Habitat	November 13, 2014	Meeting
PRCC Habitat	December 11, 2013	Meeting

Since 2006, 75 total projects have been approved for funding using one of the three funding accounts (601, NNI Fund, 602, Habitat Supplemental Fund, 603, Habitat Conservation Fund). Of those, 38 are completed and 37 are currently active and underway. Fifteen new projects were approved in 2014 by the PRCC and/or PRCC Habitat Subcommittee with five from Fund 601, nine from Fund 602, and one from Fund 603. The individual projects, separated by funding account, are listed in Table 41.

Table 41 Summary of habitat projects to date, funded in part or wholly approved by the PRCC and /or PRCC Habitat Subcommittee. Projects are grouped by type; No Net Impact (601), Habitat Conservation (602) and Habitat (603) funding accounts, by year completed and whether they have been completed or still ongoing.

Grouped Project Titles	Account	Benefits	Year Initiated	Year Completed	Expenditures to Date	Total Approved Cost
Predator Study	601	Predator Removal	2008	2012	$2,428,176	$2,447,907
McIntyre Dam	601	Fish Passage	2008	2013	$1,770,055	$1,770,055
ORRI Phase I	601	Habitat Restoration	2009	2009	$411,000	$411,000
Tall Timber	601	Conservation Easement	2010	2010	$55,000	$55,000
JSAT Steelhead & Pikeminnow Derby	601	Steelhead Study/Predation	2011	2011	$2,008635	$2,012,939
Pikeminnow Derby	601	Predation	2012	2012	$23,669	$25,000
Fish Screen Monitoring, Northern Pikeminnow Bridge 1, GeoChemical Analysis	601	Habitat Improvement/Predator removal/Land Acquisition/Research	2012	Ongoing	$1,586,803	$2,253,522
Electrofishing Boat	601	Predation	2013	Ongoing	$129,859	$125,000
Intake Screen Assessment	601	Infrastructure Improvement	2014	Ongoing	$3,947	$102,815
Hanford Reach Survival	601	Study	2014	Ongoing	$69,183	$79,906
Smolt Migration Drawdown	601	Study	2014	Ongoing	$224,513	$225,000
Wenatchee Instream Flow	601	Flow Improvement	2014	Ongoing	$0	$456,241
MVID Instream Flow	601	Flow & Fish Passage	2014	Ongoing	$109,750	$1,400,000
Nason Creek-	602	Land Acquisition	2007	2007/2008	$650,059	$897,910

Godwin & Hardesty						
Trinidad Creek	602	Land Acquisition	2009	Ongoing	$84,851	$117,000
Vertical Drop Structure 13	602	Spawning Habitat Improvement	2011	Ongoing	$8,742	$65,141
Sugar Dike	602	Land Acquisition	2011	2011	$174,279	$170,366.48
Nason Creek B+ Reconnection, Wenatchee Nutrient Enhancement, Entiat Stormy Reach	602	Habitat Restoration and Assessment/Land Acquisition	2011/2012	Ongoing	$54,495	$991,000
Lower Wenatchee Instream Flow	602	Water Acquisition	2012	2012	$300,000	$300,000
ORRI Phase II, Icicle Creek Boulder Field, Shuttleworth Creek & Tyee Ranch	602	Habitat Restoration Fish Passage Assessment, Water Acquisition and Conservation Easement	2012	Ongoing	$1,124,137	$1,704,032
Roaring Creek Flow Restoration and Diversion	602	Fish Passage & Instream Flow	2013	Ongoing	$8,424	$160,000
Robinson Property Acquisition	602	Land Acquisition	2013	Ongoing	$265,015	$270,065
Tyee Ranch Conservation Easement	602	Attorney/Consulting Fees	2013	2013	$1,000	$1,000
Entiat Stormy Phase II	602	Land Appraisals	2013	2013	$1,700	$1,700
Entiat Cottonwood Phase II	602	Land/Water Acquisition	2013	Ongoing	$5,000	$10,000
Barkley Irrigation Diversion	602	Irrigation Improvement	2014	Ongoing	$31,430	$299,380
Natapoc Appraisal	602	Land Appraisal	2014	Closed	$20,000	$20,000
McIntyre Dam Fish Study	602	Fish Passage	2014	Ongoing	$10,382	$32,941
Spawning Platforms	602	Habitat Improvement	2014	Ongoing	$245,264	$391,200
Primary Appraiser	602	Land Appraisals	2014	Ongoing	$10,800	$50,000
Nason Creek Side Channel	602	Habitat Improvement	2014	Ongoing	$3,275	$10,000
Silver Side Channel	602	PIT Tag Assessment	2014	Ongoing	$74,102	$123,638
Newby Narrows	602	Land Acquisition	2014	Ongoing	$0	$350,000
ORRI Spawning Platform No. 3	602	River Restoration	2014	Ongoing	$0	$367,369
Nason Creek-Godwin	603	Land Acquisition	2007	2007	$3,409	$3,409
Fulton Diversion	603	Fish Passage/Culvert	2006	2006	$126,971	$150,971

