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1 INTRODUCTION

1.1 Aquatic Settlement Agreement

The Wells Hydroelectric Project (Wells Project) is owned and operated by Public Utility District No. 1 of Douglas County (Douglas PUD). The Aquatic Settlement Agreement (Agreement) for the relicensing of the Wells Project (Federal Energy Regulatory Commission [FERC] License No. 2149) was signed by Douglas PUD’s commissioners on January 19, 2009, following the receipt of signatures from the Confederated Tribes of the Colville Reservation (CCT; November 10, 2008), Washington State Department of Ecology (Ecology; November 18, 2008), and Washington Department of Fish and Wildlife (WDFW; November 20, 2008). The Yakama Nation (YN) signed the Agreement on February 24, 2009; the U.S. Fish and Wildlife Service (USFWS) signed the Agreement on July 23, 2009; and the Bureau of Land Management signed the Agreement on November 13, 2009. These signatory entities are collectively referred to as the Parties. Preparation of this report was funded by Douglas PUD as a requirement of the Agreement, and it is the fifth annual report to be developed for activities accomplished under the Agreement, covering the period from January 1, 2013, to December 31, 2013.

The Agreement is intended to resolve all aquatic resource issues related to compliance with all federal and state laws applicable to the Wells Project FERC License that are not already addressed by the Anadromous Fish Agreement and Habitat Conservation Plan (HCP) for the Wells Project (HCP 2002), or other related agreements. The Agreement is the culmination of 3 years of collaborative discussions with stakeholders related to relicensing that began in March 2006.

1.2 Wells Project FERC License

On December 18, 2009, Douglas PUD filed with FERC the Draft License Application for the new operating license, which included the Agreement. A Final License Application was filed with FERC on May 27, 2010, and included a Joint Offer of Settlement related to the Agreement by the Parties. Subject to the reservations of authority in Section 13 of the Agreement, the Agreement establishes Douglas PUD’s obligations for the protection, mitigation, and enhancement of aquatic resources affected by Wells Project operations under the new operating license, as well as its obligations to comply with all related federal and
state laws applicable to the issuance of the new operating license for the Wells Project. The Agreement also specifies procedures to be used by the Parties to ensure that the new operating license is implemented consistent with the Agreement and other laws.

In October 2011, FERC released the Final Environmental Impact Statement for the Wells Project license. In February 2012, Ecology issued the final Clean Water Act (CWA) Section 401 Certification, which included all HCP and Agreement measures plus additional measures for monitoring temperature and dissolved gas, as recommended by Ecology. The final Biological Opinions under Section 10 of the Endangered Species Act (ESA) from the National Marine Fisheries Service (NMFS) and USFWS were filed with FERC on March 7, 2012, and March 19, 2013, respectively.

On November 9, 2012, FERC issued Douglas PUD a new license Order for the Wells Project (available at http://dcpud.org/wells-project/wells-project-license). The term of the new license is 40 years. With the Priest Rapids Project and the Rocky Reach Project licenses both expiring in 2052, FERC concluded that it would be practical to put all three projects on a license term that coincides with the expiration of the Rocky Reach HCP (i.e., in 2052 or in 40 years)\(^1\). In addition, FERC’s financial analysis determined that Douglas PUD settlement measures bound Douglas PUD to moderate measures for fish and wildlife and therefore did not justify a lengthier license term. The new license also stipulates additional review and approval processes that will affect timing and scheduling of project activities. In December 2012, Douglas PUD filed a request for re-hearing to address a number of questions regarding the new license. FERC issued orders on May 16, 2013, granting in part and denying in part Douglas PUD’s request for re-hearing. In June 2013, Douglas PUD filed with FERC a request for reconsideration of two of the decisions for which FERC had denied a re-hearing: 1) the FERC decision to exclude the costs of the HCP in the evaluation of the extent of measures included in the new license; and 2) the FERC decision to issue a 40-year license rather than the requested 50-year license. That request was denied on September 19, 2013, and the new license stands as revised by the FERC orders of May 16, 2013.

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\(^1\) Rock Island Project’s license term expires in 2028, and thus could not be synchronized with the other projects.
1.3 Aquatic Resource Management Plans

As of the effective date of the Agreement, pursuant to Section 5 of the Agreement, the Parties agreed that the measures set forth in the six Aquatic Resource Management Plans (White Sturgeon Management Plan, Bull Trout Management Plan, Water Quality Management Plan, Pacific Lamprey Management Plan, Aquatic Nuisance Species (ANS) Management Plan, and Resident Fish Management Plan) contained in Attachments B through G, respectively, of the Agreement, are adequate to identify and address Wells Project impacts to aquatic resources and are expected to achieve the goals and objectives set forth in each of the six Aquatic Resource Management Plans.

In 2013, as required by Article 406 of the Wells Project License, annual reports were developed for each Aquatic Resource Management Plan documenting progress made towards the implementation of each respective Aquatic Resource Management Plan, with focus on the previous year’s developments. In May 2013, the Aquatic Settlement Work Group (Aquatic SWG) approved the 2012 annual reports for all six Aquatic Resource Management Plans (Appendix C), which were then filed with FERC on May 31, 2013. All reports will be updated annually in consultation with the Aquatic SWG, and then filed with FERC on or prior to the May 31 deadline.
2 PROGRESS TOWARD IMPLEMENTING THE AGREEMENT AND WELLS PROJECT LICENSE ORDER

Section 11.7 of the Agreement requires preparation of an annual report that includes all relevant materials associated with Agreement activities during the year. The following subsections describe activities that were implemented during 2013 in accordance with the Agreement and Aquatic Resource Management Plans, which are also found as requirements in the Wells Project License Order.

2.1 2013 Aquatic Settlement Agreement Decisions, Agreements, and Milestones

In 2013, Douglas PUD completed actions required by their White Sturgeon, Bull Trout, Water Quality, Pacific Lamprey, ANS, and Resident Fish Management Plans, as outlined in the 2013 Aquatic Settlement Agreement Action Plan (Appendix D).

Decisions, agreements, and milestones reached by the Aquatic SWG during 2013 that are related to the Agreement are shown in Table 1 and are documented in the Aquatic SWG meeting minutes (Appendix A).

<table>
<thead>
<tr>
<th>Aquatic SWG Decisions, Agreements, and Milestones</th>
<th>Date</th>
</tr>
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<tbody>
<tr>
<td>Approved the 2013 Gas Abatement Plan and Bypass Operating Plan following a 30-day review period, as noted by email correspondence.</td>
<td>February 1, 2013</td>
</tr>
<tr>
<td>Supported collection of larval white sturgeon by the CCT at the following locations (in no priority): 1) the Rock Island tailrace and Wanapum Pool; 2) the Priest Rapids tailrace, including the reach near the confluence of the Snake and Columbia rivers; and 3) Lake Roosevelt. These collection efforts will occur in 2013 to meet Douglas PUD’s FERC license requirements under the White Sturgeon Management Plan.</td>
<td>February 13, 2013</td>
</tr>
<tr>
<td>Agreed, in principle, to proposed revisions to the draft White Surgeon Collection Plan statement of agreement (SOA), including: 1) prioritization of Mid-Columbia locations for larval collection efforts by the CCT; 2) broodstock collection locations for the YN; and 3) deferred development of a detailed stocking plan until numbers of juvenile sturgeon from the different locations and sourcing methods are known. This agreement will be formalized by email concurrence of a revised SOA.</td>
<td>March 13, 2013</td>
</tr>
<tr>
<td>Aquatic SWG Decisions, Agreements, and Milestones</td>
<td>Date</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------------------------------------</td>
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<tr>
<td>Approved the White Sturgeon Collection Plan SOA via email.</td>
<td>March 20, 2013</td>
</tr>
<tr>
<td>Approved Douglas PUD’s ANS best management practices (BMPs) and education and outreach materials.</td>
<td>April 10, 2013</td>
</tr>
<tr>
<td>Approved the 2013 Aquatic Settlement Agreement Action Plan.</td>
<td>April 10, 2013</td>
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<tr>
<td>Approved the 2013 Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas Monitoring.</td>
<td>May 8, 2013</td>
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<tr>
<td>Approved Douglas PUD’s letter to FERC requesting rescheduling the Bull Trout Radio Telemetry Study at the Twisp Weir to occur in 2016.</td>
<td>June 12, 2013</td>
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<tr>
<td>Agreed to discuss logistics of the white sturgeon program, and also unresolved genetics issues, at the Aquatic SWG in-person meeting on October 9, 2013.</td>
<td>July 10, 2013</td>
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<tr>
<td>Agreed to hold the Mid-Columbia Regional Sturgeon Workshop on September 10, 2013, at Douglas PUD in East Wenatchee, Washington.</td>
<td>August 14, 2013</td>
</tr>
<tr>
<td>Approved the Bull Trout Stranding, Entrapment, and Take Study Plan.</td>
<td>September 11, 2013</td>
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<tr>
<td>Approved the Lamprey Entrance Efficiency and Operations Study Plan.</td>
<td>September 11, 2013</td>
</tr>
<tr>
<td>Agreed to continue discussions on the Conflict of Interest Policy at the Aquatic SWG in-person meeting on October 9, 2013.</td>
<td>September 11, 2013</td>
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<tr>
<td>Approved the Spill Prevention Control and Countermeasures Plan.</td>
<td>October 9, 2013</td>
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<tr>
<td>Approved the Water Quality Attainment Plan.</td>
<td>October 9, 2013</td>
</tr>
<tr>
<td>Agreed to continue discussions regarding the potential removal of the upstream ramp exiting the Wells Dam count window area at the Aquatic SWG meeting on December 11, 2013.</td>
<td>November 13, 2013</td>
</tr>
<tr>
<td>Agreed to continue discussions regarding future plans for the Douglas PUD Adult Lamprey Passage and Enumeration Study at the Aquatic SWG meeting on December 11, 2013.</td>
<td>November 13, 2013</td>
</tr>
<tr>
<td>Agreed if WDFW guidance on white sturgeon fish health rearing and stocking practices is to continue rearing and stocking all asymptomatic (i.e., no clinical signs of disease or evidence of an epizootic) larval-origin white sturgeon, the default action will be to follow the White Sturgeon Management Plan and stock the full complement of larval-origin fish currently on-station at Wells Hatchery (i.e., 2,300 fish), with the balance to achieve the 5,000 fish goal coming from the direct gamete-origin fish. Fish stocking sizes and release dates will be determined by the Aquatic SWG. If WDFW Fish Health Program staff provide guidance other than above, the Aquatic SWG will convene a conference call to discuss options toward achieving the 5,000 fish stocking goal contained within the White Sturgeon Management Plan.</td>
<td>December 11, 2013</td>
</tr>
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2.1.1 White Sturgeon

In August 2010, the Aquatic SWG and Douglas PUD began developing a draft Request For Proposals (RFP) addressing implementation of the artificial propagation program identified in Phase 1 of the Wells Project White Sturgeon Management Plan. Once approved by the Aquatic SWG, the RFP, along with the Supplementation Plan, will be submitted to FERC for approval prior to implementation of the program. Douglas PUD is required to implement the Wells Project White Sturgeon Management Plan in the first year following issuance of the new Wells Project Operating License with the stocking of juvenile white sturgeon scheduled to begin in Year 2 of the new license (2014), requiring collection of white sturgeon broodstock or larvae in 2013.

2.1.1.1 Early Implementation

In September 2011, the Aquatic SWG recommended that Douglas PUD proceed with finalizing the RFP; and on October 20 and 27, 2011, Douglas PUD advertised the RFP in local newspapers with a November 30, 2011 deadline for proposals. In response to the RFP, Douglas PUD received two proposals, one from the YN, and one from the CCT and Golder Associates. In December 2011, the Aquatic SWG and Douglas PUD discussed the technical merits of the two proposals. Douglas PUD indicated that both proposals had strengths and limitations and said that they were willing to support either proposal recommended by consensus of the Aquatic SWG. The Aquatic SWG agreed to review the proposals and, beginning with the January 9, 2012 meeting, to work toward selecting a preferred proposal. The selection of a proposal in early 2012 would allow for early implementation of broodstock collection activities in 2012 rather than in 2013, as required in the Wells Project White Sturgeon Management Plan.
In January 2012, the Aquatic SWG continued discussions of the YN and the CCT white sturgeon supplementation program proposals, including presentations by both proposal sponsors and a review of their efforts to consolidate their approaches into a joint proposal. After 3 months of intensive discussions, the Aquatic SWG was unable to reach consensus on a single white sturgeon broodstock collection plan for implementation in 2012. As a result, the early implementation of the White Sturgeon Management Plan was placed on hold.

2.1.1.2 Wild Larval Program and Direct Gamete Program

In May 2012, Douglas PUD introduced a statement of agreement (SOA) to the Aquatic SWG to implement a multifaceted strategy for the collection of white sturgeon offspring in 2013, including the implementation of both wild larval collection and adult broodstock collection. The proposed SOA met the goals and objectives of the White Sturgeon Management Plan, and also addressed the concerns and uncertainties that were debated in early 2012. In June 2012, after several modifications and revisions by Douglas PUD, WDFW, the YN, and the CCT, the Aquatic SWG approved the Wells White Sturgeon Offspring Collection Plan SOA for implementation in 2013. In early 2013, the white sturgeon professional services contracts were finalized between Douglas PUD and the CCT and the YN to collect broodstock, fertilized eggs, and larval fish in June and July 2013.

2.1.1.3 White Sturgeon Collection Plan

In February 2013, in order to facilitate moving forward with logistical planning such as obtaining permits, the Aquatic SWG began discussing white sturgeon larval collection locations for the Wells Supplementation Project. The Aquatic SWG discussed the technical merits of different collection locations, and in March 2013, the final White Sturgeon Collection Plan SOA (Appendix E) was approved by the Aquatic SWG via email.

2.1.1.4 Wells Hatchery Sturgeon Facility Upgrades

In May 2013, Douglas PUD provided a presentation on the Wells Hatchery Sturgeon Facility upgrades that were being made as part of the Wells Hatchery Modernization. Sturgeon facility improvements included 12 new circular tanks with improved lid, pipe, temperature control, and biosecurity. In June 2013, white sturgeon eggs from the direct gamete program began arriving at the newly upgraded Wells Hatchery Facility, and by August 2013,
approximately 70,000 white sturgeon collected from both the direct gamete program and the larval program were on station.

2.1.1.5 Genetics
The Aquatic SWG recognized the need to address unresolved genetic issues, and in September 2013, a Mid-Columbia Regional Sturgeon Workshop was held at Douglas PUD headquarters in East Wenatchee, Washington, during which white sturgeon technical experts shared presentations and open forum discussions focused on genetic considerations and other technical data to help inform the future of the white sturgeon program.

2.1.1.6 Stocking Plan
In October 2013, Douglas PUD put forth a draft White Sturgeon Stocking Proposal that proposed a 50/50 split between the larval and direct gamete programs (i.e., 2,500 larvae and 2,500 direct gamete fish). This proposal was based on agreed-upon commitments as described in the White Sturgeon SOA that was approved in March 2013, the White Sturgeon Management Plan, and requirements outlined in the Wells Project FERC License. In December 2013, the CCT provided an alternative White Sturgeon Stocking Proposal for discussion that proposed either stocking juveniles from the direct gamete program, or a compromise involving a prorated number of offspring from the direct gamete population of fish. The CCT’s proposal was based on their interpretation of the Wells Project FERC License, and also on technical information supporting the benefits of wild larvae origin fish.

Additionally, in early December 2013, fish screening results detected White Sturgeon Iridovirus (WSIV) in larval-origin fish collected from Lake Roosevelt. WDFW Fish Health Program staff began discussions regarding the fate of sturgeon testing positive for WSIV. The Aquatic SWG agreed that if WDFW guidance on white sturgeon fish health rearing and stocking practices is to continue rearing and stocking all asymptomatic (non-clinical signs of an epizootic) larval-origin white sturgeon, the default action will be to follow the White Sturgeon Management Plan and stock the full complement of larval-origin fish currently on-station at Wells Hatchery (i.e., 2,300 fish), with the balance to achieve the 5,000 fish goal coming from the direct gamete-origin fish. If WDFW Fish Health Program staff provide guidance other than above, the Aquatic SWG agreed to convene a conference call to discuss
Progress Toward Implementing the Agreement, FERC License Order 2149-52, and the Aquatic Resource Management Plans

options toward achieving the 5,000 fish stocking goal in the White Sturgeon Management Plan. The Aquatic SWG also agreed that fish size at the time of stocking and release dates would be determined by the Aquatic SWG as discussions continue in 2014.

2.1.1.7 Phase One White Sturgeon Management Plan M&E Study Plan
In October 2013, the draft Phase One White Sturgeon Management Plan M&E Study Plan was distributed to the Aquatic SWG for review. In December 2013, the final Phase One White Sturgeon Management Plan M&E Study Plan (Appendix F) was approved by the Aquatic SWG via email, following a 10-day extension of the original 30-day comment period.

2.1.1.8 Planned Monitoring and Studies 2014
In 2014, Douglas PUD will continue efforts to increase the white sturgeon population in the Wells Reservoir, including further discussions on genetics, fish health screening, and a stocking plan for future years.

2.1.2 Bull Trout
Douglas PUD continues to identify, monitor, and address impacts, if any, on bull trout in the Wells Reservoir as outlined in the Bull Trout Management Plan, and as further described below.

2.1.2.1 Bull Trout Monitoring and Management Plan and Bull Trout Management Plan
In 2012, bull trout monitoring was conducted under two plans: the Bull Trout Monitoring and Management Plan (BTMMP), and the Bull Trout Management Plan. Bull trout monitoring was conducted under the BTMMP prior to the issuance of FERC License Order 2149-52 in November 2012. After issuance of the new license, bull trout monitoring continued under the Bull Trout Management Plan that is outlined in the Agreement, as well as complying with all of the new bull trout measures outlined in the new FERC license. In March 2013, the final 2012 Bull Trout Management Plan Annual Report (Appendix G) was filed with FERC, which included elements of the 2012 BTMMP when Douglas PUD was still
operating under the previous license, as well as monitoring through the end of 2012 that was conducted under the Bull Trout Management Plan and the new FERC license.

Bull trout monitoring continued in 2013 under the Bull Trout Management Plan, which follows bull trout measures outlined in FERC License Order 2149-52 and is consistent with USFWS' Terms and Conditions and Fishway Prescriptions and Ecology’s CWA Section 401 Water Quality Certification for the Wells Project. Final 2013 bull trout monitoring results will be included in the 2013 Bull Trout Management Plan Annual Report that will be approved by the Aquatic SWG and filed with FERC no later than May 31, 2014. Briefly in 2013, efforts included coordinating with regional groups, participating in bull trout recovery efforts, monitoring passage times and counts at Wells Dam fish count stations, and passive integrated transponder (PIT)-tagging bull trout at Wells Dam and off-site locations in Methow River tributaries (a coordinated effort with WDFW). Douglas PUD contractors handled a total of 169 bull trout in the Methow Basin, the majority of which were adult fish captured at the Twisp River Weir. Additional fish were captured using hook-and-line angling and electro-shocking, and screw traps were used to capture juvenile salmonids. When bull trout were encountered, they were scanned for a PIT tag, or they were given a PIT tag if they had not previously been tagged. Movements of bull trout in the Methow Basin were tracked in 2013 using instream PIT tag arrays. All of these untagged bull trout were given a PIT tag and released after a short recovery period. Movements of tagged bull trout will be summarized in annual reporting.

2.1.2.2 Bull Trout Stranding and Take Study Plan
Under FERC License Order 2149-52, Douglas PUD and the Aquatic SWG are required to develop a bull trout stranding and incidental encounter monitoring program by October 2013, to address License Article 402. In September 2013, the Aquatic SWG members present approved the Bull Trout Stranding and Take Study Plan (Appendix H), and the plan was filed with FERC by the October 2013 deadline.

2.1.2.3 Bull Trout PIT Tagging Summary Report
Douglas PUD is preparing a Bull Trout PIT Tagging Summary Report as requested by the Aquatic SWG in lieu of the Bull Trout Radio Telemetry (RT) Study at the Twisp Weir that
was deferred until 2016/2017. The summary report evaluates bull trout behavioral data in the Methow basin. The draft summary report will be reviewed by the Aquatic SWG in 2014 (this is not a FERC requirement).

2.1.2.4 **Bull Trout Radio Telemetry Study at the Twisp Weir**

In 2011, Douglas PUD planned a RT study for 2012 to evaluate adult bull trout passage conditions at the Twisp Weir in the Methow Basin, as required by Section 4.2.2 of the Agreement Bull Trout Management Plan. However, poor PIT-tag detection efficiency, caused by extremely high water conditions experienced at the Twisp Weir during spring-time freshets, prompted Douglas PUD and USFWS to propose delaying the RT study at Twisp Weir until 2016, when an adult passage RT study at Wells Dam is scheduled to occur. Combining the weir and Wells Dam study together into one study would limit the number of study fish needed for each study and thus reduce handling and tagging impacts on the wild bull trout population. In the interim, existing PIT-tag data will continue to be collected to be considered in planning for the 2016 study (see section 2.1.2.3). In June 2013, the Aquatic SWG approved Douglas PUD’s letter to FERC requesting rescheduling the Bull Trout RT Study at the Twisp Weir (Appendix I), and in October 2013, FERC approved the request to defer the study until 2016/2017.

2.1.2.5 **Planned Monitoring and Studies 2014**

In 2014, implementation will continue of the Bull Trout Management Plan and bull trout measures outlined in FERC License Order 2149-52. The 2013 Bull Trout Management Plan Annual Report will be submitted to FERC and the Aquatic SWG in spring 2014, which will summarize the activities and results of 2013.

2.1.3 **Water Quality**

In 2013, as required by Douglas PUD’s CWA Section 401 Water Quality Certification for the Wells Project and FERC License Order 2149-52, Douglas PUD continued efforts to protect the quality of the surface waters in the Wells Reservoir, as outlined in the Water Quality Management Plan, and as further described below.
2.1.3.1 **Total Dissolved Gas Monitoring**

In February 2013, the Aquatic SWG approved the 2012 Total Dissolved Gas Abatement Plan Report (as appended to the Aquatic SWG 2012 Annual Report) that summarized the 2012 fish spill season at Wells Dam.

In February 2013, Ecology approved Douglas PUD's 2013 Gas Abatement Plan and Bypass Operating Plan (2013 GAP and BOP; Appendix J). A 30-day review period was provided to the Aquatic SWG, with no additional revisions suggested outside of Ecology’s comments. Spill operations for the 2013 spill season are outlined in the 2013 Spill Playbook (which is included as an appendix to the GAP). The 2013 fish spill season at Wells Dam began at 0000 hours on April 9, 2013, and ended at 1200 hours on August 19, 2013, and was characterized by above-normal flows for the duration of the entire season. Specifically, flows in April and May were 20% higher than average as a result of short periods of drafting at Grand Coulee Dam for recreation and high spring inflows to Lake Roosevelt. In addition, incoming total dissolved gas was above 110% at Wells Dam during almost half of the total fish bypass period as a direct result of operations at Chief Joseph Dam and the federal hydrosystem above Wells Dam. Despite this, total dissolved gas compliance at Wells Dam was exceptionally high during the 2013 season. These results are reported in the 2013 Wells Project Total Dissolved Gas Abatement Plan Annual Report, which will be appended to the Aquatic SWG 2014 Annual Report.

In subsequent years, Douglas PUD will monitor total dissolved gas production and abatement year round, providing annual reports as required by the CWA Section 401 Water Quality Certification for the Wells Project.

2.1.3.2 **Gas Bubble Trauma Monitoring**

As part of the GAP, Douglas PUD is required to accompany the plan with a biological monitoring plan and, as such, is required to examine migrating salmonids for Gas Bubble Trauma (GBT) if total dissolved gas in the Wells tailrace exceeds 125% at any point during the fish spill season. In 2013, the hourly tailrace total dissolved gas levels exceeded the 125% standard only once during the fish spill season: on April 11, 2013. On April 12, 2013, per the requirements of the Ecology-approved GAP, juvenile fish were sampled at the Rocky Reach
bypass sampler. Less than 10 fish were sampled over a 2-hour period because the number of fish traveling through the sampler that early in the fish migration season was very low. No sampled fish showed signs of GBT. Results of monitoring for GBT are also reported in the 2013 Wells Project Total Dissolved Gas Abatement Plan Annual Report.

2.1.3.3  Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas Monitoring

Douglas PUD’s CWA Section 401 Water Quality Certification requires that the PUD develop a document explaining how water quality data collected in the Wells Project would meet high quality collection standards within the first year of the FERC License Order 2149-52. As required, in 2013, Douglas PUD and Ecology collaborated on a Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas Monitoring (QAPP; Appendix K), and in May 2013, the Aquatic SWG approved the 2013 QAPP.

2.1.3.4  Spill Prevention Control and Countermeasures Plan

A Spill Prevention Control and Countermeasures (SPCC) Plan addresses oil spill prevention and potential impacts on water quality. A SPCC Plan is not required under the Agreement; however, it is a requirement under both Douglas PUD’s CWA Section 401 Water Quality Certification and FERC License Order 2149-52. As required, in 2013, Douglas PUD and Ecology collaborated on a SPCC Plan (Appendix L), which the Aquatic SWG approved in October 2013.

2.1.3.5  Water Quality Attainment Plan

A Water Quality Attainment Plan (WQAP) is a 10-year compliance plan that outlines how Douglas PUD plans to meet water quality requirements specific to meeting total dissolved gas standards found in the Washington State Administrative Code. As required by Douglas PUD’s CWA Section 401 Water Quality Certification and FERC License Order 2149-52, in 2013, Douglas PUD and Ecology collaborated on a WQAP (Appendix M), which the Aquatic SWG approved in October 2013.
2.1.3.6 Planned Monitoring and Studies 2014

In 2014, Douglas PUD will continue annual monitoring of total dissolved gas at the Wells Project as required by the Ecology-approved GAP and will transition to year-round monitoring for total dissolved gas and seasonal remote water temperature monitoring. Water quality monitoring is expected to begin in April 2014.

2.1.4 Pacific Lamprey

Since 2004, Douglas PUD has continued efforts to monitor and address impacts, if any, on Pacific lamprey in the Wells Reservoir, as outlined in the Pacific Lamprey Management Plan and as further described in the following sections.

2.1.4.1 Installation of Half-duplex Passive Integrated Transponder Tag Detectors

In 2004, 2007, and 2008, adult lamprey passage evaluations were conducted using RT at the default, 1.5-foot-head differential fishway operating condition at Wells Dam. Results indicated that once lamprey passed the sills in the fishway or entrances, approximately 90% remained in the fishway and proceeded up the ladder.

In 2009 and 2010, Douglas PUD investigated lamprey passage at Wells Dam fishways using Dual-Frequency Identification Sonar (DIDSON) camera technology. In 2009, both fishway entrances were monitored and passage was evaluated at the 0.5-, 1.0-, and 1.5-foot-head differentials. Tests were conducted from 9:00 pm to 1:00 am, on August 21, 2009, through September 23, 2009. In 2010, fish passage was monitored once again at both fishway entrances; however, only two fishway entrance operating conditions were evaluated (1.0- and 1.5-foot-head differentials). Also, in an attempt to increase sample size, the duration of monitoring and the hours of sampling per day were expanded to occur from 5:00 pm to 1:00 am, on August 7, 2010, through September 30, 2010. The combined 2009 and 2010 sample sizes were too small to yield statistically meaningful results; however, the observed behavior of the lamprey at the fishway entrance suggested that the lower head differential (1.0-foot) enhanced entrance efficiency. Results were summarized in the draft 2010 DIDSON Study Report, and Douglas PUD presented a summary of the results at the Aquatic SWG July 13, 2011 meeting.
In 2011, based on the observed 2009 and 2010 results, the Aquatic SWG requested and received approval from the HCP Coordinating Committees for a change in fishway operations from a 1.5-foot-head differential to a 1.0-foot-head differential from 5:00 pm to 1:00 am, August 7, 2011, through September 30, 2011 (lamprey operations). Lamprey operations were implemented 3 days following the date when the cumulative count of adult lamprey passing Rocky Reach Dam reached five individuals.

During review of the draft 2010 DIDSON Study Report, Aquatic SWG and HCP Coordinating Committees members expressed concern regarding the possible effects on salmonid migration and delay from changes to the head differential at the Wells fishway entrances. Because head differential at the fishway entrances had been optimized for ESA-listed salmonids, analysis was requested to determine if the flow changes designed for lamprey and implemented in 2011 had a measureable effect on ESA-listed Upper Columbia River steelhead.

In 2012, Columbia Basin Research, in coordination with the University of Washington’s School of Aquatic and Fishery Sciences, completed a report examining the possible effects of changes in fishway entrance water velocity on the passage counts of Chinook, coho, and sockeye salmon, and steelhead (Skalski and Townsend 2012). The report incorporated results from the draft 2010 DIDSON Study Report. Results of the analysis indicated that there were no statistically detectable effects on salmonids from reduced velocities at the fishway entrances during the study hours of operations. The HCP Wells Coordinating Committee and NMFS approved the report and once again implemented a 1.0-foot-head differential at Wells Dam fishway entrances for the 2012 lamprey migration, to try to enhance lamprey entrance success as a best management practice (BMP).

In January 2012, Douglas PUD installed the new FS2020 Half-duplex (HD) PIT-tag detection arrays in the west ladder of the Wells Fishway, and during the 2012/2013 winter fishway maintenance, the same arrays were installed in the east ladder. The new HD PIT-tag detection arrays will aid additional investigations of adult lamprey passage at Wells Dam. In October 2012, the Aquatic SWG approved the Wells Dam Adult Lamprey Passage and Enumeration Study Plan for implementation in 2013; in part, the study continues the
evaluation of adult lamprey entrance and ladder passage efficiency under reduced Wells Project fishway entrance velocities using RT technology.

2.1.4.2 Fishway Entrance Velocities Testing

Based on the observed results of the 2009 and 2010 adult lamprey passage studies using DIDSON camera technology, the Aquatic SWG requested approval from the HCP Coordinating Committees for a change in fishway operating conditions. Specifically, there was a request for reducing the fishway entrance head differential from a 1.5-foot-head to a 1.0-foot-head differential from 5:00 pm to 1:00 am, on August 7, 2011, through September 30, 2011 (lamprey operations). Lamprey operations would be implemented 3 days following the date when the cumulative count of adult lamprey passing Rocky Reach Dam reached five individuals. As a condition of approving this change in fishway entrance operating conditions, the HCP Coordinating Committees requested that Douglas PUD empirically measure (rather than model) water velocities at the fishway entrances. Testing was conducted March 1 and 2, 2011, and velocities were measured under both low and high tailwater conditions at 1.0- and 1.5-foot-head differentials using Acoustic Doppler Velocimeters. The results were presented to the Aquatic SWG on April 13, 2011, and to the HCP Coordinating Committees on May 24, 2011, along with a memo documenting the test results. The results of the velocity tests, when compared to the documented swimming performance for adult Pacific lamprey, suggested that the entire orifice area was passable for lamprey at both high and low tailwater elevations at the 1.0-foot-head differential. The results suggested that passage conditions would likely be most difficult for lamprey at the 1.5-foot-head differential at low tailwater elevations.

On July 26, 2011, the HCP Coordinating Committees approved the Aquatic SWG’s request for a 1.0-foot operating condition for 2011, with the understanding that Douglas PUD would continue to develop plans to investigate lamprey passage using HD PIT-tag detection technology in future years. The HCP Coordinating Committees indicated they would not likely approve a permanent change in fishway operating criteria at the Wells fishway entrances until Douglas PUD conducted a study to evaluate the potential effects on salmonid passage. To address the concern of the HCP Coordinating Committees regarding potential negative effects to salmonids as a result of changes to fishway entrance operating conditions, in August 2011, Douglas PUD requested that Dr. John Skalski, of Columbia Basin Research,
conduct a statistical analysis of passage times of adult salmonids at the 1.0-foot-head and 1.5-foot-head differential entrance conditions. The analysis was to be designed to test if adult salmonid passage behavior was altered when operating the fishway entrance with a reduced head differential. Results from this analysis indicated that there were no statistically detectable effects on Chinook, coho, and sockeye salmon, or on steelhead from reduced velocities at the fishway entrances during the study hours of operations. Based on these results, the HCP Coordinating Committees approved a request to implement a reduced collection-gallery-to-tailwater head differential from 1.5 feet to 1.0 foot between 17:00 and 0:59 hours daily, starting 3 days after the day on which the cumulative passage of lamprey at Rocky Reach Dam equals five lamprey (the same operations as those approved in 2011). The 1.0-foot differential was implemented from August 6, 2012, to September 30, 2012.

2.1.4.3  Wells Dam Count Window Modifications

During the 2012/2013 winter fishway maintenance at Wells Dam, count window improvements were installed in both east and west fish ladders in an effort to improve enumeration of Pacific lamprey at Wells Dam and in preparation for the 2013 Wells Dam lamprey studies. Among these improvements was the installation of an 18-inch-wide aluminum ramp on both the upstream and downstream face of the fish count louvers. During the 2013 salmon counting season, Wells Dam fell behind on counts in part due to fish swirling back and forth through the count window. Based on an evaluation conducted by NMFS, it was concluded that the upstream ramps may be interfering with the ability to accurately count fish by causing uneven hydraulics and flow separation through the count window area, and subsequently causing smaller fish to repeatedly pass back and forth through the count window area. Video of the count window area also showed lamprey free-swimming through the area, which suggests that the ramps were not contributing to improved lamprey passage. In November 2013, based on these assessments, the HCP Coordinating Committees approved removing the ramps from both ladders to improve fish count efficiency in future years. In December 2013, the Aquatic SWG reviewed the HCP Coordinating Committees’ recommendation, and as recommended, both upstream down-ramps were removed during the 2013/2014 winter fishway maintenance at Wells Dam.
2.1.4.4  **Wells Dam Adult Lamprey Passage and Enumeration Study Plan**

As noted in Section 2.1.4.1, in October 2012, the Aquatic SWG approved the Wells Dam Adult Lamprey Passage and Enumeration Study Plan for implementation in 2013. The study plan, developed by Douglas PUD and Longview Associates, employed active tagging of translocated adult lamprey to assess lamprey passage (Protection, Mitigation, and Enhancement [PME] measure 4.1.6 in the Pacific Lamprey Management Plan), and enumeration (PME measure 4.1.3 in the Pacific Lamprey Management Plan) at Wells Dam. Study fish were obtained from both Priest Rapids Dam and Bonneville Dam in order to provide a sufficient sample size, and to allow preliminary analysis of fish source. Lamprey were released 1.5 miles below Wells Dam and a subset of each release group were also placed directly into the fish ladder to increase the chances of fish interaction with the modified count window. Fixed-station RT receivers and associated arrays for tagged fish monitoring were deployed at a number of locations within the Wells Project fishways, and were also located at the mouths of the Okanogan and Methow rivers.

In February 2013, the HCP Coordinating Committees approved the SOA for Wells Dam 2013 Lamprey Operations, which used similar fishway operations as those that were used for the DIDSON Study conducted in 2010 (Johnson et al. 2011). Preliminary study results included minimal detections. These limited data were not enough to report on the effects of the fishway modifications that were installed to improve lamprey passage and enumeration. Although, as previously described in Section 2.1.3, the upstream down-ramps that were recently installed to improve lamprey passage and enumeration seemed to be inhibiting the ability to accurately count fish, and video of the area suggested that the ramps were not aiding in lamprey passage. Therefore, in consideration of enumeration of salmonids and other small fish in the area, the HCP Coordinating Committees approved the removal of the upstream down-ramps at their meeting on November 19, 2013.

Douglas PUD anticipates a Final Wells Dam 2013 Adult Lamprey Passage and Enumeration Study Report to be available by spring 2014, which will help inform next steps in the Pacific Lamprey Management Plan implementation process.
2.1.4.5 **Lamprey Entrance Efficiency and Operations Study Plan**

As required by conditions in FERC License Order 2149-52, Douglas PUD developed a Lamprey Entrance Efficiency and Operations Study Plan (Appendix N) that assesses potential changes in fish-way operations to improve overall passage if and when problems are identified. In September 2013, the Aquatic SWG approved the plan, which was filed with FERC by the October 31, 2013 deadline.

2.1.4.6 **Regional Coordination**

In 2013, Douglas PUD continued participation in regional efforts to coordinate lamprey investigations. These discussions are expected to continue in 2014.

2.1.4.7 **Planned Monitoring and Studies 2014**

In spring 2014, the draft Lamprey Passage and Enumeration study will be available. Results for this study will be discussed with the Aquatic SWG and used to continue the implementation of the Pacific Lamprey Management Plan. Douglas PUD will also continue efforts with upgrades to recreational boat launches located in Pateros and Carpenter Island. Due to concerns regarding potential impacts to lamprey while performing dredging activities, Douglas PUD will continue to salvage lamprey found during these construction activities, as was done in 2013. Douglas PUD will continue to work closely with WDFW and the Aquatic SWG to accomplish this task.

2.1.5 **Aquatic Nuisance Species**

In June 2010, the Aquatic SWG approved plans to implement ANS monitoring efforts consistent with proposed requirements contained in the ANS Monitoring Plan in the Agreement. Douglas PUD began early implementation of these projects in 2010 and 2011, and continued the work per the requirements of their CWA Section 401 Water Quality Certification in 2012.

In 2013, Douglas PUD continued ANS monitoring efforts under their CWA Section 401 Water Quality Certification for the Wells Project, and also under FERC License Order 2149-52, including updating their ANS Management Plan to include BMPs to prevent the spread of ANS during construction of recreation enhancement measures (per Section 4.1 of the
FERC license), and protocols to be implemented if ANS are detected during monitoring activities at the project (per Section 4.2.1 of the FERC license). In April 2013, the Aquatic SWG approved the revised ANS BMPs, which were included in the final ANS Management Plan that was filed with FERC (Appendix O). In May 2013, in accordance with their 401 Water Quality Certification, Douglas PUD also posted ANS signage and educational pamphlets at all project area boat launches and recreation facilities, including at the Highway 97 rest area at Wells Dam.

2.1.5.1 Crayfish

In late 2010, Douglas conducted an exploratory crayfish sampling effort in the Wells Reservoir using methods described in the Crayfish Survey Protocol and Identification Guide for Washington (Pearl et al. 2011). No native signal crayfish (Pacifastacus leniusculus) or non-native northern crayfish (Orconectes virilis) were captured during this exploratory effort (Douglas County PUD 2012).

In June 2011, crayfish were collected incidental to beach seining of subyearling Chinook (HCP-related activity), confirming the presence of the non-native northern crayfish in some Project locations.

In 2012, the Wells Project Crayfish Distribution Pilot Study was conducted where crayfish traps were deployed throughout five areas of the Wells Project, resulting in zero crayfish captured, and active capture at 19 sites resulted in the capture of seven non-native northern crayfish (as reported in the 2012 Wells Crayfish Study).

In 2013, crayfish monitoring was conducted in the same locations as in 2012; although, because trapping was so ineffective in 2012, only active sampling was conducted in 2013, which included hand nets and flipping rocks. Non-native northern crayfish were found at the mouth of the Okanogan (15 total), Washburn Island (1 total), and at the mouth of the canals near Bridgeport Bar (1 total).
2.1.5.2 Zebra/Quagga Mussels and Macrophytes

In 2011, Douglas PUD monitored for zebra and quagga mussels, as well as macrophytes, none of which were detected during 2011 ANS sampling efforts. In 2012, Douglas PUD continued early detection monitoring for zebra and quagga mussels using plankton tows for veligers and artificial substrate samplers, and, like in 2011, no zebra or quagga mussels were found in the samples collected.

In 2013, Douglas PUD coordinated zebra and quagga mussel monitoring with WDFW from July to October 2013, at three sites in the Wells Reservoir, including the Pateros winter boat launch and the mouth of the Methow River, Brewster boat launch, and Bridgeport boat launch. Results from veliger tow samples indicated no presence of zebra or quagga mussel veligers. In addition, no adult mussels were observed on artificial substrate samplers.

2.1.5.3 Eurasian Milfoil

In September 2011, Douglas PUD conducted an aquatic plant survey. Eurasian milfoil was not dominant but was subdominant in 15% of the samples taken. In 2012, monitoring for Eurasian watermilfoil (Myriophyllum spicatum) was performed as part of the Wells Project Crayfish Distribution Study. Eurasian watermilfoil was not observed to be dominant at any sample sites; however, as a measure required under the Recreation Management Plan, on August 16, 2012, the aquatic herbicide diquat dibromide was applied at the Pateros, Brewster, and Bridgeport swim areas as part of Recreation Action Plans requirements. The application did not specifically target watermilfoil but instead was intended to clear all aquatic vegetation in the swimming areas, specifically Elodea canadensis, Potamogeton pusillus, Myriophyllum spicatum, and Potomogeton crispus. The application was somewhat successful and was carried out again on July 15, 2013, with superior results observed compared to the 2012 application. Prior to application, the Aquatic SWG was consulted on the matter.

2.1.5.4 Planned Monitoring and Studies 2014

In 2014, Douglas PUD will continue to support and implement ANS efforts. Monitoring of zebra and quagga mussel early-detection will continue in coordination with WDFW and Portland State University.
New Zealand mudsnails were discovered in the Columbia River in the Hanford Reach in early 2014. Douglas PUD will continue to implement best management practices to prevent the introduction of all ANS, including New Zealand mudsnails, and will coordinate with WDFW on monitoring for the presence of this species in the Wells Project if it is determined necessary.

### 2.1.6 Resident Fish

In 2013, Douglas PUD continued efforts to protect and enhance native resident fish populations and habitat in the Wells Reservoir, as outlined in the Resident Fish Management Plan, including developing a resident fish study plan for 2014 and incidentally capturing and recording the abundance of many resident fish during the third year of a subyearling life history study (HCP-related action). Results were summarized and delivered to WDFW as part of scientific collection permit reporting.

Douglas PUD continued to implement northern pikeminnow removal efforts in 2013. These efforts resulted in the removal of 11,888 northern pikeminnow from the Wells Reservoir and tailrace. Incidental captures of other resident fish species were also monitored and recorded during these efforts.

#### 2.1.6.1 Planned Monitoring and Studies 2014

In 2014, Douglas PUD will continue to implement activities in the Resident Fish Management Plan, including the 2014 Resident Fish Assemblage Study. The primary goal of the 2014 Resident Fish Assemblage Study will be to determine the relative abundance of the various resident fish species found within the Wells Reservoir. In addition to the Resident Fish Assemblage Study, Douglas PUD will continue to monitor by-catch of resident fish species in other management activities.
3 AGREEMENT ADMINISTRATION

This section lists events of note that occurred in 2013 related to the administration of the Agreement, and lists reports published in 2013 that relate to the Aquatic SWG.

3.1 HCP Coordination

In June 2013, the Aquatic SWG requested approval from the HCP Coordinating Committees for implementation of 1.0-foot-head differential from 19:00 to 02:00 every other night, and the normal, 1.5-foot-head differential operating on alternating days, starting on July 15, 2013, and continuing through October 7, 2013, at the Wells fishway entrances in 2013 (lamprey operations). The HCP Coordinating Committees approved implementation of lamprey operations for 2013.

In November 2013, the Aquatic SWG requested approval from the HCP Coordinating Committees to remove the ramps located on the upstream side of the count windows at Wells Dam to improve fish count efficiency in future years. The HCP Coordinating Committees approved removal of the ramps.

The 2013 GAP and Bypass Operating Plan were developed collaboratively by the HCP and Aquatic SWG as required by FERC License Order 2149-52 and Douglas PUD’s CWA Section 401. Both work groups approved the documents prior to filing them with FERC.

3.2 Aquatic Settlement Work Group Members

A designated technical representative and a separate designated policy representative for each of the parties make up the Aquatic SWG, as established under the Agreement. The Aquatic SWG meets collectively to expedite the process for overseeing and guiding the implementation of the Agreement. The policy representatives will meet at least once annually during the term of FERC License Order 2149-52 to review progress and implementation of the Agreement. Minutes from the monthly meetings are compiled in Appendix A of this report. Appendix B lists current members of the Aquatic SWG.
3.3 **Aquatic SWG Extranet Site**

In 2013, as required by FERC License Order 2149-52 and Douglas PUD’s CWA Section 401 Water Quality Certification, Douglas PUD developed two new websites to house Aquatic SWG-related documents, and by October 2013, both websites were fully functional. The public website includes information about the Wells Project and the Aquatic SWG, including links to Ecology water quality data and final reports and study plans. The secure Aquatic SWG Extranet site (not for public access) houses all Aquatic SWG-related documents, and replaces the former ftp site. The secure site is also equipped with several searching capabilities that the former ftp site could not perform.

3.4 **Conflict of Interest Policy**

In August 2013, the Aquatic SWG began discussing possibly implementing a Conflict of Interest Policy, which is typically a standard requirement of committees or working groups responsible for reviewing proposals and recommending funding. After several discussions, the Aquatic SWG ultimately decided that implementing a Conflict of Interest Policy would exclude too many key parties from technical decision-making; therefore, it was decided to defer implementation of a Conflict of Interest Policy at this time.

3.5 **Agreement-related Reports Published in Calendar Year 2013**

The following documents were finalized by the Aquatic SWG in 2013:

- 2012 White Sturgeon Management Plan Annual Report (included in Appendix C)
- 2012 Pacific Lamprey Management Plan Annual Report (included in Appendix C)
- 2012 Resident Fish Management Plan Annual Report (included in Appendix C)
- 2012 Water Quality Management Plan Annual Report (included in Appendix C)
- 2012 Aquatic Nuisance Species Management Plan Annual Report (included in Appendix C)
- 2013 Aquatic Settlement Agreement Action Plan (Appendix D)
- Phase One White Sturgeon Management Plan Monitoring and Evaluation Study Plan (Appendix F)
• Bull Trout Stranding and Take Study Plan (Appendix H)
• 2013 Gas Abatement Plan and Bypass Operating Plan (Appendix J)
• 2013 Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas Monitoring (Appendix K)
• Douglas PUD Spill Prevention Control and Countermeasures Plan (Appendix L)
• Douglas PUD Water Quality Attainment Plan (Appendix M)
• Lamprey Entrance Efficiency and Operations Study Plan (Appendix N)
4 REFERENCES


APPENDIX A
AQUATIC SETTLEMENT WORK GROUP
2013 MEETING MINUTES AND
CONFERENCE CALL MINUTES
Final Meeting Minutes

Aquatic Settlement Work Group

To: Aquatic SWG Parties
From: Michael Schiewe, Chair (Anchor QEA)
Re: Final Minutes of the January 9, 2013 Aquatic SWG Meeting

The January Aquatic Settlement Work Group (SWG) met in person at the Wells Dam Hydroelectric Project on Wednesday, January 9, 2013, from 10:00 am to 4:00 pm. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items
   1. Steve Lewis will provide revisions to the draft December 13, 2012 Aquatic SWG conference call minutes to Kristi Geris for incorporation prior to finalizing and distributing to the Aquatic SWG (Item VI-2).
   2. Chas Kyger will provide photos of the Wells Dam count window modifications to Kristi Geris for distribution to the Aquatic SWG (Item VI-3).
   3. Andrew Gingerich will provide Douglas PUD’s draft 2012 Gas Abatement Plan (GAP) Report to Kristi Geris for distribution to the Aquatic SWG for review prior to filing the report with the Federal Energy Regulatory Commission (FERC) in February 2013 (Item VI-4).
   4. The Aquatic SWG will submit comments on Douglas PUD’s draft 2013 Action Plan to Kristi Geris no later than Friday, January 18, 2013 (Item VI-4).
   5. Andrew Gingerich will provide contact information for the new Aquatic SWG U.S. Bureau of Land Management (BLM) Technical and Policy Representative, Chris Sheridan, to Kristi Geris for distribution to the Aquatic SWG (Item VI-8).

II. Summary of Decisions
   1. There were no Statements of Agreement (SOAs) approved at today’s meeting.

III. Agreements
   1. There were no agreements discussed at today’s meeting.
IV. Review Items
1. The Douglas PUD draft 2013 Action Plan is available for review with comments due to Kristi Geris by Friday, January 18, 2013.
2. Kristi Geris sent an email to the Aquatic SWG on January 11, 2013, notifying them that the Douglas PUD 2012 GAP Report is available for a 30-day review period, with comments due to Andrew Gingerich by Monday, February 11, 2013.

V. Reports Finalized
1. No reports have been finalized since the last Aquatic SWG meeting.

VI. Summary of Discussions
1. **Wells Dam Hydroelectric Project Tour – Part I: Power Production** (Brian Hicks, Andrew Gingerich, Chas Kyger): Brian Hicks, the Wells Dam Hydroelectric Project Superintendent, Andrew Gingerich, and Chas Kyger led a tour of the power production facilities at the Wells Dam Hydroelectric Project. Hicks provided an overview of power production at the dam while touring several areas of the project, including the Operations Center.

2. **Welcome, Agenda Review, and Meeting Minutes Review** (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and introduced Jessi Gonzales, the Aquatic SWG Policy Representative for U.S. Fish and Wildlife Service (USFWS). Gonzales also introduced Doug Tangen, a new office assistant at USFWS. Tangen has a background in Environmental Sciences and came to USFWS from the U.S. Navy. Schiewe welcomed them both and reviewed the agenda. He asked for additional agenda items, and the following revisions were made to the agenda:

   - Andrew Gingerich requested two additions: 1) a brief announcement regarding the new Aquatic SWG Technical and Policy Representative for BLM; and 2) a discussion of the Pacific Lamprey count window modifications and head differential license amendment.

Kristi Geris reported that one additional revision was received on the draft December 13, 2012 conference call minutes from Patrick Verhey on January 2, 2013. Verhey requested a modification regarding Washington Department of Fish and Wildlife’s (WDFW’s) review of the new Wells Project FERC license. Steve Lewis requested a revision to the discussion regarding the installation of infrared (IR) cameras for improved lamprey enumeration. He said that he would like it noted that the Aquatic SWG did not conclude whether to use IR cameras in the future; and he added that he would like to see what angles the existing cameras are capable of viewing. Gingerich said that he had not intended to give the impression that the IR cameras are no longer being considered. He said that the Aquatic SWG did collectively decide to postpone
installation of the IR cameras to first investigate if fish can effectively be enumerated without installation of the IR cameras; Gingerich added that this question will be investigated this year. Lewis said that he will provide revisions to the draft December 13, 2012 Aquatic SWG conference call minutes to Geris for incorporation prior to finalizing and distributing these minutes to the Aquatic SWG.

3. **Pacific Lamprey Count Window Modifications and Head Differential License Amendment** (Chas Kyger): Chas Kyger said that the modifications to the count windows have been installed, and that the Aquatic SWG will have an opportunity to view the improvements during the tour of the Wells Dam east and west fish ladders. Kyger said that he will also take photos of the count window modifications and provide them to Kristi Geris for distribution to the Aquatic SWG.

Andrew Gingerich reminded the Aquatic SWG members that the new FERC license requires a license amendment for all permanent modifications to project facilities. He said that Douglas PUD is in the process of discussing the package of information to prepare for FERC that describes and shows that the Aquatic SWG has thoroughly reviewed and discussed the lamprey study and the related operational and structural modifications. Gingerich said that Douglas PUD should have a package ready for discussion for the Aquatic SWG February 13, 2013 meeting. Bao Le asked if Douglas PUD planned to state that the proposed head differential changes will occur each year, or just in 2013. Gingerich said that FERC is requesting a license amendment for these changes, so they must be viewing the changes as potentially permanent. He added that if FERC determines that the changes are a temporary measure, then an amendment will not be needed.

Kyger said that Douglas PUD is discussing logistics with the Yakama Nation (YN) to obtain adult lamprey from Bonneville Dam, and he also noted that Douglas PUD is coordinating with Grant PUD to obtain fish from Priest Rapids Dam, which Kyger said in total, covers all of the 125 study fish needed for the 2013 Pacific Lamprey radio telemetry study. Kyger said that arrangements should be finalized by spring. Steve Lewis asked if the U.S. Army Corps of Engineers (who operates Bonneville Dam) is requesting federal approval for securing the lamprey, and Kyger said that Douglas PUD is investigating whether that is a requirement. Kyger said that the YN would collect and transport the fish from Bonneville Dam to Wells Dam for tagging.