Dam & Omak Creek		Replacement				
Skookumchuck & Kitsap County LiDAR	603	Land Acquisition & Topographic Survey Data	2006	2007	$516,719	$524,000
Upper Columbia Basin LiDAR	603	Topographic Survey	2007	2007	$60,000	$60,000
Wenatchee River Irrigation Diversion & Antoine Creek	603	Water Acquisition & Habitat Restoration	2007	2008	$85,950	$91,970
Mission Creek Barrier Removal, Blackbird Island Phase I & Entiat River Knapp-Wham	603	Fish Passage/Habitat Restoration/Irrigation Diversion	2008	2009	$123,141	$132,935
Blackbird Island Phase II	603	Habitat Restoration	2009	2009	$133,398	$136,500
Bonaparte Creek	603	Livestock Exclusion	2009	2010	$24,078	$27,578
Trinidad Creek	603	Land Acquisition	2010	Ongoing	$84,851	$117,000
Nason Creek LWP	603	Alternative Analysis Design and Report	2010	2011	$45,722	$49,583
White River Nason View Cedar Bend	603	Land Acquisition	2010	2012	$455,600	$454,422
Libby Creek	603	Land Acquisition	2011	2011	$131,537	$206,600
Entiat Stormy Reach Phase II	603	Land Acquisition	2012	2012	$10,000	$10,000
White River Gage Station, Nason Creek Lower White Pine Ponds, Lower Chewuch Beaver Project & Barkley Irrigation Diversion	603	O&M Streamflow Monitoring	2012	Ongoing	$255,481	$273,866
Methow 1890s Side Channel	603	Land Acquisition	2012	Ongoing	$75,000	$90,000
Okanogan River Discharge Monitoring	603	O&M Streamflow Monitoring	2013	Ongoing	$53,720	$90,952
Icicle/Peshastin Irrigation Flow Analysis	603	Instream Flow Improvement	2013	Ongoing	$165,836	$174,847
Icicle Creek PIT Array	603	Fish Passage Evaluation	2014	Ongoing	$127,843	$167,098

6.1 Habitat Plan

Grant PUD, in consultation with the PRCC Habitat Subcommittee, developed a draft habitat plan for Chinook salmon and steelhead affected by operation of the Project, as required under the 2004 and 2008 Biological Opinions issued by NMFS, and the 2006 SSSA. This plan was

developed to shepherd the development and implementation of the protection and restoration programs that promote the rebuilding of self-sustaining and harvestable populations of Chinook salmon and steelhead, and to mitigate for a portion of unavoidable losses resulting from Project operations. This plan was submitted to FERC on June 30, 2009 and received FERC approval on March 5, 2010. As required by Grant PUD's license (Article 401(a)(3)), this plan is now being updated and finalized in consultation with the PRCC Habitat Subcommittee. A guidance document was also produced, reviewed, and approved by the PRCC in 2014 that provides more direction as to the supporting roles to each respective committee.

6.2 Habitat Account

Grant PUD allocates annual funds to a Priest Rapids Habitat Conservation Account in order to finance tributary or mainstem habitat projects to benefit UCR spring Chinook and UCR steelhead (Habitat Fund – BiOp). The SSSA requires additional allocations related to projects identified in the Project Habitat Plan for non-listed species (Habitat Supplemental Fund), and projects to help achieve juvenile survival standards (NNI Fund). Deposits to these accounts occur annually on February 15, concurrent with the filing of this annual FERC report. Expenditures from the NNI Fund occur in consultation with the PRCC, and expenditures of the Habitat Supplemental and Habitat BiOp funds are in consultation with the PRCC Habitat Subcommittee (Table 42). The 2015 deposit for the NNI-601 is $1,944,780.95; the Habitat Supplemental-602 is $1,029,001.58; and Habitat BiOP-603 is $367,582.44.

Table 42 Priest Rapids Coordinating Committee Habitat account balances and expenditures as of December 31, 2014.

Account	Beginning Balance	Expenditures	Unencumbered Balance
No Net Impact Fund	$5,993,853	$4,160,977	$1,832,876
Habitat Supplemental Fund	$4,935,701	$1,828,682	$3,107,019
Habitat Fund (BiOp)	$1,001,581	$177,789	$823,792
Total	**$11,931,135**	**$6,167,448**	**$5,763,687**

7.0 Consultation

Grant PUD meets monthly with the PRCC, which includes representatives of NMFS, USFWS, WDFW, Colville Confederated Tribes, Yakama Nation, and CTUIR.

In addition, all reports and documents, such as this one, are distributed to the PRCC 30 days prior to filing with FERC for review and comments. The 2014 Activities under the Priest Rapids Hydroelectric Project License (FERC No.2114) report was distributed on February 26, 2015 to the PRCC for review and comment.

Literature Cited

FERC (Federal Energy Regulatory Commission). 2008. Order Issuing New License for Public Utility District No. 2 of Grant County, 123 FERC ¶ 61,049, Washington D.C. Priest Rapids Project FERC License

Grant PUD (Public Utility District No. 2 of Grant County). 2006. Priest Rapids Project Salmon and Steelhead Settlement Agreement, FERC Project No. 2114, Ephrata, Washington. Salmon and Steelhead Settlement Agreement

NMFS (National Marine Fisheries Service). 2008. Biological Opinion and Magnuson-Steven Fishery Conservation and Management Act. New license for the Priest Rapids hydroelectric Project. February 1, 2008. Upper Columbia River spring-run Chinook salmon and Upper Columbia River Steelhead Biological Opinion

United States Department of Interior Fish and Wildlife Service (USFWS). 2007. USFWS Biological Opinion on the Effects of the Priest Rapids Hydroelectric Project Relicensing on Bull Trout (FERC No. 2114). Spokane, Washington. USFWS Reference: 13260- 2006 -P-0008, 13 260-2001-F-0062.Bull Trout Biological Opinion

WDOE (Washington State Department of Ecology). 2008. Section 401 Water Quality Certification Terms and Conditions for the Priest Rapids Hydroelectric Project, FERC Project No. 2114, Spokane, Washington. WDOE Final Water Quality Certification

Grant PUD (Public Utility District No. 2 of Grant County). Hanford Reach Fall Chinook Protection Program, FERC Project No. 2114, Ephrata, Washington. Hanford Reach Fall Chinook Protection Program Agreement

Anglea, S.M., R.L. Townsend, J.R. Skalski, C.S. McCutcheon, R.J. Richmond. 2003. Survival of PIT-tagged Yearling Chinook Salmon Through the Priest Rapids Project, 2003. Prepared for the Public Utility District No. 2 of Grant County, Ephrata, WA. Cited literature

Anglea, S. M., R. L. Townsend, J. R. Skalski, C. S. McCutcheon and R. J. Richmond. 2004a. Survival of PIT-tagged yearling Chinook salmon through the Priest Rapids Project, 2003. Report to the Public Utility District No. 2 of Grant County, Ephrata, WA. Cited literature

Anglea, S. M., R. L. Townsend, J. R. Skalski, C. S. McCutcheon and R. J. Richmond. 2004b. Survival of PIT-tagged yearling Chinook salmon through the Priest Rapids Project, 2004. Report to the Public Utility District No. 2 of Grant County, Ephrata, WA. Cited literature

Anglea, S. M., R. L. Townsend, J. R. Skalski, C. S. McCutcheon and R. J. Richmond. 2005. Survival of PIT-tagged yearling Chinook salmon through the Priest Rapids Project, 2005. Report to the Public Utility District No. 2 of Grant County, Ephrata, WA. Cited literature

Collis, K., D.D. Roby, D.E. Lyons, Y. Suzuki, J.Y. Adkins, L. Reinalda, N. Hostetter, L. Adrean, M. Bokes, P. Loschl, D. Battaglia, T. Marcella, and B. Cramer. 2009. Research, monitoring, and evaluation of avian predation on salmonid smolts in the lower and mid-Columbia River. 2008 final summary. Bonneville Power Administration, U.S. Army Corps of Engineers, Portland, Oregon. Cited literature

Evans, A.F, N.J. Hostetter, K. Collis, D.D. Roby, D.E. Lyons, B.P. Sanford, R.D. Ledgerwood, and S. Sebring. 2011. A system-wide evaluation of avian predation on salmonid smolts in the Columbia River Basin based on recoveries of passive integrated transponder (PIT)

tags. Pages 64-146 *in* Roby, D.D. (ed.) Impacts of avian predation on salmonid smolts from the Columbia and Snake rivers: A synthesis report to the U.S. Army Corps of Engineers, Walla Walla District. Cited literature

Hatch, K.B, M.A. Timkp, L.S. Sullivan, J.D. Stephenson, N.L. Ogan, S.E. Rizor, C.D. Wright, C. Fitzgerald, J.R. Skalski, R.L. Townsend, and J.A. Lady. 2015. Behavior and survival analysis of juvenile steelhead and yearling Chinook salmon through Priest Rapids Project in 2014. Report prepared for Public Utility District No. 2 of Grant County, Washington by Blue Leaf Environmental, Inc., Ellensburg, Washington.

Hendrick, R. and Keeler, C. 2011. Study Plan for Evaluating Total Dissolved Gas Exchange Related to Operation of the Priest Rapids Fish Bypass. Prepared for the Public Utility District No. 2 of Grant County, Washington. March 2011.

Hillman, T., T. Kahler, G. Mackey, J. Murauskas, A. Murdoch, K. Murdoch, T. Pearsons, and M. Tonseth. 2013. Monitoring and evaluation plan for PUD hatchery programs. Chelan PUD, Wenatchee, Washington. Cited literature

Hoffarth, P. A. and T. N. Pearsons 2012. Priest Rapids Hatchery Monitoring and Evaluation: Annual Report for 2010. Grant County Public Utility District, Ephrata, Washington.