4. **2013 Aquatic SWG Action Plan** (Andrew Gingerich): Andrew Gingerich said that the Douglas PUD 2013 Aquatic SWG Action Plan was distributed to the Aquatic SWG by Kristi Geris on January 2, 2013. A PowerPoint presentation of the 2013 Aquatic SWG Action Plan (Attachment B) was also distributed to the Aquatic SWG on January 9, 2013.
Gingerich reviewed Aquatic SWG actions planned for 2013, by management plan. Actions included those associated to the Aquatic SWG Annual Report and webpage development, white sturgeon, bull trout, water quality, Pacific Lamprey, aquatic nuisance species (ANS), and resident fish. He reviewed planned activities and key dates associated with each respective management plan including planned studies, reports, and monitoring; regional coordination; and deadlines to FERC. Gingerich said that all 2013 activities will be incorporated into an Aquatic Settlement Agreement Annual Report and submitted to FERC. He noted that 2013 action dates were structured to comply with FERC deadlines.

Gingerich said that the new FERC license requires Douglas PUD to develop a webpage to post study plans, meeting minutes, and other relevant Aquatic SWG material. He said that the webpage will also include links to water quality data. Mike Schiewe asked if the webpage would be similar to a SharePoint site, and Gingerich replied that he was not yet certain what exactly the webpage will entail, but that an internal meeting is scheduled for this week to discuss these details. He said that Douglas PUD has a relicensing webpage, and that this new webpage may be similar to that. He also added that the Douglas PUD Information Technology (IT) staff is interested in including SharePoint as one of the options.

Steve Lewis asked about the status of Colville Confederated Tribe’s (CCT’s) and YN’s white sturgeon professional services contract development, and Gingerich said that they both are near finalization. Specifically, the CCT contract process is complete and Douglas PUD is waiting on insurance information from the YN to finalize that contract. Lewis asked about the areas of collection, and Gingerich indicated that they have not yet been finalized, and that before they are, he would like the Aquatic SWG to review and reach agreement on options.

Gingerich noted that for bull trout monitoring in 2013, Douglas PUD plans to employ a “greater than 10 per year” rule that would require additional monitoring activities for sub-adults at Wells Dam. Bao Le explained that if more than 10 bull trout are detected in a one-year period, additional protective measures will be triggered.

Gingerich said that there are several water quality reports and plans slated for 2013. He noted that Douglas PUD has already received and incorporated comments on the 2012 Gas Abatement Plan (GAP) Report from the Washington Department of Ecology (Pat Irle); however, he would like to also provide the Aquatic SWG an opportunity to provide comments prior to filing the report with FERC in late February 2013. He added that he will provide the draft report to Geris for distribution to the Aquatic SWG for review prior to filing the report with the FERC. Gingerich said that the 2013 GAP Report and 2013 Bypass Operating Memorandum were distributed to the Aquatic SWG on December 28, 2012; and he noted that in 2013, Douglas PUD will now look to meet the 110 percent
total dissolved gas (TDG) standard year-round, and not just monitor compliance during the spill season, which has different TDG guidelines. Lewis asked what the target species are for the TDG compliance and Gingerich said that incidental sampling will be performed on all juvenile salmonid species.

Gingerich also said that the Annual Water Temperature Report will not be available until 2014 because 2013 will be the year of infrastructure installation and the first year of data collection. He went on to say that reporting will increase with the new FERC license, which means there will be a lot more for the Aquatic SWG to review. Le noted that the Section 401 deadline for a Spill Prevention, Control and Countermeasures Plan (SPCC) is not until March 2014, as opposed to the September 2013 FERC deadline. He asked if Douglas PUD will be able to forego the FERC deadline due to the existing deadline. Pat Irle said that she could not speak to what FERC will require, but that Ecology will want to review the SPCC if it is updated in September 2013.

Gingerich clarified that “STT-WQ” means “Sovereign Technical Team – Water Quality,” and that this team is associated with the Columbia River Treaty. He said that participating in forums with the STT-WQ will help inform decisions in addressing the treaty in the future.

Gingerich noted that several Pacific lamprey actions are tentative and will be carried forward on an “as needed” basis (see third grouping of bullets in Attachment B). Shane Bickford added that, with the exception of the Lamprey Entrance Efficiency Plan, Douglas PUD has five years to complete these tentative items.

Gingerich said, in summary, that Douglas PUD has a lot planned for 2013 and he asked that the Aquatic SWG submit comments on Douglas PUD’s draft 2013 Action Plan to Geris no later than Friday, January 18, 2013. He added that he would like to request approval on the draft 2013 Action Plan at the Aquatic SWG February 13, 2013 meeting.

5. **FERC License** (Andrew Gingerich and Shane Bickford): Shane Bickford reviewed that in early December 2012, Douglas PUD submitted a request for rehearing. Bickford said that Douglas PUD had raised three overarching issues: 1) the new license term; 2) how encroachment of Wells Dam on Chief Joseph Dam is calculated; and 3) the inclusion of Article 204 to address Canadian Storage. Bickford explained that the proposed new license term of 40 years is based on the incorrect assumption that the Wells HCP would expire on the same date as the HCPs for the Rock Island and Rocky Reach Project in 2052. Bickford clarified that the Wells HCP does not expire until 2054. FERC’s intent is to synchronize the license terms for all of the mid-Columbia River dams; however, as noted by many state, federal and tribal stakeholders, a coordinated relicensing is not appealing due to work load. He also noted that the Rock Island Dam FERC license
expires in 2028, and therefore could not be synchronized with the FERC licenses for Rocky Reach and Priest Rapids.

Bickford said that Douglas PUD believes that the second issue was an error within the language in the license, in that the U.S. Corp Army of Engineers, Bonneville Power Administration, and Douglas PUD have all agreed to the terms of future encroachment calculations and payments, and that FERC simply incorrectly carried those terms into the license. He added that Douglas PUD is seeking to overturn the third issue as it is inconsistent with the license articles for the other PUD dams and represents an outdated characterization of the Columbia River Treaty. Bickford also added that there were other minor issues that Douglas PUD mentioned in the request for rehearing, including the correction of the Wells Project boundary and peak generating capacity.

Jessi Gonzales asked if the Canadian Storage language was about to change again, and Bickford replied that the Canadian Storage that is referred to in the request for rehearing will not change (it is already built). However, the terms of operation between the U.S. and Canada is expected to change (i.e., the Columbia River Treaty) and Douglas PUD would like to have the ability to change with it rather than be stuck in the past as the new license article 204 requires. Bickford said that it may take up to 7 to 8 months before Douglas PUD hears back from FERC, and he noted that the group that handles the rehearings is separate from the licensing group.

Andrew Gingerich said that Douglas PUD is now working to develop a FERC compliance matrix that includes all of the complex requirements of the new license including the requirements mandated within the CWA Section 401 water quality certification, the ESA consultations for bull trout, steelhead and spring Chinook, the Federal Power Act section 18 fishway prescriptions and the requirements imposed by FERC.

6. **Water Quality Management Plan/401 Certification Priorities** (Andrew Gingerich): This agenda item was covered in the draft 2013 Aquatic SWG Action Plan Update discussion.

7. **White Sturgeon** (Andrew Gingerich): This agenda item was covered in the draft 2013 Aquatic SWG Action Plan Update discussion.

8. **New Aquatic SWG U.S. Bureau of Land Management Technical and Policy Representative** (Andrew Gingerich): Andrew Gingerich announced that Chris Sheridan is now the new Aquatic SWG Policy and Technical Representative for BLM. Gingerich said that he will send Sheridan’s contact information to Kristi Geris for distribution to the Aquatic SWG.

9. **Wells Dam Hydroelectric Project Tour – Part II: East and West Fish ladders** (Shane Bickford, Andrew Gingerich, Tom Kahler and Chas Kyger): Shane Bickford, Andrew
Gingerich, Tom Kahler and Chas Kyger lead a tour of the east and west fish ladders at the Wells Dam Hydroelectric Project. Sites visited included the east and west fish ladders, the fish trap, the count station, the interpretive center, and the fish hatchery facilities. The 2012/2013 winter annual maintenance was underway; therefore, the east ladder was completely dewatered, which permitted access to view the recently installed count window modifications to improve lamprey enumeration. While discussing the modifications, Bickford and Kyger noted that in 2013, Douglas PUD also plans to install radio telemetry antennas in both Wells Dam fishways. They said that those arrays will help determine if the new wall diffuser screening and ramp perform as expected (i.e., if Pacific lamprey entry into the counting station is improved or if it is delayed, etc.).

VII. Next Meetings
   1. Upcoming meetings: February 13, 2013 (conference call); March 13, 2013 (conference call); and April 10, 2013 (conference call).

List of Attachments
Attachment A – List of Attendees
Attachment B – Douglas PUD 2013 Aquatic SWG Action Plan Presentation
### List of Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Mike Schiewe</td>
<td>SWG Chair</td>
<td>Anchor QEA, LLC</td>
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<tr>
<td>Kristi Geris</td>
<td>Administration/Technical Support</td>
<td>Anchor QEA, LLC</td>
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<tr>
<td>Andrew Gingerich</td>
<td>SWG Technical Representative</td>
<td>Douglas PUD</td>
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<tr>
<td>Shane Bickford</td>
<td>SWG Policy Representative</td>
<td>Douglas PUD</td>
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<tr>
<td>Tom Kahler</td>
<td>Technical Support</td>
<td>Douglas PUD</td>
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<tr>
<td>Chas Kyger</td>
<td>Technical Support</td>
<td>Douglas PUD</td>
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<tr>
<td>Steve Lewis</td>
<td>SWG Technical Representative</td>
<td>U.S. Fish and Wildlife Service</td>
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<td>Jessi Gonzales</td>
<td>SWG Policy Representative</td>
<td>U.S. Fish and Wildlife Service</td>
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<td>Doug Tangen</td>
<td>Observer</td>
<td>U.S. Fish and Wildlife Service</td>
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<tr>
<td>Patrick Verhey</td>
<td>SWG Technical Representative</td>
<td>Washington Department of Fish and Wildlife</td>
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<tr>
<td>Pat Irle†</td>
<td>SWG Technical Representative</td>
<td>Washington State Department of Ecology</td>
</tr>
<tr>
<td>Bao Le†</td>
<td>Technical Support</td>
<td>HDR Engineering, Inc.</td>
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**Notes:**

† Joined by phone
II. 2013 AQUATIC SETTLEMENT AGREEMENT AND WORKGROUP ACTION PLAN

1. Annual Report and Webpage Development

2. White Sturgeon Management Plan


4. Water Quality Management Plan

5. Pacific Lamprey Management Plan

6. Aquatic Nuisance Species Management Plan

7. Resident Fish Management Plan

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Annual Report and Webpage Development

- Distributed to ASWG, BIA and NMFS March 30, 2013
- Final Annual Report Approved by ASWG and NMFS April 30, 2013
- Annual Report Filed with FERC May 28, 2013
- Aquatic Settlement Web Portal/Database June 30, 2013
- Public Website Live Oct 2013
White Sturgeon MP

- 2011 Broodstock Collection and Breeding Plan filed with FERC for approval Mar 2013 (Revised May 2012)
- Sturgeon Hatchery Construction Updates to ASWG Jan-Apr 2013
- Collection location and logistical coordination Apr 2013
- Larval and brood collection/ Wells rearing Jun-Dec 2013
- Technical participation in regional forums Throughout 2013
- Incorporate sturgeon activities into Aquatic SA Annual report to FERC Mar 2013

Bull Trout MP

- Letter to FERC postponing Twisp Weir bull trout “take” study to year 5 Feb 2013
- OR Twisp Weir Bull Trout Passage Evaluation Study Plan to ASWG for approval Mar 2013
- Prepare a Bull Trout Stranding and Incidental Take Study Plan (Article 402) Jun 2013
- Stranding and Incidental Take Study Plan HCP and ASWG review1 (Article 402) Jul 2013
- Stranding and Incidental Take Study Plan File with FERC1 (Article 402) Oct 2013
- Stranding surveys as necessary (below 773’ MSL) As required throughout 2013
- Bull Trout counts at Wells Dam May 1st – Nov 15th 2013
- Monitor for sub-adults at Wells Dam (>10/year triggers additional measures) Throughout 2013
- PIT tagging at the Twisp Weir and genetic tissue collection May-Aug 2013
- Bull Trout Salvage during ladder maintenance Dec 2013
- Recovery planning participation/regional coordination Throughout 2013
- Include PIT histories summary in memo in lieu of RT study at Weir in 2013 Nov 2013
- Incorporate 2012 Bull Trout Activities and Incidental Take Monitoring into Aquatic SA Annual report to FERC Mar 2013

* Bull trout stranding and incidental take plan is actually three measures: 4.4, 4.5.1, and 4.6.1 in the BTMP. These items speak specifically to bull trout stranding during low reservoir conditions, incidental take monitoring during other field studies, and incidental take occurrences during hatchery operations. This comprehensive plan will cover implementation guidance for all three. Requirement is identified in the FERC License Order; page 54; Article 402.
Water Quality MP

- 2012 Gas Abatement Plan Report to ASWG and NMFS for approval Jan 2012
- 2012 Spill/bypass Operations Report to HCP CC and ASWG for approval Jan 2013
- 2013 Gas Abatement Plan to ASWG and HCP CC for approval Jan - Feb 28, 2013
- 2013 Gas Abatement Plan filed with FERC for approval Feb 28, 2013
- 2013 Gas Abatement Plan (w/ non-fish spill) Report to ASWG and NMFS for approval Dec 2013
- 2013 Gas Abatement Plan (w/ non-fish spill) Report to FERC Feb 28, 2014
- 2013 Bypass/spill Operation Plan to HCP CC and ASWG for comment Dec 2012
- 2013 Bypass/spill Operations Plan to HCP CC for approval Jan 2013
- 2013 Bypass/spill Operations Plan to FERC for approval Feb 28, 2013
- Quality Assurance Plans (QAPP) - water temp/TDG to ASWG and NMFS for approval Feb 2013
- Quality Assurance Plans (QAPP) filed with FERC for approval Mar 2013
- Year-round TDG monitoring initiated at 2 stations (hourly with web-accessibility) Mar 2013
- Remote Washburn and backup tailrace TDG Stations Installed May 2013
- All TDG stations collecting year-round hourly data and web accessible Oct 2013

Water Quality MP cont’d

- Water Quality Attainment Plan (WQAP) for TDG (10-year plan) development May 2013
- WQAP for TDG sent to ASWG and NMFS for approval Aug 2013
- WQAP for TDG sent to FERC for approval Oct 2013
- Water temperature monitoring stations installed (N=5) April – June 2013
- Water temperature monitoring hourly (April 1 to Oct 31) river stations (N=7) Oct 2013
- Water temperature monitoring hourly (April 30 – Nov 15) fish ladders April 2013
- Annual Water Temperature Report to ASWG and NMFS for approval Dec 2013
- Annual Water Temperature Report to FERC Apr 30, 2014
- Updated Oil Spill Prevention, Control and Countermeasures Plan (So 402 Cert) May 2013
- Oil Spill Prevention, Control and Countermeasures Plan to ASWG and NMFS July 2013
- Oil Spill Prevention, Control and Countermeasures Plan to FERC for approval Sept 2013
- Water Quality Protection Plan for Future Construction Activities June 2013 (60 d before action)
- Participate in WQ forums: TMDL, Columbia River Treaty, STT-WQ, CSR-SRI Throughout 2013
- Incorporate Water Quality MP Activities into Aquatic SA Annual report to FERC Mar 2013
Pacific Lamprey MP

- Finish radio antenna install Jan 2013
- Finish HD PIT antenna installation Jan 2013
- Complete count station maintenance Jan 2013
- License amendment: Counting facility modifications Mar 2013
- License amendment: Temporary operational modifications (head differential) May 2013
- Fish collection and tagging for Lamprey Passage and Enumeration Study Jun-Oct 2013
- Passage and Enumeration Study report Dec 2013; Updates throughout 2013
- Passage and Enumeration Study to ASWG and NMFS for approval Jan 2014
- Passage and Enumeration Study to FERC March 2014
- Lamprey Entrance Efficiency Plan to ASWG and NMFS for approval June 2013
- Lamprey Entrance Efficiency Plan to FERC for approval Oct 2013
- Fish Ladder Diffuser Grating Plan and Schedule to ASWG and NMFS for approval Oct 2013
- Fish Ladder Transition Zone Plan and Schedule to ASWG and NMFS for approval Oct 2013
- Fish Ladder Transition Zone Plan and Schedule to FERC for approval Dec 2013
- Fish Ladder Traps and Exit Pool Plan and Schedule to ASWG and NMFS for approval Oct 2013
- Fish Ladder Traps and Exit Pool Plan and Schedule to FERC for approval Dec 2013
- Lamprey Fish Ladder Operations Plan to ASWG and NMFS for approval Oct 2013
- Lamprey Fish Ladder Operation Plan to FERC for approval Dec 2013
- Upstream passage literature review TBD as needed within 6 months of ASWG request
- Fishway inspection Jan 2013 and Dec 2013
- Improved Carpenter Island boat launch salvage and monitoring Oct 2013
- Ladder Salvage during winter maintenance Dec 2013
- Regional participation in technical forums and planning Throughout 2013
- Incorporate Lamprey MP Activities into Aquatic SA Annual report to FERC Mar 2013

See Section 5.6.2 in USFWS fishway prescription for greater detail on above lamprey passage measures.

Aquatic Nuisance Species MP

- ANS BMP Plan and Appropriate ANS Countermeasures/Containment Plan (Article 405) Feb 2013
- Art. 405 Plans to ASWG and NMFS for approval Feb 2013
- Art. 405 Plans to FERC for approval Apr 2013
- Update ANS MP for BMP and Countermeasure plans by Oct 2013
- ANS Education Plan to ASWG and NMFS for approval Jul 2013
- ANS Education Plan to FERC for approval Oct 2013
- Pamphlet development and signage for education measures Feb 2013
- Install ANS signs and print new ANS pamphlets for launches available by May 2013
- ANS Education Plan posted to new Aquatic SWG public website May 2013
- Zebra mussel monitoring with substrate mats and plankton tows Apr-Oct 2013
- Crayfish monitoring and database management Throughout 2013
- Milfoil monitoring adjacent to recreation sites summer 2013
- Regional coordination Throughout 2013
- Incorporate ANS MP Activities into Aquatic SA Annual report to FERC Mar 2013 Due to FERC within 6 months of license issuance (November 1st to May 1st). Due end of April.
Resident Fish MP

- 2012 Pikeminnow Report to ASWG and HCP CC for review Febr 2013
- 2012 Pikeminnow Report incorporated into Aquatic SA Annual Report to FERC Mar 2013
- 2013 Pikeminnow Angling March – Oct 2013
- Resident fish abundance and diet study plan development (year two study) Oct 2013
- Resident Fish abundance and diet study 2014
- Regional coordination Throughout 2013
- Incorporate Resident Fish MP Activities into Aquatic SA Annual report to FERC Mar 2013

2013 Action Plan End

- Additional Comments:
- Approval Feb 13th.
III. FERC Rehearing Compliance Discussion

- Rehearing Update
- Compliance matrix beyond a 1-Year Action Plan...
IV. Water Quality Priorities

• 2013 Gas Abatement Plan
  – Sent 12-28-12 to ASWG. Attached also Spill/bypass plan for 2013.
  – Opportunity to comment (30 day review). No decision required.
  – Need support from Ecology and USFWS of review. Letters likely appropriate?
• 2012 GAP/TDG report and 2012 bypass report has been reviewed by Ecology already.
  – Need to send to ASWG for 30 d review
  – File with FERC Feb 28
IV. Water Quality Priorities Cont’d

• Other items:
  – QAPP
  – WQAP
  – Temperature system and contract development
    • USGS contract development. Leaders stream and river data.
  – TDG sensor installation
    • redundant tailrace sensor
    • Washburn Island sensor
  – TDG year round monitoring
    • Beginning April 2013
    • Contract with CBE for the next three years (through 2015)
  – Website live with remote real time capabilities
    • Link to be provided on implementation webpage to access data

V. White Sturgeon

• William Charles West (Kennewick WA) to do construction
  – Construction to start later this month (Jan.)
  – Construction should be complete April 30, 2013 (3-4 months)
  – Should have the month of May to water-up/fine tune system
  – Opportunity to tour facility after fish ladder walk through

• PSA development with CCT and YN
  – Both have returned signed PSA’s to the district
  – Waiting on proof of insurance from YN
  – DCPUD commissioners approved PSA for CCT Monday Jan 7th. Notice to proceed in the mail.
  – Contracting is on schedule
VI. Pacific Lamprey

- Package to FERC
- Letter or Memo of support from ASWG to FERC for license amendments
- Fish source at Bonneville
  - YN to provide N=100 Bonneville fish?
Final Conference Call Minutes

Aquatic Settlement Work Group

To: Aquatic SWG Parties                                      Date: March 13, 2013
From: Michael Schiewe, Chair (Anchor QEA)
Re: Final Minutes of the February 13, 2013 Aquatic SWG Conference Call

The February Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, February 13, 2013, from 10:00 a.m. to 11:15 am. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items
   1. Douglas PUD will distribute to the Aquatic SWG for review and comment the updated language to the Douglas PUD Aquatic Nuisance Species Management Plan along with an outline of potential aquatic nuisance species education pamphlet and outreach materials, per Article 405 of their Federal Energy Regulatory Commission (FERC) license (Item V-3).
   2. Washington Department of Fish and Wildlife (WDFW) will discuss with the Yakama Nation (YN) the potential for the Colville Confederated Tribes (CCT) to conduct experimental fishing at the confluence of the Snake River and Columbia River, downstream of Ice Harbor Dam, for white sturgeon larval collection for the Wells Supplementation Project (Item V-6).
   3. Mike Schiewe will brief and request approval from Pat Irle and Bob Rose on agreements discussed at the Aquatic SWG’s February 13, 2013 conference call meeting regarding white sturgeon larval collection locations for the Wells Supplementation Project (Item V-6).

II. Summary of Decisions
   1. There were no Statements of Agreement (SOAs) approved at today’s meeting.
III. Agreements


2. The Aquatic SWG members present supported collection of larval white sturgeon by the CCT at the following locations (in no priority): 1) the Rock Island tailrace and Wanapum Pool; 2) the Priest Rapids (PR) tailrace, including the reach near the confluence of the Snake and Columbia rivers; and 3) Lake Roosevelt. These collection efforts will occur in 2013 to meet Douglas PUD’s FERC license requirements under the White Sturgeon Management Plan.

IV. Reports Finalized

1. No reports have been finalized since the last Aquatic SWG meeting.

V. Summary of Discussions

1. Welcome, Agenda Review, and Meeting Minutes Review (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Schiewe reviewed the agenda and asked for additions or other changes to the agenda. The following additions were requested:

- Andrew Gingerich added a brief update on the Aquatic SWG 2013 Action Plan.
- Steve Lewis added a discussion on No Net Impact (NNI) for Pacific Lamprey and Douglas PUD’s role in contributing to this concept for the Wells Hydroelectric Project.

Kristi Geris reported that all comments and revisions received on the draft January 9, 2013 meeting minutes had been incorporated, and that no items remained to be discussed. The Aquatic SWG members present approved the January 9, 2013 meeting minutes, as revised.

2. 2012 Total Dissolved Gas Abatement Plan Report Approval (Andrew Gingerich): Andrew Gingerich summarized that Douglas PUD and the Washington State Department of Ecology (Ecology) had worked together from October through December 2012 on edits and revisions to Douglas PUD 2012 Total Dissolved Gas Abatement Plan Report. He said that the report was distributed to the Aquatic SWG on January 11, 2013, and that the comment period closed on February 11, 2013. Gingerich reported that no additional Aquatic SWG comments were received on the draft report, aside from those received from U.S. Fish and Wildlife Service (USFWS) during the Aquatic SWG January 9, 2013 meeting, and also those received from Ecology. Gingerich added that comments received from Ecology and USFWS had already been incorporated into the draft report that was distributed to the Aquatic SWG on January 11, 2013. Gingerich confirmed that
Douglas PUD had received an email from Pat Irle stating that Ecology approved the final report.

Aquatic SWG members present approved Douglas PUD 2012 Total Dissolved Gas Abatement Plan Report.

3. **License Article 405: Aquatic Nuisance Species Management Plan Update within 6 Months of License Issuance (May 2013)** (Chas Kyger): Chas Kyger reported that as required by their new FERC license, Douglas PUD has developed draft modifications to their Aquatic Nuisance Species (ANS) Management Plan, including best management practices (BMPs) to prevent the spread of ANS during construction of recreation enhancement measures (per Section 4.1), and protocols to be implemented if ANS are detected during monitoring activities at the project (per Section 4.2.1). Kyger said that Douglas PUD plans to distribute the draft language to the Aquatic SWG for review. He summarized that modifications per Section 4.1 include BMPs for contractors, including requirements for general cleaning inspections and in-water work. Kyger said that modifications per Section 4.2.1 include response actions to any type of introduction of ANS. He explained that this broad approach was chosen over developing language specific to species and type of introduction.

Kyger said that in accordance with Section 401 of the Clean Water Act, Douglas PUD is also required to provide educational materials (e.g., pamphlets) at boat launches to increase boater awareness of the dangers of spreading ANS and to educate the public regarding the methods to decrease the spread of ANS. Kyger said that these educational materials supplement already available literature. Andrew Gingerich added that the deadline for producing these educational pamphlets and updating the ANS Management Plan is May 2013. Kyger said that along with the updated language to the ANS Management Plan, Douglas PUD will also provide to the Aquatic SWG an outline of potential ANS education pamphlet and outreach materials. He said that at this point, Douglas PUD is interested in narrowing down needed content (i.e., supplementing what already exists). Patrick Verhey noted that Grant PUD and Chelan PUD have also produced similar educational pamphlets and he suggested that Douglas PUD contact them to discuss what materials may already exist.

4. **Ladder Maintenance Update and Lamprey Study Plan Prep Update** (Chas Kyger): Chas Kyger reported that all modifications in preparation of the 2013 lamprey study should be in place in time for the start of the study. He said that modifications are complete in the Wells Dam east fish ladder, and that in the past week, the same modifications were being made in the Wells Dam west fish ladder. Kyger said that installation of the radio-telemetry (RT) equipment is anticipated to be complete by the end of the day; only final testing remains to be completed once the west ladder is re-watered.
5. **Lamprey Operation Changes and Modifications Amendment** (Andrew Gingerich):
Andrew Gingerich said that Douglas PUD still does not know whether a license amendment will be required for the Pacific Lamprey count window modifications at Wells Dam. He added that Douglas PUD has not yet been assigned a FERC compliance officer to discuss details regarding this requirement. Gingerich reminded the Aquatic SWG that if the modifications can be characterized as temporary, a license amendment would not be required. He said, however, that Douglas PUD has consulted legal counsel who encouraged Douglas PUD to file a license amendment. Gingerich said that Douglas PUD will keep the Aquatic SWG updated as the process moves forward. Gingerich also noted that an SOA for a modified lamprey operations for 2013 was distributed to the HCP Coordinating Committees on February 12, 2013, and that the SOA will be up for approval at the February 26, 2013 meeting of the Coordinating Committees.

6. **White Sturgeon Larval Collection Locations for the Wells Supplementation Project** (Jason McLellan): Andrew Gingerich summarized that in fall 2011, the Aquatic SWG approved the White Sturgeon Broodstock Collection and Breeding Plan, and that subsequently, Douglas PUD released a related request for proposals (RFP). He said that an agreement was not reached on whether Douglas PUD supplementation program should focus on collection of naturally spawned larvae or on collection of broodstock and artificial spawning to meet their production goals. In the end it was agreed that Douglas PUD would fund both approaches in the first year of implementation. Gingerich said that the time to collect larval fish and broodstock is rapidly approaching, and that Douglas PUD is interested in Aquatic SWG members their input on priority locations for collection of white sturgeon larvae.

Jason McLellan said that the CCT has proposed three collection locations: 1) downstream of Rock Island Dam and Wanapum Pool; 2) downstream of PR Dam including McNary Pool; and 3) Lake Roosevelt. McLellan said that based on discussions with WDFW and the YN, both WDFW and the YN felt that collection of larvae in Lake Roosevelt should be the lowest priority. McLellan indicated that WDFW had initially recommended that the collection efforts focus downstream of The Dalles Dam in Bonneville Pool. However, McLellan said that further discussions with the YN made it clear that the YN, along with the other Columbia River Inter-Tribal Fish Commission (CRITFC) tribes, were not supportive of the CCT collecting larvae in Zone 6 (i.e., the Columbia River reach from Bonneville Dam to McNary Dam). McLellan suggested that opposition to the CCT collecting larvae in Zone 6 and Lake Roosevelt reduces their likelihood of collecting adequate numbers of larvae. Mike Schiewe asked if there is a scientific basis to not fish in Zone 6, or if the decision is based on jurisdiction. Chad Jackson replied that he had his suspicions as to why the CCT were excluded from Zone 6; however, he wanted to follow up with the YN to determine the exact reasons. McLellan said that he spoke with Bob Rose after the CRITFC decision and it was clear that the decision was based on policy implications. Schiewe then asked about the reasoning...
behind making Lake Roosevelt collection the lowest priority, and McLellan replied that there is disagreement on the technical merits of using Lake Roosevelt fish. McLellan explained that WDFW was prioritizing collection between the PUD dams over Lake Roosevelt because they assumed downstream mixing was already occurring and they were interested in encouraging upstream mixing of genetic resources. McLellan suggested that because downstream gene flow was likely already occurring, Lake Roosevelt fish would be appropriate. Schiewe asked other Aquatic SWG members why, if in fact there is already downstream movement of larvae, Lake Roosevelt would not be a viable source of larvae for supplementation. Schiewe then asked about the value of facilitating upstream gene flow, and Jackson replied that based on discussions between WDFW, the YN, Grant PUD, and Chelan PUD during early implementation of the PUDs’ respective white sturgeon supplementation programs, and prior to Andrea Drauch-Schreier’s genetic analysis of Columbia River white sturgeon, there were differing opinions amongst researchers, managers, and other technical staff on stock structure, based on the available science. Jackson said that given these differing opinions, WDFW and the YN felt it was best for Grant PUD and Chelan PUD to collect sturgeon gametes from adult inhabiting the middle Columbia River. After Drauch-Schreier’s study was released, there appeared to be a general acceptance that Columbia River white sturgeon are one population with apparent greater genetic relatedness between middle and upper Columbia River stocks and populations. He said that regardless of whether Lake Roosevelt larvae are in the mix, WDFW would like this source of fish to be available for all three PUDs’ supplementation programs. Jackson concluded that at this time, WDFW prefers that the CCT obtain all fish from the PR project area to achieve numerical goals. He added, however, that because larvae collection success within the PR project area is unknown, WDFW will allow Lake Roosevelt larvae to be part of the 2013 collection efforts because the likelihood of success is very high there. Jackson also noted that there were logistical details regarding collection that need to be further discussed with the CCT.

Schiewe summarized that due to tribal policy related-issues in the Lower Columbia River (Zone 6), the CCT larval collection needs to come from the Columbia River upstream of McNary Dam. Schiewe noted that it would be a more robust program if fish were collected from different areas. McLellan agreed, however, he added that the fishing gear that the CCT has available is limited by velocity for two reasons: 1) keeping the gear in position; and 2) keeping the larvae alive. He said that the CCT is discussing fishing areas downstream of PR, perhaps as far south as the Tri-Cities (i.e., Kennewick, Pasco, and Richland, Washington). Jackson said that to his knowledge, there are no issues with the CCT fishing within the Hanford Reach downstream of PR Dam. McLellan added that it is apparent that the McNary Dam reach population moves around and that some fish spawn downstream of Ice Harbor Dam. He asked if there is concern with the CCT conducting experimental fishing downstream of Ice Harbor Dam. Jackson said that he was unsure, but that WDFW will discuss with the YN and specifically address the
potential for the CCT to conduct experimental fishing at the confluence of the Snake River and Columbia River. Gingerich asked if he was hearing that all parties present agreed that the three larval sturgeon collection locations—downstream of Priest Rapids Dam, downstream of Rock Island Dam, and within Lake Roosevelt—were acceptable to all group members present; specifically, for the purposes of collecting larval fish in 2013. Schiewe proceeded to ask each member present if all parties agreed to these three locations. All parties present agreed that the three locations proposed would be acceptable for 2013. Gingerich asked if concerns may be anticipated from those absent from this discussion, including the Washington Department of Ecology (Ecology) and the YN representatives. Schiewe said that he will brief and request approval from Pat Irle and Rose on agreements discussed regarding white sturgeon larval collection locations for the Wells Supplementation Project. (Note: Pat Irle indicated her approval, via email on February 27, 2013, of the three proposed white sturgeon larval collection locations for the Wells Supplementation Project based on all fish managers reaching consensus, including the YN). Gingerich asked if the CCT need to obtain collection permits from WDFW, and Jackson replied that yes, the CCT is required to have current WDFW scientific collection permit(s) for all collection area(s) of the Columbia River that they plan to collect larvae from, including the confluence of the Snake and Columbia rivers. McLellan said that the CCT and Grant PUD has applied for collection permits for downstream of Rock Island Dam and Wanapum Pool, and that the CCT has been advised by their legal counsel to not apply for permits for Lake Roosevelt because it is considered reservation boundary waters (which do not require a permit). He added that transport permits for all three locations would also be applied for. Jackson noted that the WDFW Fish Transport Permits required for larval fishing efforts in 2013 should be sent directly to him for any and all of the agreed upon fishing locations, and that he would help move them through the permitting process. McLellan acknowledged this and agreed to send permits directly to Jackson.

7. Aquatic SWG 2013 Action Plan (Andrew Gingerich): Andrew Gingerich reminded the Aquatic SWG that the Aquatic SWG 2013 Action Plan was reviewed at the January 9, 2013 meeting, and that an electronic version of the action plan was distributed to the Aquatic SWG on January 2, 2013. Gingerich said that no comments have been received on the plan with the exception of those edits discussed during the Aquatic SWG January 9, 2013 meeting; however, revisions have been made to elements in the Pacific Lamprey Management Plan, as distributed to the Aquatic SWG on January 28, 2013. Gingerich said that based on year 1 requirements outlined in their FERC license, Douglas PUD decided to remove some of the Pacific Lamprey activities previously included in the Aquatic SWG 2013 Action Plan.

8. NNI and Pacific Lamprey Management Plan (Steve Lewis): Steve Lewis recommended including a component of NNI in the Aquatic SWG 2013 Action Plan. Andrew Gingerich recalled similar discussions amongst the Aquatic SWG members at the October 10, 2012
and November 13, 2012 meetings. He explained that Douglas PUD remains committed to the Pacific Lamprey Management Plan (PLMP), which contains similar components of the JFP proposal such as juvenile habitat use, and that Douglas PUD does not feel that another document is needed. He added that specific language for “no net impact” is not found within the PLMP or the ASA and the term NNI remains largely undefined in circles outside of the Aquatic SWG, and Douglas PUD does not see value in trying to define NNI. Gingerich said that Douglas PUD is showing their commitment to Pacific Lamprey by conducting the Pacific Lamprey Passage Study, which has specific intent to address objectives in the PLMP. Lewis suggested that some issues have changed since the development of the PLMP, especially those related to policy. He agreed with the difficulties in defining NNI, and added that there are ways to modify a plan and still keep the general concept; he said, for example, that they could do what was done for the bull trout study in early 2000. This bull trout study included a high level of coordination between USFWS and Douglas PUD regarding the upstream and downstream passage of tagged bull trout through the Wells Dam and within tributaries both upstream and downstream of the Wells Dam. Gingerich replied that if USFWS thought something needed to be accomplished within the context of the PLMP, Douglas PUD would encourage that they bring forward a very specific study that the Aquatic SWG could discuss and potentially approve, like that which was completed for the passage study, instead of creating a new management plan that is broad and undefined in terms of scope. He recalled that the NNI document presented at the Aquatic SWG’s October 10, 2012 meeting contained a lot of broad language with few specifics measure or study items; therefore, it did not seem to be a very productive approach that fit within the contents of existing PLMP objectives. Lewis asked if Douglas PUD plans to participate in tributary studies, and Gingerich said that the tributary components are outside of the scope of the PLMP. Gingerich added, however, that Douglas PUD would collaborate on these efforts by sharing data or tag codes if another agency funded some other aspect of a study, which was outside the scope of the PLMP. He explained that Douglas PUD can only participate in a way that is consistent with the existing Well Settlement Agreement that the Aquatic SWG member organizations signed off on. Lewis asked if Douglas PUD would be interested in installing arrays in the Chewuch River and in other locations in the Methow Basin, and Gingerich replied that Douglas PUD would need to review a formal proposal and added that he thinks the response would be that it is outside of the scope of this year’s study objectives. He said that if the request is to collaborate on sharing Passive Integrated Transponder (PIT) tag data from the lamprey passage study, then that would likely be no problem. Mike Schiewe noted that it would be a good opportunity to share and capitalize on data being collected during the lamprey study. Lewis agreed that a proposal would be a good approach, and added that he was only trying to gauge Douglas PUD’s interest in this type of suggestion. Gingerich said that the proposal would need to contain specific details and that it would need to speak to one of Douglas PUD’s management plans to get any traction with Douglas PUD managers. Lewis said that USFWS is largely focused on passage and tributary efforts.
and Gingerich said that Douglas PUD is on board with those efforts. Patrick Verhey said that more discussions are planned and, as things solidify, he said that he anticipates that Douglas PUD will be invited to further participate in these discussions.

VI. **Next Meetings**
   1. Upcoming meetings: *March 13, 2013 (conference call); April 10, 2013 (conference call); and May 8, 2013 (conference call).*

**List of Attachments**
Attachment A – List of Attendees
## List of Attendees

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<td>U.S. Fish and Wildlife Service</td>
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<tr>
<td>Jason McLellan</td>
<td>SWG Technical Representative</td>
<td>Colville Confederated Tribes</td>
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The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, March 13, 2013, from 10:00 a.m. to 11:30 am. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items

1. Mike Schiewe will revise the draft White Surgeon Collection Plan Statement of Agreement (SOA) and redistribute the revised SOA to the Aquatic SWG for review. Email approval of the SOA is needed no later than March 20, 2013 (Item V-2).

2. The Aquatic SWG will submit comments on the draft Aquatic Nuisance Species (ANS) Best Management Practices (BMPs) and education/outreach materials to Chas Kyger no later than April 1, 2013. Douglas PUD will request approval of these materials at the Aquatic SWG’s April 10, 2013 meeting (Item V-3).

3. Andrew Gingerich will provide annual reports for each Aquatic Settlement Agreement Management Plan (six in total) to the Aquatic SWG for review. Douglas PUD will request approval of these annual reports no later than the Aquatic SWG’s May 8, 2013 meeting (Item V-4).

II. Summary of Decisions

1. There were no SOAs approved at today’s meeting.

III. Agreements

1. Aquatic SWG representatives present agreed, in principle, to proposed revisions to the draft White Surgeon Collection Plan SOA, including: 1) prioritization of Mid-Columbia locations for larval collection efforts by the Colville Confederated Tribes (CCT); 2) broodstock collection locations for the Yakama Nation (YN); and 3) deferred
development of a detailed stocking plan until numbers of juvenile sturgeon from the
different locations and sourcing methods are known. This agreement will be formalized
by email concurrence of a revised SOA (Item V-2; Action Item I-1).

IV. Reports Finalized
1. No reports have been finalized since the last Aquatic SWG meeting.

V. Summary of Discussions
1. **Welcome, Agenda Review, and Meeting Minutes Review** (Mike Schiewe): Mike
   Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A)
   and opened the meeting. Schiewe reviewed the agenda and asked for additions or
   other changes to the agenda. No additions or changes were requested.

   Kristi Geris reviewed comments and revisions on the draft February 13, 2013 meeting
   minutes that were received after the revised minutes had been distributed to the
   Aquatic SWG on March 5, 2013. She said that Pat Irle clarified that her approval of the
   proposed white sturgeon larval collection locations was contingent on all fish managers
   reaching consensus. Geris also reviewed edits made by Steve Lewis, including: 1)
   clarification that the three larval white sturgeon collection locations are listed in no
   order of priority; 2) clarification to the content of Lewis’s added agenda item; 3)
   acknowledgement of U.S. Fish and Wildlife Service’s (USFWS’s) comments to the 2012
   Total Dissolved Gas Abatement Plan Report; 4) clarification regarding who has applied
   for collection permits, and why the Confederated Coleville Tribes (CCT) were not
   applying for a permit to collect larva in Lake Roosevelt (their own CCT territorial waters);
   5) acknowledgement of edits discussed on the Aquatic SWG 2013 Action Plan; 6)
   clarification that Lewis recommended—not requested—that a component of No Net
   Impact (NNI) be included in the Aquatic SWG 2013 Action Plan; and 7) additional
   background language regarding the collaborative efforts between USFWS and Douglas
   PUD on the early 2000 bull trout study.

   The Aquatic SWG members present approved the February 13, 2013 meeting minutes,
as revised.

2. **DECISION: White Surgeon Collection Statement of Agreement** (Andrew Gingerich):
   Andrew Gingerich said that the draft White Surgeon Collection Plan SOA was distributed
to the Aquatic SWG by Kristi Geris on February 28, 2013. He said that comments were
received from Chad Jackson and Jeff Korth on the draft SOA, as distributed to the
Aquatic SWG by Geris on March 4, 2013, and March 13, 2013, respectively. Gingerich
also noted a typo in the final paragraph of the background information. He said that the
reference to the June 2014 SOA should read “June 2012 SOA.” He reminded the Aquatic
SWG that the June 2012 SOA approved a dual strategy for the collection of white
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March 13, 2013 Meeting

sturgeon offspring including the implementation of wild larval collection and adult brood collection programs, to be utilized for four years toward identifying the best strategy for the long-term supplementation of white sturgeon in the Wells Project.

Gingerich noted concern regarding Korth’s proposed edit of the draft SOA, specifically, the addition, “In the event that insufficient numbers of larvae are captured to produce half of Douglas PUD’s program, Lake Roosevelt fish may be used to produce up to half the program in 2013 only.” Gingerich said that the purpose of this SOA was to approve broodstock collection locations in order to facilitate moving forward with logistical planning such as obtaining permits—not to get into the details of stocking programs. He added that once the fish are obtained, stocking plans can be addressed. Korth explained that Washington Department of Fish and Wildlife’s (WDFW’s) agreement to add Lake Roosevelt as a collection location was based on prioritizing which fish get used first. He added that this decision had also been vetted within an informal Mid-Columbia Sturgeon Technical Workgroup. He said that the intent of this statement was to ensure that there is a strong effort to use Mid-Columbia-origin fish first, before using fish from Lake Roosevelt. Korth said that he is open to discussing the proportion of fish from Lake Roosevelt used, but in terms of priorities, WDFW maintains that it is appropriate that the Mid-Columbia collection is a priority over Lake Roosevelt. Mike Schiewe reminded the Aquatic SWG members that the purpose of this SOA is to document agreement on collection locations, and not to define a detailed stocking plan. He added that once fish are in the hatchery, then priorities will be discussed. Korth replied that adding Lake Roosevelt as a collection site is dependent on the priority. Bob Rose agreed that capture efforts do need to be focused in the Mid-Columbia. Gingerich said that he is concerned that specifying any proportion from any location was premature because technical discussions on the merits of Lake Roosevelt fish (or fish from any location) have not taken place. He said that he understands state agencies’ desire to move fish upstream; however, that is outside of the scope of this SOA.

Jason McClellan said that he would like any discussion of stocking left out of this SOA. He said that stocking requires a program-wide technical discussion and a SOA of its own. McClellan added that he is not familiar with the informal Mid-Columbia Sturgeon Technical Workgroup, and he has no objections if WDFW and the YN choose to consult this informal workgroup; however, he prefers that the technical merits of the stocks used and prioritizations are decided within the Aquatic SWG. Rose explained that this informal workgroup largely grew out of Chelan PUD and Grant PUD license implementation discussions, and that Douglas PUD is now reaching a similar stage in implementation of their new license for the Wells Project. He said that an invitation to participate in the workgroup had been extended to the CCT, however, this was prior to McClellan’s employment with the CCT. Rose said he appreciated McClellan’s comments, and noted that it would be a good idea to reevaluate the Mid-Columbia Sturgeon Technical Workgroup in terms of its composition and path forward. Korth added that
the workgroup was intended to be an advisory group, and their input was not meant to override the Aquatic SWG.

Korth acknowledged the long standing disagreement among the fish forum participants and PUDs about sturgeon population structure, but he said that WDFW’s position is that there is greater diversity downstream, and that it would enhance population diversity to move fish upstream.

Steve Lewis said the USFWS agreed with the CCT position that stocking should not be included in this SOA, and suggested modifying the language to keep it broad. Schiewe asked the Aquatic SWG if editing Korth’s added sentence specifying stocking proportions to instead focus on sampling effort and keep the SOA focused on collection locations would be acceptable. McClellan said that the CCT have no objections to moving fish upstream; and however, he added, nor does the CCT have objections to collecting at Lake Roosevelt. He said that the CCT just wants the ability to collect fish where they know there is likely to be high success. He added that the CCT are concerned that their opportunity to succeed is being limited.

Gingerich suggested prioritizing the fishing locations. Schiewe said that, for example, the SOA could define the CCT collection locations in order of priority and then add a statement that the Aquatic SWG will develop a detailed stocking program placing priority on moving gene flow upstream. McClellan said that the CCT do not want to include any prioritization regarding stocking until it is known what fish are on hand. Rose said that his main concern is that Lake Roosevelt should be a lesser priority for fish collection. McClellan said that the CCT are planning for a substantially greater fishing effort in the Mid-Columbia than in Lake Roosevelt. Schiewe said, then, that the SOA can simply define collection locations, indicating the greater fishing effort in the Mid-Columbia than in Lake Roosevelt, and specify that the Aquatic SWG will develop a stocking program prior to releasing the stock on hand spring 2014.

Pat Irle asked for clarification of the genetics issue, and McClellan explained that genetic diversity, as measured by the number of polymorphic alleles (i.e., number of different alleles at genetic loci), tends to be greater in downstream populations. He said that as a result, fish collected downstream of McNary Dam in the Columbia River could potentially contribute to increasing allelic diversity in upstream populations. However, with larval collection, he said that naturally-produced larvae have the potential to introduce greater numbers of alleles from wild populations regardless of the collection location, than the breeding a few select adults collected downstream does. Additionally, offspring released from larval collection are unlikely to be genetically related, and therefore, represent a greater number of crosses. In that way, McClellan said, using larval collection increases genetic diversity. Gingerich added that these are the types of technical issues that need to be discussed once fish are on hand.
McClellan said that because sturgeon in the Mid-Columbia and Lake Roosevelt spawn at about the same time, the CCT will be simultaneously collecting at multiple areas. He said that the plan is to focus collection efforts downstream of Rock Island Dam and Wanapum Pool. Lake Roosevelt fish will be held separately. He said that once fish are on hand, then it can be decided what fish to keep. Rose said that he did not realize there was such synchronicity with timing. Korth asked if the Spokane Tribe of Indians (STI) typically collects more fish than they need for their Lake Roosevelt Program; and if so, he asked if they could hold them for the Douglas PUD program. McClellan said that he plans to have further discussions with the STI regarding the logistics of collecting larvae at Lake Roosevelt, and that he will know more about available options once those discussions take place.

Schiewe suggested that the revised draft SOA state that larval collection by the CCT will focus in the Priest Rapids Project Area and the Hanford Reach of the Columbia River from Priest Rapids Dam downstream to the Vernita Bridge, and in Lake Roosevelt (in that priority of effort). The YN collection locations will be defined as occurring in the Columbia River, between Bonneville Dam and Rock Island Dam. Lastly, the SOA will state that stocking decisions will be made by spring 2014, and will be based on what fish are on hand. McClellan said that the CCT can agree to that; however, he noted that the majority of the CCT’s Mid-Columbia collection effort will occur downstream of Rock Island Dam. Aquatic SWG representatives present agreed, in principle, to the proposed revisions to the draft White Surgeon Collection Plan SOA, including: 1) prioritization of Mid-Columbia locations for larval collection efforts by the CCT; 2) broodstock collection locations for the YN; and 3) deferred development of a detailed stocking plan until numbers of juvenile sturgeon from the different locations and sourcing methods are known. Schiewe said that he will revise the draft White Surgeon Collection Plan SOA and redistribute the revised SOA to the Aquatic SWG for review. Email approval of the SOA is needed no later than March 20, 2013.

3. **Aquatic Nuisance Species Best Management Practices Update/Comments** (Chas Kyger): Chas Kyger said that, as discussed at the Aquatic SWG’s February 13, 2013 meeting, there are new Federal Energy Regulatory Commission (FERC) requirements for Douglas PUD’s ANS Program, including incorporating BMPs and ANS detection protocols in their ANS Management Plan. Kyger said that draft ANS BMPs and education and outreach materials were distributed to the Aquatic SWG by Kristi Geris on February 15, 2013. He said that no comments have been received to date, and that Douglas PUD would like to establish an official comment period deadline to keep the process moving forward.

Steve Lewis asked if the plan and educational materials are consistent with those developed by the other PUDs, and Kyger confirmed that they are similar to the Chelan
PUD and Grant PUD ANS materials. Kyger said that Douglas PUD is also considering developing a voluntary boater self-survey, as Chelan PUD has done; and Bob Rose added that Grant PUD also has a similar survey. Pat Irle said that she provided Douglas PUD’s ANS materials to the Washington State Department of Ecology’s (Ecology’s) ANS specialist, and that she has not received any concerns on the materials. Kyger noted a minor typo in the draft ANS BMPs that were distributed on February 15, 2013, under modifications per Section 4.2.1, fifth bullet, last sentence: In the case of zebra mussels or other Dreissendid species. Kyger explained that this fragmented sentence does not pertain to this bullet and will be removed.

No other comments on the draft ANS materials were discussed at this time. The Aquatic SWG agreed to submit comments on the draft ANS BMPs and education and outreach materials to Kyger no later than April 1, 2013. Douglas PUD will request approval of these materials at the Aquatic SWG’s April 10, 2013 meeting.

4. **Annual Technical Memorandums/Reports for each Management Plan** (Andrew Gingerich): Andrew Gingerich said that the new FERC license requires annual reports to be completed for all six Aquatic Settlement Agreement Management Plans. He said that Douglas PUD is currently developing all six reports for 2012, and that within the next couple of weeks, he plans to provide the reports to the Aquatic SWG for review. Gingerich said that he would like to provide at least a 30-day review period for each plan, keeping in mind, however, the FERC submittal deadline for these reports, which is at the end of May 2013. Gingerich said that he will include a review period deadline for each report as they are distributed. He added that the format to expect will be the actual management plans with an italicized update incorporated after each applicable section. He said that Douglas PUD will request approval of these annual reports no later than the Aquatic SWG’s May 8, 2013 meeting.

5. **HCP Coordinating Committees’ Approval of the Pacific Lamprey Statement of Agreement Providing Head Differential Changes for 2013 in the Wells Dam Collection Gallery** (Andrew Gingerich): Andrew Gingerich said that Kristi Geris distributed an email on February 26, 2013, notifying the Aquatic SWG that the Wells Dam 2013 Pacific Lamprey Operations were approved by the HCP Coordinating Committees. Gingerich explained that the 2013 lamprey operations are similar to those approved in the previous years; only this year, the operations also include specific treatments for the Adult Lamprey Passage and Enumeration Study. Steve Lewis questioned whether specifying a timeframe (i.e., 19:00 to 02:00) in the SOA might be constraining, and Gingerich replied that this timeframe is consistent with previous years’ lamprey operations, and is also based on results from the DIDSON studies. Gingerich added that if this timeframe needed to be changed then a new request and approval from the Coordinating Committees would be required. Bob Rose said that if Lewis or any others
have alternative ideas it would be a good idea to present them to the Coordinating Committees now, instead of at the last minute.

VI. Next Meetings
1. Upcoming meetings: April 10, 2013 (conference call); May 8, 2013 (conference call); and June 12, 2013 (conference call).