Hoffarth, P. A. and T. N. Pearsons 2012. Priest Rapids Hatchery Monitoring and Evaluation: Annual Report for 2011-2012. Grant County Public Utility District, Ephrata, Washington. Cited literature

Keeler, C. 2012. Wanapum Dam Advanced Turbine Total Dissolved Gas Evaluation – Final Study Plan. Prepared for the Public Utility District No. 2 of Grant County, Washington. September 2012.

Keeler, C. 2014. Final Total Dissolved Gas Abatement Plan for the Priest Rapids Hydroelectric Project. Prepared for the Public Utility District No. 2 of Grant County, Washington. February 2013.

Keeler, C. 2014a. Summary of the 2013 annual fish spill and total dissolved gas monitoring. Final Report. Prepared for the Public Utility District No. 2 of Grant County, Washington. October 2013.

Keeler, C. 2014b. Evaluation of Total Dissolved Gas Related to the Operataion of Advanced Turbines at Wanapum Dam – Final Report. Prepared for the Public Utility District No. 2 of Grant County, Washington. February 2014.

LGL Limited 2003. Predation of Chinook Salmon Smolts by Gulls and other Birds at Wanapum Dam and nearby Areas on The Columbia River – Spring 2002. Cited literature

Normandeau Associates, Inc; J.R. Skalski; and R. Townsend. 2005. Performance Evaluation of the New Advanced Hydro Turbine (AHTS) at Wanapum Dam, Columbia River Washington. Prepared for Public Utility District No. 2 of Grant County, Ephrata, WA. Cited literature

Normandeau Associates, Inc. and J.R. Skalski. 2005. Relationship of Turbine Operating Efficiency and Survival Condition of Chinook Salmon Smolts at Priest Rapids Dam, Columbia River. Report prepared for Grant County Public Utility District, Ephrata, Washington. Cited Literature Report for 2013

Richards, S. P., P. A. Hoffarth, and T. N. Pearsons. 2013. Priest Rapids Hatchery Monitoring and Evaluation Annual Report for 2012-13. Grant County Public Utility District, Ephrata, Washington.

Richmond, R.J., Anglea, S.M 2008. Priest Rapids Dam Adult Fishway PIT-Tag Detection Efficiency and Characterization of PIT-tagged Fish Passage in 2007. Grant County Public Utility District, Ephrata, Washington. Cited literature

Robichaud, D, B. Nass, M.A., Timko, K.K. English, and B. Ransom. 2005. Analysis of Chinook smolt behavior and relative survival at Wanapum Dam using three-dimensional acoustic telemetry, 2004. Report prepared for Grant County Public Utility District, Ephrata, Washington. Cited literature

Roby, D.D., K. Collis, D.E. Lyons, J.Y Adkins, P. Loschl, Y. Suzuki, D. Battaglia, T. Marcella, T. Lawes, A. Peck-Richardson, L. Bayliss, L. Faulquier, D. Harvey, E. Tompkins, J. Tennyson, A. Evans, N. Hostetter, B. Cramer, M. Hawbecker, R.D. Ledgerwood, and S. Sebring. 2011a. Research, monitoring and evaluation fo avian predation on salmonid smolts in the lower and Mid-Columbia River. Final 2010 annual report. Bonneville Power Administration, U.S. Army Corps of Engineers, Portland, Oregon. Cited literature

Skalski, J.R. and five co-authors. 2009a. Survival of Acoustic-Tagged Steelhead Smolts through the Wanapum – Priest Rapids Projects in 2008. Cited literature

Skalski, J.R., Townsend, R.L., Timko, M.A., Sullivan, L.S. 2009b. Survival of Acoustic-Tagged Steelhead and Sockeye Salmon Smolts through the Wanapum – Priest Rapids Projects in 2009. Cited literature

Skalski, J.R., Townsend, R.L., Timko, M.A., Sullivan, L.S. 2010. Survival of Acoustic-Tagged Steelhead and Sockeye Salmon Smolts through the Wanapum – Priest Rapids Projects in 2009. Cited literature

Skalski, J.R., Townsend, R.L., Timko, M.A., Sullivan, L.S. 2011. Survival of Acoustic-Tagged Steelhead and Sockeye Salmon Smolts through the Wanapum – Priest Rapids Projects in 2010. Cited literature

Sullivan, L.S., C.D. Wright, S.E. Rizor, M.A. Timko, C.A. Fitzgerald, M.L. Meagher, J.R. Skalski and R.L. Townsend. 2009. Analysis of juvenile Chinook, steelhead and sockeye salmon behavior using acoustic tags at Wanapum and Priest Rapids dams, 2008. Cited literature

Thompson, A.M, R.R. O'Connor, M.A. Timko, L.S. Sullivan, S.E. Rizor, J.L Hannity, C.D. Wright, C.A. Fitzgerald, M.L. Meagher, J.D. Stephenson, J.R. Skalski, and R.L Townsend. 2012. Evaluation of downstream juvenile steelhead survival and predator-prey interactions using JSATS through the Priest Rapids reservoir in 2011. Cited literature

Timko, M. A., L. S. Brown, C. D. Wright, R. R. O'Connor, C. A. Fitzgerald, M. L. Meager, S. E. Rizor, P. A. Nealson and S. V. Johnston. 2007. Analysis of juvenile Chinook, steelhead and sockeye salmon behavior using acoustic tags at Wanapum and Priest Rapids dams, 2006. Draft report by Hydroacoustic Technology, Inc., Seattle, WA. For Public Utility District No. 2 of Grant County, Ephrata, WA. Cited literature

Timko, M. A., L. S. Sullivan, C. D. Wright, R. R. S. E. Rizor, C. A. Fitzgerald, R. R. O'Connor and M. L. Meager. 2008. Analysis of juvenile Chinook, steelhead and sockeye salmon behavior using acoustic tags at Wanapum and Priest Rapids dams, 2007. Draft report by Hydroacoustic Technology, Inc., Seattle, WA. For Public Utility District No. 2 of Grant County, Ephrata, WA. Cited literature

Timko, M.A. and ten co-authors. 2010. Behavior and survival analysis of steelhead and sockeye through the Priest Rapids Hydroelectric Project in 2009. Prepared for Public Utility District No. 2 of Grant County. Cited literature

Timko, M.A. and ten co-authors. 2011. Behavior and survival analysis of juvenile steelhead and sockeye through the Priest Rapids Hydroelectric Project in 2010. Prepared for Public Utility District No. 2 of Grant County. Cited literature

Wright, C.D., L.S. Sullivan, R.R. O'Connor, M.A. Timko, S.E. Rizor, J.L. Hannity, C.A. Fitzgerald, M.L. Meagher, and J.D. Stephenson. 2010. Evaluation of gatewell exclusion screens and escapement at Priest Rapids Project in 2010. Cited literature

Appendix A
Priest Rapids Project 2014 Spill Summary

2014 PRIEST RAPIDS DAM INADVERTENT SPILL PATTERN - During Fish-Spill Season - (5/02/2014)

Total Spill In KCFS	Gate Number																				Total Opening In Feet
	1	2	3	4	TSB 5	TSB 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
24.0	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Fish-Spill			Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	**0pen**	**0pen**	**0pen**	**11**
25.3					Closed	Closed													1	Open	Open	Open	12
26.6					Closed	Closed												1	1	Open	Open	Open	13
27.9					Closed	Closed												2	1	Open	Open	Open	14
29.2					Closed	Closed											1	2	1	Open	Open	Open	15
30.5					Closed	Closed										1	1	2	1	Open	Open	Open	16
															1	1	1	2	1				
31.8					Closed	Closed									1	1	2	2	1	Open	Open	Open	17
33.1					Closed	Closed								1	1	1	2	2	1	Open	Open	Open	18
34.4					Closed	Closed							1	1	1	1	2	2	1	Open	Open	Open	19
35.7					Closed	Closed							1	1	1	2	2	2	1	Open	Open	Open	20
37.0					Closed	Closed							1	1	2	2	2	2	1	Open	Open	Open	21
												1	1	1	2	2	2	2	1				
38.3					Closed	Closed					1	1	1	1	2	2	2	2	1	Open	Open	Open	22
39.6					Closed	Closed					1	1	2	1	2	2	2	2	1	Open	Open	Open	23
40.9					Closed	Closed					2	1	2	1	2	2	2	2	1	Open	Open	Open	24
42.2					Closed	Closed				1	2	1	2	1	2	2	2	2	1	Open	Open	Open	25
43.5					Closed	Closed			1	1	2	1	2	1	2	2	2	2	1	Open	Open	Open	26
44.8					Closed	Closed		1	1	1	2	1	2	1	2	2	2	2	1	Open	Open	Open	27
46.1					Closed	Closed		1	2	1	2	1	2	1	2	2	2	2	1	Open	Open	Open	28
47.4					Closed	Closed		1	2	1	2	1	2	2	2	2	2	2	1	Open	Open	Open	29
48.7					Closed	Closed		1	2	1	2	2	2	2	2	2	2	2	1	Open	Open	Open	30
50.0					Closed	Closed	1	1	2	1	2	2	2	2	2	2	2	2	1	Open	Open	Open	31
51.3					Closed	Closed	1	1	2	2	2	2	2	2	2	2	2	2	1	Open	Open	Open	32
52.6					Closed	Closed	1	1	2	2	2	2	2	2	2	3	2	2	1	Open	Open	Open	33