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Attachment A – List of Attendees
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<tr>
<td>Keith Hatch</td>
<td>Observer</td>
<td>Bureau of Indian Affairs</td>
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**Notes**

† Joined for the White Surgeon Collection SOA discussion
The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, April 10, 2013, from 10:00 a.m. to 11:00 am. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items
   1. Aquatic SWG representatives will submit comments and/or their formal approval of the draft 2012 Aquatic SWG Annual Report to Andrew Gingerich no later than April 15, 2013 (Item VI-4).
   2. Andrew Gingerich will provide annual reports for each Aquatic Settlement Agreement Management Plan (six total) to the Aquatic SWG for review. Douglas PUD will request approval of these annual reports at the May 8, 2013 meeting of the Aquatic SWG (Item VI-4).

II. Summary of Decisions
   1. The White Sturgeon Collection Plan Statement of Agreement (SOA) was approved by the Aquatic SWG via email on March 20, 2013 (Item VI-5).

III. Agreements
   1. Aquatic SWG representatives present approved Douglas PUD’s Aquatic Nuisance Species (ANS) Best Management Practices (BMPs) and education and outreach materials (Item VI-2).
   2. Aquatic SWG representatives present approved the 2013 Aquatic SWG Action Plan (Item VI-3).
IV. Review Items
1. Kristi Geris sent an email to the Aquatic SWG on April 12, 2013, notifying them that the Annual ASWG Management Plan Reports are available for review, with comments due to Andrew Gingerich prior to the Aquatic SWG May 8, 2013 conference call. Douglas PUD will seek approval of these six management plan reports during the May 8th 2013 call.

V. Reports Finalized
1. No reports have been finalized since the last Aquatic SWG meeting.

VI. Summary of Discussions
1. Welcome, Agenda Review, and Meeting Minutes Review (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Schiewe reviewed the agenda and asked for additions or other changes to the agenda. The following revisions were requested:

   - Andrew Gingerich added: 1) a decision item on the 2013 Aquatic SWG Action Plan; 2) a Douglas PUD annual reporting update; and 3) a Wells Dam bypass and fish spill update.
   - Bob Rose added a Pacific lamprey update.
   - Schiewe added a White Sturgeon Collection Plan SOA update.

Kristi Geris reported that no revisions were received on the draft March 13, 2013 meeting minutes. Gingerich noted one minor correction to the White Sturgeon Collection Plan SOA discussion that was also corrected under the Agreements of the draft minutes. The Aquatic SWG members present approved the March 13, 2013 meeting minutes, as revised.

2. DECISION: ANS BMPs and Education and Outreach Materials (Chas Kyger): Chas Kyger asked the Aquatic SWG if there were any additional questions or suggested edits to the Douglas PUD ANS BMPs and education and outreach materials before Douglas PUD submits the materials to the Federal Energy Regulatory Commission (FERC). Kyger said that he contacted Chelan PUD and Grant PUD about voluntary boater self-surveys. He said that there is a widely used, basic survey that Grant PUD distributes, and added that Douglas PUD would likely use the same one if the Aquatic SWG decides that Douglas PUD should distribute a survey. The Aquatic SWG agreed that distributing a voluntary boater self-survey would be a good idea, and Kyger said that Douglas PUD will plan to do so.

Patrick Verhey asked if Douglas PUD is planning any public events to increase awareness of ANS, and Kyger replied that no public events are planned right now. He added that
Douglas PUD plans to distribute the education and outreach materials at project boat launches and recreation facilities. Verhey suggested distributing information at the Brewster Salmon Derby at Lake Pateros, and leaving education and outreach materials at the local service station near the lake. Kyger took note of these suggestions, and added that materials may also be provided to local visitor centers.

Aquatic SWG representatives present approved Douglas PUD’s ANS BMPs and education and outreach materials.

3. DECISION: 2013 Aquatic SWG Action Plan (Andrew Gingerich): Andrew Gingerich recalled that the draft 2013 Aquatic SWG Action Plan was reviewed at the in-person Aquatic SWG meeting on January 9, 2013, and approval of the plan was scheduled for the February 13, 2013 meeting of the Aquatic SWG. However, at the February meeting, the decision was made that since the action plan is not a license requirement, a formal approval would not be necessary. The final 2013 Aquatic SWG Action Plan (Attachment B) was distributed to the Aquatic SWG by Kristi Geris on April 8, 2013. Gingerich said that in consideration of FERC’s preference for formal approval, Douglas PUD has decided to request a formal decision on this document after all.

Patrick Verhey asked if the action plan can be revised or updated as time progresses, and Gingerich replied that it absolutely can. Gingerich added that the intention of the action plan is to outline activities planned for the year and, therefore, if unanticipated needs arise, the action plan can be updated as necessary.

Steve Lewis asked for clarification on revisions made to Pacific Lamprey Management Plan (PLMP) portion of the draft 2013 Aquatic SWG Action Plan, as distributed via email to the Aquatic SWG on January 28, 2013. Gingerich explained that because there are so many year-one requirements with the new FERC license, Douglas PUD decided to focus only on those requirements and defer the other activities that are not year-one requirements to a later date. For the PLMP, that decision entailed keeping the Entrance Efficiency Plan but deferring plans pertaining to the fishway (diffuser grating plan, etc.) to another year, when they are specifically required. He noted that of these lamprey plans, only the entrance efficiency plan is due in year one.

Bob Rose requested additional time to review the final action plan and agreed to submit his decision via email. All other Aquatic SWG representatives present approved the final 2013 Aquatic SWG Action Plan. (Note: Rose submitted the Yakama Nation’s [YN’s] approval of the final 2013 Aquatic SWG Action Plan via email directly following the meeting.)

4. Douglas PUD Annual Reporting (Andrew Gingerich): Andrew Gingerich reminded the Aquatic SWG that the draft 2012 Aquatic SWG Annual Report was distributed by Kristi
Geris on March 14, 2013, for a 30-day review period, and that comments on the draft report are due to Douglas PUD no later than April 15, 2013. Gingerich said that a formal approval of the annual report will also be needed from the Aquatic SWG prior to submitting the final report to FERC at the end of May 2013. Therefore, Gingerich requested that Aquatic SWG representatives submit comments and/or their formal approval of the draft 2012 Aquatic SWG Annual Report to him no later than April 15, 2013.

Gingerich reminded the Aquatic SWG that technical reporting for each Aquatic Settlement Agreement Management Plan is now required under the new FERC license, as discussed at the March 13, 2013 meeting of the Aquatic SWG. He said that Douglas PUD is in the final process of drafting these reports, and that once they are complete, he will distribute all six reports to the Aquatic SWG for review—hopefully by April 12, 2013. (Note: the six reports were distributed to the Aquatic SWG for review on April 12, 2013, as planned.) He reminded the Aquatic SWG that the reports are a series of narratives explaining accomplishments for each plan objective and towards meeting license requirements. Gingerich said that the reports need to be filed with FERC at the end of May 2013, and therefore, Douglas PUD will be requesting formal approval of the reports at the May 8, 2013 meeting of the Aquatic SWG.

5. **White Sturgeon Collection Plan SOA** (Mike Schiewe): Mike Schiewe said that a revised final White Sturgeon Collection Plan SOA was distributed to the Aquatic SWG by Kristi Geris prior to the meeting. He noted that email approval of the SOA was received from Douglas PUD, Washington Department of Fish and Wildlife (WDFW), the Colville Confederated Tribes (CCT), the YN, and U.S. Fish and Wildlife Service (USFWS). Schiewe said that Washington State Department of Ecology (Ecology) submitted comments on the draft SOA; however, it was unclear if incorporation of Ecology’s comments indicated actual approval of the SOA. Pat Irle confirmed that Ecology approved the SOA. For the record, the White Sturgeon Collection Plan SOA was approved by the Aquatic SWG via email on March 20, 2013.

Bob Rose requested that the statement, “…the total Phase One goal is to release up to 20,000 juvenile sturgeon by 2017,” as stated in Appendix A of the final SOA be clarified to indicate, “…by the end of 2017.” This clarification was made and the final revised White Sturgeon Collection Plan SOA (Attachment C) was distributed to the Aquatic SWG following the meeting.

6. **Pacific Lamprey Update** (Bob Rose): Bob Rose said that although tribal representatives have no issues with the YN’s involvement in assisting Douglas PUD with obtaining Pacific lamprey for their 2013 Pacific lamprey radio telemetry study, the YN is becoming increasingly concerned with the potential public scrutiny that may result from their involvement in the process. He said that the YN is planning additional public outreach
on this issue; however, he also suggested that Douglas PUD develop a “back-up plan” for obtaining the fish without involving the YN in the transaction. He suggested coordinating directly with the researchers at Bonneville Dam. Andrew Gingerich said that Douglas PUD is supportive of either approach to obtain the fish, and he added that Douglas PUD is willing to attend tribal meetings to discuss possible options, or to do whatever else is needed to facilitate the obtainment of lamprey. Gingerich recalled, however, that when Douglas PUD initially discussed options with the U.S. Army Corps of Engineers (USACE), it seemed that USACE implied that they would like to help Douglas PUD, but would need to follow their prescribed formal process. Gingerich added that he is unsure whether USACE would or could support a study at Wells Dam since the USACE aren’t managers of the resource, and instead the regional managers in the lower river would have to be consulted. Chas Kyger also added that working directly with USACE seemed like it could be a potentially long process to obtain fish, and he noted that at this point in time, he is uncertain if fish could be obtained in time for the proposed study. Rose said that he thinks USACE would be receptive to different options, and added that everyone is interested in the most efficient way to obtain the fish. He also added that he will further investigate available options and will also contact other researchers to identify any problems or concerns. Kyger reiterated that Douglas PUD is open to different options and asked that Rose keep them informed on how Douglas PUD can support each process.

On a related topic, Rose suggested that Douglas PUD consider releasing some of the translocated Pacific lamprey lower in the Columbia River, just upstream of the mouth of the Entiat River. He suggested that if fish arriving at Wells Dam were released further downstream, they would be more representative of the run at large. Gingerich said that one of the objectives in the PLMP is to evaluate fish interacting with Wells Dam in terms of passage and enumeration; and added that releasing Pacific lamprey lower in the Columbia River poses a risk that the fish may not interact with Wells Dam at all—for example, if the fish were to move into the Entiat River. Rose noted that there is risk either way; however, currently, there are no means to evaluate it. Rose recommended that Douglas PUD contact other researchers to obtain their input. Gingerich noted that the Aquatic SWG would need to support and approve any decisions made regarding release locations for the study. Rose said that he was concerned that releasing fish too close to the dam might affect the fish’s natural instinct to move upstream, which when combined with the effects of transportation and handling, may result in unnatural behavior; whereas releasing fish further downstream allows fish time to get re-oriented into their natural behaviors. Gingerich said that, conversely, if fish are released too close to the Entiat River, they may be deterred from the Columbia River and instead move up the Entiat River and never interact with Wells Dam. Rose suggested, then, releasing only a small sub-group further downstream, and Gingerich noted that the study also proposes releasing Pacific lamprey directly within the Wells Dam fish ladders. Patrick Verhey noted that if three release locations are considered (i.e., 1.5 miles
downstream of Wells Dam; lower in the Columbia River, as Rose is suggesting; and directly in the Wells Dam fish ladders), then sample size and statistical power would need to be revisited. Gingerich agreed that a methodology needs to be determined that does not sacrifice the sample size too much, and added that inadequate sample size has been an issue in the past. Rose suggested continuing this discussion in June or July after people have had a chance to further consider all options.

7. **Wells Dam Bypass Update** (Andrew Gingerich): Andrew Gingerich said that Douglas PUD initiated bypass operations at Wells Dam on April 9, 2013, per the 2013 Bypass Operating Plan, and he added that 20,000 cubic feet per second (cfs) is currently spilling at the dam for fish bypass.

VI. **Next Meetings**

1. Upcoming meetings: *May 8, 2013 (conference call); June 12, 2013 (conference call); and July 10, 2013 (conference call).*

**List of Attachments**
Attachment A – List of Attendees
Attachment B – Final 2013 Aquatic SWG Action Plan
Attachment C – Final White Sturgeon Collection Plan SOA
## List of Attendees

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<thead>
<tr>
<th>Name</th>
<th>Role</th>
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<tr>
<td>Mike Schiewe</td>
<td>SWG Chair</td>
<td>Anchor QEA, LLC</td>
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<tr>
<td>Kristi Geris</td>
<td>Administration/Technical Support</td>
<td>Anchor QEA, LLC</td>
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<td>Andrew Gingerich</td>
<td>SWG Technical Representative</td>
<td>Douglas PUD</td>
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<tr>
<td>Chas Kyger</td>
<td>Technical Support</td>
<td>Douglas PUD</td>
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<td>Pat Irle</td>
<td>SWG Technical Representative</td>
<td>Washington State Department of Ecology</td>
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<td>Steve Lewis</td>
<td>SWG Technical Representative</td>
<td>U.S. Fish and Wildlife Service</td>
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<td>Patrick Verhey</td>
<td>SWG Technical Representative</td>
<td>Washington Department of Fish and Wildlife</td>
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<td>Chad Jackson</td>
<td>Technical Support</td>
<td>Washington Department of Fish and Wildlife</td>
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<tr>
<td>Bob Rose</td>
<td>SWG Technical Representative</td>
<td>Yakama Nation</td>
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2013 AQUATIC SETTLEMENT AGREEMENT AND WORKGROUP ACTION PLAN

A) Annual Report and Webpage Development
1. Distributed to ASWG, BIA and NMFS March 30, 2013
2. Final Annual Report Approved by ASWG and NMFS April 30, 2013
3. Annual Report Filed with FERC May 28, 2013
5. Public Website Live Oct 2013

B) White Sturgeon MP
1. 2011 Brood Stock Collection and Breeding Plan filed with FERC for approval Mar 2013
2. Sturgeon Hatchery Construction Updates to ASWG Jan-Apr 2013
3. Collection location and logistical coordination Apr 2013
4. Larval and brood collection/ Wells rearing Jun-Dec 2013
5. Technical participation in regional forums Throughout 2013
6. Incorporate sturgeon activities into Aquatic SA Annual report to FERC Mar 2013

C) Bull Trout MP
1. Letter to FERC postponing Twisp Weir bull trout “take” study to year 5 Feb 2013
2. OR Twisp Weir Bull Trout Passage Evaluation Study Plan to ASWG for approval Mar 2013
3. Prepare a Bull Trout Stranding and Incidental Take Study Plan1 (Article 402) Jun 2013
4. Stranding and Incidental Take Study Plan HCP and ASWG review1 (Article 402) Jul 2013
5. Stranding and Incidental Take Study Plan File with FERC1 (Article 402) Oct 2013
6. Stranding surveys as necessary (below 773’ MSL) As required throughout 2013
8. Monitor for sub-adults at Wells Dam (>10/year triggers additional measures) Throughout 2013
9. PIT tagging at the Twisp Weir and genetic tissue collection May-Aug 2013
11. Recovery planning participation/regional coordination Throughout 2013
12. Include PIT histories summary in memo in lieu of RT study at Weir in 2013 Nov 2013
13. Incorporate 2012 Bull Trout Activities and Incidental Take Monitoring into Aquatic SA Annual report to FERC Mar 2013

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1 Bull trout stranding and incidental take plan is actually three measures: 4.4, 4.5.1, and 4.6.1 in the BTMP. These items speak specifically to bull trout stranding during low reservoir conditions, incidental take monitoring during other field studies, and incidental take occurrences during hatchery operations. This comprehensive plan will cover implementation guidance for all three. Requirement is identified in the FERC License Order; page 54; Article 402.
D) Water Quality MP

1. 2012 Gas Abatement Plan Report to ASWG and NMFS for approval Jan 2012


5. 2013 Gas Abatement Plan to ASWG and HCP CC for approval Jan- Feb 28 2013
6. 2013 Gas Abatement Plan filed with FERC for approval Feb 28 2013
7. 2013 Gas Abatement Plan (w/ non-fish spill) Report to ASWG and NMFS for approval Dec 2013

9. 2013 Bypass/spill Operation Plan to HCP CC and ASWG for comment Dec 2012
10. 2013 Bypass/spill Operations Plan to HCP CC for approval Jan 2013
11. 2013 Bypass/spill Operations Plan to FERC for approval Feb 28 2013

12. Quality Assurance Plans (QAPP) - water temp/TDG to ASWG and NMFS for approval Feb 2013
13. Quality Assurance Plans (QAPP) filed with FERC for approval Mar 2013

14. Year-round TDG monitoring initiated at 2 stations (hourly with web-accessibility) Mar 2013
15. Remote Washburn and backup tailrace TDG Stations Installed May 2013
16. All TDG stations collecting year-round hourly data and web accessible Oct 2013

17. Water Quality Attainment Plan (WQAP) for TDG (10-year plan) development May 2013
18. WQAP for TDG sent to ASWG and NMFS for approval Aug 2013
19. WQAP for TDG sent to FERC for approval Oct 2013

20. Water temperature monitoring stations installed (N=5) April – June 2013
21. Water temperature monitoring hourly (April 1 to Oct 31) river stations (N=7) Oct 2013
22. Water temperature monitoring hourly (April 30 – Nov 15) fish ladders April 2013
23. Annual Water Temperature Report to ASWG and NMFS for approval Dec 2013

25. Updated Oil Spill Prevention, Control and Countermeasures Plan (5a 401 Cert) May 2013
26. Oil Spill Prevention, Control and Countermeasures Plan to ASWG and NMFS July 2013
27. Oil Spill Prevention, Control and Countermeasures Plan to FERC for approval Sept 2013

29. Participate in WQ forums: TMDL, Columbia River Treaty, STT-WQ, CSR-SRI Throughout 2013
30. Incorporate Water Quality MP Activities into Aquatic SA Annual report to FERC Mar 2013
E) Pacific Lamprey MP

31. Finish radio antenna install Jan 2013
32. Finish HD PIT antenna installation Jan 2013
33. Complete count station maintenance Jan 2013
34. License amendment: Counting facility modifications Mar 2013
35. License amendment: Temporary operational modifications (head differential) May 2013
36. Fish collection and tagging for Lamprey Passage and Enumeration Study Jun-Oct 2013
37. Passage and Enumeration Study report Dec 2013; Updates throughout 2013
38. Passage and Enumeration Study to ASWG and NMFS for approval Jan 2014
39. Passage and Enumeration Study to FERC March 2014
40. Lamprey Entrance Efficiency Plan to ASWG and NMFS for approval June 2013
41. Lamprey Entrance Efficiency Plan to FERC for approval Oct 2013
42. Upstream passage literature review TBD as needed within 6 months of ASWG request
43. Fishway inspection Jan 2013 and Dec 2013
44. Improved Carpenter Island boat launch salvage and monitoring Oct 2013
45. Ladder Salvage during winter maintenance Dec 2013
46. Regional participation in technical forums and planning Throughout 2013
47. Incorporate Lamprey MP Activities into Aquatic SA Annual report to FERC Mar 2013

F) Aquatic Nuisance Species MP

48. ANS BMP Plan and Appropriate ANS Countermeasures/Containment Plan (Article 405) Feb 2013
49. Art. 405 Plans to ASWG and NMFS for approval Feb 2013
50. Art. 405 Plans to FERC for approval Apr 2013
51. Update ANS MP for BMP and Countermeasure plans by Oct 2013
52. ANS Education Plan to ASWG and NMFS for approval Jul 2013
53. ANS Education Plan to FERC for approval Oct 2013
54. Pamphlet development and signage for education measures Feb 2013
55. Install ANS signs and print new ANS pamphlets for launches available by May 2013
56. ANS Education Plan posted to new Aquatic SWG public website May 2013
57. Zebra mussel monitoring with substrate mats and plankton tows Apr-Oct 2013
58. Crayfish monitoring and database management Throughout 2013
59. Milfoil monitoring adjacent to recreation sites summer 2013
60. Regional coordination Throughout 2013
61. Incorporate ANS MP Activities into Aquatic SA Annual report to FERC Mar 2013

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2 See Section 5.6.2 in USFWS fishway prescription for greater detail on above lamprey passage measures.
G) Resident Fish MP

62. 2012 Pikeminnow Report to ASWG and HCP CC for review Feb 2013
63. 2012 Pikeminnow Report incorporated into Aquatic SA Annual Report to FERC Mar 2013
64. 2013 Pikeminnow Angling March – Oct 2013
65. Resident fish abundance and diet study plan development (year two study) Oct 2013
66. Resident Fish abundance and diet study 2014
67. Regional coordination Throughout 2013
68. Incorporate Resident Fish MP Activities into Aquatic SA Annual report to FERC Mar 2013
Wells Aquatic Settlement Agreement

White Sturgeon Collection Plan

Statement of Agreement (SOA)

March 13th, 2013

(Approved March 20, 2013)

Statement

During the first year of Douglas PUD’s white sturgeon collection efforts (2013), the Aquatic Settlement Workgroup (Aquatic SWG) agrees that larvae will be collected in the Mid-Columbia River from the Vernita Bridge upstream to the Rock Island tailrace, and in Lake Roosevelt. Collection from Mid-Columbia locations will be the highest priority. In addition, the Aquatic SWG agrees that broodstock will be collected in the pools of the Columbia River between Bonneville Dam upstream to Rock Island Dam. Finally, the Aquatic SWG agrees that the relative number of fish from each program (larvae and brood collected offspring) released into the Wells Project will be agreed upon prior to planting in spring 2014 following the completion of the larvae and brood collection season and following the results from initial incubation and rearing efforts.
 Appendix A

Background

The Aquatic Settlement Agreement White Sturgeon Management Plan (WSMP) requires that Douglas PUD fund the collection of white sturgeon offspring starting in 2013, and begin releasing up to 5,000 juvenile sturgeon per year beginning in the summer of 2014 (year two of Douglas PUD’s FERC license); the total Phase One goal is to release up to 20,000 juvenile sturgeon by the end of 2017. The intent of this program is to increase the abundance and genetic diversity of white sturgeon found within the Wells Project, and concomitantly increasing population size in the Wells Project.

In June of 2012 the Aquatic SWG agreed via SOA that Douglas PUD should implement a dual strategy for the collection of white sturgeon offspring starting in the spring/summer of 2013. These two approaches will include the implementation of a wild larvae collection program lead by the Colville Confederated Tribes (CCT) and an adult brood collection programs lead by the Bands of the Yakama Nations (YN).

In order to maximize genetic diversity in the two programs and maximize numbers of offspring available for planting in 2014, during 2013 the Aquatic SWG agrees that the CCT larvae program will focus on collecting white sturgeon larvae in the Mid-Columbia River from the Vernita Bridge upstream to the Rock Island tailrace, and in Lake Roosevelt, with the greater effort focusing on collection in the Mid-Columbia. The YN program will focus on capturing broodstock for egg and milt collection from the pools of the Columbia River between Bonneville Dam upstream to Rock Island Dam.

Consistent with the June 2012 SOA, to address differential success within and between programs the Aquatic SWG will be consulted annually to determine the numbers of fish from each to be released into the Wells Project. The assessment of the results and the determination of program release numbers will be conducted by the Aquatic SWG in October 2013. Release numbers for each program will be determined based on trying to meet or improve upon family representation goals outlined in the 2011 Wells Broodstock and Breeding Plan or a revised version of this plan.
The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, May 8, 2013, from 10:00 a.m. to 11:30 a.m. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items

1. Pat Irle (Washington State Department of Ecology [Ecology]) will provide additional comments or approval of the Aquatic Settlement Work Group 2012 Annual Report to Mike Schiewe via email (Approval was confirmed via email dated May 9, 2013) (Item VI-2).

2. Irle will provide additional comments or approval of the Water Quality Management Plan 2013 Annual Report to Schiewe via email (Approval was confirmed via email dated May 9, 2013) (Item VI-3).

3. Andrew Gingerich will talk with Scott Kreiter (Douglas PUD Lands Department) about the method of application of aquatic herbicide in public swimming areas, and report back to Aquatic SWG representatives at the June 12, 2013 meeting (Item VI-8).

4. Steve Lewis will send the Twisp Weir Bull Trout Study deferral request letter to Emily Pizzichemi for distribution to the Aquatic SWG. Aquatic SWG representatives will submit comments and/or their formal approval to Gingerich no later than June 5, 2013 (Lewis emailed the draft letter to the Aquatic SWG distribution on May 10, 2013) (Item VI-9).

5. Chas Kyger will provide additional details on the Lamprey Passage and Enumeration Study, including release locations, during the June 5, 2013 meeting (Item VI-10).

II. Summary of Decisions

1. There were no Statements of Agreement (SOAs) approved at today’s meeting.
III. Agreements

1. Aquatic SWG representatives present approved Douglas PUD’s Aquatic Settlement Work Group 2012 Annual Report (Bob Rose and Pat Irle provided email confirmation of approval on May 9, 2013) (Item VI-2).

2. Aquatic SWG representatives present approved Douglas PUD’s Aquatic Settlement Agreement Management Plan Annual Reports (six total) (Bob Rose and Pat Irle provided email confirmation of approval on May 9, 2013) (Item VI-3). Approval required the inclusion of a reference to the Wells Aquatic Settlement Agreement White Sturgeon Collection Plan SOA (approved March 20, 2013) in the prioritization list on page 11, Section 4.4.1, of the White Sturgeon Management Plan Report.

3. Aquatic SWG representatives present approved the 2013 Draft Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas Monitoring (Bob Rose provided email confirmation of approval on May 9, 2013) (Item VI-4).

V. Reports Finalized

1. The Douglas PUD Aquatic Settlement Work Group 2012 Annual Report was approved by Aquatic SWG members present. Bob Rose and Pat Irle provided email approval on May 9, 2013.

2. The Douglas PUD Aquatic Settlement Agreement Management Plan Annual Reports were approved by Aquatic SWG representatives present, contingent on the addition of a reference to the previously approved SOA and Management Plan in the prioritization list for the White Sturgeon Management Plan. Bob Rose and Pat Irle provided email approval on May 9, 2013.

3. The Douglas PUD Quality Assurance Project Plan (QAPP) for Water Temperature and Total Dissolved Gas Monitoring was approved by Aquatic SWG members present.

VI. Summary of Discussions

1. Welcome, Agenda Review, and Meeting Minutes Review (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Schiewe reviewed the agenda and asked for additions or other changes to the agenda. The following revisions were requested:

   - Andrew Gingerich suggested that Agenda item 6 (Douglas PUD Advocating 110 Percent Standard in the Wells Pool) be removed from the agenda. He further explained that Douglas PUD’s intention to meet the 110 percent standard for water quality is consistent with existing standards throughout water bodies within Washington State, with few exceptions (which include 7Q10 flow events and fish passage waivers). Douglas PUD’s commitment to meeting the current standard is not a relevant discussion topic.
Patrick Verhey (Washington Department of Fish and Wildlife [WDFW]) requested an update on the upcoming ceremony highlighting the relicensing of Wells Dam by the Federal Energy Regulatory Commission (FERC).

Emily Pizzichemi reported that all comments and revisions received on the draft April 10, 2013 meeting minutes had been incorporated. The Aquatic SWG members present approved the April 10, 2013 meeting minutes, as revised.

2. DECISION: Aquatic Settlement Work Group 2012 Annual Report (Andrew Gingerich):
Andrew Gingerich asked the Aquatic SWG if there were any additional questions or suggested edits to the Douglas PUD Aquatic Settlement Work Group 2012 Annual Report. The final report was originally distributed by Kristi Geris to the Aquatic SWG on March 13, 2013, for a 30-day comment period. Gingerich said that having formal approval in the meeting minutes is beneficial for the consultation record. Pat Irle commented that she experienced difficulties downloading the document from the ftp site. Irle requested an extension for her approval and said that she would inform Mike Schiewe of her decision via email by May 9, 2013 (approved via email dated May 9, 2013; Bob Rose also provided email confirmation of approval on May 9, 2013). The Aquatic SWG representatives present approved Douglas PUD’s Aquatic Settlement Work Group 2012 Annual Report.

3. DECISION: Aquatic Settlement Agreement Management Plan Annual Reports (Andrew Gingerich): Andrew Gingerich asked the Aquatic SWG if there were any questions or suggested edits to the Douglas PUD Aquatic Settlement Management Plan Annual Reports. The draft Management Plan Reports were distributed to the Aquatic SWG by Kristi Geris on April 12, 2013. Although the reports now exist as six separate regulatory documents, Gingerich said he hopes to file these “mini” Management Plan Reports combined with the comprehensive report for 2012. The reports are due to be filed by the end of May 2013, which will give Douglas PUD enough time to compile the drafts into PDFs, document the consultation record, and file the reports with FERC by the fall.

Patrick Verhey cited the comments that WDFW sent to Gingerich on May 6, 2013, via email, regarding the White Sturgeon Management Plan, Page 11 section 4.4.1: “WDFW recommends not prioritizing the list of juvenile fish source options that shall be incorporated into a Broodstock Collection Breeding Plan. The Aquatic SWG discussed this issue prior to Douglas PUD submitting the September 2011 White Sturgeon Broodstock Collection and Breeding Plan. As a result of discussions, a prioritized list was not included in that plan. WDFW recommends using similar language used in section 3.0 of the September 2011 Plan in regards to juvenile fish sources in the 2012 WSMP [White Sturgeon Management Plan] Annual Report or simply not prioritizing the list of juvenile fish source options” (from an email correspondence dated May 6, 2013). Gingerich pointed out that the prioritized list and language contained therein are taken straight out of the White Sturgeon Management Plan (B-3 of the Aquatic Settlement
Agreement). In an email response to Verhey’s comments, Gingerich stated that when Douglas PUD drafted the reports, they attempted to keep all of the language identical to the Management Plans, so if the prioritized list is removed, he thinks that a footnote addressing the revision or referring readers to the recently filed Broodstock and Breeding Plan would be necessary. The note would state that the original White Sturgeon Management Plan prioritized fish, but the workgroup now relies on the Broodstock and Breeding Plan so the original list is moot. Pat Irle asked if the Annual Reports change each year and Gingerich answered that only the information in the Objectives section changes, while the Management Plan language remains the same. Irle, Steve Lewis, and Bob Rose (via email to Mike Schiewe dated May 9, 2013) agreed that a footnote is suitable.

Regarding other management plans, Verhey commented that in the future, the Pacific Lamprey Management Plan should include a reference to the Section 18 prescriptions for up-stream passage performance. He said that, for the current year, the report is satisfactory. Lewis asked Gingerich if the bull trout letter to defer the Twisp Weir Study would be filed at the same time as the Management Plan Reports and Gingerich indicated that that the letter would be filed separately.

Irle stated that she experienced technical difficulties accessing the reports and wanted to look over the Water Quality Management Plan report again. She requested a deferral of her approval until May 9, 2013. She then emailed Schiewe on May 9, 2013, with her formal approval.

The Aquatic SWG representatives present approved Douglas PUD’s Aquatic Settlement Agreement Management Plan Annual Reports with the addition of a reference to the previously approved SOA and Management Plan in the prioritization list for the White Sturgeon Management Plan.

4. DECISION: Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas Monitoring (Andrew Gingerich): Andrew Gingerich asked the Aquatic SWG if there were any questions or comments about the QAPP for Water Temperature and Total Dissolved Gas before Douglas PUD submits the document to FERC. The draft QAPP was distributed to the Aquatic SWG for comments and/or approval on April 16, 2013, by Kristi Geris. Gingerich said Douglas PUD and Ecology collaborated on the document. According to their 401 certification, they are required to provide Ecology and the Aquatic SWG with a document explaining their data collection protocol within the first year of the new license. Gingerich noted that even though the document is not due to be filed with FERC until October, he and Pat Irle are seeking approval sooner than that because they are implementing the plan and starting to collect data; therefore, it makes sense to have the document approved by all Aquatic SWG stakeholders and FERC prior to the October Deadline.
The Aquatic SWG representatives present approved Douglas PUD’s QAPP for Water Temperature and Total Dissolved Gas Monitoring.

5. **Wells Hatchery Sturgeon Program Update and Fish Health Presentation** (Andrew Gingerich and Chad Jackson): Andrew Gingerich presented the Wells Hatchery Sturgeon Facility Update in PowerPoint format (Attachment B). The presentation was distributed to the Aquatic SWG by Emily Pizzichemi on May 8, 2013, before the conference call start time. The facility was built in the 1960s and is currently undergoing modernization. Before demolition, the building contained troughs and three salmon stacks for incubating eggs that were not being used. This obsolete infrastructure has been replaced with twelve 5-foot by 3-foot tanks—six tanks for the larvae program and six tanks for the brood stock program. The tank lids are designed to provide a dark, quiet, and low-stress environment for the fish. The tanks are filled with untreated well water. External standpipes, which are easily accessible for frequent cleaning and draining, are an additional design feature that should make cleaning the tanks easier on hatchery staff. This water source is roughly 52 degrees Fahrenheit (° F) throughout the year; however, heaters can be used to raise the temperature to 58 to 60° F in the incubation tanks if required to increase growth rate to reach the release target of 250 millimeters (mm) in fork length (FL). Gingerich noted that they still expect wide variation in fork length, as per normal in sturgeon rearing. Gingerich stated that Douglas PUD plans to release up to 5,000 fish in 2014 following a year of rearing. As a buffer, the facility is equipped with enough water and space to rear 6,500 fish to 250 mm FL.

The brood stock and larval programs are contained within the same room and require methods of biosecurity, including bio-curtains and treatment protocols that separate the larvae from the fertilized gametes. Gingerich said that subsamples of larval fish will be collected and screened for pathogens before release. Chad Jackson, Jayson Wahls, and Bob Rogers of WDFW are coordinating the fish health plans and Jackson will present more on this topic in the subsequent meeting. Gingerich further explained that Douglas PUD has been working on this project since August 2012. The plans for the updated facility were developed by HDR. Following the initial design and a bid process, Williams Charles West of Kennewick, Washington, was awarded the contract. Construction began on April 1, 2013, and was completed on May 3, 2013, with the exception of the water heater installation. Douglas PUD expects the water heater to be installed and the facility to be ready to receive fish by June 1, 2013. As of now, Gingerich noted, hatchery staff has about 3 weeks to operate, clean, and prepare for the fish arrival.

Steve Lewis asked Gingerich if Douglas PUD has considered using technology such as “bioballs” to increase growth and development hatchery-reared sturgeon. According to one study, the material helped sturgeon conserve energy, thereby increasing growth and development and improving survival. Gingerich noted that because the “bioballs” have only been proven effective in the first few days following hatching, the technology
might be helpful for the brood stock program, but not for the larvae program. He suggested that numbers of fertilized eggs will not likely be a limiting factor, and therefore, the utility of the bioballs would only be for reducing hatchery related selection mortality.

Jackson then presented a PowerPoint entitled “2013 Douglas PUD White Sturgeon Broodstock and Larvae Pathogen Screening” (Attachment C), which was distributed to the Aquatic SWG by Pizzichemi on May 8, 2013, before the conference call. As part of their brood stock health assessment, WDFW collects eggs, ovarian fluid, and milt from all brood stock spawned. These samples are sent to the U.S. Fish and Wildlife Service (USFWS) Idaho Fish Health Center in Orofino, Idaho, for virological and bacteriological exams to test for infectious hematopoietic necrosis (IHN), infectious pancreatic necrosis (IPN), and viral hemorrhagic septicemia (VHS). Histological exams are also performed on tissue samples from pectoral fin clips taken from all brood stock (involved in spawning) to test for white sturgeon iridovirus (WSIV) and white sturgeon herpesvirus (WSHV). The anticipated number of tissue samples taken from brood stock is between 6 and 12 individuals.

Jackson went on to explain that the whole fish samples of larvae will undergo the same tests as the broodstock at the Idaho Fish Health Center. WDFW is still working out the final details for the larval sampling rate. Jackson explained that their main dilemma is whether to sample each pool separately or to sample each unique collection site/event separately. As of now, it is very likely that WDFW will just sample each pool. Larval sampling rate will range from 120 to 360 fish, with roughly 60 fish per pool or collection site, but Jackson noted that these numbers will be adjusted based on the catch rate and total number of larvae transported to the Wells Hatchery Facility. Sampling will begin one to two months after hatchery arrival to allow time for adequate pectoral fin growth and to allow time for the fish to exhibit any signs of disease. Jackson said that fish health screening is WDFW protocol for all hatchery programs. Fish diseases can be transmitted vertically from parent to egg/larvae. If not tested, juveniles could become stressed, exhibit clinical signs of disease, and can potentially be spread horizontally throughout the entire hatchery through slashing or accidental poor culture techniques (e.g., using same scrub brush in all tanks). Gingerich said that he hopes Douglas PUD and WDFW can work together to make modifications as needed.

6. Douglas PUD Advocating 110 Percent Standard in the Wells Pool (Andrew Gingerich): Andrew Gingerich commented on this item earlier in the meeting when he removed it from the agenda.

7. Wells Dam Water Quality/Spill Season Update (Andrew Gingerich): Andrew Gingerich said that operations at Wells Dam have been uneventful. To date, Wells Dam experienced one 125 percent hourly exceedance in the Wells tailrace about 4 weeks
ago, but that was attributable to an operator scheduling issue, not an actual flow problem. Gingerich said that because of the exceedance, they conducted bio-monitoring at Rocky Reach. Gingerich said that as the weather warms the U.S. Army Corps of Engineers expects flows to increase. Specifically, Gingerich mentioned that the Okanogan and Methow rivers are expected to reach 30 to 35 kcfs by May 14, 2013. Gingerich said that Douglas PUD has been well within compliance standards for water quality over the past 4 weeks at Wells Dam. Gingerich has been providing weekly updates to Pat Irle. Gingerich agreed to update the whole Aquatic SWG when there are exceedences and biomonitoring.

8. **Application of Aquatic Herbicide to Swimming Areas in Summer of 2012** (Andrew Gingerich): Andrew Gingerich explained that Douglas PUD applied to Ecology last year for a license to apply aquatic herbicides in selected public swimming areas. This license is valid for 3 years, after which time, Douglas PUD must reapply. According to their Recreation Plan, Douglas PUD is required to keep public swimming areas clean of macrophytes. Gingerich thinks that they could improve the outcome of the herbicide application from last year if they applied the herbicide earlier in the season. Due to the presence of salmonids in the area, July 15 has been deemed an acceptable start date for herbicide application, and Douglas PUD hopes to begin application at that time.

Gingerich said that Douglas PUD developed the plan to use herbicide on the aquatic vegetation after a meeting with Jenifer Parsons from Ecology early last year. Other vegetation removal options include manual pulling or cutting of the plants or installing substrate mats. Gingerich said he consulted with Patrick Verhey about using herbicides again this year, but he wanted to bring the decision to the attention of the Aquatic SWG. Gingerich further explained the application process: Douglas PUD hires a company to apply the herbicide from a boat, with a diver in the water applying the chemical directly onto the vegetation. He was not sure if the chemical came in a liquid or granular form. There were several questions and requests for more details and Gingerich agreed to speak with Scott Kreiter (Douglas PUD Lands Department) about the application procedure and to report back to the Aquatic SWG at the June 12, 2013 meeting. Steve Lewis asked about the possibility of using a pipe system coupled with booms to disperse herbicides, but he was uncertain about the pros and cons of this method. Lewis also wondered why July 15 was the earliest start date and Gingerich explained that Douglas PUD concluded that if the vegetation is younger, the herbicide will be more effective, but if USFWS has issues with bull trout or other species in the area, then those issues may trump the earlier timeline. Verhey thanked Gingerich and said that he appreciates Douglas PUD’s willingness to balance the herbicide application timeline with the species and environmental impact considerations.

9. **Bull Trout Letter Deferring Twisp Weir Study** (Andrew Gingerich): Andrew Gingerich and Steve Lewis are preparing a letter requesting a deferral of the Twisp Weir Bull Trout
Gingerich said that Douglas PUD is waiting for a response to their request for rehearing from FERC. In the meantime, Gingerich said that Douglas PUD and USFWS must move on with implementation of the management plans. Lewis noted that he initially considered whether the letter should focus solely on the Twisp Weir or if it should include all of the off-site project facility weirs. Lewis and Gingerich agreed that the only potentially relevant operating facility offsite is the Twisp Weir, so the letter focuses only on that facility. The bull trout study at the facility is intended to meet the requirements set forth in the Bull Trout Management Plan. Gingerich affirmed that a comprehensive study will be performed at a later time. Lewis and Gingerich discussed whether the letter was ready to be distributed to the Aquatic SWG for their review. As an action item, Lewis agreed to send the Twisp Weir Bull Trout Study deferral letter to Emily Pizzichemi for distribution to the Aquatic SWG, and indicated that he and Gingerich would like comments and/or formal approval no later than the June 5, 2013 meeting, at which time it will be on the agenda as a decision item.

10. **Lamprey Source for 2013 Passage and Enumeration Study** (Chas Kyger): Chas Kyger offered a quick update on the Lamprey and Passage Enumeration Study. Kyger explained that they anticipate receiving 100 individuals from Bonneville Dam and an additional 25 individuals from Priest Rapids Dam. Right now they are focused on getting fish collected at Bonneville Dam and transported to Wells hatchery for tagging, and they are currently on track. Kyger said that they are consistently referring to the Study Plan to ensure that they meet the goals and objectives of the study. Kyger stated that they plan to spread the release of lamprey over four or five sessions, depending on the overall numbers, rather than releasing all the fish at once. Steve Lewis asked if there was agreement on release locations, somewhere neither too close to nor too far from the dam. He recalled that Bob Rose had suggested that lamprey be released closer to the mouth of the Entiat River to assess potential to enter that sub basin. Kyger responded that Douglas PUD intends to conduct releases as described in the study plan, which prescribes that fish be released 1.5 miles below the dam. Rose had previously noted that releasing the fish that close to the dam would not give the fish enough time to acclimate and behave normally and that releasing them closer to the mouth may minimize that possibility. Kyger said that they are still discussing the release location details and, as an action item, he will provide additional information during the June 5, 2013 meeting.

Notwithstanding Rose’s concern, Gingerich expressed concern that if the fish were released too far down from Wells Dam that they may migrate into the Entiat and not interact with the dam at all. He clarified that the point of the study is to monitor how lamprey interact with the dam structure and to find out how modifications to the facility have improved enumeration and passage, and that releasing them further away from the dam may not meet these objectives. All Aquatic SWG representatives present
agreed to continue the discussion of the release location at the next Aquatic SWG meeting.

11. Wells Dam FERC License Celebration (Andrew Gingerich and Patrick Verhey): Patrick Verhey indicated that Douglas PUD employees and stakeholders had received invitations to a ceremony at Wells Dam on Tuesday, May 14 at 1:30 PM to celebrate the Wells Dam FERC License renewal. There will be activities, presentations, and tours. Greg Mackey will give a presentation and tour of the hatchery modernization efforts. Verhey said that WDFW Director Phil Anderson cannot attend the event, but that Verhey will be attending in his stead. Andrew Gingerich said that invitations were distributed as postcards and he hopes people can fit the event into their schedules.

VI. Next Meetings
1. Upcoming meetings: June 12, 2013 (conference call); July 10, 2013 (conference call); August 14, 2013 (conference call).

List of Attachments
Attachment A – List of Attendees
Attachment B – Wells Hatchery Sturgeon Facility Update
Attachment C – 2013 Douglas PUD White Sturgeon Broodstock and Larvae Pathogen Screening
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<td>Chad Jackson</td>
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Wells Hatchery Sturgeon Facility Update

APRIL 15TH 2013

Before Demolition - facility was built in late 60’s

Pictures 1-4
Wells Hatchery Sturgeon Rearing Facility

Ready for larval and gamete acceptance June 1st or before

**Biosecurity**

- Include separation of larval and fertilized eggs via unique cleaning instruments, bio-curtains and treatment protocols.
- Subsamples of larval fish will be lethally taken for pathology analyses
- WDFW Chad Jackson, Jayson Wahls and Bob Rogers coordinating fish health plans (See Chad Jackson’s presentation).

Untreated Well Water and Single Use Supply

Picture 5

Picture 6

Picture 7
External standpipes for easy cleaning

Lids should provide dark, quiet, and less stress on fish. Although lids sag and are not fitted.

Water source can included heated water (Well water source is ~52 F throughout the year.

Heater will allow 58-60 F incubation year round toward release target of ~250 mm FL (but expect a wide distribution in size)

Combi’s are 3’ x 5’, coupled with bioprogram: capable of rearing 6,500 fish to 250 mm FL

Schedule

 Been working on this project since approximately August 2012.

1. Bio-programming
2. Designs, specs, drawings
3. Call for bids
4. Bid opening
5. Award
6. Preconstruction schedule and visit
7. Demo and construction

- Construction began April 1st.
- Remaining item: installing water heater.
- Construction finish by May 3rd (accept for water heater).

Hatchery staff will have 3+ weeks to operate, clean, and prepare for fish arrival.
April 1st vs. April 19th

Pictures 10 - 11
BROOD STOCK

- Virology and bacteriology performed on eggs, ovarian fluid, and milt collected from all brood stock involved in spawning to test for IHN, IPN, and VHS
- Histology performed on tissue samples taken from pectoral fin clips from all brood stock involved in spawning to test for WSIV and WSHV
- USFWS Idaho Fish Health Center in Orofino, ID will perform all pathogen screening
- Given the relatively low number of fish tested (~6-12), payment for services is through a reimbursement of lab supplies (~$1,000 & split between all entities)
LARVAE

- Whole fish will be shipped to USFWS Idaho Fish Health Center for testing (virology and histology)
- Same testing as brood stock
- WDFW Fish Health still working on final sampling rate details for larvae
- Main dilemma is whether to sample each pool or each unique collection site/event
- Highly likely that WDFW will just sample each pool
- Sampling rate will range from 120 to 360 fish
- Sampling will occur 1-2 months post hatchery arrival

LARVAE (Cont)

- Total larvae transported to Wells Hatchery will also influence sampling rates
- Since the number of samples is considerably larger, Idaho Fish Health Center felt it was best to enter into an inter-government agreement to bill for services
- Maximum cost to perform process 360 samples is $13,989
  - Histology: $2,080
  - Virology: $6,960
  - Bacteriology: $2,052
  - Indirect (26.1%): $2,897
The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, June 12, 2013, from 10:00 a.m. to 12:00 p.m. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items

1. Steve Lewis will distribute the final revised letter requesting deferral of the Bull Trout Radio Telemetry Study at the Twisp Weir, as approved at today’s conference call, to the Aquatic SWG prior to the Aquatic SWG conference call on July 10, 2013 (Item V-2).
2. Andrew Gingerich will confirm the acreage to be treated during Douglas PUD’s 2013 aquatic herbicide application, and will provide this information to the Aquatic SWG (Item V-3).
3. Andrew Gingerich will contact the Chelan County Noxious Weed Control Board to discuss their 2013 aquatic herbicide application, and to also compare methods with Douglas PUD’s planned application. Gingerich will provide a summary of the discussions to the Aquatic SWG (Item V-3).
4. Douglas PUD will review the Joint Fisheries Parties’ (JFP’s) Lamprey Proposal for the Upper Columbia prior to the Aquatic SWG conference call on July 10, 2013 (Item V-8).

II. Summary of Decisions

1. There were no Statements of Agreement (SOAs) approved at today’s meeting.

III. Agreements

IV. Reports Finalized

1. The Douglas PUD Aquatic Settlement Work Group 2012 Annual Report that was approved by the Aquatic SWG on May 9, 2013, was submitted to FERC on May 31, 2013.

V. Summary of Discussions

1. Welcome, Agenda Review, and Meeting Minutes Review (Kristi Geris): Kristi Geris welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Geris reviewed the agenda and asked for additions or other changes to the agenda. Bob Rose added a discussion on a Lamprey Proposal for the Upper Columbia.

Emily Pizzichemi reported that all comments and revisions received on the draft May 8, 2013 meeting minutes had been incorporated. The Aquatic SWG members present approved the May 8, 2013 meeting minutes, as revised. Bob Rose approved the draft May 8, 2013 meeting minutes via telephone directly following the meeting, and Jason McClellan approved the minutes via email on June 13, 2013.

2. DECISION: Bull Trout Letter Deferring Twisp Weir Study (Andrew Gingerich): Andrew Gingerich asked if the Aquatic SWG had additional input on Douglas PUD’s letter to FERC requesting deferment of the Bull Trout Radio Telemetry Study at the Twisp Weir. The draft letter was distributed to the Aquatic SWG in an email from Steve Lewis on May 10, 2013, with comments due to Gingerich and Lewis prior to today’s Aquatic SWG meeting. Patrick Verhey asked when the final deadline is for a deferral request from FERC and Gingerich replied that everything needs to be submitted to FERC by the end of October 2013. Aquatic SWG representatives present approved Douglas PUD’s letter to FERC requesting rescheduling the Bull Trout Radio Telemetry Study at the Twisp Weir to occur in 2016. Lewis will distribute the final revised letter, as approved at today’s conference call, to the Aquatic SWG prior to the Aquatic SWG conference call on July 10, 2013.

3. Aquatic Herbicide Application Methods (Andrew Gingerich): Andrew Gingerich met with Scott Kreiter (Douglas PUD Lands Department) to discuss details regarding Douglas PUD’s 2013 aquatic herbicide application in public swimming areas. Gingerich said that Douglas PUD hired Woodland Resource Services from Ellensburg, Washington, to perform the application. The herbicidal chemical is diquat dibromide, applied in liquid form. The contractors use a boat with a submerged trail bar with multiple weighted hoses for direct herbicidal application to plant. This method of application broadcasts the chemical less than other methods and does not require people applying the herbicide to be in the water. Patrick Verhey asked how many acres Douglas PUD plans to treat during 2013 and Gingerich said that he would confirm the exact acreage and provide the information to the Aquatic SWG at the meeting on July 10, 2013. Gingerich said that Douglas PUD plans to treat three swimming areas within city parks with water
access recreation areas—one each in Pateros, Brewster, and Bridgeport, Washington. Verhey asked if Douglas PUD considered using the same herbicide that Chelan PUD used near the Entiat River and suggested that Douglas PUD compare the two chemicals and application methods. Pat Irle said that, according to an herbicide application plan produced by the Chelan County Noxious Weed Control Board, Chelan County is using a chemical called Triclopyr because it is the most cost-effective herbicide with minimal impacts on local listed fish species. Gingerich said that he will contact the Chelan County Noxious Weed Control Board to discuss their 2013 aquatic herbicide application process and compare methods with Douglas PUD’s planned application; and then he will provide a summary of the discussions to the Aquatic SWG. Gingerich said that the first application is scheduled for just after July 15, 2013, which will account for bull trout movement in the area.

4. **Lamprey Entrance Efficiency Plan** (Andrew Gingerich): Andrew Gingerich said that, as required by conditions in their FERC license, Douglas PUD is developing a Lamprey Entrance Efficiency Plan (LEE Plan). This plan is being developed in coordination with Bao Le from HDR Engineering, Inc., and will be presented to the Aquatic SWG for comments and approval. Gingerich said that even though it is not explicitly stated in a FERC license article, Douglas PUD is also required to construct an operations study plan to assess potential changes in fish-way operations to improve overall passage if and when problems are identified. He said that the 2013 Adult Lamprey Passage and Enumeration Study Plan already includes this type of information and also contains potential improvement options. However, Douglas PUD would try and combine the LEE Plan and the Operations Plan into one document or plan. Pat Irle asked when Douglas PUD expects to have the draft document available for review, and Chas Kyger replied that they hope to distribute the plan to the Aquatic SWG before the Aquatic SWG conference call on July 10, 2013. Gingerich added that he is targeting August 2013, or at the latest, September 2013 as the approval deadline for the Aquatic SWG in order to meet the FERC submittal deadline of October 2013. Gingerich noted that Douglas PUD needs time after the completion of the approval process to develop the consultation record for the approved plan; which gets filed with FERC along with the approved plan.

Bob Rose asked what data Douglas PUD plans to evaluate, and Kyger responded that they will rely heavily on the 2013 Adult Lamprey Passage and Enumeration Study Plan and will also consult outside study data. Rose said that he hopes Douglas PUD coordinates with the U.S. Army Corps of Engineers (Corps) to discuss the potential use of acoustic tags for gathering three-dimensional baseline data. Gingerich noted that acoustic data have some pros and cons and that one of the difficulties with developing this plan is that there is currently no standard entrance efficiency for lamprey or passage standards and much of the baseline information is missing. Rose said, for example, that if there were data on lamprey approaching the entrance of the dam but not fully entering the fish passage, assumptions could be made regarding causes for fish
rejecting the fish passage. However, since those data have not been documented, assumptions cannot be developed. Rose said that this is fundamental information about the interaction between lamprey and dams that should be addressed in study objectives. Le explained that the plan will be sufficiently robust in utilizing currently available data tools, and that the analyses will be as conservative as possible. Rose acknowledged that this plan is just a starting point and it will take several years to determine the best plan for maximizing lamprey entrance efficiency. Irle asked if the past Dual-Frequency Identification Sonar (DIDSON) lamprey passage studies are being used to guide Douglas PUD’s plan, and Le replied that, due to small sample sizes and the subsequent lack of statistical significance, those studies did not contribute much useable data to the 2013 study plan; however, results of those studies have informed current operations in Wells fishways to lower entrance velocities to support lamprey migration at appropriate times of the year. Le also said that the lack of information about lamprey should be kept in mind and that the mistake of comparing lamprey to salmonids should be avoided. He said that the implication dams have for the population dynamics and ecology of the species is not yet fully understood. Rose said that he thinks lamprey and salmon are not so fundamentally different as to write off the possibility that no passage means rejections, as it does in salmonids. Rose asked if salmon are being considered in the formulation of the efficiency plan, and Gingerich confirmed that the document will also address impacts to salmonids. Gingerich noted that changes to the fishway for the benefit of lamprey need HCP approval because impacts to passage of Endangered Species Act (ESA) listed salmonids must be considered.

5. **2013 Lamprey Study: Release Location below Wells Dam** (Chas Kyger): Chas Kyger said that, as the Aquatic SWG approved in the 2013 Adult Lamprey Passage and Enumeration Study Plan, lamprey will be released 1.5 miles below Wells Dam and a subset of each release group will be placed directly into the fish ladder. Kyger asked for further thoughts or comments, and Bob Rose reminded the Aquatic SWG of his previous recommendation of releasing some fish further downstream near the Entiat River. He recalled that the lamprey for this study are being transported from Bonneville Dam, and that, typically, it takes lamprey 3 to 6 weeks to travel from Bonneville Dam to Wells Dam. Rose said that drastically reducing this natural timeline could bias the data. Gingerich said that the shortened timeline may be considered a positive bias; however, carrying a radio tag may be considered a negative bias since asking a fish to behave normally while carrying the burden of a tag and the stress associated with the transport and tagging experience is unqualified, but undoubtedly negative. So ultimately, each scientific study is with some bias and assumptions. Gingerich noted that the study has been designed to address the objectives, and that it is up to the Aquatic SWG to be aware of the assumptions and biases and discuss the results of the study within this context.
Kyger said that he had previously discussed with Rose releasing PIT-tagged lamprey at different locations downstream from Wells Dam to gather data about movement patterns. These PIT-tagged lamprey would be in addition to the 125 individuals already planned for the study. Aquatic SWG representatives present agreed that releasing additional PIT-tagged lamprey in various locations would be beneficial. Kyger added that the extra lamprey can either be bulk-released in one location or spread over several locations, and would only be released if the Yakama Nation (YN) could provide the additional fish. Kyger also noted that since the release location would be in the Rocky Reach reservoir that Douglas PUD would need to consult Chelan PUD. Gingerich said that the 25 additional lamprey will only carry PIT-tags while the other 125 study fish will carry both PIT-tags and acoustic tags. Gingerich said that he suggested using full duplex (FD) array tags on the additional 25 lamprey, since tributary arrays are wired for FD detection. Bao Le agreed that FD array tags are best for data collection purposes. Pat Irle asked if Douglas PUD would be interested in lamprey interaction with the Methow River instead of the Entiat River, and Gingerich replied that the objective of the study is to evaluate how fish interact with Wells Dam, and releasing fish into the Methow River would compromise that objective. He added, however, that fish traveling through Wells and into the Methow River would have a good chance of being detected on PIT tag arrays currently installed in that tributary, provided flows were reasonable; since, detection efficiency of those arrays is dependent on flow. Rose asked if aerial antenna arrays were still planned to be deployed at the entrances to the Methow and Okanogan rivers, and Kyger replied that these elements are still in the 2013 study plan.

6. **White Sturgeon Egg Arrival Update** (Andrew Gingerich): Andrew Gingerich said that Douglas PUD was able to bring white sturgeon eggs to the Wells Hatchery Facility thanks largely due to efforts by Chelan PUD collecting broodstock and spawning efforts by the YN. Gingerich said that delivered eggs were a result of a three-by-three (3x3) matrix, consisting of three females and three males, and is hoping to bring in additional fish in the near future since additional broodstock may be available as a result of Grant PUD and the YN collection efforts. Gingerich said that the egg program has been successful so far and that one of the maternal families in the hatchery hatched a few days ago. Pat Irle asked if Douglas PUD is keeping adults on site at Wells Hatchery, and Gingerich replied that they are not and stated that Douglas PUD has a larvae program and a broodstock program, and that spawning takes place at Marion Drain. He said that the eggs from one female are incubated together as a lot, regardless of paternity (i.e., families are grouped by maternal family unit). Jason McLellan suggested that, in the future, eggs be kept separate based on both maternity and paternity until they begin to feed. He explained that there can be differential success during incubation and that over-representation of one genetic cross over another could occur if the eggs are combined too early. Gingerich said that next year they will keep the different genetic crosses in separate jars to mitigate for this concern. Rose said that it is important that
additional discussions occur within the next few weeks regarding future needs and expectations for the programs.

7. **Wells Dam Water Quality Update** (Andrew Gingerich): A Total Dissolved Gas (TDG) Update for Wells Dam (Attachment B) was distributed to the Aquatic SWG by Kristi Geris on June 12, 2013 [today], prior to the start of the meeting. Andrew Gingerich explained that there were two 125 percent exceedences at Wells Dam in early April 2013 due to a coordination issue between Douglas PUD operators and the Central Control at Grant PUD. He noted that they have not seen 7Q10 flows this season and explained that a 7Q10 flow is the probability of a certain extreme flow lasting 7 days and occurring every 10 years. The 7Q10 flow at Wells Dam is 246,000 cubic feet per second (246 kcfs) and the mean hourly flow this month has been approximately 155 kcfs. He added that there was also one 115 percent exceedence at the Rocky Reach forebay. Gingerich encouraged the Aquatic SWG to read the document more thoroughly and contact him with any questions or concerns. Pat Irle asked about the 115 percent 12-C high exceedance in the Rocky Reach forebay. Gingerich explained that on the day before the exceedance, there was a short, intense flow as a result of poor hourly coordination communication with Central at Grant PUD, which resulted in the Rocky Reach Forebay exceedance.

Irle asked if the Corps has accepted the fact that their responsibility is 110 percent. Gingerich replied that they should, based on State water quality regulations; however, he said that he did not think they have formally adopted this standard. Gingerich added, however, that they have been running above the 110 percent standard since June 1, 2013, based on measurements in the Wells Forebay.

8. **Lamprey Proposal for Upper Columbia** (Bob Rose): The Lamprey Proposal for the Upper Columbia (Attachment C) was distributed to the Aquatic SWG by Kristi Geris on June 12, 2013 [today], prior to the meeting. Bob Rose said that the proposal has been in development for some time and that the Joint Fisheries Parties (JFP) are now bringing it to the work group forum for comments. Rose said that he will refrain from using the term No Net Impact (NNI) because Douglas PUD does not have a NNI clause in its documents. Rose went on to say that the JFP is only looking at primary objectives to set the stage for collecting more long-term status and trend data. They want to develop critical research questions for a large-scale Columbia lamprey study and then proceed to obtain tools, experts and professionals, and other data collection needs. Rose said that this discussion is meant to provide an overview of objectives and data gaps and that this conversation will guide the development of a cleaner document with more specific goals and methods for the study. Rose said that he hopes the JFP have clearer resolution on the issue by October or November 2013. He said that the primary objective is to maximize the value of every fish put into the river by obtaining as much data as possible in just 2 to 3 years. After this time period, he thinks that the data will indicate whether
or not lamprey are viable candidates for movement tracking studies. Rose proposed using radio telemetry tags to track movements more carefully. He further explained that if the JFP are considering translocation as a possible tool for repopulation, it needs to be known if translocated fish produce viable offspring. Rose said that once tagged adults spawn, he hopes that biologists can observe where the tags end up and draw conclusions from there. From the spawning grounds, biologists can move downstream and pinpoint index sites with potential spawning and rearing habitat. Rose suggested that, based on these data, it may be feasible to make connections between juveniles and their parents to determine if offspring are coming from tagged or untagged adults. Rose said this proposal is a good approach to figuring out what is going on with lamprey in the Mid- to Upper Columbia River in a relatively short period of time with low expenses, so they can more quickly develop management plans for the species.

Andrew Gingerich requested additional time to review the document prior to discussing it. He added that Douglas PUD will review the proposal prior to the Aquatic SWG conference call on July 10, 2013. Rose said that the JFP agrees that the document is not perfect and needs refinement. Pat Irle asked about the release location of half-duplex PIT-tagged individuals as depicted on a diagram on page 18 of the proposal (Attachment C), and Rose clarified that the fish would be released in the general vicinity, up to a few miles away. Gingerich said that Douglas PUD is committed to studying lamprey in a way that is consistent with the existing Douglas PUD Pacific Lamprey Management Plan (PLMP) and the Aquatic Settlement Agreement (ASA).

Lastly, Rose provided a brief overview of the objectives for juveniles. He said that juvenile lamprey are vulnerable and highly susceptible to predation at dams. He suggested taking actions to reduce piscivorous fish around dams to increase juvenile survival. He said that irrigation diversions are another concern for juvenile survival. He wondered if juveniles could get entrained in these irrigation features in rivers such as the Wenatchee where they are common. Rose said that much can be learned about life history from propagating juveniles of a known size, age, and location, and that this could be a cost-effective way to supplement populations in the Upper Columbia.

VI. Next Meetings
1. Upcoming meetings: July 10, 2013 (conference call); August 14, 2013 (conference call); September 11, 2013 (conference call)

List of Attachments
Attachment A – List of Attendees
Attachment B – TDG Compliance Update for Wells Dam
Attachment C – Lamprey Proposal for the Upper Columbia
## Attachment A
### List of Attendees

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<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>Patrick Verhey</td>
<td>SWG Technical Representative</td>
<td>Washington Department of Fish and Wildlife</td>
</tr>
<tr>
<td>Chad Jackson</td>
<td>Technical Support</td>
<td>Washington Department of Fish and Wildlife</td>
</tr>
<tr>
<td>Bob Rose</td>
<td>SWG Technical Representative</td>
<td>Yakama Nation</td>
</tr>
<tr>
<td>Jason McLellan</td>
<td>SWG Technical Representative</td>
<td>Colville Confederated Tribes</td>
</tr>
<tr>
<td>Bao Le</td>
<td>Technical Support</td>
<td>HDR Engineering, Inc.</td>
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TDG Compliance Update for 2013 Spill/Bypass Season

Aquatic SWG June 12th 2013 Conference Call

Prepared by
Douglas County PUD
Figure 1. Total flow (top) and total spill at Wells Dam (middle) and resulting Wells tailrace TDG concentration (bottom) by hour from April 9th 2013 to June 9th 2013.

Coordination issue with DCPUD operators and Central Control at GCPUD. Load vs. Spill equation.
Compliance to date

- **125% hourly**: 61/62 days compliant (98.4%).
- **120% 12-C high**: 62/62 days compliant (100%).
- **115% 12-C high**: 61/62 days compliant (98.4%).

*Note. No days this season with 7Q10 flows. Unlike the last two years where there were one month+ periods of 7Q10 flows.*

Current Operations

- Approximate hourly flows from 130-180 at Wells. Mean flow close to 155 kcf/s.
- With 9 of 10 units operating turbine capacity is ~180 kcf/s.
- Only spill occurring is associated with fish spill (~10 kcf/s).
- Weekly forecast of 145 kcf/s until Friday. Reduced weekend flow for 6/11-6/12 (110 kcf/s) and 150 kcf/s on Monday the 13th of June.
- Grand Coulee will be full July 4th. B. of Reclamation slowly filling now. Last week flows into Grand Coulee were 170 kcf/s (extra water was used to fill slowly).
- Incoming TDG to Wells was the highest last week and weekend that it has been all year (113-114%). More spill at CJD.
- Well is adding approximately 1% TDG currently, which is associated with fish spill.
Attachment B

Table 1. Wells Dam TDG compliance data for 2013 spill season.
Wells Forebay

Date

Wells Tailrace

1-Apr

15

104.1

104.5

104.9

23

104.4

105

Hourly
High
(125%)
105.4

2-Apr

0

104

104.4

104.7

23

104.3

104.8

105.3

#

24h

12h

hr

Avg

Avg

Count
High

24h
Avg

12- C High
(120%)

Rocky Reach Forebay
Count

24h
Avg

12- C High
(115%)

23

106.1

106.3

106.6

23

105.5

105.7

105.8

High

3-Apr

18

103.6

104

104.3

22

103.9

104.3

104.7

22

105.3

105.4

105.5

4-Apr

24

104.6

104.9

105.3

20

105.2

106

109.2

20

105.6

105.7

105.9

5-Apr

24

103.9

104

104.5

19

105.2

105.8

111

19

105.1

105.3

105.4

6-Apr

24

103.5

103.7

103.9

20

104.5

105.1

109.1

20

106.1

106.5

107

7-Apr

24

103.5

103.8

104.5

21

103.7

104.1

104.7

21

106.2

106.4

107

8-Apr

24

102.3

102.6

103

23

107.3

111.7

125.4

23

103.8

104.6

105.6

9-Apr

24

102.3

102.7

102.8

20

109

110.5

111.7

20

104

105.8

114.1

10-Apr

24

103.5

103.9

104.4

20

111

112.3

115

20

110.4

111.5

113.8

11-Apr

24

102.9

103.1

103.4

19

114.3

115.7

126.1

19

110.3

110.4

110.5

12-Apr

24

103.8

104.1

104.4

20

109.9

110.6

112

20

113.2

113.8

114.1

13-Apr

24

104.2

104.4

104.5

23

110

110.5

110.9

23

111

112.3

113.1

14-Apr

23

104.1

104.3

105.2

18

112.9

115.7

119.2

18

108.6

109

109.3

15-Apr

24

102.4

102.8

103.4

23

109.4

110.5

111.4

23

111.5

113.1

114.4

16-Apr

24

102.3

102.8

102.9

24

111.1

111.6

111.9

24

108.2

108.8

108.9

17-Apr

24

102.6

102.9

103.9

20

109.1

109.5

110

20

109.8

110.5

110.7

18-Apr

24

104.6

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105

24

108.9

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109.5

110.2

110.7

19-Apr

24

104.1

104.6

105

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110.8

20-Apr

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105.4

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21-Apr

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24-Apr

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26-Apr

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27-Apr

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104.8

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107.1

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107.4

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28-Apr

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104.8

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105.6

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107.3

29-Apr

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106.9

30-Apr

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102.8

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1-May

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2-May

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3-May

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4-May

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Official start to
Douglas PUD bypass
season is April 9,
2013 @ 000 hrs.


Purpose: The purpose of this discussion is to provide the need and rationale for employing the "No Net Impact" (NNI) concept to Pacific lamprey as a result of the operations of the Mid-Columbia public utility projects (PUDs). Specifically, the Joint Fishery Parties (JFP, including the YN, CCT, CTUIR, USFWS and WDFW) agree that the preponderance of evidence throughout the Columbia River Basin clearly indicates that mainstem hydroelectric projects do in fact impede or prevent adult passage past these dams with a direct or indirect negative effect. This is evident in the fact that the Federal Action Agencies (Bonneville Power Administration, US Army Corps of Engineers, and Bureau of Reclamation) agreed to allocate $50,000,000 dollars primarily for adult passage improvements in the 2008 Fish Accords, and is farther evident in the fact the Mid-Columbia PUDs are themselves beginning to implement passage improvements in these Projects, therefore recognizing the impact to the migrating adult lamprey populations.

Need: It is clearly evident at both local and regional scales that Pacific lamprey populations have plummeted over the past decades, and that recovery actions are imminent and urgent. Above the Mid-Columbia Projects, local populations are essentially extirpated. From an ecologically and from a tribal harvest perspective, they are extirpated. The JFP recognizes that the Projects are not solely responsible for this cumulative effect, but they are a primary contributor to the situation and a key player in future Pacific lamprey recovery actions. The JFP advocates there is a clear connection between passage issues, Project Effects and the need for the PUDs to mitigate for these impacts to the population.
Background: Each of the PUDs contain language within their perspective Lamprey Management Plans that recognize the need to contribute to Pacific lamprey recovery. The essence of this language is captured below.

The goal of the PLMP is to achieve No Net Impact (NNI) on Pacific lamprey by measuring ongoing Project-related impacts, if any, on Pacific lamprey; implementing appropriate and reasonable measures to reduce or eliminate such impacts; and implementing on-site or off-site measures to address unavoidable impacts.

Grant County PUD Lamprey Management Plan: Section 4 Protection, Mitigation, and Enhancement Measures.
The goal of the PLMP is to identify ongoing Project-related impacts on Pacific lamprey; implementing reasonable and feasible measures to reduce or eliminate such impacts; and implementing on-site or off-site measures to address unavoidable impacts.

4.1 Objective 1: No Net Impact (NNI). Identify, address, and fully mitigate Project effects to the extent reasonable and feasible.

Douglas PUD: Lamprey Management Plan Section 3.0: Goals and Objectives
The goal of the PLMP is to implement measures to monitor and address impacts, if any, on Pacific lamprey resulting from the Project during the term of the new license. Douglas, in collaboration with the Aquatic SWG, has agreed to implement several Pacific lamprey PMEs in support of the PLMP. The PMEs presented within the PLMP are designed to meet the following objectives:

Objective 1: Identify and address any adverse Project-related impacts on passage of adult Pacific lamprey;
Objective 3: Participate in the development of regional Pacific lamprey conservation activities.

The PLMP is intended to be compatible with other Pacific lamprey management plans in the Columbia River mainstem. Furthermore, the PLMP is intended to be supportive of the HCP, the critical research needs identified by the Columbia River Basin Technical Working Group, the Resident Fish Management Plan, Bull Trout Management Plan, and White Sturgeon Management Plan by continuing to monitor and address ongoing impacts, if any, on Pacific lamprey resulting from Project operations. The PLMP is intended to be not inconsistent with other management strategies of federal, state and tribal natural resource management agencies and supportive of designated uses for aquatic life under Washington state water quality standards found at WAC 173-201A.

Section 1: Introduction. Paragraph 3:
The PLMP will direct implementation of measures to protect against and mitigate for potential Project impacts on Pacific lamprey (Lampetra tridentata). To ensure active stakeholder involvement and support, Douglas developed this plan, along with the other aquatic management plans, in close coordination with the members of the Aquatic SWG.

In sum, the JFP agrees there is sufficient language embedded within the Pacific Lamprey Management Plans to justify that additional (and potentially off-site) actions are not only warranted, but required within these Plans. We make the argument that even if the Projects could achieve 80-90 percent passage with little or no passage delay (which would likely be a substantial improvement over what we currently believe exists today) there would still be an impact to the migrating population and that the NNI concept was built on the foundation that all impacts would be mitigated for.

**Recommendation:** The JFP recommends that within each of the three Forums (ASWG, RRFF, PRFF) we establish this topic as a regular agenda item, in anticipation this discussion will require several months of considerations. We recognize the uniqueness of each of the PUDs and the need for each institution to maintain boundaries within their own FERC license, but we also recognize that each of the Plans call for regional cooperation. As a result, the JFP would ultimately like to develop and begin initiation of a "regional strategy" towards lamprey recovery in the Mid- Columbia region (Priest Rapids Dam to Okanogan River) and agree that the Mid-Columbia PUD Projects should play a role towards this end.

The JFP offers to this discussion several examples of activities that should be considered as a part of these future discussions. We do not advocate that the PUDs are solely responsible for any or all of these actions, rather, we hope to build inter-agency cooperation in a similar manner as has evolved within salmonid recovery actions. Over time, we will identify various responsibilities, and from this point we will discuss and identify the "appropriateness" of the actions as a component of overall NNI mitigation. The following actions (not intended to be comprehensive, but examples for this time) are recommended for discussion:

- contributions towards juvenile and adult supplementation / trans-location in the Upper Columbia tributaries,
- passage at Tumwater Dam - and irrigation facilities that may need enhancements,
- fixing juvenile entrainment at Dryden Dam - and other irrigation facilities,
- financial support to better establish baseline information / monitoring in preparation for restoration activities and long-term monitoring of status and trends within the tributary habitats,
- support in regional planning documents that identify specific survival standards, tagging technologies and recovery actions in which each of the PUDs can participate,
- enhanced understanding of in-reservoir adult mortality (predation? - sturgeon?),

**Next Steps:** The JFP will announce to the three Forums our interests and intentions at the September forum meetings. We will advocate that this be an agenda item which will require at least one hour during the October meeting. We anticipate developing an initial list of activities that could be implemented in each of the Upper Columbia Subbasins (Okanogan, Methow, Entiat, and Wenatchee)
during the winter and spring months of 2013. From this short planning process, in which we will use existing salmonid subbasin restoration committees, we will discuss potential partnerships for implementation and appropriate timeframes, which will include involvement from each of the PUDs.
Collaborative Implementation and Research Strategy

in the

Upper Columbia Region

for the

Recovery of Pacific Lamprey

Purpose

• The purpose of this document is to establish a coordinated and collaborative approach towards Pacific lamprey recovery in the Upper Columbia region Priest Rapids to Chief Joseph Dam).
• To describe in sufficient detail a regional strategy for which each of the three Mid-Columbia Public Utility Districts (Douglas, Chelan and Grant counties) can efficiently and effectively join local fishery managers in implementing key activities benefiting the recovery of Pacific lamprey.
• Identify priority objectives, tasks and data needs to be addressed by actions implemented by multiple agencies.

Need

• Lamprey populations are very low and in many watersheds of the Upper Columbia Region have been extirpated, or nearly so. Lamprey are recognized to be an important species both ecologically and culturally. Tribal culture has lost an important component of their heritage.
• Population declines and reduced spatial distribution are a result of multiple threats to the species, affecting all life stages.
• Recovery of Pacific lamprey in the Upper Columbia can only be achieved by simultaneously implementing multiple actions, including research, to address priority threats for all life stages throughout the region.
• The Joint Fisheries Parties\(^1\) recognizes that the Mid-C Projects are not solely responsible for this cumulative effect, but that hydro-electric Projects do negatively affect Pacific lamprey populations and are a key and necessary player in future recovery actions within and outside of the Project boundaries.

Scope

• This regional strategy encompasses the mainstem Columbia River and Project boundaries of the Wells, Chelan and Grant PUD Project Areas (excluding the Project boundary of the Rock Island Project). The timeframe will last through December, 2018.

---

\(^1\) The Joint Fisheries Parties consist of the US Fish and Wildlife Service, NOAA Fisheries, Washington Department of Fish and Wildlife, Yakama Nation, Colville Confederated Tribes and the Confederated Tribes of the Umatilla Indian Reservation.
Relatively little is currently understood about many important aspects of lamprey biology and ecology. As such, there is a great necessity for "adaptive management".

Geographically, the scope is contained within the Columbia River from Priest Rapids Dam to Chief Joseph Dam and includes priority areas within the Okanogan, Methow, Entiat and Wenatchee subbasins. "Priority\textsuperscript{2}\textsuperscript{n}" watersheds / stream reaches will be defined for various Objectives.

Temporally, the scope of these objectives and activities is contained within a period of approximately five years (2013 - 2018).

Activities contained within this Scope are consistent and will be coordinated by the tribes and the USFWS in coordination with the Conservation Agreement and other regional planning and implementation strategies (CRITFC Restoration Plan, PUD Mgt Plans, NPCC Fish and Wildlife Program, US ACE, etc).

Note:
The following 7 Primary Objectives are not intended to be in order of priority.

It is thought that a mixed use of radio telemetry, HD and FD PIT tags will be necessary. This is an important component of the discussion.

Genetics analysis is one of the analytical tools that will be required to discern translocated juveniles from the rest.

\textsuperscript{2} Fishery managers will define priority watersheds or stream reaches where lamprey populations are either known to exist or are likely to exist if lamprey were relatively abundant. These areas are generally considered to be priority sites to monitor status and trend and to establish "anchor points" for spatial structure, increased productivity and abundance.
1. Regional Establishment Baseline / Status and Trend Information

**Objective:**
Establish baseline information by enumerating (relative abundance) local populations (watershed scale) of adults and juveniles in priority areas (stream reaches).
- Track and understand changes of both juvenile and adult populations in priority monitoring locations (index sites) over time.
- Compare and evaluate these changes relative to other Columbia Basin regions.

**Scope:**
Primary sources of information will include, but not necessarily limited to:
- adult counts at mainstem PUD dams
- adult counts at Tumwater Dam (as they become available)
- adult spawning surveys in key index sites
- juvenile rearing and adult spawning locations based upon key "index sites" to be established
- juvenile counts at irrigation maintenance / sediment cleanout
- juvenile counts at screw traps
- juvenile counts at Rocky Reach Juvenile Fish Facility
- radio tag/tracking information - adults
- PIT tag counts at various stations - adults

**Critical Questions:**
- What is the actual adult escapement over each of the mainstem Columbia River dams and how does this change over time? (implies accurate dam counts)
- What is adult escapement and spawning success at priority spawning areas?
- Where are important adult spawning locations within the Upper Columbia (and do these need to be enhanced and / or protected)?
- Where are the important juvenile rearing locations within the region (and do these need to be enhanced and / or protected)?
- What is the relative (vrs absolute) production (or productivity) of key watersheds / stream reaches?

**Primary Data Needs:**
- Accurate daily dam counts, including fishway entrance efficiency and passage efficiency.
- Identification of important known / potential spawning locations and use.
  - radio telemetry
  - spawning surveys
- Identification of important known / potential juvenile rearing locations and use.
Tasks, Responsibilities and Estimated Budgets

<table>
<thead>
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<th>Task</th>
<th>Responsibility</th>
<th>Timeframe</th>
<th>Estimated Budget</th>
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2. Fate of Adults in Reservoirs

**Objective:**
Determine fate of adults that enter into PUD reservoirs with regards to:
- movement behavior through reservoir (passage success and timing, over-winter, etc),
- mortality / predation within reservoir,
- successful entry into tributary streams.
- success in reaching spawning locations. (See status and trend).

**Scope:**
- Study period three-years under "normal" flow / reservoir conditions.
- Wells, Rocky Reach, Wanapum, Priest Rapids reservoirs.
- Okanogan, Methow, Entiat, Wenatchee rivers and Crab Creek.

**Critical Questions:**
- What are the basic movement patterns (time and space) of adults as they enter and pass through reservoirs?
- What proportion of adults reside and potentially spawn in reservoirs?
- What proportion of adults are lost to predation in reservoirs?
- What is the proportion of adults successfully moving into tributary streams and what are their basic movement patterns approaching tributary mouths.

**Primary Data Needs:**
- Time of exit from various PUD fishways.
- Time of entrance into various PUD fishways.
- Time of entrance into tributary streams.
- Location of last observation in reservoir.

**Tasks, Responsibilities and Estimated Budgets**

<table>
<thead>
<tr>
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3. Predation on Juveniles in Tailrace

**Objective:**
Determine the relative (or absolute) level of predation on juvenile lamprey in turbine boils and tailrace areas and implement measures to reduce excessive predation, as warranted.

**Scope:**
- Tailrace areas influenced by turbine outwash (boils) and approximately XXX yards downstream during times of juvenile out-migration.

**Critical Questions:**
- Are a significant (or disproportionally high) number of out-migrating juvenile lamprey being consumed by predators in the tailrace areas immediately below PUD dams? *(discuss relative abundance??)*
- What species are primarily responsible for significant predation on out-migrating lamprey.
- What management practices could be employed to significantly reduce predation in these areas?

**Primary Data Needs:**
- Presence, relative abundance and timing of potential predators in study area during juvenile lamprey out-migration timeframes.
- Presence (relative abundance??) of juvenile lamprey in study area.
- Stomach contents of predators in study area over time (compare relatively high and low presence of juvenile lamprey with stomach contents of predators).
- Inventory of cost-effective means to reduce predation in the study area.

**Tasks, Responsibilities and Estimated Budgets**

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4. Adult Passage - Tributary Streams

**Objective:**
Evaluate and correct adult passage issues in priority areas within the Upper Columbia subbasin tributary streams. *(note - five year scope - and priority areas)*

**Scope:**
- Initial focus at Dryden and Tumwater Dams (Wenatchee) and Foghorn Dam (Methow).
- Potential passage structures (i.e. culverts) in other-priority areas.

**Critical Questions:**
- To what extent are Dryden and Tumwater Dams limiting passage of adults attempting to spawn in the Upper Wenatchee River?
- To what extent is Foghorn Dam - or other irrigation or humanoid-made structures - limiting passage of adults attempting to spawn in priority Upper Columbia watersheds and stream reaches?
- What measures should be implemented to obtain cost-efficient and effective passage at dams or other structures for adult passage?

**Primary Data Needs:**
- Inventory of potential structures known or suspected to be barriers for adult passage.
- Assessment of site-specific potential passage issues that may lend to obstruction of passage.
- Information (radio telemetry or PIT Tag) suggesting passage obstruction.
- Specific recommendations detailing remedies for resolving passage issues.

**Tasks, Responsibilities and Estimated Budgets**

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5. Juvenile Entrainment (Dryden / other Irrigation structures)

**Objective:**
Evaluate and correct juvenile entrainment into irrigation facilities within priority watersheds / stream reaches in the Upper Columbia subbasin tributary streams. *(note - five year scope - and priority areas)*

**Scope:**
- Initial focus is on Dryden Dam (Wenatchee) and all major irrigation withdrawal structures within the Upper Columbia subbasins.
- Secondary focus includes minor irrigation pumping stations.

**Critical Questions:**
- To what extent does Dryden Irrigation Diversion entrain juvenile lamprey and what proportion of these are lost to the overall population?
- What are the priority irrigation ditches within the Upper Columbia subbasins that are known or likely to entrain juvenile lamprey such that these fish are lost to the local populations?
- What management actions can be taken to reduce or eliminate entrainment of juvenile lamprey into priority irrigation diversions?

**Primary Data Needs:**
- Inventory of potential structures known or suspected to entrain juvenile lamprey.
- Assessment of site-specific conditions that either will / may entrain juveniles.
- Surveys documenting entrainment.
- Technical recommendations outlining solutions for resolving entrainment issues.

**Tasks, Responsibilities and Estimated Budgets**

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*Attachment C*
6. Juvenile Propagation Research

**Objective:**
Determine / Estimate and Compare proportion of surviving larval lamprey and growth rates in laboratory environment using various feeding, light and other environmental controls) and in various stream locations to determine efficacy of using artificially propagated fish in critical research or future supplementation and recovery of upper Columbia populations.

**Scope:**
Five year evaluations in both laboratory and natural environments (stream reaches to be determined) focusing on 0-4 year age classes in growth and survival measurements. Key stream reaches to be used / evaluated identified in Pacific Lamprey Artificial Propagation and Rearing Investigations: Rocky Reach Pacific Lamprey Management Plan.

**Critical Questions:**
- What is the temporal survival of propagated larval lamprey in both the laboratory and natural environments?
- What is the rate of growth of larval lamprey produced by artificial propagation under various conditions and how does this differ from larval lamprey produced in the natural environment?
- What are the key environmental and habitat characteristics (water temperature, flow, and discharge) associated with larval growth and survival?
- What are the important foods and feeding strategies that lead to favorable / optimal growth and survival?
- What is the range for optimal densities that can be expected for early year classes in the natural environment?

**Primary Data Needs:**
- Relative survival and average growth rates / length frequencies over time, in laboratory and in natural environment.
- Survival and average growth rates compared to key environmental factors (nutrition, temperature, substrate types, water quality, photoperiod).
- In-stream environmental (temp, flow, chemistry (P:K:N) and discharge) and habitat data (substrate).

---

3 Based upon information obtained in the Art Prop and Rearing document developed by the RRFF, for key sub-objectives have been identified to guide progress towards this primary objectives, specifically: (1) Influence of rearing density, photoperiod, and water temperature on fish growth and health; (2) Identification and development of foods and rations for optimal growth and nutrition; (3) Evaluate release timing, size at release, and release of various life history stages to determine most successful time of and stage for fish stocking, and (4) Develop optimal artificial feeds to enhance growth rates at all life history stages.
• Mark/recapture data.

**Tasks, Responsibilities and Estimated Budgets**

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7. Adult Translocation Research

**Objective:**
Evaluate the success of translocated fish in producing viable redds, eggs, larvae and early age ammocoetes in key stream reaches identified in the Pacific Lamprey Artificial Propagation and Rearing Investigations: Rocky Reach Pacific Lamprey Management Plan.

**Scope:**
- Initial scope for translocation research includes mainstem Columbia River (to support PUD passage and reservoir studies), upper Wenatchee / Nason Creek, and in the mid-upper Methow River and Chewuch Creek. Re-introduction period to include 2013 - 2016 with monitoring to occur in 2013 - 2018).

**Critical Questions:**
- Do translocated fish spawn in areas determined to be of good habitat by fisheries managers?
- Are translocated adults able to produce viable redds, larvae and early-aged juveniles in areas identified by fishery managers as being of good quality for spawning and rearing?
- What is the relative success of larval production from eggs and ammocoete production from larvae?
- What were key environmental characteristics associated with this relative success?

**Primary Data Needs:**
- Genetic information from each adult translocated into the study area.
- Genetic information taken from "appropriate" number of offspring and tested for lineage to translocated adults.
- Location of tagged adult spawning.
- Estimate of total number of eggs and viable eggs within redds over time.
- Environmental characteristics (flow, substrate, temperature, gradient, stream size, for example)
- Locations and relative abundance of juvenile offspring from translocated adults.

**Tasks, Responsibilities and Estimated Budgets**

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Attachment C
## Total Annual Adult Lamprey Counts for Each Mid-Columbia Project

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<thead>
<tr>
<th></th>
<th>Priest Rapids</th>
<th>Rock Island</th>
<th>Rocky Reach</th>
<th>Wells</th>
</tr>
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<tbody>
<tr>
<td>2008</td>
<td>5083</td>
<td>880</td>
<td>368</td>
<td>7</td>
</tr>
<tr>
<td>2009</td>
<td>2714</td>
<td>375</td>
<td>278</td>
<td>9</td>
</tr>
<tr>
<td>2010</td>
<td>1114</td>
<td>318</td>
<td>268</td>
<td>2</td>
</tr>
<tr>
<td>2011</td>
<td>3868</td>
<td>886</td>
<td>618</td>
<td>1</td>
</tr>
<tr>
<td>2012</td>
<td>4025</td>
<td>1048</td>
<td>805</td>
<td>3</td>
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## Total and Percentage of migrating adult Pacific lamprey unaccounted in each of the Mid-Columbia Project Pools (no information available for Wells Project).

<table>
<thead>
<tr>
<th></th>
<th>Priest Rapids (PR)</th>
<th>Rock Island (RI)</th>
<th>Rocky Reach (RR)</th>
<th>Wells</th>
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<tbody>
<tr>
<td></td>
<td>Total Unaccounted between PR and RI</td>
<td>% Unaccounted between PR and RI</td>
<td>Total Unaccounted between RI and RR</td>
<td>% Unaccounted between RI and RR</td>
</tr>
<tr>
<td>2008</td>
<td>4203</td>
<td>83%</td>
<td>512</td>
<td>58%</td>
</tr>
<tr>
<td>2009</td>
<td>2339</td>
<td>86%</td>
<td>97</td>
<td>26%</td>
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<tr>
<td>2010</td>
<td>796</td>
<td>71%</td>
<td>50</td>
<td>16%</td>
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<tr>
<td>2011</td>
<td>2982</td>
<td>77%</td>
<td>268</td>
<td>30%</td>
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<tr>
<td>2012</td>
<td>2977</td>
<td>74%</td>
<td>243</td>
<td>23%</td>
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## Ice, LoMo, Goose, Granite

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<tr>
<th></th>
<th>Ice</th>
<th>LoMo</th>
<th>Goose</th>
<th>Granite</th>
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<tbody>
<tr>
<td>2008</td>
<td>264</td>
<td>145</td>
<td>104</td>
<td>61</td>
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<tr>
<td>2009</td>
<td>57</td>
<td>58</td>
<td>34</td>
<td>12</td>
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<tr>
<td>2010</td>
<td>114</td>
<td>29</td>
<td>114</td>
<td>15</td>
</tr>
<tr>
<td>2011</td>
<td>269</td>
<td>99</td>
<td>80</td>
<td>48</td>
</tr>
<tr>
<td>2012</td>
<td>484</td>
<td>135</td>
<td>88</td>
<td>48</td>
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Acoustic tags: fate of adults in reservoir --- where did we last see them?

HD - what percent of fish went into the tributaries?

FD - if we can fit it in, little expense and additional info.

RT - once fish go into tributaries, where do they go? How do they behave? Where do they spawn? (Then set up Index Sites below spawning areas.)

All adults with genetic information saved.

2-Year scope

Need major irrigation diversions included for RT

approximately 400 fish
Final Conference Call Minutes

Aquatic Settlement Work Group

To: Aquatic SWG Parties
From: Michael Schiewe, Chair (Anchor QEA, LLC)
Re: Final Minutes of the July 10, 2013 Aquatic SWG Conference Call

The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, July 10, 2013, from 10:00 a.m. to 11:45 a.m. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items

1. Andrew Gingerich, Bob Rose, and Jason McLellan will review logistic and coordination issues associated with the 2013 direct gamete and larval collection field season, and report the results to the Aquatic SWG (Item VI-2).

2. Andrew Gingerich, Bob Rose, and Jason McLellan will develop an agenda focusing on genetic diversity issues associated with implementation of the Wells White Sturgeon Reintroduction Program for a session at the Aquatic SWG in-person meeting on October 9, 2013 (Item VI-2).

3. Aquatic SWG representatives will consider possible white sturgeon and genetics experts to invite to participate in the white sturgeon discussions planned for the Aquatic SWG in-person meeting on October 9, 2013 (Item VI-2).

4. Douglas PUD will provide the draft Lamprey Entrance Efficiency Plan (LEE Plan) to the Aquatic SWG for a 30-day review within the next few weeks (Item VI-3).

5. Douglas PUD will provide the draft Water Quality Attainment Plan to the Aquatic SWG for review when completed (Item VI-3).

6. Bob Rose will provide the revised draft Lamprey Proposal for the Upper Columbia to the Aquatic SWG for review no later than July 19, 2013 (Item VI-5).

7. Steve Lewis will contact Andrew Gingerich regarding submittal of the final revised letter to the Federal Energy Regulatory Commission (FERC) requesting deferral of the Bull Trout Radio Telemetry Study at the Twisp Weir (Item VI-8).

8. The Aquatic SWG meeting on October 9, 2013 will be held in person (Item VII-2).
II. Summary of Decisions
   1. There were no Statements of Agreement (SOAs) approved at today’s meeting.

III. Agreements
   1. Aquatic SWG representatives present agreed to discuss logistics of the white sturgeon program, and also unresolved genetics issues, at the Aquatic SWG in-person meeting on October 9, 2013 (Item VI-2).

IV. Review Items
   1. Kristi Geris sent an email to the Aquatic SWG on July 29, 2013, notifying them that the draft Bull Trout Stranding and Take Study Plan is available for a 30-day review period, with comments due to Andrew Gingerich no later than Wednesday, August 28, 2013.
   2. Kristi Geris sent an email to the Aquatic SWG on August 9, 2013, notifying them that the draft Lamprey Entrance Efficiency and Operations Study Plan is available for a 30-day review period, with comments due to Andrew Gingerich or Chas Kyger no later than Monday, September 9, 2013.

V. Reports Finalized
   1. The final Wells Hydroelectric Project Quality Assurance Project Plan (QAPP) for Water Temperature and Total Dissolved Gas that was approved by the Aquatic SWG on May 8, 2013, and filed with FERC in June 2013, was distributed to the Aquatic SWG by Kristi Geris on July 11, 2013.

VI. Summary of Discussions
   1. Welcome, Agenda Review, and Meeting Minutes Review (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Schiewe reviewed the agenda and asked for additions or other changes to the agenda. The following revisions were requested:

   - Bob Rose requested: 1) that the White Sturgeon Collection Update be discussed at the beginning of the meeting; 2) a 2013 Adult Lamprey Passage and Enumeration Study update; and 3) a follow-up discussion on the Lamprey Proposal for the Upper Columbia.
   - Steve Lewis added an update on the Bull Trout Letter Deferring the Twisp Weir Study.

   Kristi Geris reviewed two late revisions to the revised draft June 12, 2013 meeting minutes. One revision fixed a typographical error, and the other added historical information about the past Dual-Frequency Identification Sonar (DIDSON) lamprey
passage studies. She reported that all other comments and revisions received on the
draft minutes had been incorporated. The Aquatic SWG members present approved the
June 12, 2013 meeting minutes, as revised. Patrick Verhey approved the revised draft
minutes via email on July 3, 2013.

2. **White Sturgeon Collection Update** (Andrew Gingerich): Andrew Gingerich said that the
three-by-three (3x3) and one-by-three (1x3) crosses that were delivered to Wells
Hatchery from Marion Drain are doing well, and added that the first group is
exogenously feeding. He said that in addition to the direct gamete takes, the larval
program has now started; and as of last week, 600 larval fish have been delivered to
Wells Hatchery from Lake Roosevelt. Gingerich said that fish obtained through the
larval program are further along developmentally than those from the direct gamete
takes. He said that so far, mortality is low in both programs; and added, however, that
now is a critical time period for fish survival (i.e., when fish are transitioning to feed
following the complete absorption of their yolk). Gingerich said that the Colville
Confederated Tribes’ (CCT’s) larval collection is taking place downstream of Rock Island
Dam and also in Lake Roosevelt. He said that, so far, 16 larvae have been collected from
areas downstream of Rock Island Dam. Jason McLellan added that the first indication of
spawning in the Rock Island tailrace was on July 4, 2013, and that there have been
collections at that location every two days since. He said that only a few yolk-sac larvae
have been collected from the Rock Island tailrace; and added that the first feeding
larvae will be transferred to Wells Hatchery this weekend. He also added that fishing in
the Rock Island tailrace will be suspended until that time. With regards to Lake
Roosevelt, McLellan said there has been substantial free embryo catch, and added that
a large pulse is expected anytime. He said that the CCT hopes to collect 5,000 fish from
Lake Roosevelt by the end of the week, and then plans to add to that the fish collected
downstream of Rock Island Dam.

Bob Rose asked if the CCT has encountered any problems fishing downstream of Rock
Island Dam, and McLellan replied that conditions have been good. He said that the CCT
has been fishing upstream of Crescent Bar at a location with a flat bottom that has been
good for anchor sets. He said that bottom velocities have been ideal and that debris-
loading is low. He said that the location is a great place to sample with a fair amount of
potential, and that they are just waiting for fish to develop.

Rose asked Gingerich if there have been any problems from Douglas PUD’s perspective
that would be a consideration for the program in future years. Gingerich replied that,
for this first year of Douglas PUD funding the direct gamete take program, he did not
have any concerns. He added that this question may be better suited for hatchery staff.
Gingerich noted that the program has been so successful, and that survival has been
really high thus far, that the program ended up with a lot of fish—possibly too many. He
said that perhaps in future years, delivering fewer eggs could be considered. McLellan
cautioned that with conservation aquaculture, there is often high variation in survival between crosses; he added that this is something to keep in mind before reducing egg numbers. Gingerich also added that next year, Douglas PUD plans to keep half sibling families in separate hatching jars to manage for differential success (this year, in 2013, hatching jars were separated by maternal family only for the first 3x3 cross, while the 1x3 cross was separated by both maternal and paternal family groups). Steve Lewis said that the logistics of catching fish also need to be discussed with regards to having ample staff available to sample the fish collected and to prevent over-handling of fish. Rose suggested convening a post-season meeting in August or September 2013 to review logistics and coordination issues associated with the 2013 direct gamete and larval collection field season to help inform future years for the program. He suggested that, for the initial meeting, the principals convene and then bring key discussion points back to the larger Aquatic SWG.

Pat Irle noted that there are still unresolved genetic issues that need to be addressed, that will also inform the future of the white sturgeon program. She suggested that these issues could be jointly addressed at Rose’s proposed meeting. She also recommended inviting outside experts in sturgeon genetics to participate in these discussions. Gingerich agreed with Irle that the genetic issues will require further discussion, and that inviting outside expertise is a good idea. However, at this time, he said the meeting that Rose is proposing is only meant to focus on the program mechanics of the 2013 field season. Rose agreed with Gingerich, and added that now may also be a good time to reconvene a separate meeting to discuss the genetic issues, such as those noted by Irle. McLellan said that the genetics discussion is relevant in the near term because decisions need to be made this fall regarding which fish to release in the Wells pool. He said that it is important that all of those involved in the decision-making have the right information to inform their decisions before that time.

Mike Schiewe summarized the two proposed meetings: 1) Gingerich, Rose, and McLellan will review logistic and coordination issues associated with the 2013 direct gamete and larval collection field season, and report the results to the Aquatic SWG; and 2) the Aquatic SWG will plan for an extended discussion of genetic issues and concerns associated with the white sturgeon enhancement program. Gingerich, Rose, and McLellan will develop an agenda for the second meeting, which Aquatic SWG representatives present agreed to hold in person at the Aquatic SWG meeting on October 9, 2013. Aquatic SWG representatives also agreed to suggest names of outside white sturgeon genetics experts to invite to participate in the white sturgeon discussions planned for the Aquatic SWG in-person meeting on October 9, 2013.

3. **Lamprey Entrance Efficiency Plan** (Chas Kyger): Chas Kyger said that Douglas PUD will provide the draft LEE Plan, which includes the Lamprey Operations Plan, to the Aquatic SWG for a 30-day review within the next few weeks. Kyger reminded the Aquatic SWG
that the LEE Plan is a year one requirement of the Wells FERC license that requires approval by the Aquatic SWG prior to submitting the plan to FERC in October 2013.

Andrew Gingerich noted that October 2013 is also an important deadline for two other year one requirements, including Douglas PUD’s Water Quality Attainment Plan and Article 402 Bull Trout Monitoring Plan. He explained that the Water Quality Attainment Plan outlines how Douglas PUD plans to meet water quality requirements, and added that Douglas PUD will also be providing this draft plan to the Aquatic SWG for review when completed. He said the other plan due in October 2013 is a Bull Trout Monitoring Plan that is required by Article 402 of their FERC license. He said to expect that plan soon, as well.

Steve Lewis asked if tributary interactions are incorporated in the LEE Plan. Kyger replied that the LEE Plan focuses solely on entrance efficiency and operational modifications at Wells Dam, and therefore, it does not address tributary interactions. He said, however, that the 2013 Adult Lamprey Passage and Enumeration Study will start next week and has tributary interaction aspects incorporated into the plan. Gingerich further explained that the LEE Plan is one of four sub-plans under the Pacific Lamprey Management Plan (PLMP). Each plan is specific in scope and addresses different areas in Wells Dam and its fishways to improve passage for lamprey. He said the other three plans, however, are not due until year five of the license.

4. 2013 Adult Lamprey Passage and Enumeration Study Update (Chas Kyger): Chas Kyger recalled that the 2013 Adult Lamprey Passage and Enumeration Study Plan stated that 100 lamprey would be obtained from Bonneville Dam, spread over three different trapping occasions. He noted that the plan also implied that trapping would be conducted as the need arose. He said that the Yakama Nation (YN) has already reached their quota on lamprey collection from Bonneville Dam, and that surplus fish are being held at Prosser Hatchery. Kyger asked if there were any concerns with Douglas PUD using these surplus fish for the study. He said that the fish will have been held longer than planned, but added that this may be beneficial because stress related to trapping and transfer should be lessened. He noted that the plan called for immediate collection at Bonneville and delivery to Wells Hatchery with no holding at Prosser; and that this may complicate the study. Rose added that, based on past experiences, mortalities related to the stress of trapping and transfer typically occur within the first few days of transfer; therefore, using fish that have been held longer may result in healthier fish.

Steve Lewis asked how many days total the fish would be held prior to release. Rose replied that lamprey collection at Bonneville Dam started in late June 2013 and ended around July 2, 2013. After about a 2-week holding period, the first delivery of lamprey to Wells Dam will be on July 16, 2013, and release will occur shortly thereafter. Aquatic SWG representatives present had no concerns with using the surplus fish for the study. (*Note: lamprey were delivered to Wells Dam on July 16, 2013, as planned. The transfer
of lamprey was conducted by the YN from the YN Prosser Hatchery facility; and therefore, did not require that Douglas PUD obtain a transport permit for the transfer.)

5. **Lamprey Proposal for Upper Columbia (Bob Rose):** Bob Rose recalled that an updated draft of the regional coordination plan (otherwise known as the “Lamprey Proposal for Upper Columbia”; and formerly the “Joint Fisheries Parties No-Net-Impact proposal [JFP NNI]”) was distributed to the Aquatic SWG by Kristi Geris on June 12, 2013. Rose said that fish managers are requesting that regional relicensing workgroups and forums participate in implementation of the plan as it pertains to their FERC licenses. Rose added that the plan is being revised to identify which objectives link to which PUD license. He said that, after initial revisions, the plan now has 10 objectives, as compared to the 7 it previously had. Rose explained that there is no new content, but rather the existing objectives have been reorganized. He said that objectives are now defined by tier, with tier 1 objectives being most applicable to the PUDs, and tier 2 and 3 objectives having less or no direct linkage. The idea is to be explicit and inclusive, with nothing implied. He also said that the revised plan will identify specific tasks as they relate to each objective. Rose said that he also wanted to make the Aquatic SWG aware that discussions are currently underway regarding the logistics and costs associated with double-tagging fish. He said that those conversations are occurring outside of the Aquatic SWG—not out of disrespect, but in consideration of timeline. Rose said that he still needs a few days to refine the language in the revised plan, in coordination with Washington Department of Fish and Wildlife (WDFW) and U.S. Fish and Wildlife Service (USFWS), and with whomever else would like to participate. He added that he will provide the revised draft Lamprey Proposal for the Upper Columbia to the Aquatic SWG for review no later than July 19, 2013. He said that Douglas PUD should feel free to continue reviewing and commenting on the initial draft, and those comments can still be incorporated into the new revised draft. Rose also said that it would be helpful if Douglas PUD, Chelan PUD, and Grant PUD worked together to identify and distribute roles and responsibilities, as opposed to doing so separately in each forum. Rose also added that a one-on-one conversation with Douglas PUD would be beneficial prior to the larger gathering of the PUDs.

Andrew Gingerich said that Douglas PUD is committed to implementing the PLMP; which, in some aspects is consistent, and sometimes even redundant, with the Lamprey Proposal for the Upper Columbia, or former JFP NNI proposal. He added that those elements will be easy to parse out. He said, however, that those aspects that are not consistent with the PLMP will be more difficult to support. He said that Douglas PUD is on board as far as regional coordination and participating in meetings. Chas Kyger added that Douglas PUD is also very interested in continuing coordination and sharing of data.

6. **Wells Dam Water Quality Update (Andrew Gingerich):** Andrew Gingerich said that the Wells Dam Water Quality Update for July 1 to July 7, 2013, was distributed to the
Aquatic Settlement Work Group  Page 7 of 9
July 10, 2013 Meeting

Aquatic SWG by Kristi Geris on July 9, 2013 (Attachment B). He explained that the update is titled, “Report #13,” to easily distinguish between the similar reports that Douglas PUD provides to Washington State Department of Ecology (Ecology) each week. Gingerich provided an overview of the report layout and specifically noted the three standards that the Wells Project is required to meet during the fish passage (spill) season as described on page 2 of Attachment B. He said that Table 1 on page 3 of Attachment B summarizes weekly total dissolved gas (TDG) compliance at Wells Dam. He explained that, last week, criteria were met for the 12C-High and the hourly high in the Wells tailrace; however, the 12C-High in the Rocky Reach forebay was not met. Gingerich said that it is difficult to meet standards in the Rocky Reach forebay when incoming TDG is already above the standard. He said that, last week, hot weather and drawing Lake Roosevelt levels down to provide more beach area for the holiday weekend likely contributed to the high incoming TDG. He added that, with a Fish Passage Waiver, if incoming TDG is out of compliance, as long as the project does not add TDG, the project is still in compliance. (*Note: the last condition is not written in the Washington Administrative Code [WAC], but has been verbally agreed to by Ecology.) Gingerich said that Chief Joseph Dam, however, does not have a Fish Passage Waiver; and therefore, needs to meet the Washington State standard of 110 percent year round in the Chief Joseph tailrace. Gingerich added that these findings will be summarized in a gas abatement plan (GAP) report and TDG report at the end of the year.