53.9				Closed	Closed	1	1	2	2	2	2	2	3	2	3	2	2	1	Open	Open	Open	34
55.2				Closed	Closed	1	1	2	2	2	3	2	3	2	3	2	2	1	Open	Open	Open	35
56.5				Closed	Closed	1	1	2	2	2	3	2	3	3	3	2	2	1	Open	Open	Open	36
57.8				Closed	Closed	1	1	2	2	2	3	3	3	3	3	2	2	1	Open	Open	Open	37
59.1				Closed	Closed	1	2	2	2	2	3	3	3	3	3	2	2	1	Open	Open	Open	38
60.4				Closed	Closed	1	2	2	2	2	3	3	3	3	3	2	2	2	Open	Open	Open	39
61.7				Closed	Closed	1	2	2	2	3	3	3	3	3	3	2	2	2	Open	Open	Open	40
63.0				Closed	Closed	1	2	2	2	3	3	3	3	3	3	3	2	2	Open	Open	Open	41
64.3			1	Closed	Closed	1	2	2	2	3	3	3	3	3	3	3	2	2	Open	Open	Open	42
65.6			2	Closed	Closed	1	2	2	2	3	3	3	3	3	3	3	2	2	Open	Open	Open	43
66.9			2	Closed	Closed	2	2	2	2	3	3	3	3	3	3	3	2	2	Open	Open	Open	44
68.2		1	2	Closed	Closed	2	2	2	2	3	3	3	3	3	3	3	2	2	Open	Open	Open	45
69.5		2	2	Closed	Closed	2	2	2	2	3	3	3	3	3	3	3	2	2	Open	Open	Open	46
70.8		2	2	Closed	Closed	2	2	2	2	3	3	4	3	3	3	3	2	2	Open	Open	Open	47
72.1		2	2	Closed	Closed	2	2	2	3	3	3	4	3	3	3	3	2	2	Open	Open	Open	48
73.4		2	2	Closed	Closed	2	2	2	3	3	4	4	3	3	3	3	2	2	Open	Open	Open	49
74.7		2	2	Closed	Closed	2	2	3	3	3	4	4	3	3	3	3	2	2	Open	Open	Open	50
76.0		2	2	Closed	Closed	2	2	3	4	3	4	4	3	3	3	3	2	2	Open	Open	Open	51
77.3		2	2	Closed	Closed	2	2	3	4	4	4	4	3	3	3	3	2	2	Open	Open	Open	52
78.6		2	2	Closed	Closed	2	3	3	4	4	4	4	3	3	3	3	2	2	Open	Open	Open	53
79.9	1	2	2	Closed	Closed	2	3	3	4	4	4	4	3	3	3	3	2	2	Open	Open	Open	54
81.2	1	2	3	Closed	Closed	2	3	3	4	4	4	4	3	3	3	3	2	2	Open	Open	Open	55
82.5	1	2	3	Closed	Closed	3	3	3	4	4	4	4	3	3	3	3	2	2	Open	Open	Open	56
83.8	1	2	3	Closed	Closed	3	3	3	4	4	4	4	4	3	3	3	2	2	Open	Open	Open	57
85.1	1	2	3	Closed	Closed	3	3	3	4	5	4	4	4	3	3	3	2	2	Open	Open	Open	58
86.4	1	2	3	Closed	Closed	3	3	3	5	5	4	4	4	3	3	3	2	2	Open	Open	Open	59
87.7	1	2	3	Closed	Closed	3	3	4	5	5	4	4	4	3	3	3	2	2	Open	Open	Open	60
89.0	1	2	3	Closed	Closed	3	4	4	5	5	4	4	4	3	3	3	2	2	Open	Open	Open	61
90.3	1	2	3	Closed	Closed	3	4	5	5	5	4	4	4	3	3	3	2	2	Open	Open	Open	62
91.6	1	2	3	Closed	Closed	3	4	5	5	5	4	5	4	3	3	3	2	2	Open	Open	Open	63