7. **Aquatic Nuisance Species Signage Update** (Chas Kyger): Chas Kyger said that, in May 2013, Douglas PUD posted aquatic nuisance species (ANS) signage and educational pamphlets at all project area boat launches and recreation facilities, including at the Highway 97 rest area at Wells Dam. Andrew Gingerich provided a photograph of the ANS signage and pamphlets (Attachment C) that Kristi Geris distributed to the Aquatic SWG following the meeting on July 11, 2013. Kyger said that pamphlets at some locations have already been refilled, which seems to indicate that the public is taking interest in the materials. Gingerich noted that boater surveys have also been posted at these locations. Kyger also noted that Douglas PUD will start zebra mussel sampling next week.

Steve Lewis asked about Douglas PUD’s 2013 aquatic herbicide application, and Gingerich replied that an update was distributed to the Aquatic SWG by Geris on June 21, 2013. He summarized that Triclopyr, the Chelan County Weed Board’s choice for treatment in the Entiat, is used to specifically treat milfoil, and will not affect all vegetation in the swimming areas in the Wells Pool. Gingerich added that notices for Douglas PUD’s 2013 aquatic herbicide application were distributed to the Aquatic SWG by Geris on July 9, 2013; and that application is planned for July 15, 2013. He said that Douglas PUD obtained a 3-year aquatic herbicide application permit, and so they are already permitted for treatment in 2014, if needed.
8. **Bull Trout Letter Deferring Twisp Weir Study** (Steve Lewis): Steve Lewis said that the USFWS plans to file with FERC the final revised letter requesting deferral of the Bull Trout Radio Telemetry Study at the Twisp Weir. He said that he will contact Andrew Gingerich regarding submittal of the letter.

**VII. Next Meetings**

1. **Chelan River Fish Forum Meeting** (Pat Irle): Pat Irle said that, after not meeting for a number of years, the Chelan River Fish Forum is scheduled to reconvene on August 14, 2013 at 8:00 am. Irle said that, therefore, she will be unable to attend the Aquatic SWG meeting on August 14, 2013, but plans to review the agenda once it is distributed and will be prepared to provided Ecology input, if necessary, prior to the meeting.

2. **Upcoming meetings** (Mike Schiewe): *August 14, 2013 (conference call); September 11, 2013 (conference call); and October 9, 2013 [in person]*.

**List of Attachments**
Attachment A – List of Attendee
Attachment B – Wells Dam Water Quality Update for July 1 to July 7, 2013
Attachment C – Photograph of the ANS signage and pamphlets
## List of Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mike Schiewe</td>
<td>SWG Chair</td>
<td>Anchor QEA, LLC</td>
</tr>
<tr>
<td>Kristi Geris</td>
<td>Administration/Technical Support</td>
<td>Anchor QEA, LLC</td>
</tr>
<tr>
<td>Andrew Gingerich</td>
<td>SWG Technical Representative</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Chas Kyger</td>
<td>Technical Support</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Pat Irle</td>
<td>SWG Technical Representative</td>
<td>Washington State Department of Ecology</td>
</tr>
<tr>
<td>Steve Lewis</td>
<td>SWG Technical Representative</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>Bob Rose</td>
<td>SWG Technical Representative</td>
<td>Yakama Nation</td>
</tr>
<tr>
<td>Jason McLellan</td>
<td>SWG Technical Representative</td>
<td>Colville Confederated Tribes</td>
</tr>
</tbody>
</table>
In-Season Fish Passage TDG Report # 13
Wells Hydroelectric Project
FERC No. 2149

Update for July 1st- July 7th 2013

Prepared by:
Public Utility District No. 1 of Douglas County
1151 Valley Mall Parkway
East Wenatchee, WA 98802-4497

Prepared for:
Pat Irle
Hydropower Projects Manager
Washington Department of Ecology
15 W. Yakima Avenue, Suite 200
Yakima, WA 98902-3452
Wells Hydroelectric Project

The Wells Hydroelectric Project (Project) is owned by Public Utility District No. 1 of Douglas County (Douglas PUD) and operated under License No. 2149 from the Federal Energy Regulatory Commission (FERC). The Project is located at river mile 515.6 on the Columbia River. The Project is the ninth hydroelectric project from the mouth of the Columbia River, and is the last project on the Columbia with fish passage facilities.

The Wells Project is a run-of-river hydroelectric project, with limited reservoir storage capacity and a 10 feet operating range. On average, daily inflows equal daily outflows. The Wells Project is a hydrocombine design, with eleven spillbays located vertically above ten Kaplan turbine units, with upstream fish passage facilities located at each end of the concrete dam structure. The maximum hydraulic capacity of the ten units is approximately 220,000 cubic feet per second (cfs); flows in excess of hydraulic capacity must be spilled through the spillbays.

Regulatory Framework

The Wells Project is required to meet the State of Washington Water Quality Standards (WQS) promulgated under Washington Administrative Code (WAC) Chapter 173-201A. The upper criterion for total dissolved gas (TDG) saturation is 110% when river flows are less than the highest seven consecutive days average observed during a ten-year period (7Q-10 flow). The 7Q-10 flow for the Wells Project is 246,000 cfs, based on the hydrologic records from 1930 to 1998.

Ecology may also approve an exception to the 110% upper criterion for TDG saturation during the outmigration of juvenile salmon; fish passage spill is used to facilitate project passage survival. The TDG exception is considered by Ecology on a per-application basis and must be accompanied by an approved Gas Abatement Plan (WAC 173-201A-200(1) (f) (ii)). On the Columbia and Snake rivers, the TDG exception for fish passage has three standards during the fish passage (spill) season:

1. TDG shall not exceed 125% saturation in the tailrace of the project as measured in any one-hour period;

2. TDG shall not exceed 120% saturation in the tailrace of the project based on the average of the twelve highest consecutive hourly readings in any one day (12C-High); and,

3. TDG shall not exceed 115% saturation in the forebay of the next downstream project based on the average of the twelve highest consecutive hourly readings in any one day.

Ecology approved the 2013 Wells Project Gas Abatement Plan and TDG exception in February 2013.
TDG Compliance

Table 1 displays the weekly TDG summary for Wells Dam. Compliance information is collected for the three TDG standards including the 12-C high 120% and hourly 125% standard in the Wells tailrace and the 12-C High 115% standard at the Rocky Reach Forebay. Highlighted cells represent violations of the standard and non-highlighted cells are values within an acceptable range of the specific standard.

Table 1. Weekly TDG compliance table

<table>
<thead>
<tr>
<th>Date</th>
<th>Wells Tailrace</th>
<th>Rocky Reach Forebay</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12- C High (120%)</td>
<td>Hourly High (125%)</td>
</tr>
<tr>
<td>1-J ul</td>
<td>118.6</td>
<td>119.5</td>
</tr>
<tr>
<td>2-J ul</td>
<td>119.3</td>
<td>120.1</td>
</tr>
<tr>
<td>3-J ul</td>
<td>119.9</td>
<td>120.4</td>
</tr>
<tr>
<td>4-J ul</td>
<td>117.6</td>
<td>119.7</td>
</tr>
<tr>
<td>5-J ul</td>
<td>116.9</td>
<td>117</td>
</tr>
<tr>
<td>6-J ul</td>
<td>117.1</td>
<td>118.1</td>
</tr>
<tr>
<td>7-J ul</td>
<td>115.5</td>
<td>116.3</td>
</tr>
</tbody>
</table>

Notes

- Since June 29th Rolling 12-C high in the Wells Forebay has been above 112% (daily values ranging between 112.0-113.6). WA state standard in the Wells forebay is 110% and has been in violation as a result of FCRPS TDG production upstream of Wells Dam.
- Average flow at Wells from July 1st - July 7th was 204.9 kcfs.
- Flows have been falling since July 7th, following a ten day period of high flows.

Biological Monitoring

None conducted.
The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, August 14, 2013, from 10:00 a.m. to 11:30 a.m. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items

1. Chas Kyger will verify the detection range of the radio-telemetry (RT) antennae that are being used in the 2013 Adult Lamprey Passage and Enumeration Study, and report back to the Aquatic SWG (Item VI-2).

2. An Upper Columbia White Sturgeon Workshop will be held on September 10, 2013, at Douglas PUD in East Wenatchee, Washington (Item VI-3).

3. Bob Rose will provide a draft agenda for the Upper Columbia White Sturgeon Workshop to the Aquatic SWG no later than Friday, August 16, 2013; the draft agenda will be structured by key management questions and will also include a presentation during the morning session by Andrea Drauch Schreier of University of California, Davis (UC Davis) (Item VI-3).

4. Chad Jackson will provide details regarding the white sturgeon broodstock fish health screening results via email to Kristi Geris for distribution to the Aquatic SWG (Item VI-3). *(Note: Jackson provided a summary of the white sturgeon broodstock fish health screening results, which Geris distributed to the Aquatic SWG on August 16, 2013.)*

5. Andrew Gingerich will provide a draft Conflict of Interest Policy to the Aquatic SWG for a 2-week comment period; the draft policy will largely be shaped after the HCP Hatchery Committees’ current policy, which was distributed prior to the conference call as an example of a working conflict of interest policy (Item VI-6).

6. The Aquatic SWG meeting on October 9, 2013 will be held in person (Item VII-1).
II. Summary of Decisions
   1. There were no Statements of Agreement approved at today's meeting.

III. Agreements
   1. Aquatic SWG representatives present agreed to hold the Upper Columbia White Sturgeon Workshop on September 10, 2013, at Douglas PUD in East Wenatchee, Washington (Item VI-3).

IV. Review Items
   1. Kristi Geris sent an email to the Aquatic SWG on July 29, 2013, notifying them that the draft Bull Trout Stranding and Take Study Plan is available for a 30-day review period, with comments due to Andrew Gingerich no later than Wednesday, August 28, 2013.
   2. Kristi Geris sent an email to the Aquatic SWG on August 9, 2013, notifying them that the draft Lamprey Entrance Efficiency (LEE) and Operations Study Plan is available for a 30-day review period, with comments due to Andrew Gingerich or Chas Kyger no later than Monday, September 9, 2013.
   3. Kristi Geris sent an email to the Aquatic SWG on August 26, 2013, notifying them that the draft Spill Prevention Control and Countermeasures (SPCC) Plan is available for review, with comments due to Andrew Gingerich no later than Tuesday, October 1, 2013.
   4. Kristi Geris sent an email to the Aquatic SWG on August 27, 2013, notifying them that the draft Conflict of Interest Policy is available for review. The draft policy will be up for approval at the Aquatic SWG meeting on October 9, 2013.
   5. Kristi Geris sent an email to the Aquatic SWG on August 27, 2013, notifying them that the draft Water Quality Attainment Plan (WQAP) is available for review, with comments due to Andrew Gingerich no later than Tuesday, October 1, 2013.

V. Reports Finalized
   1. There are no reports that have been recently finalized.

VI. Summary of Discussions
   1. Welcome, Agenda Review, and Meeting Minutes Review (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Schiewe reviewed the agenda and asked for additions or other changes to the agenda. The following items were requested as additions to the White Sturgeon Collection/Wells Fish Hatchery Rearing Update agenda item:
      - Bob Rose added a Marion Drain Sturgeon Hatchery update, and a discussion on an Upper Columbia White Sturgeon Workshop.
• Chad Jackson added a brief update on white sturgeon broodstock health results.

The revised draft July 10, 2013 meeting minutes were reviewed. Kristi Geris said that she incorporated a “Review Items” section into the meeting minutes’ template that tracks items that are currently available for Aquatic SWG review, and added that currently, these items include the draft Bull Trout Stranding and Take Study Plan and draft LEE and Operations Study Plan. She also added under the “Reports Finalized” section the distribution of the final Wells Hydroelectric Project Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas that was approved by the Aquatic SWG on May 8, 2013, and filed with the Federal Energy Regulatory Commission (FERC) in June 2013.

Geris said there was also one outstanding comment remaining to be discussed regarding the Fish Passage Waiver that was referenced during last month’s Wells Dam Water Quality Update. Andrew Gingerich explained that if the forebay total dissolved gas (TDG) is out of compliance, as long as the project does not add TDG, the project is still considered in compliance. He said that this exemption is not written in a Washington Administrative Code (WAC), but has been verbally agreed to by the Washington State Department of Ecology (Ecology). This clarification will be reflected in the final July 10, 2013 meeting minutes.

Patrick Verhey also requested that the 2013 Adult Lamprey Passage and Enumeration Study Update reflect that lamprey were delivered to Wells Dam on July 16, 2013, as planned, and that the transfer of lamprey was conducted by the Yakama Nation (YN) from the YN Prosser Hatchery facility. Therefore, the transfer did not require that Douglas PUD obtain a transport permit.

The Aquatic SWG members present approved the July 10, 2013 meeting minutes, as revised. Pat Irle provided Ecology’s approval of the revised draft minutes via email on August 19, 2013.

2. **2013 Adult Lamprey Passage and Enumeration Study Update** (Chas Kyger): Chas Kyger said there have been a total of three releases for the 2013 Adult Lamprey Passage and Enumeration Study, on July 16, 23, and 30, 2013, as follows:

<table>
<thead>
<tr>
<th>Release Location</th>
<th>Tagging</th>
<th>Release Group Size*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wells Dam tailrace</td>
<td>PIT-tagged and radio-tagged</td>
<td>83</td>
</tr>
<tr>
<td>(Approximately 1.5 miles downstream of Wells Dam)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wells Dam fish ladders</td>
<td>PIT-tagged and radio-tagged</td>
<td>18</td>
</tr>
<tr>
<td>Wells Dam tailrace</td>
<td>PIT-tagged only</td>
<td>5</td>
</tr>
</tbody>
</table>
Kyger said that Douglas PUD is expecting an additional 25 lamprey from Priest Rapids (PR) next week and he thanked Washington Department of Fish and Wildlife (WDFW) for their help in obtaining the necessary transfer permits required to meet study objectives.

Kyger said that based on data downloaded from the RT stations, 16 of the 106 total lamprey have been detected past Wells Dam; 12 of those have entered the Methow River. He said that 48 of the 83 total radio-tagged lamprey that were released 1.5 miles below Wells Dam still have not been detected. *(Note: Kyger later clarified the distinction between numbers detected, versus numbers passed; noting that the two are separate subsets of the totals.)* He said that mobile tracking efforts detected four lamprey last week, and another mobile tracking effort is planned for this week. He said that Douglas PUD is planning for one more release group on August 21, 2013, provided that the additional lamprey are obtained from PR; Douglas PUD plans to continue monitoring and downloading data for the next 2 to 3 months, for the remainder of the tag lives. Mike Schiewe asked about the distribution of release groups among those detected. Kyger replied that the first two release groups made up the majority of those that have been detected above Wells Dam. He added that only four or five of the total ladder releases have not been detected and were assumed to be still in the fish ladders, but the remainder have passed. He said that the majority of the tailrace releases have not been detected.

Andrew Gingerich said that the new FS2020 Half-duplex PIT-tag detection arrays installed in the Wells Dam East and West Fish Ladders have been obtaining useful PIT-tag data in pool 19; and that there is also video of lamprey passing the count window. Bob Rose asked about the detection range of the RT antennae located at the entrance of Wells Dam, and Kyger said that he will verify the detection range with LGL Limited Environmental Research Associates, and report back to the Aquatic SWG. Rose noted that this information would be useful in measuring entrance efficiency. Gingerich said that the RT antennae used during mobile tracking was able to detect a fish in about 35 feet, and Rose added that he expects something similar for those located at the entrance of Wells Dam.
Rose asked when a report with findings can be expected. Kyger replied that the radio tags have a 162-day tag life, and preliminary results should be available shortly thereafter. He said that a final report can be expected sometime next spring.

3. **White Sturgeon Collection/Wells Fish Hatchery Rearing Update** (Andrew Gingerich): Andrew Gingerich said that collections are now complete for both the direct gamete and larvae programs, and added that about 70,000 sturgeon are now on station. He said the fish are doing well and a protocol for culling excess fish is needed. Gingerich said that about 3,500 larval fish were collected from Lake Roosevelt, and survival has been greater than 90%. He said that these survival numbers are encouraging, especially compared to the 30% survival that has been observed in the past at Sherman Creek, which he speculated to be connected with rearing fish on cold well water. Gingerich said that the water source for the Wells sturgeon facility was recently switched from one well to another (called forebay and monument wells, respectively), due to complications with the water heater. He said that although fish are taking feed well, growth has been delayed due to colder water conditions. He said, however, that he is hesitant to put warmer water on the fish because he is not confident that the water temperature can be controlled. He said that a new controller card for the water heater is being installed today that will hopefully remedy the issue.

Jason McLellan further explained details of the collection of larvae by the Colville Confederated Tribes. He said that larval collection took place at two locations: Wanapum Pool and Lake Roosevelt. He said that the Wanapum Pool collections included a total of 82 sets, averaging 23 hours per set. Total frame hours fished was 1,892 hours over 16 days. Fishing effort was planned around when larvae were expected to be available based on collection of eggs by Golder Associates at Rock Island Dam. McLellan said that during this effort, only 43 larvae and 10 free embryos (yolk-sac larvae) were collected, and noted that for such an extensive effort, this was a fairly low catch. McLellan suggested that the cause of this low catch may be low productivity, and/or that reduced flows at night (due to power peaking) may have affected larvae drift. In an attempt to compensate for nightly low flows, nets were relocated to areas with higher nighttime velocities. McLellan said that Lake Roosevelt collections included a total of 164 sets, averaging 2 to 3 hours per set. Total frame hours fished was approximately 400 hours over 19 days. Staff collected approximately 5,000 larvae and 700 free embryos. McLellan said that 4,100 larvae were transferred to Wells Hatchery. He said that of the roughly 900 larvae that were not transferred to Wells Hatchery, some were mortalities, and some were transferred to Sherman Creek Hatchery for the Spokane Tribe of Indians’ Lake Roosevelt program. *(Note: these data are preliminary and are subject to change.)*

**Marion Drain Sturgeon Hatchery** (Bob Rose): Bob Rose said that the YN has a Bonneville Power Administration (BPA) Accords project through the Columbia River Inter-Tribal Fish
Commission (CRITFC) to identify potential locations for a sturgeon facility. He said that, after a lengthy screening and planning process, a decision has recently been made to devote the majority of CRITFC Sturgeon Hatchery Accord funds to the Marion Drain facility. Rose said that a considerable amount of planning has already been completed, and upgrades to the Marion Drain facility should be complete within 2 to 3 years. He added that substantial improvements are expected—almost doubling the size of the facility. Rose said that the YN is now tasked with developing contracts, and added that they plan to meet soon with the Northwest Power and Conservation Council and BPA to discuss more on the process for moving forward. Rose said that there is interest in collecting juveniles in the lower Columbia River, and there are ongoing discussions about how to conduct more research in the lower Columbia River with existing funds. Rose said that he will keep the Aquatic SWG informed as the process moves forward.

Upper Columbia White Sturgeon Workshop (Bob Rose): Bob Rose said that after exchanging several emails, September 10, 2013, was identified as the best possible date for interested parties to hold an Upper Columbia White Sturgeon Workshop. He said that no other dates in September aligned with respective schedules, and the workshop would need to be pushed into October if September 10 did not work out. Rose said that Andrew Gingerich provided ideas for a draft agenda that he plans to develop and distribute once complete. Gingerich noted the importance of, and strongly encouraged, each Aquatic SWG members’ participation in this workshop. Mike Schiewe reminded the Aquatic SWG that the in-person meeting on October 9, 2013, was identified as the time to have an in-depth discussion on Wells white sturgeon. Rose noted that the October 9 meeting also aligns with the September 10 workshop date, so that certain components can be discussed prior to any Aquatic SWG decisions. Jason McLellan said that his concern about the proposed September 10 date is that sturgeon geneticist, Andrea Drauch Schreier of UC Davis, will not be available that week. Gingerich replied that although Drauch Schreier will not be able to physically attend the workshop, she is available to attend via WebEx. McLellan said that he supports the September 10 workshop date as long as Drauch Schreier can participate; and added that Drauch Schreier has conducted a lot of work on stock structure, which is one of the key discussions that needs to take place. McLellan also said that Drauch Schreier planned to provide a presentation. Schiewe agreed that several issues are tied to stock structure, and that the workshop should be rescheduled should Drauch Schreier not be able to attend. Gingerich noted that another benefit of the September 10 date is that the Aquatic SWG monthly meeting is the following day on September 11, 2013, which will provide opportunity for a more focused discussion within the SWG.

Rose said that the draft agenda is currently split into a morning session and afternoon session, as follows:

- 9:00 a.m. Welcome, Introductions, and Agenda Overview
- 9:20 a.m. Principles of the Past
Rose suggested participants bring a sack lunch so that discussions can continue through lunch. He said that once Drauch Schreier provides her presentation, additional presentations and discussions can take place for the remainder of the day. McLellan questioned whether the afternoon session, alone, would provide adequate time for presentations and all needed discussions. Rose agreed and suggested removing items from the morning session to free up some time. Schiewe suggested moving Drauch Schreier’s presentation to before lunch, and consolidating material from the morning session, rather than removing it. Schiewe suggested that the first part of the workshop focus on identifying: 1) what is on-hand now in terms of numbers and sources; and 2) what FERC requires. He added that the latter needs to be informed by stock issues and concerns. He said that this discussion should then be followed by the genetics discussion. McLellan also suggested that the draft agenda be structured by specific management questions, and added that this will help inform procedures in the future. He also noted the need to incorporate a certain level of background information within the frame of the discussions. Rose said that it seems feasible to consolidate the morning session into a single hour. He said that he will provide a new draft agenda for the Upper Columbia White Sturgeon Workshop to the Aquatic SWG no later than Friday, August 16, 2013. He said that the draft agenda will be structured by key management questions, and will also include a presentation during the morning session by Drauch Schreier of UC Davis. The Aquatic SWG agreed to hold the Upper Columbia White Sturgeon Workshop on September 10, 2013, at Douglas PUD in East Wenatchee, Washington.

**White Sturgeon Broodstock Health Results** (Chad Jackson): Chad Jackson said that WDFW received the white sturgeon broodstock health results back from the U.S. Fish and Wildlife Service (USFWS) Idaho Fish Health Center in Orofino, Idaho. *(Note: this topic was originally discussed at the Aquatic SWGs meeting on May 8, 2013.)* Jackson said that all pathogens tested for were negative, and added that he will provide additional details regarding the fish health screening via email to Kristi Geris for distribution to the Aquatic SWG. *(Note: Jackson provided a summary of the white sturgeon broodstock fish health screening results, which Geris distributed to the Aquatic SWG on August 16, 2013.)* Jackson said that once the recently collected larvae grow
larger, they will also be subjected to fish health screening. He said that reduced sampling will also be conducted on approximately 60 larvae that were recently collected at a location downstream from Rock Island Dam.

4. **Bull Trout Stranding and Take Study Plan – Review Reminder** (Andrew Gingerich): Andrew Gingerich said that the draft Bull Trout Stranding and Take Study Plan was distributed to the Aquatic SWG by Kristi Geris on July 29, 2013; the draft plan is available for a 30-day review period, with comments due to him no later than Wednesday, August 28, 2013. He also noted that the draft LEE and Operations Study Plan was also distributed to the Aquatic SWG by Geris on August 9, 2013; the draft plan is available for a 30-day review period, with comments due to him or Chas Kyger no later than Monday, September 9, 2013. Gingerich noted the importance of meeting these deadlines because Douglas PUD needs to file these documents with FERC by October 2013. He said that Douglas PUD also hopes to distribute the draft Water Quality Attainment Plan for comments and revisions prior to next month’s meeting, so a more final version can be approved on the September 11, 2013 conference call.

5. **Lamprey Proposal for Upper Columbia** (Bob Rose): Bob Rose said that the Lamprey Proposal for Upper Columbia (formerly the “Joint Fisheries Parties No-Net-Impact Proposal [JFP NNI]”) is still under revision, and added that a fair amount of work has been done with the PUDs to tie the respective licenses to lamprey activities. Rose noted that it would be helpful to discuss the proposal with Douglas PUD soon, and added that he would also like to convene a workgroup with the other PUDs to further discuss a path forward. He said that as the revised proposal is nearing completion, he is also interested in identifying cost-share partnerships. He said that he has been working with USFWS, and has identified a few prospective partnerships. Rose suggested a 2- to 3-hour discussion to piece things together; however, he noted that he will be unable to attend next month’s Aquatic SWG meeting.

6. **Conflict of Interest** (Mike Schiewe): Mike Schiewe said that an example conflict of interest policy (Attachment B) was distributed to the Aquatic SWG by Kristi Geris on August 2, 2013. He explained that a conflict of interest policy is typically a standard requirement of committees or working groups responsible for reviewing proposals and recommending funding. He said that Attachment B is the HCP Hatchery Committees’ policy, which was modeled after the HCP Tributary Committees’ policy, and which also incorporates definitions from the National Institute of Health protocol for convening review groups. He said that there is nothing new or unusual about this policy, and that Attachment B is intended to serve as a draft for initial comments. He said that Pat Irle has indicated interest in participating in this discussion. Andrew Gingerich said that he will use Attachment B as a template to develop a draft Conflict of Interest Policy for the Aquatic SWG, and that once complete, he will provide the draft to the Aquatic SWG for review.
Bob Rose said that he thought “professional relationships,” as described in Attachment B, needed additional clarification. He also expressed concern about the inability of conflicted parties to participate in project review. He said that, in many cases, the conflicted parties are the key parties with the expertise. Rose added that he would not want the only people who have expertise to be excluded from the review process. Schiewe explained that, as implemented in the HCP Hatchery and Tributary Committees, the non-conflicted parties have the option to include a conflicted party in the discussion of a project under review—but that a conflicted party cannot participate in the decision-making. Schiewe said that the HCP Hatchery Committees’ policy was introduced initially on an interim basis, for a 2-year trial. He said that there was never a need to implement the policy during the interim 2-year trial; and so in January 2013, the policy was extended for an additional 2-year trial. Schiewe suggested implementing a similar interim 2-year trial for the Aquatic SWG Conflict of Interest Policy.

VII. Next Meetings
1. Upcoming meetings (Mike Schiewe): September 11, 2013 (conference call); October 9, 2013 [in person]; and November 13, 2013 (conference call).

List of Attachments
Attachment A – List of Attendees
Attachment B – Example Conflict of Interest Policy
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<th>Name</th>
<th>Role</th>
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<tr>
<td>Mike Schiewe</td>
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<tr>
<td>Patrick Verhey</td>
<td>SWG Technical Representative</td>
<td>Washington Department of Fish and Wildlife</td>
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<td>Chad Jackson</td>
<td>Technical Support</td>
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<td>Bob Rose</td>
<td>SWG Technical Representative</td>
<td>Yakama Nation</td>
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<td>Jason McLellan</td>
<td>SWG Technical Representative</td>
<td>Colville Confederated Tribes</td>
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Conflict of Interest Policy
HCP Hatchery Committees
16 January 2013

Approved January 2013
Term: 2 years

Introduction

Members of the Wells, Rocky Reach, and Rock Island Habitat Conservation Plans Hatchery Committees (HC members) represent a variety of federal, state, and tribal governments, and Douglas and Chelan County Public Utility Districts (PUDs). In the normal course of business, HC members are periodically called upon to prepare Requests for Proposals (RFPs), and review and recommend funding for research, monitoring, or evaluation proposals and study plans; some of which may have been prepared by HC members, their professional colleagues, persons with whom they may share a personal relationship, or where there may be a financial interest. Because the HC members recognize that such relationships may influence or appear to influence a member’s judgment or views regarding the merits of a proposal or study plan, or the capability of an organization or individual to undertake a study, the HC has established the following policy for managing conflicts of interest.

Conflict of Interest Policy

General Approach

HC members have a personal responsibility to alert the HC of any possible conflict of interest that may influence or appear to influence their position on a proposed study or program. The HC Chair will request disclosure of possible conflict of interest by the committee members prior to discussion or decisions on proposed studies or programs. On a case-by-case basis, the HC shall determine whether a particular situation presents a potential conflict of interest that needs to be addressed, and the HC may require HC members to recuse themselves from the discussion of a proposal or study plan, from formal review of a proposal or study plan, or from a decision to approve or reject a proposal or study plan. The HC may decide to allow a member with a potential conflict of interest to participate by a simple majority vote. HC members may employ an alternate HC member in cases where such action removes the conflict, avoiding disenfranchisement of his/her member organization. Among the HC members, the PUD representatives are in the unique position of responsibility for, and funding of, all HCP studies and programs, and thus have an interest in all outcomes of the HC. For purposes of this policy,
this position will not be considered a conflict of interest, and therefore, the PUD representatives shall participate in all funding decisions within the HC.

Definitions

For the purposes of this policy, conflicts of interest may include the following situations:

- Employment: The situation where Principal Investigator (PI) or key personnel are employees of a HC member’s employing organization

- Personal relationships: The situation where PI or key personnel are the spouse or domestic partner, parent, sibling, child, father-in-law, mother-in-law, brother-in-law, sister-in-law, son-in-law, or daughter-in-law of a HC member

- Professional relationships: The situation where PI or key personnel have a history of regular professional collaboration with a HC member

- Financial benefit: The situation where a HC member has a financial interest in the approval and award of a proposal

Preparation of RFPs

HC members or third parties involved in developing a RFP shall not submit a proposal for that RFP as a PI or key personnel. HC members will automatically recuse themselves from the RFP development process if they plan to submit a proposal.

Review of Proposals

HC members shall not participate in the HC review of proposals prepared by a PI or key personnel where there is a conflict of interest due to employment, personal relationships, professional relationships, or financial benefit (as defined in the Definitions section). HC members will automatically recuse themselves from voting on these studies. However, at the discretion of the HC, a HC member with a conflict of interest may on a case-by-case basis participate in discussion of a proposal or study plan.
Final Mid-Columbia Regional Sturgeon Workshop
Minutes

To: Aquatic SWG Parties

From: Kristi Geris (Anchor QEA, LLC)

Re: Final Minutes of the Mid-Columbia Regional Sturgeon Workshop

The Mid-Columbia Regional Sturgeon Workshop was held at Douglas PUD headquarters in East Wenatchee, Washington, on Tuesday, September 10, 2013, from 9:00 a.m. to 3:00 p.m. Attendees are listed in Attachment A of these workshop minutes.

I. Summary of Discussions

1. Purpose and Introductions (Tracy Hillman and Andrew Gingerich): Tracy Hillman welcomed the attendees (attendees are listed in Attachment A) and opened the meeting. He said that the purpose of this first annual Mid-Columbia Regional Sturgeon Workshop is to review project achievements and lessons learned; and also to fulfill an Aquatic Settlement Work Group (SWG) request for a workshop to review genetic considerations in advance of implementing the Aquatic Settlement Agreement (ASA) White Sturgeon Management Plan (MP). Andrew Gingerich said that in April 2013, the Aquatic SWG signed a Statement of Agreement (SOA) stating that during the first 4 years of Douglas PUD’s white sturgeon collection efforts (2013), Douglas PUD would conduct both broodstock and larval programs. He said this SOA was signed with the understanding that following collection, both programs would be revisited to discuss further actions for the first year of stocking. Gingerich said that he hoped to have discussions about current, best available information that can help inform decisions regarding Wells’ first year of stocking and beyond.

2. Principles of Past Management Direction (Bob Rose): Bob Rose said that this workshop is an opportunity to reflect on what has been done and to identify opportunities for the future. He said that the best indicator of success has been the professional manner in which this group has moved the white sturgeon program forward in the Mid-Columbia, despite the several logistical uncertainties at the start of the program. He said, now there are only a few pending issues that are unresolved, pertaining to broodstock collection and the issue of genetics. He added that a strategy needs to be developed
that outlines how to obtain fish throughout the entire spectrum, as well as where to obtain fish such that genetic diversity is maximized. Rose said that he feels that enough background work has been done to move the program even further forward, and more is learned each day through the ongoing monitoring programs. He said that the Yakama Nation (YN) and the Columbia River Inter-Tribal Fish Commission (CRITFC) recently broke ground on plans for renovations to the Marion Drain Facility; and he said that the renovations will largely be shaped by Mid-Columbia and Bonneville Power Administration (BPA) programs.

3. **Summary of Mid-Columbia Program Activities and Achievements** (Yakama Nation, Washington Department of Fish and Wildlife, Grant PUD, Chelan PUD, Douglas PUD):

   **Yakama Nation** (Bob Rose): Bob Rose said that BPA, CRITFC, and the YN are currently developing a conceptual design for the new Marion Drain Facility. He said that he anticipated that the design will be complete within a year, and that this design will also accommodate implementation of monitoring strategies. The process will then move to 85 to 90 percent design, including a thorough review of fish management. Lastly, the plans will go to the Independent Scientific Review Panel (ISRP) for review. Rose said that he expects renovations at Marion Drain to be completed within 2 to 2.5 years. He said that Ringold Hatchery is also being considered for certain components of the program; and that Walla Walla Community College has also expressed interest in participating in a lamprey program. Rose said that visitors are welcome to view the facility during construction, and that he anticipates the facility to double in size. He said that certain details are still being ironed out and that contractors will be on site soon. Rose added that CAD drawings should be drafted by mid-winter to help visualize what the renovated facility will look like.

   Tracy Hillman asked what the capacity of the new facility will be, and Rose replied that it is planned to be approximately 20,000 juvenile sturgeon. Rose said that the facility will have the capacity to hold broodstock year-round, but if broodstock are not held year-round, then the juvenile component might be expanded. Chad Jackson asked if construction will require an Environmental Impact Statement (EIS) and associated review. Rose said that they plan to consult BPA environmental compliance staff, and that an Environmental Assessment (EA) is definitely being considered. Mike Clement asked about stocking capacity at the new facility, and Rose replied that those details have not been discussed and will likely be reviewed by CRITFC.

   **Washington Department of Fish and Wildlife** (Chad Jackson): Chad Jackson said that Washington Department of Fish and Wildlife (WDFW) is not directly involved with collection and stocking; rather, WDFW is more involved with: 1) permitting; 2) providing WDFW facilities as satellite facilities; and 3) fish health coordination. He said that WDFW has been filling in the gaps and helping where needed. Pat Irle asked if WDFW is
taking on a management role with white sturgeon in the Mid-Columbia, and Jackson replied that WDFW represents the State of Washington’s interest to ensure that fish are handled appropriately.

_Grant PUD_ (Mike Clement and Paul Grutter): Paul Grutter said that in 2013, Grant PUD had four key objectives: 1) release 2012 Marion Drain broodstock in May 2013; 2) collect 2013 broodstock in June 2013; 3) monitor natural production and spawning to evaluate the potential to capture eggs on a mass scale; and 4) monitor acoustic tags.

Grutter said that 2012 Marion Drain broodstock were initially tagged in two groups: a main group of 2,000, and an additional back-up group of 782. He said that because there were several groups of fish on station, another 1,000 fish were tagged for release, for a total of 3,782 fish tagged and released. He said that fish were released from both Marion Drain and Columbia Basin Hatchery into the Wanapum and Priest Rapids pools on May 14 and 15, 2013. He noted that the average release size of Columbia Basin Hatchery fish was about 270 millimeters (mm); and at Marion Drain, at the time of tagging, average fish size was already 292 mm. He reviewed the different types of tags deployed, and noted that there were some incidents of tag shedding.

Grutter said that collection of 2013 broodstock started on June 1, 2013. He said that 17 wild sturgeon were caught using a set line, and 23 were caught by angling, using two boats. He said that three fish went to the hatchery—two males and one female. Grutter also said that several large females were caught, but they were not ready to spawn.

Grutter said that only 2 weeks were budgeted to monitor natural spawning, in contrast to the typical 2-month program when the goal is to capture the entire spawning season. He said that, instead, efforts were maximized for egg capture. He said that eggs were captured and incubated in July 2013. Grutter added that they used a prototype incubator that used fibrous material to suspend panels in the incubator to avoid the need for handling the eggs. Theoretically, the eggs would hatch and embryos would drain into a collection chamber. Grutter reported low success with this method, and suggested that embryos were lost due to structural issues. He said, however, that 29 larvae were still collected from a couple of different methods.

Andrew Gingerich asked if there is a way to gauge the development of female sturgeon to predict when they will be ready to spawn. Paul Anders said that this can be gauged by looking at the eggs—he said that a “F4” will likely be ready to spawn the following year, and an “F3” would be ready to spawn in approximately 2 years. Larry Hildebrand agreed that an “F4” (i.e., having black eggs) will spawn the following year; and he said that the timing for anything beyond an “F4” is likely to be influenced by a number of factors, such as diet and diel effects. Mike Clement said that Golder Associates had
been able to collect eggs that represented six to seven different spawning events. He said that this implies that F5 females are not effectively being collected, and also suggests that there are more spawning brood present. Hildebrand said they know that more fish are located below Rock Island Dam based on tracking in previous years; however, they were unable to capture them. Jim Powell added that they are either not catching them, or they are not accurately locating where they are spawning.

**Chelan PUD (Lance Keller):** Lance Keller said that in 2013, Chelan PUD contracted Blue Leaf Environmental, Inc. to conduct brood collection efforts, which took place downstream of McNary Dam on May 16 through 25, 2013, and on May 30 and 31, 2013. He said that Chelan PUD borrowed Grant PUD’s trailer and also received great support from Marion Drain staff as well. Keller said that, in general, there was greater success in 2013 than in 2012. He said that in the first few days of collection, four females were captured and transported to Marion Drain; three of which contributed to a three-by-three (3x3) cross. He said that nine males were also taken to the hatchery, and that a total of 23 mature adult fish were captured. He said that all females captured were taken to Marion Drain, but that several males were released because they had reached hatchery capacity. He added that they had never needed to do that before. Keller said that the success of the 3x3 cross was split between Columbia Basin Hatchery and Chelan Falls. Keller said that in order to keep more males, additional females would be needed. Jim Powell added that, genetically, there is no significant advantage from increasing the cross to a 6x6. Paul Anders said that, ideally, obtaining fish over many years would be best.

Keller said that regarding juvenile stocking, 2012 brood were stocked in the Rocky Reach Reservoir in late May 2013. He said that Corral Creek had been used for stocking in 2011 and 2012. However, past telemetry tracks indicate that those fish have moved upstream and taken up residency just below Wells Dam. Therefore, for this year, based on discussions with the Rocky Reach Fish Forum (RRFF), two new release locations have been introduced—at Daroga State Park and at the Entiat boat launch. Keller said that a total of 7,900 fish, including 65 with acoustic tags, were released at the two new release locations. Larry Hildebrand asked about the mean fish size, and Keller replied that the fish were relatively large, but did not recall the exact size. He added that the fish were released a little later than desired. Mike Clement asked about the fish holding below Wells Dam. Keller explained that the 2012 fish appeared to be holding, and so Chelan PUD conducted a recapture event in the Rocky Reach Reservoir. He said that they discovered fish holding below Wells Dam, and that only one fish had left the reservoir from the 2011 and 2012 releases. He said that passive integrated transponder (PIT) tag data indicate that only 31 fish from the 2011 release emigrated out of Rocky Reach Reservoir; and he added that one fish was detected at McNary Dam.
Keller said that Chelan PUD initiated an indexing and monitoring program that is carried out by random sampling efforts using set line gear, over five 10-day sampling periods. He said that in the first 7 days of the program, 65 fish were recaptured, including 7 adults that are now tagged and can be tracked.

Douglas PUD (Andrew Gingerich): Andrew Gingerich said that Douglas PUD recently received a new operating license and also recently started implementing their White Sturgeon MP. He said that last winter, Douglas PUD started modifications at Wells Hatchery, including the installation of 12 round tanks—each 3 feet deep and 5 feet in diameter. He said that six of the tanks were dedicated to the direct gamete program (eggs obtained from broodstock), and the other six tanks were dedicated to the larval program. He said there were complications with the water heater in the Wells sturgeon facility; however, those issues now seemed to be resolved. He said that WDFW has been instrumental in supporting rearing at Wells; and he added that 10 families were brought back to Wells, and that about 2,500 of the 4,500 larvae survived from the larval program (i.e., about 65% survival). Gingerich said that, historically, about 30% survival has been the best achieved; and he added that with increasing rearing experience, he thinks survival will also increase. He said that Douglas PUD has just begun culling the 60,000 to 70,000 direct gamete program, and hoped to reduce these numbers down to 22,000 total. He said that the necessary permits are being obtained to move the fish if other facilities need extra family representation. Tracy Hillman asked if the fish were all from natural spawning events, and Gingerich replied that they were—that all fish are from wild original, not captive brood.

4. PRESENTATION: Naturally Produced Larvae: A New Approach to White Sturgeon Conservation Aquaculture (Jason McLellan): Jason McLellan presented Naturally Produced Larvae: A New Approach to White Sturgeon Conservation Aquaculture (Attachment B), which was distributed to the Aquatic SWG by Kristi Geris on September 9, 2013. He said that the CCT, in collaboration with Andrea Drauch-Schreier of the Genomic Variation Laboratory, University of California, Davis (UC Davis), conducted a genetic evaluation of broodstock versus wild caught larvae. He said that he would present Drauch-Schreier’s work on her behalf, as she was unavailable to attend the workshop due to prior obligations. (Note: “Patterns of Population Structure Vary Across the Range of the White Sturgeon” by A. Drauch-Schreier, B. Mahardja, and B. May [2013], was recently published in Transactions of the American Fisheries Society [142:5, 1273-1286].)

McLellan reviewed definitions, noting that “broodstock” was defined as adult sturgeon captured from the wild—not captive broodstock—for extraction of gametes used in aquaculture production. He explained that “repatriation” is defined as the capture of early life stage (in this case, larvae) for captive rearing and release. He also noted that “effective population size (N_e)” was defined as the number of reproducing individuals in
an ideal population that would lose genetic variation due to genetic drift or inbreeding at the same rate as the number of reproducing individuals in the real population under consideration. He reviewed key concerns with the current aquaculture program that prompted this evaluation, including concerns with genetics and broodstock handling. He said that there is concern about diversity, and that by selecting mates, natural selection is being eliminated. He also noted the stress and injury associated with broodstock handling, and also that broodstock handling requires additional infrastructure and removes fish reproductive potential.

McLellan said that researchers began studying collecting larvae because of the high degree of genetic relatedness they found in conventional broodstock collections of lake sturgeon. He said that a comparative genetic study of eggs and larvae versus broodstock conducted by Crossman et al. (2011) indicated a lower mean degree of relatedness and co-ancestry with eggs and larvae, or in other words, lower risk of inbreeding in the long term. (Note: “Gamete and larval collection methods and hatchery rearing environments affect levels of genetic diversity in early life stages of lake sturgeon [Acipenser fulvescens]” by Crossman et al. [2011], was published in Aquaculture [310:3-4, 312-324].) Pat Irle asked if the optimum number of adult broodstock was used in the study, and McLellan could not recall exactly how many were used, but believed that a representative brood program was used, which he thought was approximately 12 adult brood. He said that lake sturgeon spawn in very shallow, low-velocity rivers and streams, and that there is more difficulty collecting in large river settings. Jim Powell said that in the Crossman et al. study, one female and multiple males were used—not a matrix in this case.

McLellan said that the questions in the Upper Columbia were whether wild larvae collection was feasible, and whether the same benefits found in the lake sturgeon study result. He said that studies were conducted to determine how many larvae could be captured in Lake Roosevelt in 2010, 2011, and 2013, and also in the Wanapum Pool in 2013. McLellan noted that studies conducted in Lake Roosevelt in 2011 and 2013 were conducted at night; and Bob Rose noted the higher survival in those studies. McLellan clarified that the survival noted on page 9 of Attachment B represents survival in the collection bucket—not in-hatchery. He said that mortality was about 10 to 15%, depending on debris-loading. He noted the large collection efforts put forth in the Wanapum Pool, but said that not many larvae were obtained. He said that other areas could have higher densities, and noted that 104 larvae were captured during a couple of nights of sets in the Bonneville Pool, and additional larvae were captured using a D-ring in the McNary/Hanford Reach, Zone 6 Pools, and in the Lower Columbia River above Bonneville.

McLellan said that the increase in hatchery survival shown in studies conducted in 2010, 2011, and 2013 was largely due to increased understanding of feeding regimes,
Paul Anders asked if the cause of mortalities was known, and McLellan replied that a few things could be contributing factors. He said that the Sherman Creek water source is reservoir water where temperatures exceed 20 degrees Celsius. Also, the water intake lines are made of black pipes, so the water conveyed through the pipes is heated during the day and cooled at night. He said that this high fluctuation of water temperatures may be causing the fish stress. He said that there were also columnaris issues during the pilot years, which contributed to the mortalities during that time; and there were also issues with feeding regimes. He said that more is known about transitioning onto a hatchery diet, which also helps reduce mortalities.

McLellan reviewed results from a model analyzing whether repatriation captures as much genetic diversity as broodstock capture in white sturgeon conservation aquaculture. Results indicated that brood collection of adults in 2010 resulted in 121 alleles, while repatriation of larvae in 2010 resulted in 180 alleles (i.e., 90% allelic diversity). Further, results indicated that there is no benefit in combining brood collection and larval collection (i.e., brood collection of adults plus repatriation of larvae in 2010 still resulted in 180 alleles). He also noted that these same analyses indicated that collecting larvae from a less diverse population (number of alleles) can result in higher numbers of alleles in offspring used for conservation aquaculture, when compared to the offspring from a limited number of adult broodstock collected from a more diverse population. McLellan then demonstrated this same concept by reviewing a model showing how many juveniles need to be repatriated to capture target levels of genetic diversity (i.e., 180 alleles, or 90% allelic diversity). In the graph on page 13 of Attachment B, McLellan noted how the curve begins to approach its asymptote at approximately 200; this means that no more than about 200 individuals are needed to achieve 90% allelic diversity. Steve Hemstrom asked if this number would change based on the number of adults upstream, and McLellan replied that the model is representative of total spawning abundance. Powell noted that this also does not mean that the release number should only be 200 individuals; and McLellan said that the point is that a smaller number of individuals obtained from larval collection can yield high allelic diversity.

McLellan said that the number of parents represented by repatriated juveniles was investigated, and for brood year (BY) 2010, based on 89 larvae, results indicated that approximately 78 parents were represented. He said that additional analyses indicated that 17 spawning groups were present among the 78 spawners. McLellan noted that Drauch-Schreier said that this number may be an overestimate; however, analyses still suggest that white sturgeon are not one-to-one spawning in the wild—rather, they are spawning with multiple adults. Gingerich asked if the software calculating these clusters is based on known parentage, and McLellan replied that it was. He said that the program is called “Colony,” and that it had been well tested and validated. He said the
validation process used sturgeon from a commercial aquaculture facility with known parentage in California.

McLellan reviewed the benefits of larval collection, including the large numbers of larvae that can be captured, high in-hatchery survival rates, and greater genetic diversity with relatively few larvae, among others. Rose said that it seems like larval collection makes sense if the goal is to maintain diversity of a population that is isolated to one particular pool or area. He said, however, if the goal is to infuse diversity from another area, it can only be accomplished with brood collection. McLellan said that larval collection can be implemented anywhere. Rose said, however, that a lower river fish can be crossed with an upper river fish today; whereas, with larval collection, it would take 25 years for the alleles to cross. McLellan said that based on recent studies, he is unsure that there is a benefit to crossing lower with upper river fish. He said that there is a genetic benefit with high numbers of alleles, and for them to sort themselves out over time. Rose said that he is still under the impression that fish came up from the lower part of the river, so there is already that natural genetic mobility. He asked whether that natural mobility should be mimicked in the near term by crossing fish. He added that this ties into risk management. McLellan said that the question seems to be whether the genetic benefit of crossing upper and lower river fish provides a better genetic management approach than larval collection. He said that with crossing brood, a higher number of siblings is produced than in a larval approach, and so the relatedness increases while decreasing the effective population size. Anders added that fairly high resolution data are now available to support these findings.

McLellan reviewed how to transition to wild-caught larvae, including exploring additional collection locations, refining collection gear and techniques, refining hatchery techniques, and refining release strategies. He also said that if 87% survival can be achieved for 0.5-year post-release to 5.5-year post-release, then release targets can be reduced by 67%. He added that he believes this can be achieved through refined release strategies. McLellan reviewed graphs on pages 27 and 28 of Attachment B that used data from annual gill net surveys in Lake Roosevelt to analyze what fish length and weight would need to be reached to achieve 87% survival. Results indicated that fish length and weight would likely need to be in the range of 35 centimeters (cm) and 300 grams (g), respectively, to achieve 87% survival, which, McLellan said, is a target size that he believes is quite feasible to reach within 10 months. Rose said that this target size can definitely be reached within 11 months; and McLellan added that if brood was not collected, the larvae could be held longer. Gingerich asked if fish size is the biggest factor for survival, and McLellan replied that fish size is one factor, but may not be the main factor. He added that research on the Kootenai Sturgeon Aquaculture Program indicates that bigger fish have higher survival. Anders noted current efforts to reduce the number of fish in captivity, and investigations regarding how much earlier fish can be released without affecting survival. Powell added that if larger fish are released, they
may not be targeted as prey items. He also suggested monitoring what other prey items were present. Rose said that this idea has been discussed before, and suggested releasing randomly sized fish for comparison.

McLellan said that based on these results, and from a conservation perspective, the CCT believes that transition to larval collection is the appropriate approach. Larry Hildebrand also noted a paper in press that supports egg collection. He said that the paper states that during 2 years of egg recovery, analyses indicated the mean number of spawners contributing to eggs collected was 109. He said that these results were based on 12 to 18 spawning events, and that there were likely more than 12 individuals participating in each event. McLellan said that there are some places where it is difficult to collect larvae, so collecting eggs may be a good alternative; and Hildebrand suggested combining larval and egg collection.

5. **PRESENTATION: Considerations: Egg and Larval Collection for Stocking** (Jim Powell):

Jim Powell of the Freshwater Fisheries Society of British Columbia (FFSBC) presented *Considerations: Egg and Larval Collection for Stocking* (Attachment F), which was distributed to the Aquatic SWG by Kristi Geris on September 9, 2013. Powell’s presentation is based largely on research conducted by the FFSBC under the Upper Columbia White Sturgeon Recovery Initiative (UCWSRI).

Powell reviewed reasons for considering egg and larval collection for stocking, including costs, genetics, and time and labor required to collect broodstock. He said that with egg and larval collection, there are more opportunities to save funds than with collecting broodstock, and costs can be reallocated. From a genetic perspective, the number of alleles and rare alleles increases. He also noted that sturgeon are getting older in the Transboundary Reach (TBR), and that on average, one sturgeon dies with each year of old age. Powell said that stocking efforts and survival in the TBR have been so successful that the growing abundance of really young fish is resulting in an increase in the amount of time needed to find broodstock. Also, because a spawner cannot be used twice, it is getting harder to capture “new” fish each year. Powell also noted the difficulty in handling adult sturgeon, which can be more than 10 feet long and weigh more than 300 pounds, creating potential safety and hatchery capacity issues.

Powell said that through more than 10 years of spawning monitoring conducted by Golder Associates and two internal feasibility evaluations, it has been determined that egg and larval collection for stocking is economically, biologically, and logistically feasible. He said that other work completed by sturgeon experts such as Katy Jay, Andrea Drauch-Schreier, and Paul Anders also supports the feasibility of egg and larval collection for stocking. Research indicates that larval collection results in greater diversity, and is superior to trap and transport. Powell said that in the TBR, as a safeguard, indexing continues, a reserve population is being reared in the Revelstoke
Reach, and research and hands-on monitoring of stock continues. Bob Rose asked if a low larval year can be predicted so that appropriate preemptive actions can be taken; and Powell replied that this is not possible yet. Jason McLellan added that there is no consistent natural recruitment anyway; so if there is an occasional year with no larval collection, it should not pose a significant impact. Pat Irle asked whether the event of no larvae being collected is an indication that there is no breeding taking place. Powell replied that sometimes larvae may just be missed when sampling. Larry Hildebrand added that it may also be due to larval drift. Powell said that the ability to detect spawning events is not totally accurate, and in this instance, Revelstoke Reach is the safeguard. Hildebrand added that there are also mechanisms in place to avoid predation by raising Revelstoke Reach fish to a larger size. Powell also said that in the 5 years that he has been involved in this program, the management tools available have doubled and are only growing.

Powell reviewed the risks and problems with egg and larval collection for stocking, such as a “bad” spawning year; he noted, for example, the impacts of the high flows experienced in 2012. He also noted the possible lack of site fidelity, or sites that change with high flows. Powell also said that the mechanical aspect of collecting eggs can be tedious and difficult. Powell said that the FFSBC is moving more towards egg and larval collection. He said that there are two full incubation early-life rearing units, plumbed out and electrical at the KSH facility (as shown on page 17 of Attachment C). He also said that the FFSBC is still collecting reduced numbers of brood, but they have reduced stocking numbers and increased wild capture. McLellan noted that Powell was referring specifically to the British Columbia (BC) component of the UCWSRI, and that the Washington component has gone completely to egg and larval collection for stocking. Hildebrand said that based on the success of the incubators, he expects that egg and larval collection will move forward next year. Powell said that a poll was distributed to gauge what thoughts are regarding what needs to be accomplished to move egg and larval collection forward. The poll included questions about whether a pilot study was needed, what is important to the Mid-Columbia, what research will be involved, what data gaps need to be filled, what monitoring is needed, and whether there is a reason to continue brood collection. Powell said that the poll will be discussed at the next UCWSRI Technical Working Group (TWG) conference call. Hildebrand noted that certain components of the program that the FFSBC developed are not required for the U.S., and he added that the FFSBC does not have nearly as many opportunities to capture larvae as there are in the U.S. He said this is one of the reasons that the FFSBC is looking into eggs as well as larval collection, and he added that it is also easier to capture eggs.

Powell said that, in conclusion, “conventional” methods are changing, and now egg and larval collection are being considered. He said that the reasoning is clear and supported by research, and that egg and larval collection are genetically superior and cost effective. Paul Anders asked if the Mid-Columbia should consider collecting larvae in
the BC regions of the Columbia River, and Powell cautioned that moving gametes across the border is difficult.

**BREAK: Lunch**

6. **Open Forum Discussion (All):** Tracy Hillman provided a recap of the morning discussions, and opened the floor for discussion.

**Sturgeon vs. Lamprey**

Paul Anders recommended that consideration should be given to how sturgeon contribute to the marine ecosystem; for example, how sturgeon supplementation may affect lamprey supplementation efforts. He added that, initially, there seems to be a focus on genetics and representation, and it is not until later that the focus moves to real-time demographic issues and concerns about how those fish are contributing to the entire community. He said that, sometimes, it is difficult to address those management questions until they are at the forefront. Jim Powell added that another good example of long-term supplementation affecting other populations is when bull trout supplementation efforts ceased in order to supplement the kokanee population. Larry Hildebrand said that Golder Associates is in their eleventh year of an indexing program that indexes key representative species in a population, and monitors growth and other metrics. He said that this program has been ongoing in parallel with sturgeon data collection, so those data are available to be compared up to 10 years ago. Tracy Hillman said that this issue of how managers will supplement sturgeon as well as lamprey also came up in the RRFF. Steve Hemstrom said that Chelan PUD’s White Sturgeon MP, for example, has a goal to create a “harvestable” population; however, it is unclear what abundance is needed to achieve that goal. Pat Irle asked if WDFW already has those numbers defined. Brad James replied that in a number of areas, the management approach is to assess the population abundance, and then to develop a sustainable exploitation rate, and he noted that this rate is often already being exceeded. He said that the goal is to increase abundance until it can be expected that a population will slowly increase. He said that the annual production and abundance continually fluctuates, which translates into an ever-changing exploitation rate, resulting in fluctuating harvestable numbers. Hemstrom asked if this means that there is no minimum harvestable number, and Hildebrand said that it has been the case that most healthy populations can withstand 3 to 5% harvest. James said that based on work conducted in the late 1980s, the exploitation rate was initially 15%. He said that WDFW measured fish by toe length and then narrowed size, looking for ways to slow harvest down, and he added that now there are variable size slots. He said that due to the sea lion predation below Bonneville Dam, WDFW recognized that the previous exploitation rate needs to be lower. So the previous rate of 15% translated into 22% for the current size slot, and about 12% below Bonneville Dam due to the higher mortality rate. James said that developing accurate exploitation rates comes down to a lot of monitoring,
namely of mortalities and angling. Anders said that the 3 to 5% harvest is based on lake populations, and he added that lake sturgeon managers are adamant about this number. He said that 3 to 5% is not the absolute answer, but lake populations have been increasing in recent years. Hemstrom said that it also needs to be determined if there is higher risk associated to stocking too many or not enough numbers, in terms of the conflicting commitments to sturgeon and lamprey.

Bob Rose acknowledged the challenge of how to capture these questions and develop action items for a path forward. He asked, for example, what “habitat capacity” means, and how it is measured. Is habitat capacity calculated by stocking a reservoir and monitoring the fish, or does the habitat capacity need to be maxed out throughout an entire life stage? How does habitat capacity incorporate into the discussion of “how many is enough?” Anders said that he addressed a similar issue with the ISRP on the Kootenai River; and added that it was no easy task. He said that, in that case, based on more than 20 years of sampling, a target population size was defined and then release numbers were generated by working backwards. He said that based on the high variability and difficulties with modeling, ultimately several scenarios were presented, including proposed management decisions based on a formal adaptive process. Anders said it seems that the solution needs to be an approach that balances risk and what is tangible.

Collecting Broodstock vs. Collecting Eggs and Larvae
Tracy Hillman said that, currently, Mid-Columbia programs are largely collecting broodstock, but research is now indicating that collecting eggs and larvae may have greater benefits. He asked whether it was wise to completely abandon collecting brood based on these new findings. Pat Irle said that she would like to ask the experts that question, as well as how much value there is with collecting adults versus larvae, and also questions about timing and location. Jim Powell said that, ultimately, it is the co-managers’ decision. He also asked if it is the number of fish or biomass that should be considered. Larry Hildebrand said that there is no simple answer, and added that the number of fish needed can very easily change because of factors such as fluctuating mortalities. Jason McLellan said that based on his experiences, he feels it is a fair assumption that the best survival is going to be driven by fish size. Andrew Gingerich noted that based on fish source, survival calculations may be complicated by variable emigration and immigration rates. Hildebrand said that downstream migration does happen, and it counts as a mortality to the population. He added that many of these problems are due to release location; but if the habitat is present, they will stay. McLellan suggested that timing of release may also be a contributing factor, and he added that, for example, if fish are released during a freshet (i.e., in high flows), they may leave. Powell said that many of these questions can be answered with monitoring, and he suggested that monitoring be ramped up. Hillman noted that, historically,
reservoirs were considered more of a sink than a source for sturgeon; he asked if that was not the case anymore. Hildebrand replied that it seems so.

Hillman said that based on recent research, a lot of effort was put into collecting larvae from downstream with little success; and he asked if there were any thoughts on how this can be improved. McLellan suggested that other locations with larger spawning areas need to be considered. He added, however, that it took at least 5 years of early-life history research in the Upper Columbia to find these locations that resulted in good success; and so he indicated that it cannot be expected to just go to a random, unevaluated area to drop frames and immediately have success collecting adequate numbers of larvae. He suggested that areas that have already been fished will have greater success. He said, for example, that based on the pilot year and Hildebrand’s crews success with egg collection, collecting larvae below Rock Island Dam in the Wanapum Pool may be a more viable option.

Powell asked if any habitat improvements have been completed to improve larval collection, and Paul Anders replied that some work is being done. He added that within populations, behavior patterns are duplicative; and in different rivers there are different patterns. He recommended obtaining this type of information on the larvae that are collected, and recreating this habitat in the Upper Mid-Columbia. He also suggested not stopping with early life stages, and said that it would be beneficial to see what types of habitat they prefer throughout all life stages.

Hillman asked if there was consensus to move to larval collection, and whether there is a need to continue collecting brood. Bob Rose said that it makes no sense to stop one and start another; rather, he suggested evaluating both for a few years. He added that instead of a change in management, he sees an augmentation in management.

Gingerich said that Douglas PUD’s thoughts are consistent with Rose’s. He added that the Aquatic SWG came to a unanimous decision to conduct both brood and larval programs for 4 years, and that further decisions will need to be vetted within the forum. Gingerich said that Douglas PUD has about 2,500 larvae on station, and a total target of 5,000 sturgeon; this target could not be met with larvae alone. He added that, luckily, both brood and larval programs were successful for Year 1, and that, collectively, Douglas PUD has good options for stocking this year. He said that after 4 years, the Aquatic SWG will re-evaluate the programs, but in the meantime, monitoring and evaluation will continue as the programs move forward.

Mike Clement asked Rose, with being located the furthest downstream, what resources the YN and WDFW have to perform juvenile collection below Priest Rapids Dam. Rose said that these discussions have come up between the YN and WDFW, and also with BPA and CRITFC; however, no final determinations have been made. He said that he anticipates collecting next spring. Clement asked if collection would be more focused
on larval and egg collection, and Rose replied that larval collection is being considered, but he was unsure about egg collection. Lance Keller said that Chelan PUD conducted a trial effort with egg collection, but due to complications with the hydrograph and other unforeseen hurdles, the experience was not as valuable as they had hoped. Tucker Jones of the Oregon Department of Fish and Wildlife (ODFW) said that it was his understanding that Oregon is quite interested in egg collection. Clement asked Jones if ODFW has data on spawning locations, and Jones replied that he thinks that the U.S. Geological Survey (USGS) has those data, especially near the Bonneville Dam tailrace and throughout the Willamette River. Powell asked Jones if their egg mat worked well, and Jones said that it did. Keller also suggested using a D-ring. He said that Chelan PUD has stocked two years of sturgeon using a D-ring, which so far has shown no problems. Clement asked Keller if he has seen an index report for 2012, and Keller replied that, so far, the 2012 report only has 7 days of data.

Chad Jackson said that WDFW supports larval collection, and recommended that others follow suit. He said that soon contracts will expire and Requests for Proposals (RFPs) will be issued for collection next year, and he added that some hatcheries will need infrastructure upgrades in order to raise larvae. Hillman said that the decision is up to the individual forums, but having these discussions about risks and benefits is helpful.

Stocking Levels
Paul Anders said that it seems that front-loading releases may help inform stocking level decisions. He said that by doing so, useful data can be obtained on initial early survival; and combined with adult survival data, a range of scenarios could be developed that could help inform decisions. Jason McLellan asked how future stocking can be planned with any certainty when those plans are based on survival estimates with confidence intervals of (+/-) 20%. Steve Hemstrom said that research studies are designed to produce reliable results and added that survival estimates will always have variability. He said that his concern is that the stocking issue is being addressed in terms of short-term management, instead of long-term. He asked, for example, what would happen if entrainment prevented fish from passing the ladders and spawning upstream. Anders noted that entrainment rates presumably differ by project. Lance Keller said that he is encouraged by the natural recruitment in the Mid-Columbia, and he added that stocking levels can always be adaptively managed as more data are collected.

Andrew Gingerich said that Douglas PUD’s White Sturgeon MP is separated into two phases: Phase 1 and Phase 2. He said that Phase 1 was developed with the concept in mind to simply get fish in the reservoir—stocking 5,000 fish in the first 4 years. He said that Phase 2 says that subsequent stocking decisions will be based on monitoring and evaluation (M&E) data. Tracy Hillman asked how Douglas PUD plans to use those M&E data to help inform future stocking rates, and Gingerich replied that those data will help inform survival and retention within the reservoir. He added that he is optimistic about
retention in the Wells Reservoir because, in terms of available habitat, there is a lot to choose from between the Methow and Okanogan rivers in addition to the mainstem stretch of the Wells Project. Hillman asked if stocking numbers would be increased in the event of poor retention (i.e., how would those data be interpreted?). Gingerich said that those decisions would need to be vetted in the Aquatic SWG. Hillman asked how those data inform other programs. Anders said that over time, the benefits of fish become out of sync with certain geographical boundaries, but will always accrue in one place or another. He said that based on this notion, new boundaries may eventually need to be reconsidered, or there will need to be acceptance of the idea that everyone is contributing to a resource that will continually shift.

Mike Clement said that Grant PUD is required to annually stock 0 to 6,500 sturgeon collectively between Priest Rapids and Wanapum, and it is up to the RRFF to determine how many are actually stocked. He said that in the past few years, stocking levels were based on the quality of fish and their ability to serve M&E and supplementation needs. He said that in Year 1, three different origins were used, and monitoring data indicated that emigration rates were fairly high among the first release group. He said there have been years where no fish were released; and he added that last year, roughly 3,000 were released based on achieving a 6x6 factorial cross.

Anders asked if anyone has looked at empirical data for indications of a “breaking point” where fish with low fitness may become the majority (i.e., is there risk associated with producing too many endangered fish?). He clarified that he is asking what the severity of risk would be in, say, 10 to 15 years, and he suggested possibly minimizing the number of stocking events per year. McLellan noted a concern that a very high proportion of catch were from CRITFC releases, and so he suggested proportional numbering. Lance Keller said that there was a similar situation with Grant PUD’s first year with wild-by-wild versus captive brood, and he added that there were different survival rates among two different stocks of fish. He said that in the first year, they stocked just greater than 6,300 fish, and in 2012, there was a fish health issue, but some juveniles at Chelan Falls did survive. He said that, to date, about 6,500 sturgeon have been stocked in the reservoir. He said that for BY2014, Chelan PUD’s White Sturgeon MP will once again be under discussion. He said that discussions can be based off of preliminary indexing and monitoring data, and also pikeminnow bycatch numbers (Keller clarified that recapture data are obtained from bycatch caught on pikeminnow set lines). Hillman said that PUD monitoring data provide information on movement, residency, and survival; and he asked if these data also indicate habitat. Keller replied that the data do indicate habitat and also provide information on growth rates. Clement added that Larry Hildebrand’s group has also collected data on deep water habitat. Keller said that Chelan PUD also has pressure tags out that are obtaining diel depth data, and that shore releases are also being conducted; and so, there should be ample data to inform 2014 releases. Pat Irle asked if there are juvenile passage data
below Rocky Reach Dam, and Keller replied that sometimes those data can be obtained from PIT tags. He said, however, that most data are from recaptures, which do not indicate passage. Anders asked if Andrea Drauch-Schreier’s genetics research found that fish from different projects in the Mid-Columbia were contributing to groups downstream. Hildebrand replied that Drauch-Schreier’s research was based on wild fish captured in the Mid-Columbia. He said, however, that those data did not include progeny in the pool; so, captive progeny and wild data. Bob Rose asked if genetic samples were obtained from every adult, and Clement replied that samples were obtained from all wild adults. Keller said that Chelan PUD inherited archived larval juvenile data from efforts conducted below the Dalles Dam, but that those data have not yet been reviewed.

Hildebrand said that crossing downstream fish with upstream fish presupposes that downstream fish have greater genetic diversity, which needs to be proven first. Anders said that in order to test whether there is a difference between upper and lower fish, there need to be representative populations from both locations. McLellan said that the only advantage to crossing upper and lower fish is to demonstrate survival, as the benefits in progeny would not be apparent until 25 years later. Rose questioned whether a large enough sample size could be obtained for a valid study. Further, he asked how far downstream is “downstream,” and whether there is a difference between fish from Bonneville and fish from below Bonneville. He added that recent research indicates that that these fish are all the same. Hildebrand disagreed that recent research indicates that all fish are “the same.” He added that there are major behavioral differences that cannot be fully quantified; however, they should still be considered.

McLellan asked what the ultimate goal is for stocking; and Hillman asked what needs to happen for an effective M&E program, and in Chelan PUD’s case, to put out harvestable numbers. McLellan asked if fish should be grown larger and stock fewer, if stocking strategies should be adjusted, or whether what is currently written in the plan should just be continued. Hemstrom said that growth rates will determine whether there is density dependence; and added that ecological concerns also need to be considered. He said that with all of the unknowns it is difficult to determine where to go, and how fast or slow is the best way to get there. McLellan said that if the goal is growth then fewer fish would be needed. He added that density dependence can then be evaluated through recapture, and if the process moves too slowly, the effects of growth will be harder to monitor. Irle suggested that Chelan PUD ask Steve Hays what he intended by inserting the “harvestable numbers” language into the MP. Hemstrom said he thinks that survival in the Rocky Reach Reservoir will be high. McLellan asked, then, if the goal is conservation and maximizing genetic diversity. Hildebrand said that the carrying capacity of sturgeon is unknown, and he added that arbitrary numbers are known, but the genetic considerations are not applicable to sturgeon. McLellan said that larval
collection can represent allelic diversity, and if high survival can be achieved, a large number of fish do not need to be stocked, from a conversation perspective. Rose said that sufficient levels of monitoring need to be determined. He asked, regarding ecological impacts, if there are enough resources in place to make a meaningful interpretation; and he added that he does not believe so. He also said that he does not believe that adequate resources are in place to make determinations about carrying capacity. Anders said that it would be advantageous to obtain agreement on diagnostic metrics for different ecological conditions. He said without that, there is no plan to obtain those data. Hildebrand said that it is serendipitous—that these fish will start preying on other fish once they grow large enough, and at that point, impacts to other species will be apparent.

7. **Concluding Remarks and Next Steps** (Tracy Hillman): Tracy Hillman thanked Douglas PUD for hosting this first annual Mid-Columbia Regional Sturgeon Workshop. He also thanked Kristi Geris of Anchor QEA for developing and distributing the Workshop minutes. He said that this Workshop will likely be held annually, and thanked everyone for their participation.

**List of Attachments**

Attachment A – List of Attendees
Attachment B – Naturally Produced Larvae: A New Approach to White Sturgeon Conservation Aquaculture
Attachment C – Considerations: Egg and Larval Collection for Stocking
## List of Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracy Hillman</td>
<td>BioAnalysts</td>
</tr>
<tr>
<td>Kristi Geris</td>
<td>Anchor QEA, LLC</td>
</tr>
<tr>
<td>Bob Donnor</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Andrew Gingerich*</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Chas Kyger*</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Steve Hemstrom</td>
<td>Chelan PUD</td>
</tr>
<tr>
<td>Lance Keller</td>
<td>Chelan PUD</td>
</tr>
<tr>
<td>Mike Clement</td>
<td>Grant PUD</td>
</tr>
<tr>
<td>Jim Powell</td>
<td>Freshwater Fisheries Society of British Columbia</td>
</tr>
<tr>
<td>Paul Anders</td>
<td>Cramer Fish Sciences/University of Idaho</td>
</tr>
<tr>
<td>Larry Hildebrand</td>
<td>Golder Associates</td>
</tr>
<tr>
<td>Paul Grutter†</td>
<td>Golder Associates</td>
</tr>
<tr>
<td>Pat Irle*</td>
<td>Washington Department of Ecology</td>
</tr>
<tr>
<td>Chad Jackson*</td>
<td>Washington Department of Fish and Wildlife</td>
</tr>
<tr>
<td>Brad James</td>
<td>Washington Department of Fish and Wildlife</td>
</tr>
<tr>
<td>Tucker Jones†</td>
<td>Oregon Department of Fish and Wildlife</td>
</tr>
<tr>
<td>Christine Mallette†</td>
<td>Oregon Department of Fish and Wildlife</td>
</tr>
<tr>
<td>Bob Rose*</td>
<td>Yakama Nation</td>
</tr>
<tr>
<td>Jason McLellan*</td>
<td>Colville Confederated Tribes</td>
</tr>
<tr>
<td>Matt Howell</td>
<td>Colville Confederated Tribes</td>
</tr>
<tr>
<td>Bret Nine</td>
<td>Colville Confederated Tribes</td>
</tr>
</tbody>
</table>

Notes:
- * Denotes Aquatic SWG member or alternate
- † Joined by phone
Naturally Produced Larvae: A New Approach to White Sturgeon Conservation Aquaculture

Jason McLellan & Matt Howell
Colville Confederated Tribes

Andrea Schreier & Bernie May
Genomic Variation Laboratory, UC Davis

Definitions

- **Conservation Aquaculture** – aquaculture conducted to preserve/increase genetic diversity and mitigate for depressed natural recruitment

- **Broodstock** – adult sturgeon captured from the wild for extraction of gametes used in aquaculture production

- **Direct Gamete Take** – removal of gametes from adult broodstock (Crossman et al. 2011)

- **Free-embryo** – sturgeon at the developmental stage between hatch and first-feeding (yolk-sac larvae)

- **Larvae** – sturgeon at the developmental stage between transition to exogenous food sources and juvenile stage

- **Repatriation** (Dowling et al. 2005) – capture of early life stage (in this case larvae) for captive rearing and release

- **Effective population size** ($N_e$) (Hallerman 2003) – number of reproducing individuals in an ideal population that would lose genetic variation due to genetic drift or inbreeding at the same rate as the number of reproducing individuals in the real population under consideration

- **Genetic Diversity** (Hallerman 2003) – the genetic variation within and between population components
Background

- Aquaculture a tool for sturgeon conservation
- Conventional method – direct gamete removals
- Concerns
  - Genetic
  - Broodstock handling

Background – Lake sturgeon studies

- Rearing naturally produced larvae
  - Holtgren et al. (2007); Smith and Hobden (2011)
- Comparative genetics study – eggs/larvae v. broodstock (Crossman et al. 2011)
  - lower mean relatedness – eggs/larvae
  - lower mean coancestry – eggs/larvae
  - higher effective number of breeders – eggs/larvae

Background - FDR white sturgeon

- Recruitment failure investigations (2004-2008)
- Fair numbers larvae captured
- Larval collection for white sturgeon aquaculture?

Methods - Feasibility
### How many larvae can be captured?

<table>
<thead>
<tr>
<th>Location</th>
<th>2010 (pilot)</th>
<th>2011</th>
<th>2013*</th>
<th>2013*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling period</td>
<td>10-25 Jul</td>
<td>25 Jul-1 Aug</td>
<td>1-25 Jul</td>
<td>4-25 Jul</td>
</tr>
<tr>
<td>No. of Sets</td>
<td>73</td>
<td>155</td>
<td>164</td>
<td>82</td>
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<tr>
<td>Mean set duration (hr)</td>
<td>16.1</td>
<td>2.4</td>
<td>2.5</td>
<td>23.1</td>
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<tr>
<td>Total effort (frame hrs)</td>
<td>1,173</td>
<td>373</td>
<td>410</td>
<td>1,892</td>
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<tr>
<td>No. free embryos</td>
<td>405</td>
<td>56</td>
<td>700</td>
<td>10</td>
</tr>
<tr>
<td>No. early larvae</td>
<td>3,235</td>
<td>10,355</td>
<td>5,000</td>
<td>43</td>
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<tr>
<td>Collection Goal</td>
<td>N/A</td>
<td>10,000</td>
<td>5,000</td>
<td>5,000</td>
</tr>
</tbody>
</table>

*Preliminary data – subject to change.

### How many larvae can be captured (cont’d.)?

- Potential in other areas
  - Bonneville Pool (Parsley and Kofoot 2013)
  - BPA 86-50 Project work – McNary/Hanford Reach, Zone 6 Pools, LCR

### What hatchery survival rates can be achieved?

<table>
<thead>
<tr>
<th>Collection location</th>
<th>2010</th>
<th>2011</th>
<th>2013*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hatchery</td>
<td>Sherman Creek</td>
<td>Sherman Creek</td>
<td>Wells</td>
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<tr>
<td>No. transported to hatchery</td>
<td>2,744</td>
<td>10,295</td>
<td>4,100</td>
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<tr>
<td>No. released</td>
<td>522</td>
<td>3,590</td>
<td>2,500**</td>
</tr>
<tr>
<td>Survival to release</td>
<td>19%</td>
<td>35%</td>
<td>61%**</td>
</tr>
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</table>

*Preliminary data – subject to change.

**Projected as of inventory on hand Sep. 5, 2013.

### Does repatriation capture as much genetic diversity as broodstock capture in white sturgeon conservation aquaculture?

<table>
<thead>
<tr>
<th>Program</th>
<th>N_r</th>
<th>N_a</th>
<th>No. Alleles</th>
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</tr>
<tr>
<td>R_{P11}</td>
<td>500</td>
<td>383</td>
<td>179</td>
</tr>
<tr>
<td>BC_{10}+R_{P10}</td>
<td>537</td>
<td>300</td>
<td>180</td>
</tr>
</tbody>
</table>
How many juveniles need to be repatriated to capture target levels of genetic diversity?

Rate of Genetic Diversity Accumulation in 2010 and 2011 Repatriation

• 89 progeny from BY 2010 sorted into 78 full sibling families
• Full sibling family size ranged from 1-2 individuals (mean 1.1 individuals/family)
• Examining # full sibling families does not account for half-sibling structure...

How many parents represented by repatriated juveniles?

• Best Cluster configuration reconstructs half-sibling family structure
• 17 spawning clusters identified consisting of 78 spawners

How many parents represented by repatriated juveniles?

Most clusters contained two or four adults (mean 4.7 individuals)
Benefits

• Large numbers of larvae can be captured
• Relatively high survival rates can be achieved in the hatchery
• Much greater genetic diversity with relatively few larvae
• Artificial selection is minimized - Natural mating, incubation, and early rearing
• No broodstock handling
• Parents of larvae used in aquaculture programs can also contribute to natural recruitment

Benefits (cont’d)

• Releasing many progeny from few parents reduces effective population size \( (N_e) \) of wild population
• Representing many parents with few larvae per family increases effective population size \( (N_e) \) of recipient population

Benefits (cont’d)

• Larval collection represents many more parents and therefore more genetic diversity

How do we transition to wild caught larvae?

• Explore additional collection locations
• Schreier et al. 2013 – “Our results provide little support for the practice of managing each impounded reach of the Columbia-Snake River system as a genetically distinct population as adjacent reaches show little to no genetic divergence in these analyses.”
• Approach has been taken with broodstock
How do we transition to wild caught larvae?

- Refine hatchery techniques
  - Temperature
  - Diet
  - Pathogens

How do we transition to wild caught larvae?

- Refine collection gear/techniques
  - Net/frame development...
  - Collection bucket development...

- Refine release strategies
  - Time of day
  - Season
  - Location
  - Size

- Consider lower release targets

How to reduce stocking rates w/o reducing projected abundance?

- Assuming UCR mean survival rates (Golder 2007):
  - Survival from release to 0.5 yr post-release ($S_{0.5}$) = 0.28
  - Survival from 0.5 yr post-release to 5.5 yr post-release ($S_{5.5}$) = 0.87

- But if we can achieve: $S_{0.5} = S_{5.5} = 0.87$

- Then we can reduce release targets by 2/3 (67%)

- Accomplished through refined release strategies

Reduced Release Numbers

- At what length could we expect $S_{0.5} = S_{5.5} = 0.87$?
Reduced Release Numbers

- Can we raise fish to 35 cm FL and 300 g within 10 months?

Recommendation

- Transition to larval collection for white sturgeon conservation aquaculture.

Acknowledgements

- Bonneville Power Administration
- Douglas PUD
- Spokane Tribe of Indians
- UC Davis
- Washington Department of Fish and Wildlife
Considerations: Egg & Larval Collections for Stocking

Why Move From What Works?

Jim Powell
FFSBC

Reasons for Consideration

1. Cost
   - Savings
   - Reallocation
2. Genetics
   - Wild vs. Captive
   - Conservation in a declining $N_e$

UCSWRI Success

- Stocking efforts have been very successful in the TBR
- Showing promise in the Rev Reach
- Successes have meant the need to adapt
Too Successful

- 10 years of stocking
- Survivals have been great
- Growth is good
- Now migrated to the adult capture gear
- Time to get brood has increased

Then and Now

- Harder to capture fewer ‘new’ fish each year
- Cannot use spawners twice
- Brood indexing shows an aging population
- More time spent capturing fewer fish

Also...

Labour

- Difficult
- Not only sturgeon are getting older
- Safety issues
- Hatchery capacity
Here’s a Thought….

• Maturing adult are spawning
• If we mine them, there is no hope of recruitment
• Can we collect a subset of the spawn?

Feasibility

• Golder 10+ years of spawn monitoring
• Two internal feasibility evaluations determined:
  – Economic, Biologic, Logistic
  – All feasible
• Minimal infrastructure changes
• Lower risk to resource

Genetics

• Andrea’s work and others: larvae is better
• Nature is best
• Greater diversity
• Captures rare alleles
• Better than trap and transport

Comparisons

• Would have to really ramp up egg and larval capture
• Harder to find unused pairs by capture
• Harder to capture than find
This Means:

- Drop off adult capture
- Compensate with rearing larvae
- Capture and transport larvae
- Keep Rev Reach levels up

Safeguards

- Indexing continues
- Rear Rev fish
  - Reserve population
- Research continues
- Hands on monitoring of stock

Risks

- ‘Bad’ spawning year may effect stocking levels
- Mining the natural egg supply
- Greater risk to survival in larval transport
- Spawning sites may change

Problems

- Mechanical aspect of collection
- Tracking spawning sites
- Flow changes
- Transport
- Raising multiple spawns
UCWSRI

- Moving towards egg/larvae collection
- Still collect reduced numbers of brood
- Reduce stocking numbers; increase wild capture

Conclusions

- ‘Conventional’ methods are changing
- Includes egg and larvae capture
- Reasoning is clear and supported by research
- Genetically superior and cost effective
The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, September 11, 2013, from 10:00 a.m. to 11:30 a.m. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items

1. Douglas PUD will finalize the revised draft Bull Trout Stranding and Take Study Plan, and will provide a final version of the plan to Kristi Geris for distribution to the Aquatic SWG (Item VI-2).

2. Douglas PUD will incorporate Section 2.6 – Regional Coordination of the Pacific Lamprey Management Plan (PLMP) into the draft Lamprey Entrance Efficiency and Operations Study Plan, per U.S. Fish and Wildlife’s (USFWS’s) request. Upon USFWS’s approval of the revisions, Kristi Geris will distribute the final version of the plan to the Aquatic SWG (Item VI-3). (Note: Steve Lewis provided USFWS’s approval of the revised plan via email on September 11, 2013, and the final plan was distributed to the Aquatic SWG by Geris on September 12, 2013.)

3. Douglas PUD will provide a revised draft Water Quality Attainment Plan (WQAP) to Kristi Geris for distribution to the Aquatic SWG. Aquatic SWG members will submit edits and comments on the revised draft WQAP to Andrew Gingerich no later than Tuesday, October 1, 2013 (Item VI-4).

4. Aquatic SWG members will submit edits and comments on the draft Spill Prevention Control and Countermeasures (SPCC) Plan to Andrew Gingerich no later than Tuesday, October 1, 2013 (Item VI-5).

5. Jason McLellan will present his Mid-Columbia Regional Sturgeon Workshop materials at the Aquatic SWG in-person meeting on October 9, 2013 (Item VI-6).

6. Douglas PUD will provide a demonstration of the Aquatic SWG Extranet site at the Aquatic SWG in-person meeting on October 9, 2013 (Item VI-8).
7. The Aquatic SWG meeting on October 9, 2013, will be held in person at 9:00 am at Douglas PUD Headquarters in East Wenatchee, Washington. If time permits, there will also be a Wells Dam site visit following the meeting (Item VII-1).

II. Summary of Decisions
   1. There were no Statements of Agreement (SOAs) approved at today’s meeting.

III. Agreements
   1. The Aquatic SWG members present approved the draft Bull Trout Stranding and Take Study Plan, as revised (Item VI-2).
   2. The Aquatic SWG members present conditionally approved the draft Lamprey Entrance Efficiency and Operations Study Plan, pending USFWS’s email approval of the revised draft plan (Item VI-3). (Note: Steve Lewis provided USFWS’s approval of the revised plan via email on September 11, 2013, as distributed to the Aquatic SWG by Kristi Geris that same day.)
   3. The Aquatic SWG members present agreed to continue discussions on the Conflict of Interest Policy at the Aquatic SWG in-person meeting on October 9, 2013 (Item VI-9).
   4. The Aquatic SWG members present agreed to hold the Aquatic SWG meeting on October 9, 2013, at an earlier than usual start time of 9:00 am. The meeting will be held in person at Douglas PUD Headquarters in East Wenatchee, Washington. If time permits, Aquatic SWG members also agreed to a Wells Dam site visit following the meeting (Item VII-1).

IV. Review Items
   1. Kristi Geris sent an email to the Aquatic SWG on August 26, 2013, notifying them that the draft SPCC Plan is available for review, with comments due to Andrew Gingerich no later than Tuesday, October 1, 2013.
   2. Kristi Geris sent an email to the Aquatic SWG on August 27, 2013, notifying them that the draft Conflict of Interest Policy is available for review. The draft policy will be on the agenda for approval at the Aquatic SWG meeting on October 9, 2013.
   3. Kristi Geris sent an email to the Aquatic SWG on August 27, 2013, notifying them that the draft WQAP is available for review, with comments due to Andrew Gingerich no later than Tuesday, October 1, 2013.

V. Reports Finalized
   1. The final Lamprey Entrance Efficiency and Operations Study Plan was approved by the Aquatic SWG on September 11, 2013, and was distributed to the Aquatic SWG by Kristi Geris on September 12, 2013.
VI. Summary of Discussions

1. Welcome, Agenda Review, and Meeting Minutes Review (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Schiewe reviewed the agenda and asked for additions or other changes to the agenda. No additions or changes were requested.

The revised draft August 14, 2013 meeting minutes were reviewed. Kristi Geris said that she distributed a second revised draft of the August 14, 2013 meeting minutes to the Aquatic SWG on September 6, 2013. She said that the second revised draft included edits, which were based on comments from Washington State Department of Ecology (Ecology), to clarify the discussion on the 2013 Adult Lamprey Passage and Enumeration Study Update. She said that because of the many different subsets of data in the study (i.e., by release group, release date, lamprey passed versus lamprey detected, etc.), there was confusion in interpreting the numbers that were presented during the August 14, 2013 conference call. The edits in the second revised draft differentiate between the different subsets of data. Geris said that, in an attempt to avoid this same confusion in future updates, Chas Kyger offered to distribute a table summarizing the different subsets of data prior to providing updates on the study.

Geris said there was also one outstanding comment remaining to be discussed regarding edits and approval of the Aquatic SWG July 10, 2013 meeting minutes. Andrew Gingerich explained that he would like to avoid setting the precedent of revising the meeting minutes after they have already been approved by the Aquatic SWG. Schiewe added that if a person is unable to attend a meeting, then they should aim to submit edits and comments to the draft minutes prior to the meeting so that they can be discussed prior to approval. Geris will remove the revisions that were added to the Aquatic SWG July 10, 2013 meeting minutes post-approval and redistribute the finalized minutes to the Aquatic SWG.

The Aquatic SWG members present approved the August 14, 2013 meeting minutes, as revised.

2. DECISION: Bull Trout Stranding and Take Study Plan (Andrew Gingerich): Andrew Gingerich said that Kristi Geris sent an email to the Aquatic SWG on July 29, 2013, notifying them that the draft Bull Trout Stranding and Take Study Plan is available for 30-day review, with comments due to Gingerich no later than Wednesday, August 28, 2013. He said that comments were received from USFWS, and a revised plan that included tracked edits based on comments received was distributed to the Aquatic SWG by Geris on September 9, 2013. Steve Lewis said that the revisions adequately addressed USFWS comments. The Aquatic SWG members present approved the draft Bull Trout Stranding and Take Study Plan, as revised. Douglas PUD will finalize the
revised draft plan, and will provide a final version to Geris for distribution to the Aquatic SWG.

3. **DECISION: Lamprey Entrance Efficiency and Operations Study Plan** (Andrew Gingerich):
   Andrew Gingerich said that Kristi Geris sent an email to the Aquatic SWG on August 9, 2013, notifying them that the draft Lamprey Entrance Efficiency and Operations Study Plan is available for 30-day review, with comments due to Gingerich or Chas Kyger no later than Monday, September 9, 2013. He said that comments were received from USFWS and Ecology. Kyger said that USFWS requested an explicit link between the draft Lamprey Entrance Efficiency and Operations Study Plan and the USFWS Fishway prescriptions to better demonstrate that components of both documents were included in the combined plan. Therefore, language was taken directly from the USFWS Fishway prescriptions, and pasted in italics into the section on the regulatory framework (Section 1.1) of the Lamprey Entrance Efficiency and Operations Study Plan. Kyger said that the other key revision was the inclusion of a conceptual flowchart describing the Lamprey Entrance Efficiency and Operations Study Plan implementation process. He said that the flowchart was not specific in date and time, but was rather a general guide describing what processes would take place when addressing entrance efficiency.

   Steve Lewis said that he had one additional suggestion to insert language from the PLMP that addresses regional coordination. He said that this insertion would carry forward the spirit of making the best use of study fish. Kyger agreed that this revision would be good, and noted that Douglas PUD is always willing to coordinate study fish and equipment to further investigate lamprey. He said that he will incorporate Section 2.6 – Regional Coordination of the PLMP into the draft Lamprey Entrance Efficiency and Operations Study Plan, and will then provide the revised draft to Lewis for approval.

   The Aquatic SWG members present conditionally approved the draft Lamprey Entrance Efficiency and Operations Study Plan, pending USFWS’s email approval of the revised draft plan. Upon USFWS’s approval of the revisions, Geris will distribute the final version of the plan to the Aquatic SWG.  *(Note: Steve Lewis provided USFWS’s approval of the revised plan via email on September 11, 2013, as distributed to the Aquatic SWG by Geris that same day; and the final plan was distributed to the Aquatic SWG by Geris on September 12, 2013.)*

   Andrew Gingerich said that Kristi Geris sent an email to the Aquatic SWG on August 27, 2013, notifying them that the draft WQAP is available for review, with comments due to Gingerich no later than Tuesday, October 1, 2013. He said that the WQAP is a 10-year compliance plan and that Douglas PUD and Ecology have been in close coordination in developing the plan. He said that comments from Ecology are currently being incorporated into the draft plan, and that Douglas PUD will provide a revised draft to Geris for distribution to the Aquatic SWG. Gingerich said that Douglas PUD will be
requesting approval of the draft plan at the Aquatic SWG in-person meeting on October 9, 2013.

5. **Reminder: Spill Prevention Control and Countermeasures Plan – Out for Review** (Andrew Gingerich): Andrew Gingerich said that Kristi Geris sent an email to the Aquatic SWG on August 26, 2013, notifying them that the draft SPCC Plan is available for review, with comments due to Gingerich no later than Tuesday, October 1, 2013. He said that the purpose of the plan is to address oil spill prevention and potential impacts on water quality. He also said that a SPCC plan is not required under the Aquatic Settlement Agreement (ASA); however, the plan is a requirement under the Wells Dam 401 Water Quality Certification received from Ecology. He said that the document must be evaluated at least every 5 years, and that Douglas PUD’s license states that other agencies should also be consulted. He said that the plan needs to be filed with the Federal Energy Regulatory Commission (FERC) by October 31, 2013, and that Douglas PUD plans to request approval of the draft plan at the Aquatic SWG in-person meeting on October 9, 2013.

6. **Mid-Columbia Regional Sturgeon Workshop Follow-up Discussion** (Andrew Gingerich): Andrew Gingerich summarized that the Mid-Columbia Regional Sturgeon Workshop that was held on September 10, 2013, in the Douglas PUD Auditorium was a productive session. He said that valuable information came from both the open forum discussions and the presentations that were provided by Jason McLellan and Jim Powell of Freshwater Fisheries Society of British Columbia (FFSBC). Gingerich said that he was encouraged by the amount of information that was shared, and he feels that this information will help inform management decisions—not only for releasing fish, but also for the development of a monitoring and evaluation (M&E) program for Douglas PUD. He added that he hopes that yesterday’s discussions can also inform future Aquatic SWG decisions.

Pat Irle agreed that the workshop was very informative, noting the four technical experts that were in attendance, including McLellan and Powell of FFSBC, Paul Anders of the University of Idaho, and Larry Hildebrand of Golder Associates. She said that all four scientists shared recent findings indicating that, with less effort, larval collection results in greater genetic diversity than adult gamete collection (i.e., direct gamete removal from adult brood). She said that Aquatic SWG members would benefit from the materials presented at the workshop and suggested that McLellan provide a quick overview of his presentation.

McLellan summarized his presentation. He said that the idea of larval collection arose based on aquaculture concerns regarding genetics and broodstock handling. He said that the lake sturgeon community began conducting larval collection studies to address the high levels of relatedness that are present in conventional broodstock collections.
The general thought was that capturing early life stages would be infeasible, or that capturing adequate numbers would be unattainable. McLellan said that, to test this, he and Matt Howell (also of the Colville Confederated Tribes [CCT]) collected samples in Lake Roosevelt and in the Wanapum Pool. McLellan said that, although sampling difficulties were experienced in the Wanapum Pool, they were able to demonstrate high in-hatchery survival among the larvae collected. He said that the genetic benefits of larval collection were then discussed. He added that the CCT has been working with Andrea Drauch-Schreier and Bernie May from the Genomic Variation Laboratory at the University of California Davis (UC Davis), and that based on samples collected from larvae and adult broodstock captured for the CCT’s studies, they found that in the best year of adult broodstock collection, the allelic diversity was only 73% of what can be obtained in a single year of larval collection. They also found that only 200 larvae are needed to obtain more than 90% allelic diversity, which is greater diversity than what can be obtained with conventional broodstock collection. McLellan added that Mid-Columbia programs have not come close to that level of diversity. He said that Drauch-Schreier and May also investigated how many parents are represented in these larvae; and for brood year (BY) 2010, based on 89 larvae, results indicated that approximately 78 parents contributed to the 3,700 larvae collected that year. McLellan noted that this particular group had 3 to 4 times greater diversity than what could be achieved with adult collection. He said that based on those results, Drauch-Schreier and May ran additional analyses to determine spawning groups, which indicated 17 spawning groups among the 78 spawners. McLellan concluded that larval collection is feasible, and can provide many benefits, including reducing the pressures associated with broodstock collection on small populations.

McLellan agreed with Irle that providing the full presentation would benefit all Aquatic SWG members as well as anyone who will be contributing to discussions or voting on release options and stocking allocation. Therefore, he offered to present his Mid-Columbia Regional Sturgeon Workshop materials at the Aquatic SWG in-person meeting on October 9, 2013.

Irle noted a recent publication by Drauch-Schreier et al. (2013) that was discussed at the workshop (i.e., “Variable patterns of population structure revealed across the range of the ancient octoploid white sturgeon, Acipenser transmontanus”). Irle recalled that the paper discusses relatedness in Mid-Columbia sturgeon, which indicated that there is a high degree of genetic relatedness in the area. Based on these findings, broodstock and/or larvae could be obtained from any location in the Mid-Columbia without much genetic variation. McLellan said that the paper, which was recently accepted for publication in Transactions of the American Fisheries Society, is a summary of Drauch-Schreier’s dissertation work covering a range of genetic stock structure issues. He said that using 13 microsatellites and statistical tests, Drauch-Schreier evaluated basins both individually and in groups, and analyzed differences both out-of-basin and within-basin.
He said that her findings concluded that, within the Columbia-Snake River System, there is little to no genetic differentiation among sturgeon in individual pools. As such, there is no reason to manage them as individual populations. McLellan said, however, that estuary sturgeon below Bonneville Dam and Upper Snake and Kootenay sturgeon were found to be different. As for mainstem sturgeon between Bonneville Dam and the trans-boundary reach, there was no evidence that suggest they are different stocks. McLellan said this means that it is scientifically defensible to use sturgeon originating from any of these pools for supplementation.

Gingerich said that the White Sturgeon Management Plan outlines four plantings over the next 4 years, and he added that based on Drauch-Schreier’s work, he is encouraged with the 2,500 larvae that Douglas PUD has on station in terms of genetic diversity and representation of rare alleles. Steve Lewis asked if there was general agreement to lean more towards larval or brood collection. Irle replied that, based on the recent findings, Washington Department of Fish and Wildlife (WDFW) clearly stated their support of larval collection, despite formerly being skeptical. (Note: Patrick Verhey later clarified that WDFW was never skeptical of larval collection as a method for white sturgeon hatchery supplementation; rather, WDFW’s concern was with the logistics of switching from broodstock to larval collection and who would, or could, perform the collections throughout the Columbia River.) She added that Oregon Department of Fish and Wildlife (ODFW) was on the phone and they also indicated support for larval collection.

7. 2013 Adult Lamprey Passage and Enumeration Study Update (Chas Kyger): Chas Kyger said that a 2013 Adult Pacific Lamprey Passage and Enumeration Study Update (Attachment B) was distributed to the Aquatic SWG by Kristi Geris just prior to the meeting. He said that the update includes antennae detection data by release group as of August 28, 2013. He said that mobile tracking by boat is also underway, and that those data are also included in Attachment B. He noted that additional mobile tracking efforts have been conducted since August 28, 2013; however, those data are not included in Attachment B. Kyger noted one passive integrated transponder (PIT)-tag detection in particular that was detected in the Rocky Reach fish ladders, and appeared to be moving upstream. Andrew Gingerich said that this particular lamprey was released in the Wells Dam tailrace, which means the lamprey traveled downstream, past the Rocky Reach fish ladders via spill, turbine, or the Rocky Reach Juvenile Bypass System (RRJBS). Gingerich said that the lamprey likely did not travel via the RRJBS because there is high detection probability throughout that system and it was not detected—so it likely traveled via either spill or turbine and then traveled back upstream through the Rocky Reach Fishway.

Kyger said that mobile tracking efforts have been conducted once each week, and that the focus has been on the Wells Dam tailrace and the mouth of the Chelan River. He said that lamprey have been detected as far downstream as Beebe Bridge, and that
many lamprey have been detected within 4 to 5 miles downstream of their respective release locations, and are just holding in those locations for now.

Pat Irle asked where the lamprey were collected, and Kyger replied that all except nine lamprey were collected at Bonneville Dam. He said that the remaining nine were collected from Priest Rapids, none of which have been detected.

Kyger said that, per Douglas PUD’s action item from the Aquatic SWG meeting on August 14, 2013, he verified the detection range of the radio-telemetry (RT) antennae that are being used in the 2013 Adult Lamprey Passage and Enumeration Study. He said that based on tag testing of the antennae located at the gallery pier nose, outside of the collection gallery, the range is approximately 8 meters, or 25 to 30 feet. Kyger added that this location can be difficult to test due to the turbulent water.

Lewis asked Douglas PUD what their thoughts were regarding the undetected Priest Rapids lamprey. Kyger said that there has only been one download (Attachment B) since the Priest Rapids lamprey were released, which was only 6 days following their release date. He said this could mean that they just have not yet shown up. Kyger added that a lot of “noise” has been experienced during the mobile tracking efforts conducted since August 28, 2013, and that there have been difficulties detecting fish in general; therefore, the Priest Rapids fish could have been present but overlooked. Gingerich also said that lamprey are known to overwinter in freshwater before they spawn, which may be the case with the Priest Rapids or Bonneville lamprey. He added that, in this case, double-tagging the lamprey was a great idea because once the radio tags expire, detections can continue, even after the study is complete, via the PIT tags.

Lewis asked how long the study fish were held prior to release, and Kyger replied that the Bonneville lamprey were held 2 to 3 weeks prior to delivery to Wells, and the Priest Rapids lamprey were captured and delivered the same day. He said that once the lamprey were on site, they were tagged, held for recovery, and released. Lewis asked if some measurement of girth was recorded, and Kyger replied that measurements were taken of each fish.

Gingerich said that not enough data have been collected to report on the effects of the fishway modifications that were installed to improve enumeration. He said that video at the count window shows that fish are free swimming through that location, as opposed to attaching and moving across the collection plate. Lewis asked if this observed behavior is a result of the modifications, and Gingerich replied that it is unclear. He added that it could simply be preferred behavior. Irle asked if flows were lower through the count window than in previous years, and Gingerich replied that flow through the count window is unmodified, and therefore essentially consistent all of the time. He explained that the collection gallery and fish ladders are separate areas, and that the
auxiliary water system that controls head differential in the collection gallery can be operated exclusively from the rest of the fish ladders. He added that a trial experimenting with different head differentials was conducted about a year ago, and those data were distributed to the Aquatic SWG. Irle asked which detection zone name listed in Attachment B represented the collection gallery, and Kyger clarified that “Entrance Inside” is the collection gallery where lamprey would encounter different differential treatments. He added that whether the lamprey were detected “Inside” or “Outside” would identify if the fish were in regular or modified differential flow. Lewis asked if lamprey have been detected in the auxiliary water system, and Kyger replied that one was detected in the system, but was later detected in the fish ladder. Lewis asked if Douglas PUD planned to develop a scientific publication on this study, and Gingerich replied that they did, if time permits.

8. **Aquatic SWG Extranet Site Update** (Andrew Gingerich): Andrew Gingerich said that he and Douglas PUD’s Information Systems (IS) Department and Kristi Geris have been working closely in developing the Aquatic SWG Extranet website. He explained that there are two websites currently under development. He said that the Extranet site is exclusively for the Aquatic SWG to share and download documents. The other site is a public site where the public can view and download final documents. Gingerich said that Douglas PUD will provide a demonstration of the Aquatic SWG Extranet site at the Aquatic SWG in-person meeting on October 9, 2013.

9. **Conflict of Interest Policy** (Andrew Gingerich): Andrew Gingerich said that the draft Conflict of Interest Policy distributed before the meeting was essentially the same as that adopted by the HCP Hatchery Committees. Mike Schiewe said that the HCP Hatchery Committees’ Conflict of Interest Policy was modeled after several others, including the HCP Tributary Committees’ policy. He said that, in the interest of not excluding key people from technical discussions, the HCP Hatchery and Tributary Committees’ policies give the non-conflicted parties the option to include a conflicted party in the discussion of a project under review; however, a conflicted party cannot participate in the decision-making. Pat Irle requested that the discussion of the Conflict of Interest Policy be deferred to the Aquatic SWG meeting on October 9, 2013, so all parties could participate together. The Aquatic SWG members present agreed to continue discussions on the Conflict of Interest Policy at the Aquatic SWG in-person meeting on October 9, 2013.

10. **Lamprey Proposal for Upper Columbia** (Mike Schiewe): Mike Schiewe said that this agenda item was requested by Bob Rose; however, as Rose was unable to attend the meeting, Schiewe asked if anyone had comments to discuss regarding this agenda item. RD Nelle said that Rose is continuing to develop and refine the proposal, and that he anticipates that Rose will have more to discuss on this topic at the Aquatic SWG in-person meeting on October 9, 2013.
VII. Next Meetings

1. Upcoming meetings (Mike Schiewe and Andrew Gingerich): Andrew Gingerich suggested holding the Aquatic SWG in-person meeting on October 9, 2013, at Douglas PUD Headquarters in East Wenatchee, Washington, to be followed, time permitting, by a site visit at Wells Dam in the afternoon. He said that the site visit would provide an opportunity for a tour of the sturgeon facility and collection gallery, which he said would help Aquatic SWG members gain an understanding of activities and studies currently underway at Wells Dam. Gingerich also suggested an earlier start time of 9:00 am, to help manage enough time for the site visit. The Aquatic SWG members present agreed to hold the Aquatic SWG meeting on October 9, 2013, at an earlier than usual start time of 9:00 am. The meeting will be held in person at Douglas PUD Headquarters in East Wenatchee, Washington; and if time permits, Aquatic SWG members also agreed to a Wells Dam site visit following the meeting.

Upcoming meetings are as follows: October 9, 2013 [in person]; November 13, 2013 (conference call); December 11, 2013 (conference call).

List of Attachments

Attachment A – List of Attendees
Attachment B – 2013 Adult Pacific Lamprey Passage and Enumeration Study Update (9/11/13)
## List of Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
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<tbody>
<tr>
<td>Mike Schiewe</td>
<td>SWG Chair</td>
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<tr>
<td>Kristi Geris</td>
<td>Administration/Technical Support</td>
<td>Anchor QEA, LLC</td>
</tr>
<tr>
<td>Andrew Gingerich</td>
<td>SWG Technical Representative</td>
<td>Douglas PUD</td>
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<tr>
<td>Chas Kyger</td>
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<td>Steve Lewis</td>
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<td>Pat Irle</td>
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<td>Washington State Department of Ecology</td>
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<tr>
<td>Jason McLellan</td>
<td>SWG Technical Representative</td>
<td>Colville Confederated Tribes</td>
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Radio Telemetry Detections as of 8/28/13. Locations of last detection. Wells tailrace locations are detections from mobile tracking by boat. Inside ladder locations is detection on one of nine antennas between the inside of entrance and fishway exit.