92.9	1	2	3	Closed	Closed	3	4	5	5	5	4	5	4	3	3	3	3	2	Open	Open	Open	64
94.2	1	2	3	Closed	Closed	3	4	5	5	5	5	5	4	3	3	3	3	2	Open	Open	Open	65
95.5	1	2	4	Closed	Closed	3	4	5	5	5	5	5	4	3	3	3	3	2	Open	Open	Open	66
96.8	1	2	4	Closed	Closed	4	4	5	5	5	5	5	4	3	3	3	3	2	Open	Open	Open	67
98.1	1	2	4	Closed	Closed	4	4	5	5	5	5	5	4	4	3	3	3	2	Open	Open	Open	68
99.4	1	3	4	Closed	Closed	4	4	5	5	5	5	5	4	4	3	3	3	2	Open	Open	Open	69
100.7	1	3	4	Closed	Closed	4	4	5	5	5	5	5	4	4	4	3	3	2	Open	Open	Open	70
102.0	1	3	4	Closed	Closed	4	5	5	5	5	5	5	4	4	4	3	3	2	Open	Open	Open	71
103.3	1	3	4	Closed	Closed	4	5	5	5	5	5	5	4	4	4	3	3	3	Open	Open	Open	72
104.6	1	3	4	Closed	Closed	4	5	5	5	5	5	5	5	4	4	3	3	3	Open	Open	Open	73
105.9	1	3	4	Closed	Closed	4	5	5	5	5	5	5	5	5	4	3	3	3	Open	Open	Open	74
107.2	1	3	4	Closed	Closed	4	5	6	5	5	5	5	5	5	4	3	3	3	Open	Open	Open	75
108.5	1	3	4	Closed	Closed	4	6	6	5	5	5	5	5	5	4	3	3	3	Open	Open	Open	76
109.8	1	3	3	Open	Open	3	4	4	4	4	4	3	3	3	3	3	3	3	Open	Open	Open	77
111.1	1	3	3	Open	Open	3	4	4	4	4	4	4	3	3	3	3	3	3	Open	Open	Open	78
112.4	1	3	3	Open	Open	3	4	5	4	4	4	4	3	3	3	3	3	3	Open	Open	Open	79
113.7	1	3	3	Open	Open	3	4	5	4	5	4	4	3	3	3	3	3	3	Open	Open	Open	80
115.0	1	3	3	Open	Open	3	4	5	4	5	5	4	3	3	3	3	3	3	Open	Open	Open	81
116.3	1	3	3	Open	Open	3	4	5	4	5	5	4	4	3	3	3	3	3	Open	Open	Open	82
117.6	1	3	3	Open	Open	3	4	5	4	5	5	4	4	4	3	3	3	3	Open	Open	Open	83
118.9	1	3	3	Open	Open	3	4	5	5	5	5	4	4	4	3	3	3	3	Open	Open	Open	84
120.2	1	3	3	Open	Open	3	4	5	5	5	5	4	4	4	4	3	3	3	Open	Open	Open	85
121.5	1	3	3	Open	Open	4	4	5	5	5	5	4	4	4	4	3	3	3	Open	Open	Open	86
122.8	1	3	4	Open	Open	4	4	5	5	5	5	4	4	4	4	3	3	3	Open	Open	Open	87
124.1	2	3	4	Open	Open	4	4	5	5	5	5	4	4	4	4	3	3	3	Open	Open	Open	88
125.4	2	3	4	Open	Open	4	4	5	5	5	5	4	4	4	4	4	3	3	Open	Open	Open	89
126.7	2	3	4	Open	Open	4	4	5	6	5	5	4	4	4	4	4	3	3	Open	Open	Open	90
128.0	2	3	4	Open	Open	4	4	5	6	6	5	4	4	4	4	4	3	3	Open	Open	Open	91
129.3	2	3	4	Open	Open	4	4	5	6	6	5	5	4	4	4	4	3	3	Open	Open	Open	92
130.6	2	3	4	Open	Open	4	4	5	6	6	5	5	5	4	4	4	3	3	Open	Open	Open	93

131.9	2	3	4	Open	Open	4	5	5	6	6	5	5	5	4	4	4	3	3	Open	Open	Open	94
133.2	2	3	4	Open	Open	4	5	5	6	6	6	5	5	4	4	4	3	3	Open	Open	Open	95
134.5	2	3	4	Open	Open	4	5	5	6	6	6	6	5	4	4	4	3	3	Open	Open	Open	96
135.8	2	3	4	Open	Open	4	5	5	6	6	6	6	5	5	4	4	3	3	Open	Open	Open	97
137.1	2	3	4	Open	Open	4	5	6	6	6	6	6	5	5	4	4	3	3	Open	Open	Open	98
138.4	2	3	4	Open	Open	4	5	6	6	6	6	6	6	5	4	4	3	3	Open	Open	Open	99
139.7	2	3	4	Open	Open	5	5	6	6	6	6	6	6	5	4	4	3	3	Open	Open	Open	100
141.0	2	3	4	Open	Open	5	5	7	6	6	6	6	6	5	4	4	3	3	Open	Open	Open	101
142.3	2	3	4	Open	Open	5	5	7	7	6	6	6	6	5	4	4	3	3	Open	Open	Open	102
143.6	2	3	4	Open	Open	5	5	7	7	6	6	6	6	5	5	4	3	3	Open	Open	Open	103
144.9	2	3	4	Open	Open	5	5	7	7	6	6	6	6	5	5	4	4	3	Open	Open	Open	104
146.2	2	3	4	Open	Open	5	5	7	7	7	6	6	6	5	5	4	4	3	Open	Open	Open	105
147.5	2	3	4	Open	Open	5	5	7	7	7	6	6	6	5	5	5	4	3	Open	Open	Open	106
148.8	2	3	4	Open	Open	5	5	7	7	7	7	6	6	5	5	5	4	3	Open	Open	Open	107
150.1	2	3	4	Open	Open	5	5	7	7	7	7	6	6	5	5	5	4	4	Open	Open	Open	108
151.4	2	3	4	Open	Open	5	5	7	7	7	7	7	6	5	5	5	4	4	Open	Open	Open	109
152.7	2	3	4	Open	Open	5	6	7	7	7	7	7	6	5	5	5	4	4	Open	Open	Open	110
154.0	2	3	4	Open	Open	5	7	7	7	7	7	7	6	5	5	5	4	4	Open	Open	Open	111
155.3	2	3	4	Open	Open	5	7	7	7	7	7	7	6	6	5	5	4	4	Open	Open	Open	112
156.6	2	3	4	Open	Open	5	7	7	7	8	7	7	6	6	5	5	4	4	Open	Open	Open	113
157.9	2	3	4	Open	Open	5	7	7	8	8	7	7	6	6	5	5	4	4	Open	Open	Open	114
159.2	2	3	5	Open	Open	5	7	7	8	8	7	7	6	6	5	5	4	4	Open	Open	Open	115
160.5	2	3	5	Open	Open	5	7	7	8	8	8	7	6	6	5	5	4	4	Open	Open	Open	116
161.8	2	4	5	Open	Open	5	7	7	8	8	8	7	6	6	5	5	4	4	Open	Open	Open	117
163.1	2	4	5	Open	Open	5	7	8	8	8	8	7	6	6	5	5	4	4	Open	Open	Open	118
164.4	2	4	5	Open	Open	5	7	8	8	8	8	7	7	6	5	5	4	4	Open	Open	Open	119
165.7	2	4	5	Open	Open	6	7	8	8	8	8	7	7	6	5	5	4	4	Open	Open	Open	120
167.0	2	4	5	Open	Open	6	8	8	8	8	8	7	7	6	5	5	4	4	Open	Open	Open	121
168.3	2	4	5	Open	Open	6	8	8	8	8	8	7	7	6	6	5	4	4	Open	Open	Open	122
169.6	2	4	5	Open	Open	6	8	8	8	8	8	8	7	6	6	5	4	4	Open	Open	Open	123