### PIT tag detections (as of 9/4/13)

5 fish have been detected at Wells that have been released into the tailrace.

1 fish released in the tailrace has been detected at RR Dam Adult Fish ladders.

15 fish released into the fishways have been detected exiting Wells via pool 68. 1 fishway released fish has been detected at pool 19 only.

2 fishway released fish have not been detected to date.

1 Fish was released into the tailrace and detected at the upper ladder but not at pool 19.

None of the 5 PIT tagged only fish released in the tailrace have yet to be detected.

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Final Meeting Minutes

Aquatic Settlement Work Group

To: Aquatic SWG Parties
From: Michael Schiewe, Chair (Anchor QEA, LLC)
Re: Final Minutes of the October 9, 2013 Aquatic SWG Meeting

The Aquatic Settlement Work Group (SWG) met in person at Douglas PUD headquarters in East Wenatchee, Washington, on Wednesday, October 9, 2013, from 9:00 a.m. to 12:30 p.m. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items

1. Kristi Geris will contact Bob Rose and Steve Lewis to bring them up to speed on the details of the Aquatic SWG Extranet site (Item VI-2).
2. Aquatic SWG members will set up their login information to the Aquatic SWG Extranet site as soon as instructions are received via email from Douglas PUD Information Systems (IS) staff (Item VI-2).
3. Andrew Gingerich will develop a draft sturgeon stocking plan proposal, and draft Monitoring and Evaluation (M&E) Plan outline, and provide the drafts to Kristi Geris for distribution to the Aquatic SWG no later than October 31, 2013 (Item IV-4).
4. Mike Schiewe will contact Bob Rose and Steve Lewis to bring them up to speed on the sturgeon discussions (Item VI-4).
5. Chas Kyger will provide the 2013 Adult Pacific Lamprey Passage and Enumeration Study Update that was discussed at the meeting on October 9, 2013, to Kristi Geris for distribution to the Aquatic SWG (Item VI-7). \(\text{(Note: Kyger provided the update to Geris on October 11, 2013, and Geris distributed the update to the Aquatic SWG that same day.)}\)
6. Pat Irle will provide Chris Coffin’s email address to Kristi Geris to add to the Aquatic SWG distribution list (Item VI-8). \(\text{(Note: Irle provided Coffin’s email address to Geris on October 10, 2013, and Geris added Coffin to the Aquatic SWG distribution list on that same day.)}\)
7. Patrick Verhey will provide an official letter designating the current Washington Department of Fish and Wildlife (WDFW) AQUATIC SWG Policy Representation to Kristi Geris for the administrative record (Item VI-9). \(\text{(Note: Verhey provided Mike Schiewe}\)
II. **Summary of Decisions**
   1. There were no Statement of Agreements (SOAs) approved at today’s meeting.

III. **Agreements**
   1. The Aquatic SWG members present approved the Spill Prevention Control and Countermeasures (SPCC) Plan (Item VI-3).
   2. The Aquatic SWG members present approved the Water Quality Attainment Plan (WQAP) (Item VI-3).
   3. The Federal Energy Regulatory Commission (FERC) approved the request to defer the Twisp Weir Bull Trout study until 2017, as distributed to the Aquatic SWG by Kristi Geris on October 22, 2013.

IV. **Review Items**
   1. Kristi Geris sent an email to the Aquatic SWG on October 30, 2013, notifying them that the Phase One White Sturgeon Management Plan Monitoring and Evaluation Study Plan is out for a 30-day review period, with comments due to Andrew Gingerich no later than Friday, November 29, 2013.

V. **Reports Finalized**
   1. The final Bull Trout Stranding, Entrapment and Take Study Plan was submitted to FERC on September 23, 2013, as distributed to the Aquatic SWG by Kristi Geris that same day.
   2. The final Wells Hydroelectric Project Spill Prevention Control and Countermeasure Plan was submitted to FERC on October 15, 2013, as distributed to the Aquatic SWG by Kristi Geris on October 17, 2013.
   3. The final Wells Hydroelectric Project Water Quality Attainment Plan (WQAP) was submitted to FERC on October 21, 2013, as distributed to the Aquatic SWG by Kristi Geris that same day.

VI. **Summary of Discussions**
   1. **Welcome, Agenda Review, and Meeting Minutes Review** (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Schiewe reviewed the agenda and asked for additions or other changes to the agenda. The following revisions were requested:
      - Pat Irle added a Washington State Department of Ecology (Ecology) staff update.
• Patrick Verhey added a WDFW Aquatic SWG Policy representative update.

The revised draft September 11, 2013 meeting minutes were reviewed. Kristi Geris said that all comments and revisions received from Aquatic SWG members were incorporated into the revised minutes, and that there were no outstanding edits or questions to discuss. The Aquatic SWG members present approved the September 11, 2013 meeting minutes, as revised.

Geris said that a third revised draft of the Mid-Columbia Regional Sturgeon Workshop meeting minutes were distributed to the Aquatic SWG on October 8, 2013. The workshop was held at Douglas PUD headquarters in East Wenatchee, Washington, on Tuesday, September 10, 2013, from 9:00 am to 3:00 pm. Geris said that comments and revisions were received from all Aquatic SWG members that were present at the workshop except for the Yakama Nation (YN). The Aquatic SWG members present recommended that Geris follow up with Bob Rose before finalizing the revised draft minutes.

2. **Aquatic SWG Extranet Site Tutorial** (Andrew Gingerich and Julene McGregor): Andrew Gingerich summarized that, as discussed at the Aquatic SWG meeting on January 9, 2013, the Wells Dam 401 Water Quality Certification and FERC license requires Douglas PUD to provide Aquatic SWG materials to the public. He said that a new public website, [www.douglaspu.org](http://www.douglaspu.org), went live on October 4, 2013, and this site includes information about the Wells Project and the Aquatic SWG, including links to Ecology water quality data. He said that a secure Aquatic SWG Extranet site (not for public access), [https://extranet.dcpud.net/sites/nr/aswg/](https://extranet.dcpud.net/sites/nr/aswg/), has also been under development; and that Douglas PUD IS staff and Kristi Geris have been uploading Aquatic SWG documents to the secure site. He said the extranet will allow the Aquatic SWG and Douglas PUD to track all relevant documents to ensure that final documents, as approved by the Aquatic SWG, will be made public on Douglas PUD’s public webpage. Final documents from that site will be pulled and posted to the public site.

Douglas PUD IS staff member, Julene McGregor, distributed Aquatic SWG Extranet Site Document Library Instructions (Attachment B), which are also available in the “Help Documents” on the Extranet site. She gave the following instructions for accessing the Aquatic SWG Extranet site: 1) copy and paste the secure link into an Internet browser; 2) specify a login format (select “Forms Authentication” for non-Douglas PUD employees); and 3) enter your username and password. McGregor said that she will distribute a hyperlink to instructions on how to set up a username and password to access the site. She added that the hyperlink is time-sensitive and needs to be accessed within a few days, or it will become inactive. Aquatic SWG members agreed to setup their login information to the Aquatic SWG Extranet site as soon as instructions are received via
McGregor noted the last page of Attachment B, which identifies characters that are not compatible with the Extranet site (i.e., cannot be used in file names). She briefly reviewed the different views available along the left panel of the home page that will sort the document library by, for example, Action Items, Agendas, Meeting Minutes, and so on. She also said that she can create a “Meeting Date” view that will sort documents by meeting date (i.e., all meeting materials for a particular date lumped together).

Gingerich said that file sharing and document reviews via the Aquatic SWG Extranet Site will begin from this point forward. Geris said that she will contact Bob Rose and Steve Lewis to bring them up to speed on the details of the Aquatic SWG Extranet site. McGregor said that she can be reached at (509) 881-2236, to answer any questions about the Extranet site.

3. **DECISION: Spill Prevention Control and Countermeasures Plan and Water Quality Attainment Plan** (Andrew Gingerich): Andrew Gingerich said that the SPCC Plan and WQAP are both requirements under the Wells Dam 401 Water Quality Certification and new FERC operating license for Wells Dam, and that Douglas PUD has worked closely with Ecology in developing both documents. He said that both documents are due to
Mike Schiewe said that some of these types of documents also require HCP Coordinating Committees’ consultation under the new FERC license. He said that the Coordinating Committees believe that development and review of these types of documents are more appropriately the prerogative of the Aquatic SWG, and so they are discussing options to streamline the Coordinating Committees’ review and approval process, as opposed to reviewing and approving such documents independently.

Pat Irle noted the differences between the Douglas PUD Water Quality Management Plan and the WQAP, and said that the expected level of Coordinating Committees’ involvement may also be different. Gingerich said that Douglas PUD carefully reviewed the license and 401 Certification languages, and HCP review and consultation is necessary for both plans. *(Note: this process was completed at the same time the Aquatic SWG had a 30 day review of the documents.)* Chas Kyger added that similar requirements are outlined for lamprey documents.

The Aquatic SWG members present approved the SPCC Plan and the WQAP.

4. **Sturgeon Discussion** (All): The Aquatic SWG agreed that Jason McLellan should postpone his presentation, “Naturally Produced Larvae: A New Approach to White Sturgeon Conservation Aquaculture,” until all Aquatic SWG members are present. McLellan’s presentation was distributed to the Aquatic SWG by Kristi Geris on September 9, 2013, and was presented at the Mid-Columbia Regional Sturgeon Workshop on September 10, 2013. Andrew Gingerich said that he had hoped to have everyone participate in today’s discussion; however, he also recognized the need to make progress knowing that everyone cannot always be present. Mike Schiewe asked if there are critical dates in the near term to which the Aquatic SWG needs to be sensitive. Gingerich said that there is currently adequate rearing capacity at Wells, but Douglas PUD will want to start culling in the next few months; and therefore, will need to know how many fish should be retained for planting. He added that, for M&E purposes, Douglas PUD will also want to know how many fish need to be tagged, and release dates need to be discussed. In addition, tags need to be ordered and fish marked. Gingerich proposed that Douglas PUD develop a SOA that supports both larval and direct gamete programs and that recommends using a combination of sources this coming release year. He said that, with the fish that are on station, there is a good chance to meet the goal of 5,000 fish into the Wells Project in the first stocking year. He said that he is encouraged by the recent information about high genetic diversity in larval fish, and that Roosevelt fish also seem to be appropriate to use based on historic gene flow and the absence of district population segments for White Sturgeon in the mainstem Columbia. He said that there are not enough fish for larval source only, but the factorial
crosses and brood seem acceptable. He said that the 2,500 larvae are doing quite well; and added that 2,500 larvae and 2,500 direct gamete fish may be a good starting point. He noted that the YN and the U.S. Fish and Wildlife Service (USFWS) would also need to approve the SOA; and that Douglas PUD is also waiting on fish health results.

Chad Jackson agreed with Gingerich’s proposal. He said WDFW’s main concern is that there are enough fish to fulfill the M&E component (i.e., large enough sample size for a valid study). Gingerich added that the plan is to front-load the stocking years to ensure a large enough sample size and support an already low estimate population size. Jackson noted that Grant PUD’s contractors determined that their M&E objectives could be met with stocking lower numbers; to which Jackson added that if Douglas PUD determined the same, WDFW would also be supportive.

Gingerich said that the current sturgeon SOA that was approved early this year supports both programs for 4 years. He said that, based on M&E from those first 4 years, informed decisions can be made for subsequent stocking in the next 5 to 10 years, under the Wells White Sturgeon Management Plan (MP).

Pat Irle said that she would like to hear more discussion on whether there is a need for 5,000 fish to achieve M&E objectives. She said that recent studies seem to indicate that larval source fish are “better” than brood source fish with regards to greater survival and allelic diversity. She added that passive integrated transponder (PIT)-tagging the fish will provide the data needed for several different analyses. McLellan added that, from a technical perspective, 5,000 fish do not necessarily need to be stocked for an M&E program. He said that objectives can be met by adjusting release strategies, such as size, location, and time. He said that there are data that indicate that stocking can be reduced by 60% while still meeting M&E objectives. McLellan noted that there is no compelling scientific or statistical justification behind the number 5,000, and he added that he is not implying that 5,000 is a bad number. Rather, there is no compelling reason that the Aquatic SWG needs to stick to that number. He said that current research indicates that long-term risk is lower and genetic diversity is significantly higher with larval wild-origin fish. He added that there is no genetic benefit to using fish from direct gamete takes. He said that a strong argument can be made that there is no benefit to including the direct gamete takes in a release strategy.

Gingerich acknowledged that the technical information should be considered. He said the challenge is that Douglas PUD’s FERC license indicates stocking up to 5,000 and stocking another number will require an explanation to FERC. He said that, additionally, the Aquatic SWG signed a SOA which stated that both larval collection and direct gamete programs are suitable. Gingerich said that if this is no longer the case, the SOA needs to be revisited. McLellan said that he is not suggesting that direct gamete take fish are not suitable; rather, he is saying that based on the most recent data, larval
collection appears to be better. He noted that the SOA was signed knowing that both programs were pilot, and not knowing what fish could be obtained. He said that the direct gamete program has not met collection goals, and that the recent data indicate that larvae are the better alternative, from a genetic perspective. Bret Nine noted that when agreement was reached on the SOA, the matrix was two three-by-three (3x3) mating matrices; this matrix was not ultimately met. McLellan added that having the same 3x3 genetic crosses spread across the entire basin by all three PUDs is a concern.

Schiewe asked whether if there is a loss of recruitment within the next 5 years of the stocking program under the White Sturgeon MP, it would be hard to rebuild. McLellan said that there would not be an issue with 1 or 2 years; however, more than that may cause issues. He added that a couple of bad years are not unlike the natural situation where recruit failure occurs in a natural population in some years.

Schiewe suggested carrying this discussion forward to the Aquatic SWG meeting on November 13, 2013. Gingerich agreed, and asked what needs to happen between now and then. Schiewe suggested that Douglas PUD develop a draft proposal; and Irle suggested that Douglas PUD also develop a draft M&E Plan. Gingerich agreed to develop a draft sturgeon stocking plan proposal and a draft M&E Plan outline, and to provide the drafts to Geris for distribution to the Aquatic SWG no later than October 31, 2013. He asked if Aquatic SWG members present would approve using the 2,500 larval fish on station, and spreading the additional fish over 11 or 12 half-sibling families; which would be close to a 50/50 split between the larval and direct gamete programs. McLellan said that he would be interested in hearing a technical argument for using direct gamete origin fish. He added that even if agreement is reached on a 50/50 split with 250 per half-sibling cross, most larvae present represent more than 100 individual spawners, so there will still be a very small number of crosses swapping with highly inbred individuals. Gingerich noted the several uncertainties inherent in a M&E program, such as survival and recapture; and he explained that those are some of the reasons behind starting with a 50/50 split. Schiewe asked if a goal of the M&E program is to compare the two programs, and Gingerich replied that it is not. He added that the White Sturgeon MP intended for M&E to address what subsequent stocking would look like based on what is happening today and focus on things like survival and retention within the Wells Project. McLellan added that he did not see value in comparing the two programs. He said that the ultimate goal is to achieve population abundance, and M&E is meant to evaluate the aquaculture program in order to reach that end goal.

Gingerich said that Douglas PUD is not necessarily opposed to reducing releases, but release numbers need to be balanced toward meeting M&E objectives. McLellan said that the Colville Confederated Tribes (CCT) would like to see as many larval-origin fish go in the water as possible. He added that these discussions can be held on an annual basis in order to re-evaluate what is on hand, as needed. He also said that based on
discussions with Larry Hildebrand, fish size at release may be the biggest factor in rebuilding. McLellan explained a model that indicates that only about 200 larval-origin individuals are needed to achieve 90% allelic diversity; and Gingerich noted that those numbers are also dependent on predation and other factors, which may be specific to the Wells Reservoir. Therefore, a strong M&E program will be needed to determine fish survival in Wells. Gingerich continued by saying that McLellan’s model description is very beneficial; however, these data do not exist for Wells. McLellan acknowledged that obtaining specific survival estimates is difficult with sturgeon; and Gingerich said that getting 5,000 fish in the water can help answer some of those questions in the short term. McLellan agreed with this, so long as releases are structured to address those questions and enough effort is implemented to obtain adequate statistical power.

Aquatic SWG members present agreed to continue these discussions, and Schiewe said that he will contact Rose and Lewis to bring them up to speed on the issues discussed today.

5. **Conflict of Interest (COI) Policy** (Andrew Gingerich): Andrew Gingerich said that a draft COI Policy was distributed to the Aquatic SWG by Kristi Geris on August 27, 2013. He said that the draft policy, which is modeled after the Hatchery Committees’ policy, is fairly liberal, in that those in conflict can participate in conversations but cannot vote. He said that the onus is on the member who is in conflict to explain the COI with the Aquatic SWG. He added that the draft policy is fairly standard with other forums and that he hoped to discuss and comment on the policy today and then vote on it next month. Mike Schiewe said there is interest in having this conversation with all members present; however, he said he thinks it is important to start discussing issues, if there are any. Schiewe reiterated that this is a very liberal approach that does not take people out of the discussion; it just takes them out of the decision.

Bret Nine asked if language in the bi-laws state that the Aquatic SWG makes the final decisions. Gingerich said that the Aquatic Settlement Agreement (ASA) states that the Aquatic SWG is responsible for carrying out the MPs, with support from the entire membership. He recalled a question from Patrick Verhey that was distributed to the Aquatic SWG by Geris on August 27, 2013. Verhey had asked if the Aquatic SWG is responsible for awarding Request for Proposal (RFP) contracts, and the answer is no—Douglas PUD is responsible.

Gingerich said that the perception is that people’s technical opinions could be swayed by the agency that completes the work. Verhey said that WDFW does not agree with the COI Policy; and that WDFW feels that the current ASA is between government entities, not individuals. He further said that government representatives are representing the state, not individuals. He said if there is concern that there is individual interest, it should be brought to the policy level. Jason McLellan agreed with
Verhey, and added, for example, that the stocking decisions have no effect on individuals. Gingerich disagreed, and said he believes that stocking decisions have the potential to affect funding in future years. Pat Irle added that there seems to be perceived conflict whenever money is involved.

McLellan suggested that Douglas PUD develop an independent proposal review panel. He said that the Aquatic SWG can discuss the technical merits, as needed, and then the decision-making is completed by the outside review panel. Verhey added that WDFW is involved with a lot of entities. He also added that this policy does not treat all as equals—it gives Douglas PUD an exemption, which, Verhey noted, may not be appropriate. Gingerich asked how this policy is different from the HCP Tributary Committees’ policy, where both Washington State and the Tribes have agreed to participate. Verhey said that the decision was not vetted at the policy level at WDFW, who are not supportive of entering into a COI Policy. McLellan said that he is not certain whether the CCT are supportive or not, nor is he certain how the issue was addressed in the Tributary Committees, but the issue was raised with their policy staff as well.

Verhey asked what past experiences have happened and what the dispute resolution process was in those cases. Gingerich said that he was not satisfied with how the sturgeon RFP process went; and he added that, from his perspective, there were COIs whereby the technical strategy decision could not be uncoupled from the agency hired to do the work. McLellan agreed that there was COI in the sturgeon RFP process. He said that, however, it was more of a problem with the process than with anything else. He said that he felt like the two proposers were pitted against each other and that they had to fight for their proposals. McLellan recommended stepping away from that kind of set-up. Chad Jackson agreed, and said that even if this policy was in place, everyone works together and knows each other, so everyone could have perceived conflict.

Gingerich said that if Douglas PUD develops an independent proposal review panel, and the decision-making is taken out of this forum—which is not the intention of this group or the ASA language—there is the potential for certain members to become disgruntled with Douglas PUD’s technical selections and decisions. Verhey said that he believes the rules to govern this policy are problematic (i.e., members either voluntarily recuse themselves from decision, or another entity can suggest the other is in conflict). Schiewe said that he is unaware of a scientific panel that does not have a COI Policy in place. He added that it is not to constrain the process; rather, it is to strengthen the process. He suggested that an alternative might be to make all decisions Douglas PUD decisions in consultation with the Aquatic SWG.

Verhey suggested that, for now, discussions continue about a possible COI Policy; and he added that he would much prefer to work this out within the forum. Irle suggested that the Aquatic SWG only comment on technical aspects of RFPs and other documents,
and that Douglas PUD address anything related to funding. Gingerich noted that, in some instances, those two things cannot be separated. Verhey added that reasonable cost-effectiveness is an integral part of many technical discussions. He said whether it be in dollars and cents, or in magnitudes, what is reasonable also needs to be considered.

McLellan asked Gingerich if he envisioned the Aquatic SWG as being fully integrated in the review process; to which Gingerich replied that he does in terms of evaluating the technical components, but not in terms of hiring contractors. Irle suggested that if the Aquatic SWG agrees that two proposals are technically equivalent, then at that point, Douglas PUD should make the final decision. Schiewe noted that, if anyone chooses, they can always elevate the issue of the COI Policy to the policy level. He said another alternative would be to not put yourself in conflict by not submitting on a proposal. Verhey said that WDFW wants to be at the table to represent Washington State; and Schiewe said that nothing in this policy prevents anyone from participating in the discussions. Schiewe further said that Douglas PUD may need to amend their license if the decision-making is taken outside of the Aquatic SWG; and Irle noted that the ASA would definitely need to be rewritten. Schiewe noted that the list of examples of those who may be in conflict, as noted in the COI Policy, are not meant to be exhaustive—there are different degrees.

McLellan said that the Upper Columbia Technical Recovery Group (UCTRG) implements a COI Policy where: 1) for each agenda item, members in conflict identify themselves so that when that agenda item is discussed, those in conflict leave the room; and 2) an explicit, written out, standardized protocol is developed for scoring RFPs. Irle noted that she has not seen many satisfactory scoring protocols; and McLellan said that he could recommend one. Gingerich said that the draft Aquatic SWG COI Policy is figuratively “leaving the room,” and what McLellan just described is very similar to the policy being proposed.

Gingerich said that he will notify his manager that there was negative feedback on the draft COI Policy, and discuss a path forward.

6. **Aquatic Nuisance Species Update** (Chas Kyger): Chas Kyger said that Douglas PUD conducted aquatic nuisance species (ANS) monitoring for zebra and quagga mussels in July, August, and September of this year. He said that results from veliger samples have not yet been received, but the samples for artificial substrates were negative. He said that crayfish monitoring was conducted in the same locations as in 2012; and at the mouth of the Okanogan, 15 nonnative northern crayfish were found during 4 hours of sampling. Sampling included hand nets and flipping rocks. Crayfish monitoring was also conducted at Washburn Island, where one nonnative northern crayfish was found; it was also conducted at the mouth of the canals near the Bridgeport farms, where
another nonnative northern crayfish was found. Kyger added that Douglas PUD is also maintaining a database of incidental captures. Andrew Gingerich said that these results will be included in an annual report. Patrick Verhey asked if Douglas PUD tried trapping, and Kyger replied that, because trapping was so ineffective in 2012, they chose not to trap in 2013. Verhey noted that a recent graduate study found that trapping can be an effective method. Kyger said he reviewed that study and found that Douglas PUD was using different traps and was also setting the traps at different depths. He said that because there were other effective methods to conduct sampling, Douglas PUD chose to implement those rather than trapping.

7. **2013 Adult Lamprey Passage and Enumeration Study Update** (Chas Kyger): Chas Kyger said that he will provide a 2013 Adult Pacific Lamprey Passage and Enumeration Study Update (Attachment C) to Kristi Geris for distribution to the Aquatic SWG. *(Note: Kyger provided the update to Geris on October 11, 2013, and Geris distributed the update to the Aquatic SWG that same day.)*

Kyger said that this update includes antenna locations and the number of tagged lamprey detected at each station. He said that after reviewing these data, it was discovered that ambient noise was causing low detection, and so this was filtered out to try to improve the detection history. He said that LGL Limited Environmental Research Associates will have improved data in the final report. Kyger said that there have been no PIT-tag detections since the last update; and he added that the last detections were just before the Aquatic SWG meeting on September 11, 2013. He said that there are about 40 days of battery life left in the acoustic tags.

Pat Irle asked how many total lampreys have passed Wells Dam, and Kyger replied that 14 lampreys have been detected in the Methow, and 5 have passed Wells Dam, but have not yet been detected in the tributaries—so, a total of 19. Andrew Gingerich added that about 30 lamprey have not been detected at all. He said that the last detection location indicates that many of these fish have entered the project and then turned around. Kyger added that multiple fish have come up the ladders, moved back down, and then gone to the other ladder. He said that he anticipates that the final report will evaluate these data more carefully.

Patrick Verhey asked if lamprey could be bypassing the count station, and Kyger replied that there is no way to tell yet. Verhey asked where the release locations were, and Gingerich replied that Douglas PUD only received the original quota, so the release locations were as planned—in the tailrace and in the ladders. Kyger said that Douglas PUD anticipates the final report to be ready by spring 2014.

8. **Ecology Staff Update** (Pat Irle): Pat Irle recalled that John Merz occupied a position directly above her, and that Charlie McKinney occupied the position above Merz. Irle
said that Merz has now been replaced by Chris Coffin, who has requested to be included on the Aquatic SWG distribution list. Irle said that she will provide Coffin’s email address to Kristi Geris to add to the Aquatic SWG distribution list. *(Note: Irle provided Coffin’s email address to Geris on October 10, 2013, and Geris added Coffin to the Aquatic SWG distribution list on that same day.)*

9. **WDFW Aquatic SWG Policy Representative Update** (Patrick Verhey): Patrick Verhey said that Jim Brown replaced Dennis Beich as the Aquatic SWG Policy Representative. Verhey said that he will provide an official letter designating the current WDFW Aquatic SWG Policy Representation to Kristi Geris for the administrative record. *(Note: Verhey provided Mike Schiewe with an email notice on October 10, 2013, designating the current WDFW Aquatic SWG Policy Representation.)*

VII. **Next Meetings**

1. **Upcoming meetings** (Mike Schiewe): Upcoming meetings are as follows: *November 13, 2013 (conference call); December 11, 2013 (conference call); January 8, 2014 (conference call).*

VIII. **Wells Dam Site Visit (afternoon)**

1. **Sturgeon Facility and Fishways** (Interested Parties): Andrew Gingerich and Chas Kyger led a tour of the Wells Dam sturgeon facility and west fishway. The tour included the new sturgeon facility that houses 12 circular tanks, the west Wells Dam fishway, the count station and interpretive center, and the collection gallery. Only Anchor QEA, Ecology, and Douglas PUD participated in this tour.

**List of Attachments**

Attachment A – List of Attendees
Attachment B – Aquatic SWG Extranet Site Document Library Instructions
Attachment C – 2013 Adult Pacific Lamprey Passage and Enumeration Study Update
## List of Attendees

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<tr>
<td>Mike Schiewe</td>
<td>SWG Chair</td>
<td>Anchor QEA, LLC</td>
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<td>Kristi Geris</td>
<td>Administration/Technical Support</td>
<td>Anchor QEA, LLC</td>
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<td>Andrew Gingerich</td>
<td>SWG Technical Representative</td>
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<td>Chas Kyger</td>
<td>Technical Support</td>
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<td>Julene McGregor</td>
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<tr>
<td>Patrick Verhey</td>
<td>SWG Technical Representative</td>
<td>Washington Department of Fish and Wildlife</td>
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<td>Chad Jackson†</td>
<td>Technical Support</td>
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<td>Pat Irle</td>
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<td>Jason McLellan</td>
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<tr>
<td>Bob Donnor</td>
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† Joined by phone
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- backslash (\)
- colon (:)
- angle brackets (< >)
- question mark (?)
- slash (/)
- plus sign (+)
- pipe (|)
- quotation mark (")

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- You cannot use multiple consecutive periods (file..1.txt or file..txt)
- You cannot end with a period (file.txt.)
### Summary of the number of radio-tagged Pacific lamprey that were last detected within in each zone, by release session and release location as of 10/1/2013.

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<th>Detection Zone Name</th>
<th>Release (i.e., not yet detected)</th>
<th>Session 1 (7/16)</th>
<th>Session 2 (7/23)</th>
<th>Session 3 (7/30)</th>
<th>Session 4 (PR 8/22)</th>
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<tr>
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<td><strong>27</strong></td>
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The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, November 13, 2013, from 10:00 a.m. to 11:45 a.m. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items

1. The Yakama Nation (YN) and the Colville Confederated Tribes (CCT) will develop an agreed-upon revised draft White Sturgeon Stocking Proposal for Aquatic SWG review (Item VI-2).

2. Douglas PUD will contact the Federal Energy Regulatory Commission (FERC) for clarification regarding actions requiring a license amendment, as it pertains to a White Sturgeon Stocking Plan (Item VI-2).

3. The Aquatic SWG will review the draft Phase One White Sturgeon Management Plan (WSMP) Monitoring and Evaluation (M&E) Study Plan, and will provide comments to Andrew Gingerich no later than Friday, November 29, 2013 (Item VI-3).

4. Douglas PUD will provide the Johnson et al. paper received from Bao Le to Kristi Geris for distribution to the Aquatic SWG. The paper evaluates a similar situation that is being addressed at the Wells Dam count window area regarding uneven hydraulics and flow separation due to currently installed infrastructure (Item VI-5).

II. Summary of Decisions

1. There were no Statements of Agreement (SOAs) approved at today’s meeting.
III. Agreements
1. The Aquatic SWG members present agreed to continue discussions regarding the potential removal of the upstream ramp exiting the Wells Dam count window area at the Aquatic SWG meeting on December 11, 2013 (Item VI-5).
2. The Aquatic SWG members present agreed to continue discussions regarding future plans for the Douglas PUD Adult Lamprey Passage and Enumeration Study at the Aquatic SWG meeting on December 11, 2013 (Item VI-5).

IV. Review Items
1. Kristi Geris sent an email to the Aquatic SWG on October 30, 2013, notifying them that the Phase One WSMP M&E Study Plan is out for a 30-day review period, with comments due to Andrew Gingerich no later than Friday, November 29, 2013.

V. Reports Finalized
1. There are no reports that have been recently finalized.

VI. Summary of Discussions
1. **Welcome, Agenda Review, and Meeting Minutes Review** (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Schiewe reviewed the agenda and asked for additions or other changes to the agenda. Chas Kyger added a discussion of potential modifications to the Wells Dam count window area.

   The revised draft October 9, 2013 meeting minutes were reviewed. Kristi Geris said that all comments and revisions received from members of the Aquatic SWG were incorporated in the revised minutes, and that there were no outstanding edits or questions remaining to be discussed. The Aquatic SWG members present approved the October 9, 2013 meeting minutes, as revised.

2. **DECISION: White Sturgeon Stocking** (Andrew Gingerich): Andrew Gingerich said that Douglas PUD had hoped to reach agreement today on a White Sturgeon Stocking Plan; he added, however, that he is aware there is still uncertainty with some of the elements of the plan. He noted the meaningful discussion that took place about white sturgeon stocking at the last Aquatic SWG meeting on October 9, 2013; and per Douglas PUD’s action item, a draft White Sturgeon Stocking Proposal (Attachment B) was distributed to the Aquatic SWG by Kristi Geris on October 30, 2013. Gingerich noted that the draft proposal and the draft Phase One WSMP M&E Study Plan were combined into a single document (i.e., Attachment B). He said that the CCT then developed an alternative draft White Sturgeon Stocking Proposal (Attachment C), which was distributed to the Aquatic SWG by Geris on November 5, 2013.
Chad Jackson said that Washington Department of Fish and Wildlife (WDFW) supports either proposal. Bob Rose said that, at this time, the YN is not ready to approve either proposal. He added that the YN has a few ideas that they would like to continue to develop and discuss with WDFW and the CCT, and then present to the Aquatic SWG. He anticipates that an agreement can be reached within the next week or so. Mike Schiewe suggested establishing a 1- to-2 week deadline for a check-in, and Rose agreed. Jason McLellan concurred with Rose’s plans, and said that CCT staff is planning to meet with the YN to discuss issues and alternative proposals. He said these discussions will also involve WDFW, and he agreed to a 1- to 2-week deadline for a check-in or decision. Steve Lewis said that the U.S. Fish and Wildlife Service (USFWS) is still considering both proposals, and he agreed that a 1- to 2-week deadline is reasonable. He added that, although USFWS is not favoring either proposal at this time, the CCT’s proposal seems to have more flexibility. Pat Irle said that she is pleased to hear that principal parties are discussing the issue and looking to find a workable solution. She added that Washington State Department of Ecology’s (Ecology’s) main interest is that decisions are scientifically based.

Gingerich summarized that as of today there is not unanimous consent on either of the two current proposals. Schiewe suggested that the YN and the CCT move forward with discussions and develop a draft proposal to which they both agree, which can then be distributed to the Aquatic SWG for email concurrence. He noted that if the signatories prefer to discuss anything prior to concurrence, a conference call can be arranged as needed. Gingerich noted that if a revised approach is developed, Douglas PUD will need additional time for internal review. He also noted that after a plan is approved, Douglas PUD will need time for implementation. Schiewe recommended, in the interest of moving forward in a timely manner, that the YN and the CCT provide a draft for review within one week. The Aquatic SWG agreed to this plan, and the YN and the CCT agreed to develop a revised draft White Sturgeon Stocking Proposal for Aquatic SWG review.

Schiewe reminded the Aquatic SWG that the WSMP stipulates specific stocking numbers, and if the approved stocking plan deviates from the WSMP, it may become an issue that has to be reviewed and approved by FERC. McLellan said that he believes the language in the WSMP is vague enough that FERC review is unnecessary. He said that it was implied that releasing 5,000 fish is required; however, the language in the WSMP specifically states “up to 5,000” with a total number following in parentheses. He indicated that this language leaves room for interpretation. Gingerich disagreed and noted pages 50 and 51 of the Wells Project FERC license, where Article 401(c) states that a revision to the schedule will require additional actions, such as the potential for a license amendment. He added that Douglas PUD is reluctant to request a modification of the license immediately following the issuance of the new license especially since the first year of stocking has not been implemented.
Gingerich recommended that the Aquatic SWG review pages 50 and 51 of the Wells Project FERC license, and also Section 4.1.2 of the WSMP. He said that Douglas PUD is not necessarily opposed to stocking less than 5,000 fish; rather, he wants people to be aware that doing so will require additional documentation and license action, and if additional actions are preventable Douglas PUD would tend to stick to the original stocking plan, especially for Phase I. Jackson recommended that Douglas PUD contact Grant PUD and Chelan PUD because they both have deviated from their respective licenses where no amendment was required. Gingerich said that may be correct for their licenses; and noted, however, that the language and obligations for sturgeon stocking numbers are different in each management plan. He added that the license orders for Grant PUD and Chelan PUD are not as specific in terms of requirements for license modifications and amendments, unlike Douglas PUD’s. McLellan asked if clarification could be obtained regarding what actions would require a license amendment, and Gingerich said that he will contact FERC for more information.

Gingerich said that regardless of FERC consent, unanimous consent within the Aquatic SWG is still needed—whether it is 4,000 fish or 5,000 fish. Lewis asked for a summary of differences between the two current proposals. Schiewe said that Douglas PUD is proposing a 50/50 split between the larval and direct gamete programs (i.e., 2,500 larvae and 2,500 direct gamete fish; see Attachment B). McLellan said that the CCT’s ultimate preference would be for no direct gamete take fish in the Wells Pool. He said that this is because of the long-term risks for inbreeding and reduction in the effective population size. He said, however, that the CCT recognizes the need to compromise, so they proposed a prorated number of offspring from the direct gamete fish. He explained that two three-by-three (3x3) crosses would have resulted in 18 half-sibling families; and if one were to divide 2,500 by 18 (2,500/18) stocking per family would be 139 fish. Therefore, the CCT is proposing releasing 139 fish from each direct gamete take cross (n = 11) for a total of 1,529 direct gamete take origin fish, in addition to the wild larvae origin fish (see Attachment C).

Gingerich said that one concern that Douglas PUD has with the CCT’s proposal regards the numerator (i.e., 2,500) in the 2,500/18 half-sibling family equation used to calculate 139 fish. He said that Douglas PUD considers that the original Broodstock Collection and Breeding Plan that was approved and filed with FERC specified an original target of 5,000 fish; as such, the numerator should be 5,000, doubling the number of fish appropriate per family group. Gingerich said that another concern with the CCT’s proposal is how risk is assessed, and he added that qualifying genetic risk is difficult to do. He said that, ultimately, the genetic diversity currently on station is already greater than what was approved as acceptable if only broodstock were available. McLellan noted recent modeling and genetic work indicating that supplementing with hatchery fish through direct gamete take, over time, will result in domestication and high levels of
relatedness. He argued that there would be no increase in diversity with the inclusion of direct gamete take fish. Gingerich reiterated that Douglas PUD needs to work within the bounds of their FERC license. He said that the first order of business is to develop a plan that everyone can agree to.

3. **REMEMBER: White Sturgeon M&E Review** (Andrew Gingerich): Andrew Gingerich said that Kristi Geris sent an email to the Aquatic SWG on October 30, 2013, notifying them that the draft Phase One WSMP M&E Study Plan (Attachment B) is out for a 30-day review period, with comments due to Gingerich no later than Friday, November 29, 2013. Gingerich said that the document was developed to specifically address those measures found in the monitoring and evaluation objectives of the WSMP. He added that following the review period, he hopes to obtain approval of the plan so that Douglas PUD can move forward with implementation.

Steve Lewis asked if the number of tagged fish can be increased to assist comparing the two stocking proposals. Gingerich said that all fish, regardless of source, will be given a passive integrated transponder (PIT) tag and year-specific scute mark prior to release, which is a requirement of the WSMP. He added, however, that the primary objective of the M&E plan is to evaluate survival—not to compare programs. Jason McLellan said that he thinks Lewis was referring to a stocking question that is being discussed in other forums; and that is, if the stocking number is less than that of a full release, and in the interest of addressing M&E, whether the PUDs could still purchase and acoustic tag the same number of fish as if it were a full release. He said the reasoning is that much of the M&E information is expected to be derived from the telemetry data. He said the argument is that some are suggesting higher release numbers, while others are suggesting more tags. Gingerich said that the WSMP states that 1% of each release group will be given acoustic tags, with a maximum of 50 tags per year (if the release was 5,000 fish). He added, however, that Douglas PUD could potentially consider tagging more than 1%. He also added that M&E does not start until 2015; and suggested prioritizing recapture and acoustic tagging 50 of those fish from the 2014 release. McLellan asked if Douglas PUD plans to acoustic tag recaptured fish only, and Gingerich said only for the 2014 releases, as described in the M&E Study Plan. Gingerich explained that in subsequent years, a portion of fish will be tagged in-hatchery, and a portion will be tagged as recaptures. He said this methodology accomplishes gathering of two types of data: 1) habitat use data from those fish surviving after one year of release; and 2) retention data from fish tagged in-hatchery.

McLellan said that the CCT plans to provide comments on the M&E Study Plan; and if the plan goes out for Request for Proposal (RFP), the CCT would also be interested in submitting a proposal. He noted, however, that this raises the issue of a conflict of interest (COI). He said that the CCT may be perceived as in conflict while commenting on the study plan. Gingerich recalled the lack of support for an Aquatic SWG COI Policy
and stated that, after internal discussions, Douglas PUD had decided to not pursue a COI Policy for the Aquatic SWG at this time. He said Douglas PUD hopes that the Aquatic SWG can review the technical merits of the M&E Study Plan and how it speaks to the WSMP, without involving contracting. Bob Rose asked whether, in this case, a COI would be avoided if Douglas PUD selects the contractor. Gingerich said that he believes McLellan was alluding to the concern that if an entity evaluating a technical proposal is also planning to apply to conduct the work, their edits may be swayed to their skill set; and then the PUD would be swayed by the technical skill set included in the plan. As such, Gingerich noted that there is probably not a perfect way to completely remove the COI even if Douglas PUD is responsible for hiring the contractor. He added, however, that short of having a COI, Douglas PUD would try and keep the selection of the contractor independent of the proposal development since the COI proposed was not supported by the Aquatic SWG. Rose agreed and suggested that there are often checks and balances naturally in place that resolve COIs. Mike Schiewe said he understood their concerns about a potential COI; he added, however, that he is unaware of any scientific organization that would allow potential contractors to participate in developing a study plan that they would ultimately be competitively bidding to conduct. He said he understands that locally it becomes problematic because the Mid-Columbia is a small community. However, he said that without a COI policy, Douglas PUD (as the contracting entity) will make all the decisions; ideally, they would like the Aquatic SWG to assist in the development and approval of detailed study plans. Pat Irle added that she understood the COI issue but that she values the technical expertise that the Aquatic SWG has to offer.

Chad Jackson said he felt it was odd that this level of detail was already being discussed. He said that, in his experience, the first step is to approve a set of elements; and then during the RFP process, the individual contractors would be asked to present a methodology for achieving those elements. He added that it seems the process is backwards. Rose said that occurred to him, too. Gingerich disagreed, and said he believes that specific study questions and parameters should first be determined based on the WSMP; and from there, the technical process is complete. Irle said that she supports Douglas PUD’s approach because the technical experts can determine what needs to be achieved, and what is adequate; and then proposers need to adhere to what is agreed upon by the Aquatic SWG. Jackson argued that, at this point, only the metrics to evaluate need to be identified (e.g., annual fish growth); and then the contractors should identify methods to evaluate those metrics. Gingerich noted that this M&E Study Plan is not inconsistent with other study plans—it is a document containing a certain level of specificity, and once it is approved, a contractor will be hired to do the work. He added that RFPs without specificity often raise the issue of a COI. McLellan asked if comments on the M&E Study Plan can include alternative approaches. Gingerich said yes, but he recommended that edits and comments speak
directly to the goals and methods written in the WSMP. He also welcomed any level of specificity as reviewers see fit.

The Aquatic SWG agreed to review the draft Phase One WSMP M&E Study Plan, and to provide comments to Gingerich no later than Friday, November 29, 2013.

4. **Notice of License Implementation – Year 2 (November 1, 2013)** (Andrew Gingerich): Andrew Gingerich notified the Aquatic SWG that as of November 1, 2013, Douglas PUD entered Year 2 of their Wells Project FERC license. He thanked the Aquatic SWG for their help in meeting Year 1 requirements of the license. He said he reviewed the Aquatic SWG 2013 Action Plan to verify that Douglas PUD was on track to complete all tasks outlined for this calendar year. He said one item that has not been completed is a Bull Trout PIT Tagging Summary. He said that bull trout behavioral data are being evaluated in the Methow basin in lieu of the Radio Telemetry (RT) Study at Twisp Weir. He said tagging and behavioral data are consistent year over year.

Gingerich said to contact him with any questions regarding the Aquatic SWG 2013 Action Plan.

5. **Potential Modifications to the Wells Dam Count Window Area** (Chas Kyger): Chas Kyger recalled that last year, grating and ramps were installed in the Wells Dam count window area to improve fish enumeration. He said that this year during salmon counting, the counters noticed fish swirling back and forth through the count window, making accurate fish counting very difficult. He said that the HCP Coordinating Committees were considering options for resolving the counting problem. He said they were likely to recommend either removal of the upstream ramp or decreasing the approach angle. He added that videos of the count window show lamprey free swimming through the area, which suggests that the ramps are not aiding lamprey passage. Bob Rose asked about the ability to remove the ramps and reinstall them later if needed. Kyger replied that it would not be difficult at all; and Andrew Gingerich added that the bigger challenge is the narrow maintenance window to do the work. He also added that the maintenance period is only about a month and a half, which is now quickly approaching.

Gingerich said that, based on the Coordinating Committees’ assessment and the video of the count window area, Douglas PUD’s recommendation to the Aquatic SWG is to remove the upstream ramp. Rose asked if the ramps were specifically designed and installed for lamprey. Kyger said that only a downstream ramp was initially planned to be installed; however, based on comments received, an exit ramp was also installed. He said one reason why the upstream ramp may be causing issues is because the area is narrow with no grating, and so water is deflected more than it is on the downstream side.
Schiewe noted that Bryan Nordlund initiated this discussion; and Gingerich added that the HCP Coordinating Committees first became interested in this issue because Wells Dam fell behind on counts, largely due to the swirling fish problem. Rose said he did not see any compelling reason to not remove the ramps. Bao Le noted a paper by Johnson et al. that evaluates a similar situation at John Day Dam. He said the paper also recommended removing the ramps as a possible solution. Le provided the paper to Douglas PUD for distribution to the Aquatic SWG.

Steve Lewis asked if the ramps are instrumental in preventing lamprey from bypassing the count window area. He also recommended reviewing past video footage to see if lamprey were free swimming through the count window area prior to the installation of the ramps. He added that lamprey free swimming through the count window area could be attributed to the translocation of larger Bonneville fish, versus smaller fish that cannot free swim through the area. Kyger said the upstream ramp does not affect the bypass area, so removal of the ramp should have no impacts. He said that Douglas PUD can review past video footage, but he noted that there was limited lamprey passage in past years.

Rose asked about the velocity through the count window area, and Kyger said that velocity through the count window has not changed. Schiewe asked if salmon issues under the HCP are prioritized over lamprey issues under the Aquatic Settlement Agreement. Kyger said if the HCP Coordinating Committees found that lamprey modifications negatively impacted salmon passage, then Douglas PUD would be obligated to make changes as needed. Schiewe noted that the HCP Coordinating Committees will discuss this issue at their next meeting on November 19, 2013. The Aquatic SWG members present agreed to continue discussions regarding potentially removing the upstream ramp of the Wells Dam count window area at the Aquatic SWG meeting on December 11, 2013.

Rose asked about the number of lamprey Douglas PUD planned for release in front of Wells Dam in 2014 for the Adult Lamprey Passage and Enumeration Study. Kyger said that Douglas PUD is waiting for the 2013 results to help inform plans for 2014. Gingerich added that the 2013 data have been compiled, and are now undergoing quality assurance checks (e.g., weeding out false positives). A final report is expected by spring 2014. Rose requested that this topic be discussed further, and the Aquatic SWG members present agreed to continue discussions regarding future plans for the Douglas PUD Adult Lamprey Passage and Enumeration Study at the Aquatic SWG meeting on December 11, 2013.
VII. Next Meetings

1. Upcoming meetings (Mike Schiewe): Upcoming meetings are as follows: December 11, 2013 (conference call); January 8, 2014 (conference call); February 12, 2014 (conference call).

List of Attachments
Attachment A – List of Attendees
Attachment B – Douglas PUD Draft White Sturgeon Stocking Proposal
Attachment C – CCT Draft White Sturgeon Stocking Proposal
## List of Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mike Schiewe</td>
<td>SWG Chair</td>
<td>Anchor QEA, LLC</td>
</tr>
<tr>
<td>Kristi Geris</td>
<td>Administration/Technical Support</td>
<td>Anchor QEA, LLC</td>
</tr>
<tr>
<td>Andrew Gingerich</td>
<td>SWG Technical Representative</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Chas Kyger</td>
<td>Technical Support</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Bao Le</td>
<td>Technical Support</td>
<td>HDR Engineering, Inc.</td>
</tr>
<tr>
<td>Steve Lewis</td>
<td>SWG Technical Representative</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>Chad Jackson</td>
<td>Technical Support</td>
<td>Washington Department of Fish and Wildlife</td>
</tr>
<tr>
<td>Pat Irle</td>
<td>SWG Technical Representative</td>
<td>Washington State Department of Ecology</td>
</tr>
<tr>
<td>Jason McLellan</td>
<td>SWG Technical Representative</td>
<td>Colville Confederated Tribes</td>
</tr>
<tr>
<td>Bob Rose</td>
<td>SWG Technical Representative</td>
<td>Yakama Nation</td>
</tr>
<tr>
<td>Donella Miller</td>
<td>Technical Support</td>
<td>Yakama Nation</td>
</tr>
</tbody>
</table>
WHITE STURGEON STOCKING PROPOSAL

YEAR 1 STOCKING (2014)

Douglas PUD

Background
Public Utility District No. 1 of Douglas County’s (Douglas PUD) White Sturgeon Management Plan (WSMP) calls for stocking up to 5,000 white sturgeon in 2014 (2nd year of the new Wells License). Currently at the Wells Fish Hatchery, Douglas PUD has approximately 9,500 direct gamete fish from 11 half or full sibling families (resulting from a 3x3 cross and a 1x3 cross; four maternal groups). In addition, Douglas PUD has approximately 2,500 white sturgeon larvae from Lake Roosevelt and approximately 20 from the Wanapum Pool. Together, Douglas PUD, in consultation with the Aquatic Settlement Workgroup (Aquatic SWG) has enough fish to fulfill the 2014 release requirement of “up to 5,000 fish.”

During the Oct 9th, 2013 Aquatic SWG meeting, members asked if Douglas PUD would put together a proposal outlining how many and which fish to release into the Wells Hydroelectric Project (Wells Project) while taking into account the discussion and points raised from the meeting.

Proposal
Douglas PUD proposes the following:

- Release 625 fish from each of the four maternal groups for a total of 2,500 direct gamete fish. These fish would be offspring of 11 adults captured in the McNary Pool and Wanapum Pool and spawned at Marion Drain Fish Hatchery.
- Release 2,500 larval origin fish (from the Larval Capture Program), the majority of which are Lake Roosevelt source and are likely offspring of well over 75 adults (Drauch-Schreier in preparation; McLellan, J. pers. comm.).
- Therefore, total releases would approach 5,000 fish total and be consistent with Douglas PUD’s obligation per the WSMP.

Rationale
Douglas PUD believes this approach is appropriate for the following reasons:

- **Maximizing Genetic Diversity.** Douglas PUD believes the genetic diversity of white sturgeon larvae is important, which has been highlighted by recent discussion of technical data and recent publications in peer reviewed literature (Refer to Upper Columbia White Sturgeon Workshop meeting minutes, Douglas PUD headquarters, September 10, 2013). As such, Douglas PUD believes we should release all larvae available to us in 2014 given
that fish captured by this collection method are more representative of the source population in terms of allelic diversity and number of spawners represented when compared to the collection of adult broodstock alone.

- **Lake Roosevelt (FDR) Suitability.** Larvae from FDR are suitable for the Wells Project based on spatial connectivity (~50 river miles between Wells and Roosevelt), historic drift/gene flow of larval fish, and recent genetic information that suggests managing mainstem Columbia River reservoirs separately is unjustified since no DPS exist from the trans-boundary reach of the Columbia to the face of Bonneville Dam and the combination of age of impoundments and long lived life history of adult sturgeon (Drauch-Schreir et al., 2013).

- **Upstream Gene Flow.** The Aquatic SWG has agreed that a conventional broodstock program is a suitable source, with some membership previously interested in restoring gene flow upstream and therefore using broodstock from fish collected in the lower river reservoirs would support this objective.

- **M&E Sample Size.** Douglas PUD does not have enough larvae from the Larvae Program alone (preferred source of fish by some Aquatic SWG membership) to reach a 5,000 fish release target. While the WSMP provides for a reduced stocking schedule, stocking less fish in the first couple license years limits Douglas PUD’s capacity to collect vital monitoring and evaluation (M&E) data:
  
  - Research suggests that juvenile sturgeon released into the Columbia River experience the majority of their mortality in the first 6 months following release. Many estimates indicate ~25% survival in that first 6 months. Applying this estimate, Douglas PUD would have only 1,250 young sturgeon in the Wells Project to collect M&E data after just 6 months of releasing 5,000 fish.
  
  - A reduced stocking schedule (<5,000) would further reduce Douglas PUD, its contractors, and the Aquatic SWG from gaining valuable M&E information in 2014 and 2015 since the chances of encountering, recapturing and interrogating released fish would be reduced (function of low sample size and high estimated mortality). For example, releasing only 2,500 fish would provide only 625 fish to carry out M&E in a large area such as Wells Reservoir. In essence, 5,000 fish at release gives us a better sample size to start gaining valuable information about juvenile sturgeon performance in the Wells Project (survival, habitat use, etc.).
  
  - Douglas PUD estimates 2-7% of surviving fish will be recaptured during M&E efforts (Jerald, T. and Blue Leaf Environmental Pers. Comm.). Under a 2,500 fish release only an estimated 50-175 fish will be recaptured, which limits Douglas PUD’s ability to put narrow confidence intervals around survival estimates. Under a 5,000 fish release strategy recaptures double to approximately 100-350 fish and thus will improve confidence intervals surrounding survival estimates.