170.9	2	4	5	Open	Open	6	8	8	8	8	8	8	7	7	6	5	4	4	Open	Open	Open	124
172.2	2	4	5	Open	Open	6	8	8	8	8	8	8	7	7	6	5	5	4	Open	Open	Open	125
173.5	2	4	5	Open	Open	6	8	9	8	8	8	8	7	7	6	5	5	4	Open	Open	Open	126
174.8	2	4	5	Open	Open	6	8	9	8	8	8	8	7	7	6	6	5	4	Open	Open	Open	127
176.1	2	4	5	Open	Open	6	8	9	9	8	8	8	7	7	6	6	5	4	Open	Open	Open	128
177.4	2	4	5	Open	Open	6	8	9	9	9	8	8	7	7	6	6	5	4	Open	Open	Open	129
178.7	2	4	5	Open	Open	6	8	9	9	9	8	8	8	7	6	6	5	4	Open	Open	Open	130
180.0	2	4	6	Open	Open	6	8	9	9	9	8	8	8	7	6	6	5	4	Open	Open	Open	131
181.3	2	4	6	Open	Open	6	8	9	9	9	8	8	8	7	7	6	5	4	Open	Open	Open	132
182.6	2	4	6	Open	Open	6	8	9	9	9	8	8	8	7	7	6	5	5	Open	Open	Open	133
183.9	2	4	6	Open	Open	6	8	9	9	9	8	8	8	8	7	6	5	5	Open	Open	Open	134
185.2	2	4	6	Open	Open	6	8	9	9	9	9	8	8	8	7	6	5	5	Open	Open	Open	135
186.5	2	4	6	Open	Open	7	8	9	9	9	9	8	8	8	7	6	5	5	Open	Open	Open	136
187.8	2	4	6	Open	Open	7	8	9	9	9	9	9	8	8	7	6	5	5	Open	Open	Open	137
189.1	2	4	6	Open	Open	7	8	9	9	9	9	9	8	8	7	6	6	5	Open	Open	Open	138
190.4	2	4	6	Open	Open	7	8	9	9	9	9	9	8	8	7	7	6	5	Open	Open	Open	139
191.7	2	4	6	Open	Open	7	8	10	9	9	9	9	8	8	7	7	6	5	Open	Open	Open	140
193.0	2	4	6	Open	Open	7	8	10	9	10	9	9	8	8	7	7	6	5	Open	Open	Open	141
194.3	2	4	6	Open	Open	7	8	10	9	10	9	9	9	8	7	7	6	5	Open	Open	Open	142
195.6	2	4	6	Open	Open	7	9	10	9	10	9	9	9	8	7	7	6	5	Open	Open	Open	143
196.9	2	4	6	Open	Open	7	9	10	10	10	9	9	9	8	7	7	6	5	Open	Open	Open	144
198.2	2	4	6	Open	Open	7	9	10	10	10	9	9	9	8	7	7	6	6	Open	Open	Open	145
199.5	2	4	6	Open	Open	7	9	10	10	10	9	9	9	8	8	7	6	6	Open	Open	Open	146
200.8	2	4	6	Open	Open	7	9	10	10	10	10	9	9	8	8	7	6	6	Open	Open	Open	147

Note: Spill based on reservoir elevation of 486 feet.
Fish Bypass is fully (3 gates) open
Top-Spill Bulkhead is located in spill bays 5 & 6

2014 Wanapum Dam Spill Pattern - During Fish Spill

Total Spill In KCFS	Gate Number 1	2	3	4	5	6	7	8	9	10	11	12	Sluice Gate	WFB
19.0	Closed	Closed	Closed	Closed	Closed	Closed	1 ft	1 ft	2 ft	2 ft	2 ft	2 ft	Closed	Open

Note: 1) 2014 fish spill calculations are based on forebay elevation of 545 ft. and 1.5 kcfs/ft. tainter gate opening.
2) Based on performance curve, WAN Fish Bypass flow is 4 kcfs at forebay of 545"