- **Direct Gamete Effective Breeder Diversity.** Releasing 2,500 direct gamete fish from 11 effective breeders (which we currently have for 2012 direct gametes) provides more diversity than releasing 5,000 fish from 18 effective breeders, which is the target in Douglas PUD’s Aquatic SWG-approved and FERC-approved White Sturgeon Broodstock and Breeding Plan. Although the genetic diversity and rare allele
representation might not be improved by adding direct gamete fish to the larvae source, Douglas PUD believes that there is very little genetic risk to include direct gamete fish from these 11 breeders especially given the total diversity of the number of fish proposed to be released, the number of years that stocking will take place and the long age to maturation for the species.

- **1st of 10+ Years of Stocking.** Finally, a reduced stocking schedule, if deemed appropriate by the Aquatic SWG (resulting from additional information produced from regional research and the M&E program), is outlined as a tool in the WSMP during later years of stocking when the number of fish in Wells has improved and M&E objectives are being met. Additionally, if the Aquatic SWG agrees we can continue to prioritize sturgeon larvae as a source, while balancing M&E objectives, and managing genetic concerns.
PHASE I: WHITE STURGEON MANAGEMENT PLAN MONITORING AND EVALUATION STUDY PLAN

WELLS HYDROELECTRIC PROJECT

FERC Project 2149

Prepared by
Public Utility District No. 1 of Douglas County
East Wenatchee, WA

Prepared for
Aquatic Settlement Work Group

October 2013
Introduction

As part of Public Utility District No. 1 of Douglas County’s (Douglas PUD) implementation of the White Sturgeon Management Plan (WSMP) contained within the Aquatic Settlement Agreement, Douglas PUD will begin implementing the white sturgeon monitoring in year 3 of the Wells Dam License (2014-2015). The plan may be revised by the unanimous approval of the Aquatic Settlement Work Group (Aquatic SWG) as outlined in the WSMP. Revisions to this plan will follow the adaptive management framework outlined in section 3.1 of the definitions section of the Aquatic Settlement Agreement. The following sections of the WSMP will be fulfilled through the implementation of this plan. Sections below are number to coincide with relevant sections of Douglas PUD’s WSMP.

4.2.1 Index Monitoring Program

Within three years following issuance of the new license, Douglas PUD shall initiate a three-year index monitoring program (Years 3-5) for juvenile and adult sturgeon in the Wells Reservoir to determine age-class structure, survival rates, abundance, density, condition factor, growth rates, and to identify distribution and habitat selection of juvenile sturgeon. The indexing methods shall include using set lines or other appropriate recapture methods for juveniles and adults.

As a component of the Phase I indexing program, Douglas PUD shall capture and implant active tags in a portion of the juvenile and sexually mature adult sturgeon population found in the Wells Reservoir. This tagging effort shall be used to augment broodstock collection (Section 4.1.1), population level information and juvenile habitat use (Section 4.2.2) and natural reproduction potential (Section 4.2.3).

After the initial three-year indexing period (Years 3-5), Douglas PUD shall conduct an additional two years of index monitoring in Phase I as determined by the Aquatic SWG (during years 6-9). After year 9, an additional year of index monitoring would take place in year 12 and then every three to five years over the term of the new license (Phase II: Years 11 to end of license) to assess age-class structure, survival rates, abundance, condition factor, and growth rates; identify distribution and habitat selection of juvenile sturgeon; and to inform the supplementation program strategy (see Section 4.7 in WSMP, Table 1).

Frequency (every 3, 4 or 5 years) of implementation of long-term index monitoring activities (after year 12) will be determined by the Aquatic SWG. Phase II index monitoring activities will not consist of implantation of active tags in captured individuals.

4.2.2 Marked Fish Tracking Program

Beginning in year 3 of the new license and continuing for three years (Years 3-5), Douglas shall conduct tracking surveys of the juvenile white sturgeon that were released with active tags as part of supplementation activities. This will require one percent of each of the annual classes of juvenile sturgeon (up to a maximum of 50 fish each year) released in years 2, 3, 4, and 5 to be reared large enough to implant an active tag for tracking purposes (See Section 4.7 in WSMP,
The purpose of tracking active-tagged fish is to determine juvenile white sturgeon emigration rates out of the Wells Reservoir and habitat use within the Wells Reservoir.

Douglas PUD shall repeat the tracking survey for two additional years during Phase I (see Section 4.7 in WSMP, Table 1). The additional two years of surveys shall track: 1) active tags implanted in a percentage of juvenile fish from previous years of supplementation activities (dependent upon tag life) and 2) any juvenile and adult fish implanted with active tags during the last indexing period preceding the survey. Subsequent Phase I surveys are likely to coincide with the additional Phase I index monitoring and juvenile stocking activities.

### 4.2.3 Determining Natural Reproduction Potential

In years where environmental conditions are appropriate, Douglas PUD shall track sexually mature adult sturgeon that were captured and implanted with active tags under Section 4.2.1 for the purpose of identifying potential spawning locations and determining natural reproduction potential. Appropriate environmental conditions may be determined by examining the following factors: water quality and quantity (i.e., flow, temperature, and turbidity), the presence of reproductively viable adults during index monitoring activities, and the status of maturity for supplemented fish. In years in which sexually mature adult sturgeon are tagged under Section 4.2.1, Douglas PUD may also utilize egg collection mats in combination with tracking in areas of the Wells Reservoir for the purpose of identifying potential spawning locations and activity. Five surveys of natural reproduction using adult tracking and/or egg mat placement shall occur over the term of the new license. Several of these surveys are intended to be implemented during the latter part of the license in order to examine the natural reproductive potential of supplemented fish recruiting to sexual maturity. These activities will support the aquatic life designated use for spawning under WAC 173-201A in the Washington State Water Quality Standards.

### Methods

The following methods will be employed to meet tasks described above. Note that the WSMP is written to separate Index Monitoring (4.2.1), Marked Fish Tracking Program (4.2.2), and Determining Natural Reproduction Potential (4.2.3). Components of each overlap and therefore are inherently linked. Therefore, certain objectives and tasks in each section of the Monitoring and Evaluation Plan (M&E) are separated to indicate the specific WSMP section it is intended to meet, but are coupled with other elements and tasks in the M&E Plan. Total M&E tasks and objectives are summarized in Table 1 for simplicity.
Table 1. **Summarized tasks for Douglas PUD’s white sturgeon M&E 2014-2017.**

<table>
<thead>
<tr>
<th>WSMP Reference</th>
<th>Task Description</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Task</strong></td>
<td><strong>2014</strong></td>
</tr>
<tr>
<td>4.2.1 Index Monitoring</td>
<td>Long line fishing</td>
<td>45 days</td>
</tr>
<tr>
<td>4.2.1 Index Monitoring</td>
<td>Conventional angling</td>
<td>480 hours</td>
</tr>
<tr>
<td>4.2.1 Index Monitoring</td>
<td>Collect biological data</td>
<td>All fish from 1&amp;2</td>
</tr>
<tr>
<td>4.2.1 Index Monitoring</td>
<td>Acoustic tag</td>
<td>5 adults &amp; 5 subadults</td>
</tr>
<tr>
<td>4.2.1 Index Monitoring</td>
<td>Install and maintain array</td>
<td>10-20 arrays</td>
</tr>
<tr>
<td>4.2.1 Index Monitoring</td>
<td>Analysis</td>
<td>CJS model if appropriate</td>
</tr>
<tr>
<td>4.2.2 Marked Fish Tracking Program</td>
<td>Yr. specific scute and PIT</td>
<td>5000</td>
</tr>
<tr>
<td>4.2.2 Marked Fish Tracking Program</td>
<td>Acoustic tag 2014 releases</td>
<td>50</td>
</tr>
<tr>
<td>4.2.2 Marked Fish Tracking Program</td>
<td>Acoustic tag 2015 releases</td>
<td>25</td>
</tr>
<tr>
<td>4.2.2 Marked Fish Tracking Program</td>
<td>Acoustic tag 2016 releases</td>
<td>CJS model if appropriate</td>
</tr>
<tr>
<td>4.2.3 Assessment of Adult Reproductive Potential</td>
<td>Track adults</td>
<td>From 4.2.1 task 4</td>
</tr>
<tr>
<td>4.2.3 Assessment of Adult Reproductive Potential</td>
<td>Egg and larvae collection</td>
<td>720 frame hours</td>
</tr>
<tr>
<td>4.2.3 Assessment of Adult Reproductive Potential</td>
<td>Assess readiness and sex</td>
<td>From 4.2.1 task 1 &amp; 2</td>
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<tr>
<td>4.2.3 Assessment of Adult Reproductive Potential</td>
<td>Analysis</td>
<td>CJS model if appropriate</td>
</tr>
</tbody>
</table>

**Note.** In all cases effort and release numbers are defined as “up to” values described above.

Fish collected in 4.2.1 task 3 will be assessed slightly differently based on maturity. For example, Juveniles will not be sexed and scoped.

If 4.2.3 occurred in all three years (2015-2017) This would be 3 of 5 reproductive studies required over the course of the 40 year license term.
4.2.1 Index Monitoring Program (Years 2015, 2016, 2017)

The purpose of the three-year index monitoring program (Years 3-5) for juvenile and adult sturgeon in the Wells Reservoir is to determine age-class structure, survival rates, abundance, density, condition factor, growth rates, and to identify distribution and habitat selection of juvenile sturgeon. The methods designed to fulfill section 4.2.1 of the WSMP are specifically designed towards assessing the remaining natural population in the Wells Project but will also be used to monitor and evaluate fish released in the Wells Project from 2014-2017. Specific methods are outlined as follows:

1. Collect juveniles and adult sturgeon in the Wells Project
2. Recapture hatchery released juvenile white sturgeon
3. Collect adults during spawning periods to see if they can be used in brood programs
4. PIT tag all captured resident/wild juveniles and adults and acoustic tag up to (n=20 resident/wild fish in years 2015-2017) resident juveniles and adults.

Note that the WSMP is written to separate Index Monitoring (4.2.1), Marked Fish Tracking Program (4.2.2), and Determining Natural Reproduction Potential (4.2.3). Components of each overlap and therefore are inherently linked. Therefore, certain objectives and tasks in each section of the Monitoring and Evaluation Plan (M&E) are separated to indicate the specific WSMP section it is intended to meet, but are coupled with other elements and tasks in the M&E Plan. Total M&E tasks and objectives are summarized in Table 1 for simplicity.

Methods

Collection techniques and benchmarks

**Task 1** Use up to 45 days per year of long setline efforts (up to 10 setlines that will target all size classes) per monitoring and evaluation year. Up to 135 days of long lines over the three year period (up to 10 setlines each day)

Collection may be focused on descending limb of the hydrograph and when water temperatures in the Chief Joseph Tailrace reach 10° C (50° F) to determine sex, maturity and spawning interval, which may support ongoing brood collection efforts. In 2015, collection effort will be concentrated in areas where sturgeon are expected to be found in the Wells Project. In subsequent years (following stocking activities), at the discretion of the Aquatic SWG, collection effort will be spread evenly or stratified across the Wells Project to determine habitat use of resident and hatchery sturgeon.

**Task 2** Use up to 480 angling rod hours targeting adults and sub-adults per year. Use up to 1,440 rod hours over three years using gear that targets resident adults. Collection may be focused on descending limb of the hydrograph and when water temperatures in the Chief Joseph Tailrace reach 10° C (50° F) to determine sex, maturity and spawning interval, which may support ongoing brood collection efforts. In 2015 collection effort will be concentrated in areas where

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1 Two years of targeted fishing using a similar effort as proposed yielded 13 white sturgeon in 2001 and 2012 with 5 additional recaptures. Two of the fish were juveniles and the balance were classified as adults. At that time n=35 adults were estimated in the Wells Project (95% confidence interval range of 13.15-217.5; Jerald 2007).
sturgeon are expected to be found in the Wells Project. In subsequent years (following stocking activities), at the discretion of the Aquatic SWG, collection effort will be spread evenly or stratified across the Wells Project to determine habitat use of resident and hatchery sturgeon.

**Task 3** Record tag information or PIT tag all captured fish, measure length and girth, and record scute markings (for hatchery fish captured).

**Task 4** Acoustic tagging of captured fish from Tasks 1 and 2 (*wild population only n=20 tags*). Tag choices may include V9 or alternate tag but will be a function of fish size. Douglas PUD will aim to use tags with tag burdens below 2% and PRI (pulse rate interval or burst rate) of 60 seconds. Larger tags with superior tag life will be used in adults as noted above.

- Tag up to first 5 adults with 3 year tags in year one (V16 tags, 9g)
- Tag up to first 5 adults with 2 year tags in year two (V13-1L tags, 6g)
- No adults tagged in year 3
- Tag up to first 5 sub-adults with 3 year tags in year one (V9-2L, 2.9 g, 283 d, 60 sec PRI or V13 or V16)
- Tag up to first 5 sub-adults with 2 year tags in year two (V9-2L, 2.9 g, 283 d, 60 sec PRI or V13 or V16)
- No sub-adults in year 3

**Task 5** Install and maintain acoustic node (receiver) array. Ten to twenty VR2 (or equivalent) acoustic arrays will be used to track white sturgeon movement in the Wells Project. Estimated receiver placement is shown in Figure 1 (tag interrogation locations on the Wells Project). Receiver locations will be selected based on tag testing and expected coverage of the water column. Receivers will be fixed to docks, piers or submerged with releases in the river column. Expected listening range is 150-300 meters but will be confirmed during receiver install. Initial receiver location was selected in order to assess retention of released juvenile sturgeon, assess tributary use and to focus on areas where previous work suggests concentrations of sturgeon in the Wells Project. Receiver locations can be modified following the completion of the first year of acoustic telemetry results and in consultation with the Aquatic SWG. Receivers will be serviced monthly or every 1.5 months.

**Task 6** Summarize habitat use and estimate natural and hatchery population sizes using parametric and descriptive statistics including Cromack-Jolly-Seber (CJS) model application.

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Note: 20 acoustic tags are dedicated to resident/wild fish collected during indexing efforts. Additionally, as part of the marked fish tracking program 150 acoustic tags will be implanted in hatchery released sturgeon in the years 2015-2017. Therefore, acoustic receivers will be listening for up to 170 unique acoustic tag codes over an initial 3-year M&E plan.
Figure 1. Estimated VR2 receiver locations for white sturgeon acoustic telemetry in the Wells Project. Actual locations will be modified to balance detection capability/range, obscurity from the public and minimal channel width.

Deliverables and Results:

1. Age class structure will be determined using a fin ray taken from each captured sturgeon (Rien and Beamesderfer 1994). Other aging techniques will be considered in consultation with the Aquatic SWG.
2. Survival and abundance will be assessed as a function of mark recapture, with assumed no immigration or emigration (CJS model or other suitable statistic). If immigration and emigration sample sizes lend themselves to inclusion in statistical modeling these variables will be added to analyses. It is expected that later years of M&E will be able to make use of larger sample sizes since additional stocking will be completed. As such, immigration and emigration rates should be easier to calculate in these subsequent years.
3. Density will be estimated using the number of fish per area of capture. Densities can be measured as a function of Project zone (area between receivers), grouped Project zones, or whole Project area.
4. Condition factor will be determined by the ratio of girth and length with larger values having higher condition. Qualitative condition observations may also be recorded and used (e.g., fin erosion, etc.).
5. Growth rates will be determined through recaptures and computed as mm/yr at given size classes and known or estimated age of fish.
6. Habitat selection will be determined by location and time of year (e.g., use of the Okanogan River, time spent in zone, and estimated depth at point of capture).

An annual update containing collection effort, fish size, age, location of capture, population size and habitat use summaries will be include in the WSMP Annual Report. The final update will be a 3-year comprehensive report provided by January 2019. This three year report will be used to update the existing M&E plan, modify stocking techniques, and inform subsequent M&E efforts. Revisions to this plan and stocking/rearing efforts shall use the adaptive management approach as defined in the definition section of the Aquatic Settlement Agreement.

### 4.2.2 Marked Fish Tracking Program (Years 2015, 2016, 2017)

The purpose of Marked Fish Tracking Program is to determine juvenile white sturgeon emigration rates out of the Wells Reservoir and habitat use within the Wells Reservoir. The methods designed to fulfill section 4.2.2 of the WSMP are specifically designed towards assessing movements and habitat use of white sturgeon released from Wells Hatchery (age-1 repatriated or direct gamete fish) in the Wells Project from 2014-2017.

Note that the WSMP is written to separate Index Monitoring (4.2.1), Marked Fish Tracking Program (4.2.2), and Determining Natural Reproduction Potential (4.2.3). Components of each overlap and therefore are inherently linked. Therefore, certain objectives and tasks in each section of the Monitoring and Evaluation Plan (M&E) are separated to indicate the specific WSMP section it is intended to meet, but are coupled with other elements and tasks in the M&E Plan. Total M&E tasks and objectives are summarized in Table 1 for simplicity.

#### Methods

Specific methods are outlined as follows:

**Tagging**

**Task 1** All hatchery-released fish will be given a PIT and year-specific scute mark prior to release. Index monitoring activities described above will be used to recapture and interrogate fish.

**Task 2** 2014 hatchery releases: Acoustic tag n=50 releases in spring of 2015 following setline recapture (see index monitoring in 4.2.1 above). Acoustic tags (1% of released fish) will be split by proportion of direct gamete releases and larvae releases. Index monitoring above will be used to recapture and interrogate fish.

**Task 3** 2015 hatchery releases: Acoustic tag ~ n=25 prior to release and an additional ~ n=25 following 6 months in the Wells Project (as recaptures). This tagging schedule provides an opportunity to provide retention estimates of hatchery releases, while also improving sample size.
strength for those fish surviving in the first six months of release and therefore allow for improved estimates of habitat use. Larger hatchery fish will be prioritized for acoustic tag implantation to minimize tag burden. Index monitoring activities described above will be used to recapture and interrogate fish.

**Task 4** 2016 hatchery releases: Acoustic tag ~ n=25 prior to release and an additional ~ n=25 following 6 months in the Wells Project (as recaptures). This tagging schedule provides an opportunity to provide retention estimates of hatchery releases, while also improving sample size strength for those fish surviving in the first six months of release and therefore allow for improved estimates of habitat use. Larger hatchery fish will be prioritized for acoustic tag implantation to minimize tag burden. Index monitoring activities described above will be used to recapture and interrogate fish.

**Task 5** Summarize detection and movements using database software. Use CJS model, if appropriate, to examine survival.

**Deliverables and Results:**

1. Estimate immigration and emigration of released fish using detection histories from recaptures, PIT and acoustic interrogations as well as fixed PIT arrays within fishways, bypass facilities and tributaries.
2. Determine habitat use within the Project based on recapture locations and seasonal interrogation information.
3. Use recaptures and interrogations to estimate survival. Analysis of survival will be carried out using a CJS model.
4. Use recapture location information to determine habitat use.
5. Tributary entries will be determined using acoustics tags and PIT stations and acoustics.
6. Assess whether preferred stocking techniques exist by examining stocking years that apply different techniques such as larger stocking size, different stocking periods, night plants, different stocking locations etc. These independent variables will be used when examining survival during the three years of M&E activities.

An annual update containing collection effort, fish size, age, location of capture, population size and habitat use summaries will be included in the WSMP Annual Report. The final update will be a 3-year comprehensive report provided by January 2019. This three year report will be used to update the existing M&E plan, modify stocking techniques, and inform subsequent M&E efforts. Revisions to this plan and stocking/rearing efforts shall use the adaptive management approach as defined in the definition section of the Aquatic Settlement Agreement.

**4.2.3 Determining Natural Reproduction Potential (In years with expected spawning)**

In years where environmental conditions are appropriate, Douglas PUD shall track sexually mature adult sturgeon that were captured and implanted with active tags under Section 4.2.1 for the purpose of identifying potential spawning locations and determining natural reproduction potential. Five natural reproduction potential studies are scheduled over the term of Douglas
PUD’s license. As such, Douglas PUD will work with the Aquatic SWG to decide which years are most appropriate for these analyses.

Note that the WSMP is written to separate Index Monitoring (4.2.1), Marked Fish Tracking Program (4.2.2), and Determining Natural Reproduction Potential (4.2.3). Components of each overlap and therefore are inherently linked. Therefore, certain objectives and tasks in each section of the Monitoring and Evaluation Plan (M&E) are separated to indicate the specific WSMP section it is intended to meet, but are coupled with other elements and tasks in the M&E Plan. Total M&E tasks and objectives are summarized in Table 1 for simplicity.

**Methods**

**Task 1** Track tagged adults from 4.2.1 to suspected spawning locations.

**Task 2** Deploy up to 6 drift nets and frames and up to 6 egg mats for up to 15 nights or up to 720 frame hours during each year of reproductive potential studies. Concentrate fishing in suspected spawning locations or adjacent to spawning locations in subsequent or current tracking year as recommended by the Aquatic SWG. Determine development stage or day-age of collected offspring.

**Task 3** Use captured adult fish in 4.2.1 to examine for reproductive readiness, sex, maturity and spawning readiness when reasonable and feasible. Captured adult sturgeon will be scoped to examine for mature eggs or milt. These data will support Aquatic SWG discussions on decision-making for the implementation of natural reproduction surveys (Task 2).

**Task 4** Estimate adult reproductive population using CJS model if sample sizes are sufficient to support this approach. Use qualitative analyses and summary statistics to describe reproductive ecology of sturgeon in the Wells Project area.

**Deliverables:**

1. Determine spawning locations based on tracking and movement.
2. Examine captured larvae and eggs to estimate spawning frequency, periodicity by estimating day-age of offspring.
3. Use adult captures to estimate number of spawners where reasonable and feasible.

An annual update containing the results of the collection effort and natural reproduction summaries will be included in the WSMP Annual Report. The final update will be a 3-year comprehensive report provided by January 2019. Comprehensive analyses should be used to predict spawning locations and conditions of hatchery released fish as they enter reproductive maturity and wild fish captured and tagged as part of the Index Monitoring Program, identify critical areas for spawning, physical conditions under which spawning was confirmed, and help determine reproductive potential in terms of spawning success and recruitment.
References

Drauch Schreier, A. In Preperation. Title to be determined.


WHITE STURGEON STOCKING PROPOSAL

YEAR 1 STOCKING (2014)

Douglas PUD

Background
Public Utility District No. 1 of Douglas County’s (Douglas PUD) White Sturgeon Management Plan (WSMP) calls for stocking up to 5,000 white sturgeon in 2014 (2nd year of the new Wells License). Currently at the Wells Fish Hatchery, Douglas PUD has approximately 9,500 direct gamete fish from 11 half or full sibling families (resulting from a 3x3 cross and a 1x3 cross; four maternal groups). In addition, Douglas PUD has approximately 2,500 white sturgeon larvae from Lake Roosevelt and approximately 20 from the Wanapum Pool. Together, Douglas PUD, in consultation with the Aquatic Settlement Workgroup (Aquatic SWG) has enough fish to fulfill the 2014 release requirement of “up to 5,000 fish.”

During the Oct 9th, 2013 Aquatic SWG meeting, members asked if Douglas PUD would put together a proposal outlining how many and which fish to release into the Wells Hydroelectric Project (Wells Project) while taking into account the discussion and points raised from the meeting.

Proposal
- CCT proposal: Release 139 fish from each direct gamete take (DGT) cross (n=11) for a total of 1529 DGT origin fish. The goal of the DGT component was two 3x3 factorial matings, which would have resulted in 18 crosses and 139 fish per cross in a 2,500 fish release. The CCT’s proposed release number is pro-rated based on the actual number of crosses achieved. Releases of DGT origin fish should be phased out of the Wells Pool aquaculture program. The Wells program should also transition to the use of wild larvae (WL) origin fish from multiple areas within the mainstem Columbia River upstream of Bonneville Dam.
  - **Rationale:** There is no technical reason to support the release of both DGT and WL origin white sturgeon into the Wells Pool. Thus, the CCT does not believe it is appropriate to stock DGT origin fish from a small number of family groups into its boundary waters when existing evidence indicates that WL origin fish represent a larger number of family groups and greater genetic diversity. Further, there is no additional allelic diversity provided with the additional use of DGT origin fish, and the release of a large number of half-siblings from DGT origin fish decreases the effective population size. CCT also believes the two 3x3 factorial matings for DGT should be different between all PUD programs.
  - Total number of fish released based on this scenario is 4018 fish which includes all of the wild larvae.
• Release 2,500 larvae origin fish (from the Larval Capture Program), the majority of which are Lake Roosevelt source and are likely offspring of well over 75 adults (Drauch-Schreier in preparation; McLellan, J. pers. comm.).
• Therefore, total releases would be comprised of approximately 4,000 fish, which is consistent with Douglas PUD’s obligation per the WSMP.

Rationale

• **Maximize Genetic Diversity.** Douglas PUD believes the genetic diversity of white sturgeon larvae is important, which has been highlighted by recent discussion of technical data and recent publications in peer reviewed literature (Refer to Upper Columbia White Sturgeon Workshop meeting minutes, Douglas PUD headquarters, September 10, 2013). As such, Douglas PUD believes we should release all larvae available to us in 2014 given that fish captured by this collection method are more representative of the source population in terms of allelic diversity and number of spawners represented when compared to the collection of adult broodstock alone.

• **Lake Roosevelt (FDR) Suitability.** Larvae from FDR are suitable for the Wells Project based on spatial connectivity (~50 river miles between Wells and Roosevelt), historic drift/gene flow of larvae fish, and recent genetic information that suggests managing mainstem Columbia River reservoirs separately is unjustified since no DPS exist from the trans-boundary reach of the Columbia to the face of Bonneville Dam and the combination of age of impoundments and long lived life history of adult sturgeon (Drauch-Schreir et al., 2013). Also, more genetic diversity is provided when using a lower number of progeny from a large number of parents (dozens) from a less diverse (number of alleles) population versus using a large number of progeny from a low number of parents from a more diverse (number of alleles) population.

• **Collaborative Partnerships.** Despite the lack of any sound technical justification and the potential long-term risks, the CCT is agreeable to the pro-rated release number of DGT origin white sturgeon provided above. We understand that other member entities within the Wells ASWG believe that DGT origin white sturgeon are appropriate for stocking in the Wells even when the WL alternative is available. Thus, the CCT offers this compromise in order to further progress toward the implementation of the Wells White Sturgeon Management Plan and in an effort to demonstrate our support of the collaborative process.
References

Drauch Schreier, A. In Preperation. Title to be determined.


The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, December 11, 2013, from 10:00 a.m. to 11:30 a.m. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items

1. Patrick Verhey will remind Washington Department of Fish and Wildlife (WDFW) Fish Health Staff that Douglas PUD is facing a capacity issue at Wells Hatchery that requires resolution in early 2014; therefore, the Aquatic SWG needs WDFW’s input regarding white sturgeon health guidance before that time. Further, Verhey will inquire whether WDFW’s guidance will be a recommendation within the Aquatic Settlement Agreement (ASA) or unilateral decision occurring without unanimous consent of the Aquatic SWG (Item VI-2).

2. Aquatic SWG members will submit comments or email approval of the revised draft Phase One White Sturgeon Management Plan (WSMP) Monitoring and Evaluation (M&E) Study Plan to Douglas PUD (with a copy to Kristi Geris and Mike Schiewe) no later than December 20, 2013 (Item VI-3).

3. Douglas PUD will provide a draft Bull Trout Passive Integrated Transponder (PIT)-Tag Summary to Kristi Geris for distribution to the Aquatic SWG no later than December 25, 2013, for discussion during the Aquatic SWG conference call on January 8, 2014 (Item VI-5).

4. Douglas PUD will provide a draft Resident Fish Plan to Kristi Geris for distribution to the Aquatic SWG no later than December 17, 2013, for discussion at the Aquatic SWG conference call on January 8, 2014, and approval at the Aquatic SWG conference call on February 12, 2014 (Item VI-6).

5. Douglas PUD will provide the draft 2014 Gas Abatement Plan (GAP) and Bypass Operating Plan (BOP) to Kristi Geris for distribution to the Aquatic SWG no later than December 17, 2013, for discussion at the Aquatic SWG conference call on January 8,
II. Summary of Decisions
1. The Phase One WSMP M&E Study Plan was approved by the Aquatic SWG via email on December 20, 2013, following a 10-day extension of the original 30-day comment period (i.e., 40-day review period). *(Note 1: Ecology approved the study plan provided that minor grammatical edits are addressed; and USFWS also approved the study plan provided that respective comments are incorporated per the Aquatic SWG’s requests. Other members abstained from voting. Note 2: The Phase One WSMP M&E Study Plan was revisited during the Aquatic SWG conference call on January 8, 2014, and the remaining Aquatic SWG members approved the plan.)*

III. Agreements
1. The Aquatic SWG members present agreed on the following: If WDFW guidance on white sturgeon fish health rearing and stocking practices is to continue rearing and stocking all asymptomatic (non-clinical signs of an epizootic) larval-origin white sturgeon, the default action will be to follow the WSMP and stock the full complement of larval-origin fish currently on-station at Wells Hatchery (i.e., 2,300 fish), with the balance to achieve the 5,000 fish goal coming from the direct gamete-origin fish. Fish stocking sizes and release dates will be determined by the Aquatic SWG. If WDFW Fish Health Staff provides guidance other than above, the Aquatic SWG will convene a conference call to discuss options toward achieving the 5,000 fish stocking goal contained within the WSMP (Item VI-2).
2. The Aquatic SWG members present agreed to consider approval of the Phase One WSMP M&E Study Plan by email (Item VI-3).

IV. Review Items
1. The revised Phase One WSMP M&E Study Plan, which was distributed to the Aquatic SWG by Kristi Geris on December 10, 2013, is out for an additional 10-day review period with comments or email approval due to Andrew Gingerich (with a copy to Geris) no later than December 20, 2013 (Item VI-3).

V. Reports Finalized
1. There are no reports that have been recently finalized.
VI. Summary of Discussions

1. **Welcome, Agenda Review, and Meeting Minutes Review** (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Schiewe reviewed the agenda and asked for additions or other changes to the agenda. No additions or changes were requested.

The revised draft November 13, 2013 meeting minutes were reviewed. Kristi Geris said that all comments and revisions received from members of the Aquatic SWG were incorporated in the revised minutes, and that there were no outstanding edits or questions remaining to be discussed. The Aquatic SWG members present approved the November 13, 2013 meeting minutes, as revised.

2. **DECISION: White Sturgeon Stocking** (Andrew Gingerich): Andrew Gingerich recalled that during the Aquatic SWG’s conference call on November 13, 2013, the Aquatic SWG discussed both Douglas PUD’s draft White Sturgeon Stocking Proposal and the Colville Confederated Tribes’ (CCT’s) alternative draft White Sturgeon Stocking Proposal. He also recalled that the CCT and the Yakama Nation (YN) planned to discuss and develop a third draft proposal; he asked the CCT and the YN to provide an update on discussions that have taken place. Donella Miller said that the YN and the CCT discussed stocking strategies including numbers and size at release; however, at this point, the YN is not ready to make a recommendation. Bret Nine added that the CCT is proposing to release direct gamete-origin fish at 30 grams and larval-origin fish at 300 grams. He said a counter-proposal is to release direct gamete-origin fish at 150 grams, with the same proposal for the larval-origin fish at 300 grams. Pat Irle asked if there are fish health concerns that will affect those numbers. Nine replied that the CCT is proposing that if fish are asymptomatic (in terms of White Sturgeon Iridovirus [WSIV]), they should be stocked into the Wells Reservoir. He added, however, that if fish appear to be moribund or dying at a high rate that the CCT would be supportive of culling them. Bob Rose said that in terms of a stocking proposal, the YN and the CCT have not yet reached agreement.

Gingerich noted that Douglas PUD is now facing a capacity limit at Wells Hatchery, as described in an email distributed to the Aquatic SWG by Kristi Geris on November 27, 2013. He added that a decision on a stocking plan needs to be made no later than December 16, 2013. Miller asked if there is sufficient space to rear a total of 5,000 white sturgeon, and Gingerich replied that there is. He said that culling down to 5,000 fish requires knowing how many of each group will be stocked.

Patrick Verhey said that WDFW Fish Health Staff are currently working through discussions regarding the fate of sturgeon testing positive for WSIV, and should be able to provide a recommendation by the end of the week. Irle said that she understood that WDFW is now also testing the direct gamete-origin fish for WSIV, which had not yet
started when the email was distributed to the Aquatic SWG by Geris on November 27, 2013. Verhey confirmed that there was additional testing conducted on both larval-origin and direct gamete-origin fish. He said that 12 fish from each group were tested using a polymerase chain reaction (PCR) assay to validate the histological testing that was previously conducted on the larval-origin fish. He said the results were that larval-origin fish tested positive for WSIV, and direct gamete-origin fish tested negative. Gingerich further clarified that, initially, only 9 larval-origin fish were tested histologically, and 100% came back positive for WSIV. He said that later, 12 larval-origin fish and 12 direct gamete-origin fish were tested using PCR, and 9 of 12, or 75%, of the larval-origin fish, and all of the direct gamete-origin fish, came back negative for WSIV.

Schiewe summarized that resolution needs to be reached by December 16, 2013, and that there is an expectation that WDFW Fish Health Staff will provide guidance on managing fish health by the end of this week. He asked if the Aquatic SWG prefers to wait for WDFW’s input, or if they would like to develop a provisional plan? McLellan said that because he believes that the fish health concerns are based on inconsistent fish health testing, there is a strong likelihood that all fish will be stocked. He added that even if numbers are reduced to 2,500 direct gamete-origin fish, and for some reason wild larvae-origin fish are not stocked, abundance targets can still eventually be reached. Shane Bickford noted that the Federal Energy Regulatory Commission (FERC) License for the Wells Project clearly states that 5,000 white sturgeon must be released in 2014. Nine asked about interpretation of the license language that states “up to 5,000 (20,000 fish total).” Irle added that she does not interpret the language to be hard numbers. Bickford explained the language means that no more than 5,000 fish can be released per year; and a total of 20,000 fish need to be released in the first four years. He added that if only 3,500 fish are released in 2014, and no more than 5,000 fish can be released each subsequent year, there is no way to catch up by the end of year four. Nine said that the CCT would like to request clarification from FERC on interpretation of those numbers.

Irle recommended basing decisions on the best available science. Gingerich added that the fish health concern is an important consideration, and recommended reviewing the scientific literature to obtain a better understanding of the issue. Bickford said if WDFW recommends maintaining the fish, Douglas PUD would support fish health testing prior to release time. Gingerich said that currently, 2,300 larval-origin fish are on-station at Wells Hatchery, and about 6,000 direct gamete-origin fish are also on-station. McLellan asked if fish health testing continues, will both larval-origin fish and direct gamete-origin fish be monitored? Bickford replied that Douglas supported testing both groups in identical fashion.

Gingerich acknowledged that this was already a complicated issue that was even further complicated with the fish health situation. He added that in the future, the Aquatic
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SWG might benefit from a fish health protocol document developed in advance of the arrival of fish. He said in terms of moving forward, Douglas PUD is supportive of waiting for input from WDFW Fish Health Staff but that he is hopeful that the existing information on the virus and other programs would be used to come to a decision.

Verhey said that WDFW Fish Health Staff are trying to coordinate schedules to conclude their discussions; he added that Chad Jackson is very aware of the December 16, 2013 deadline. Verhey said that he will remind WDFW Fish Health Staff that Douglas PUD is facing a capacity issue at Wells Hatchery that requires resolution in the near term; therefore, the Aquatic SWG needs WDFW’s input regarding white sturgeon health guidance before that time. He said he will also inquire whether WDFW’s guidance will be a recommendation to the Aquatic SWG or a directive to Douglas PUD from WDFW.

Schiewe asked Douglas PUD if they wanted to establish a default action, such as using the 2,300 larval-origin fish and culling the direct gamete-origin fish, as needed, to release 5,000 fish. Gingerich said that given the complex nature of the situation, he is hesitant to cull direct gamete-origin fish without input from the Aquatic SWG. McLellan asked if, between all of the direct gamete-origin fish at Marion Drain, Columbia Basin, and Chelan Falls, in the event that wild fish are un-useable, would there be the ability to obtain fish from those locations to backfill? Gingerich said that he did not know; and added that now with the fish health history at Wells, it may be advantageous to keep Wells fish separate. Miller said that there is potential to backfill with Marion Drain fish; however, with the understanding that existing obligations need to be met prior to backfilling. She said that white sturgeon at Marion Drain are separated by maternal family group, and there is ample space to keep them that way. She noted, however, that some culling has already occurred at Marion Drain; so, at this point, she cannot guarantee there will be equal amounts of fish available from each family group.

Schiewe said that Douglas PUD believes they have a legal obligation to stock 5,000 fish; and he asked if anyone disagrees. Irle said that if there is a reason to stock fewer than 5,000 fish, the Washington State Department of Ecology would support a letter to FERC requesting that modification. McLellan said that the CCT disagrees with the interpretation of the 5,000 number and that an alternative proposal is being developed. He added, however, that size at release and timing still need to be discussed, and that reaching agreement by the end of the week is unlikely. Bickford reiterated that Douglas PUD’s interpretation is that the default stocking rate is as outlined in the license and management plan—5,000 fish over the first 4 years. He said this will remain the default unless the Aquatic SWG unanimously votes to deviate from it. He said this is how the ASA has always functioned, and added that the HCP functions the same way, as well.

Schiewe asked if the Aquatic SWG is comfortable with moving forward with rearing and planting as outlined in the WSMP, pending fish health guidance from WDFW. The Aquatic SWG members present agreed on the following: If WDFW guidance on white...
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sturgeon fish health rearing and stocking practices is to continue rearing and stocking all asymptomatic (no signs of clinical disease or high mortality rate) larval-origin white sturgeon, the default action will be to follow the WSMP and stock the full complement of larval-origin fish currently on-station at Wells Hatchery (i.e., about 2,300 fish), with the balance to achieve the 5,000 fish goal coming from the direct gamete-origin fish. Fish stocking sizes and release dates will be determined by the Aquatic SWG. If WDFW Fish Health Staff provides guidance other than above, the Aquatic SWG will convene a conference call to discuss options.

3. **DECISION: Phase One WSMP M&E Study Plan** (Andrew Gingerich): Andrew Gingerich said that Kristi Geris sent an email to the Aquatic SWG on October 30, 2013, notifying them that the draft Phase One WSMP M&E Study Plan was available for a 30-day review period, with comments due to him no later than Friday, November 29, 2013. He said that comments on the draft plan were received including some extensive comments received from the CCT, which Gingerich said resulted in an improved document. Gingerich said that he had initially planned to request approval of the draft plan during today’s conference call; however, due to the substantive edits made based on comments received he felt it would be appropriate to offer an extended review period so that the Aquatic SWG could consider the revisions made to the draft. He said that a revised draft Phase One WSMP M&E Study Plan was posted to the Aquatic SWG Extranet site on December 10, 2013, as described in an email sent to the Aquatic SWG by Geris that same day. He said that Douglas PUD is proposing a 10-day review period in addition to the lapsed 30-day review period, followed by a vote via email. The Aquatic SWG members present agreed to submit comments or email approval of the revised draft Phase One WSMP M&E Study Plan to Douglas PUD (with a copy to Geris and Mike Schiewe) no later than December 20, 2013. *(Note 1: the Phase One WSMP M&E Study Plan was approved by the Aquatic SWG via email on December 20, 2013, following a 10-day extension of the original 30-day comment period (i.e., 40-day review period). Ecology approved the study plan provided that minor grammatical edits are addressed; and USFWS also approved the study plan provided that respective comments are incorporated per the Aquatic SWG’s requests. Other members abstained from voting. Note 2: The Phase One WSMP M&E Study Plan was revisited during the Aquatic SWG conference call on January 8, 2014, and the remaining Aquatic SWG members approved the plan.)*

4. **White Sturgeon Fish Health** (Andrew Gingerich): Andrew Gingerich said he believed this agenda item was adequately addressed during the white sturgeon stocking discussion. He suggested that when WDFW Fish Health Staff’s input regarding white sturgeon stocking is provided to the Aquatic SWG, a summary detailing the fish health testing should also be distributed. Jason McLellan added that the group of fish that tested positive for WSIV received an exceptionally high level of scrutiny; he recommended that the other groups of fish receive the same treatment. Patrick Verhey agreed with
McLellan’s recommendation. Pat Irle recommended that for the future, Douglas PUD develop standardized testing. Gingerich agreed and said that Douglas PUD supports the notion of standardized testing.

5. **Bull Trout PIT-Tag Summary** (Andrew Gingerich): Andrew Gingerich said that Douglas PUD is preparing a draft migration behavior summary report for bull trout in the Methow basin, and indicated that this report fulfills a request from the Aquatic SWG in lieu of the Twisp Weir Study that was deferred in 2013 until 2016/2017. He said that Douglas PUD will provide a draft Bull Trout PIT-Tag Summary to Kristi Geris for distribution to the Aquatic SWG no later than December 25, 2013, for discussion during the Aquatic SWG conference call on January 8, 2014. Gingerich noted that the draft migration behavior study is not a FERC requirement.

6. **Resident Fish Plan Review** (Chas Kyger): Chas Kyger said that the draft Resident Fish Plan is currently in the final stages of internal review. He said the draft plan is consistent with the Resident Fish Management Plan and that methods are largely the same as in previous years (i.e., beach seining and diver observations). He said that based on previous observations of burbot, additional methods have been included to gain a better understanding of those populations. He said that Douglas PUD will provide a draft Resident Fish Plan to Kristi Geris for distribution to the Aquatic SWG no later than December 17, 2013, for discussion at the Aquatic SWG conference call on January 8, 2014, and approval at the Aquatic SWG conference call on February 12, 2014. Kyger also noted that the draft plan is a Year-2 FERC license requirement.

7. **2014 GAP and BOP** (Andrew Gingerich): Andrew Gingerich recalled that a GAP is prepared each year. He said that Douglas PUD is also required to develop a BOP in concert with the GAP to manage spill for bypassing fish and also to meet total dissolved gas requirements. He said that Douglas PUD will provide the draft 2014 GAP and BOP to Kristi Geris for distribution to the Aquatic SWG no later than December 17, 2013, for discussion at the Aquatic SWG conference call on January 8, 2014, and approval at the Aquatic SWG conference call on February 12, 2014. The FERC license requires Douglas PUD to submit the 2014 GAP and BOP to the FERC by February 28 of each year.

8. **Pacific Lamprey Count Window – Removal of Upstream Ramps** (Chas Kyger): Chas Kyger said that the Wells Dam West Fish Ladder is currently being dewatered for its annual winter maintenance. He said that the upstream ramps located at the Wells Dam count windows will be removed to address the fish swirling and associated enumeration problems at the count stations. Mike Schiewe added that, in consideration of enumeration of salmonids and other small fish in the area, the HCP Coordinating Committees approved the removal of the upstream ramps at their meeting on November 19, 2013. Kyger reminded the group that the removal of the ramps made
sense as all of the lamprey observed in 2013 were observed free swimming through the count station and none chose to use the upstream ramps.

9. **Wells Dam Fish Ladder Maintenance** (Andrew Gingerich): Andrew Gingerich said that the Wells Dam West Fish Ladder was taken offline and dewatered on December 10, 2013, and that fish salvage efforts are underway today and tomorrow. He said the west ladder is expected to remain offline for maintenance until January 1, 2014, and is scheduled to be brought back online in early January 2014. He said that once the west ladder is back online, the Wells Dam East Fish Ladder will be taken down for maintenance, and will be out until mid-February 2014.

VII. **Next Meetings**

1. **Upcoming meetings** (Mike Schiewe): Upcoming meetings are as follows: January 8, 2014 (conference call); February 12, 2014 (conference call); and March 12, 2014 (conference call).

**List of Attachments**

Attachment A – List of Attendees
### List of Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Organization</th>
</tr>
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<tbody>
<tr>
<td>Mike Schiewe</td>
<td>SWG Chair</td>
<td>Anchor QEA, LLC</td>
</tr>
<tr>
<td>Kristi Geris</td>
<td>Administration/Technical Support</td>
<td>Anchor QEA, LLC</td>
</tr>
<tr>
<td>Andrew Gingerich</td>
<td>SWG Technical Representative</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Chas Kyger</td>
<td>Technical Support</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Shane Bickford</td>
<td>SWG Policy Representative</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Steve Lewis</td>
<td>SWG Technical Representative</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>Patrick Verhey</td>
<td>SWG Technical Representative</td>
<td>Washington Department of Fish and Wildlife</td>
</tr>
<tr>
<td>Pat Irle</td>
<td>SWG Technical Representative</td>
<td>Washington State Department of Ecology</td>
</tr>
<tr>
<td>Jason McLellan</td>
<td>SWG Technical Representative</td>
<td>Colville Confederated Tribes</td>
</tr>
<tr>
<td>Bret Nine</td>
<td>Technical Support</td>
<td>Colville Confederated Tribes</td>
</tr>
<tr>
<td>Bob Rose</td>
<td>SWG Technical Representative</td>
<td>Yakama Nation</td>
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<tr>
<td>Donella Miller</td>
<td>Technical Support</td>
<td>Yakama Nation</td>
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APPENDIX B
LIST OF AQUATIC SETTLEMENT WORK GROUP MEMBERS
# Aquatic Settlement Work Group Members

## 2013

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<thead>
<tr>
<th>Organization</th>
<th>Policy Representative</th>
<th>Technical Representative</th>
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<tbody>
<tr>
<td>Douglas PUD</td>
<td>Shane Bickford</td>
<td>Andrew Gingerich</td>
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<tr>
<td>Yakama Nation</td>
<td>Paul Ward</td>
<td>Bob Rose</td>
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<tr>
<td>U.S. Fish and Wildlife</td>
<td>Jessi Gonzales</td>
<td>Stephen Lewis</td>
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<tr>
<td>U.S. Bureau of Land Management</td>
<td>Linda Coates (Jan)</td>
<td>Linda Coates (Jan)</td>
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<tr>
<td></td>
<td>Chris Sheridan (Jan-Dec)</td>
<td>Chris Sheridan (Jan-Dec)</td>
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<tr>
<td>Washington State Department of Ecology</td>
<td>Charlie McKinney</td>
<td>Pat Irle</td>
</tr>
<tr>
<td>Washington Department of Fish and Wildlife</td>
<td>Dennis Beich</td>
<td>Patrick Verhey</td>
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<tr>
<td>Colville Confederated Tribes</td>
<td>Bill Towey</td>
<td>Jason McLellan</td>
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EXECUTIVE SUMMARY

The White Sturgeon Management Plan (WSMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license. On November 9, 2012 the Federal Energy Regulatory Commission (FERC) issued a new Operating License for the Wells Project. The license requires the implementation of the WSMP over the course of a fourth year period.

The goal of the WSMP is to increase the white sturgeon (*Acipenser transmontanus*) population in the Wells Reservoir to a level that can be supported by the available habitat and characterized by a diverse age structure consisting of multiple cohorts (juvenile and adult). In addition, the WSMP is intended to support spawning, rearing and migration as identified by the aquatic life designated use under WAC 173-201A in the Washington state water quality standards. Based upon the information available as of December 2006, the Aquatic Settlement Work Group (Aquatic SWG) determined that an assessment of Project effects on white sturgeon was not practical given sturgeon life history characteristics and the limited number of fish estimated to exist in the Project. Therefore, the Aquatic SWG concluded that resource measures related to white sturgeon should focus on population protection and enhancement by means of supplementation as an initial step in order to increase the number of fish within the Wells Reservoir. In addition to the initial supplementation activities, implementation of a monitoring and evaluation program shall be conducted to accurately assess natural recruitment, juvenile habitat use, emigration rates, carrying capacity, and the potential for natural reproduction so as to inform the scope of a future, longer-term supplementation strategy. All objectives were developed in order to meet the WSMP goal. The PMEs presented within the WSMP are designed to meet the following objectives:

Objective 1: Supplement the white sturgeon population in order to address Project effects, including impediments to migration and associated bottlenecks in spawning and recruitment. Public Utility District No. 1 of Douglas County (Douglas PUD), in consultation with the Aquatic SWG has developed a larval collection and direct gamete take program to implement in years 1-4 of the Wells Operating License. In June 2013, both larval and fertilized eggs will be collected and transported to Wells Hatchery where juveniles will be reared for up to one year. These fish will be released in the Wells Project in 2014 towards meeting this objective.

Objective 2: Determine the effectiveness of the supplementation activities through a monitoring and evaluation program. Monitoring of naturally produced and hatchery produced juvenile and adult sturgeon will be initiated in 2015. During 2013 Douglas PUD will work with the Aquatic SWG to develop the details of the Index Monitoring Program in concert with the Marked Fish Tracking Program as part of the overall Sturgeon Monitoring and Evaluation Program.

Monitoring of release sturgeon will take place in 2015. During 2013 Douglas PUD will work with the Aquatic SWG to develop the Objective 2 Monitoring and Evaluation Program. Monitoring design will be designed around the number of fish release, fish size and program goals.
Objective 3: Determine the potential for natural reproduction in the Wells Reservoir in order to appropriately inform the scope of future supplementation activities. Natural reproduction evaluations may be coupled with the active tagging studies being implemented under Objective 2 Index Monitoring Program. In 2013 and 2014, Douglas PUD will work with the Aquatic SWG to develop a strategy for monitoring natural reproduction in the Wells Project.

Objective 4: Adaptively manage the supplementation program as warranted by the monitoring results. Phase II goals will be addressed following the completion of Phase I in 2022.

Objective 5: Evaluate whether there is biological merit to providing safe and efficient adult upstream passage. Phase II goals, including longer term indexing and evaluating the feasibility and biological merit of adult passage measures will be addressed one year after the completion of Phase I (2023).

Objective 6: Identify white sturgeon educational opportunities that coincide with WSMP activities. Education opportunities will be discussed with the Aquatic SWG in 2013 and 2014. Potential opportunities include inviting elementary school children to attend a Wells Hatchery tour and to participate in the juvenile sturgeon release events in years 2014-2017. In addition, during the development of the new visitor center at Wells Dam, white sturgeon educational material will be provided consistent with requirements of the WSMP.

This WSMP is intended to be compatible with other white sturgeon management plans in the Columbia River mainstem. Furthermore, this management plan is intended to be not inconsistent with other management strategies and recovery goals of federal, state and tribal natural resource management agencies. The WSMP is not intended to be a harvest management plan and does not create or supersede jurisdiction over fisheries management decisions made by the responsible fishery agencies and tribes. However, the WSMP activities are expected to ultimately support appropriate and reasonable harvest opportunities consistent with the goals of the responsible fishery agencies and tribes and designated use for harvest under WAC 173-201A identified in the Washington state water quality standards. Should the responsible fishery agencies and tribes determine that there is an ongoing harvestable surplus of sturgeon in the Wells Reservoir, then this indicates significant progress toward achievement of the goals and objectives of this plan.

The WSMP will be updated in 2013 to reflect additional requirements that have been added by the final Clean Water Act Section 401 Water Quality Certification and the new project license issued by the FERC. The 2013 annual report on the implementation of the WSMP will include all of the sturgeon related activities that took place from the issuance of the new license in November 2012 to the end of December 2013. The 2013 annual report will also specifically address the implementation of the new sturgeon related measures found exclusively in the FERC license.
1.0 INTRODUCTION

The White Sturgeon Management Plan (WSMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license (Issued November 9, 2012).

To ensure active stakeholder participation and support, the Public Utility District No. 1 of Douglas County (Douglas PUD) developed all of the resource management plans in close coordination with agency and tribal natural resource managers (Aquatic Settlement Work Group or Aquatic SWG). During the development of this plan, the Aquatic SWG focused on developing management priorities for resources potentially impacted by Project operations. Entities invited to participate in the Aquatic SWG include the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Washington Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), and Douglas PUD.

The WSMP will direct implementation of measures to protect against and mitigate for potential Project impacts on white sturgeon (*Acipenser transmontanus*). To ensure active stakeholder involvement and support, Douglas PUD developed this plan, along with the other aquatic management plans, in close coordination with the members of the Aquatic SWG.

The Aquatic SWG agrees on the need to develop a plan for the long-term management of white sturgeon in the Wells Hydroelectric Project (Project). This management plan summarizes the relevant resource issues and background (Section 2), identifies the goal and objectives of the plan (Section 3), and describes the relevant PMEs (Section 4) for white sturgeon during the term of the new license.

In addition to the requirements found within the WSMP, the new Federal Energy Regulatory Commission (FERC) license added several additional sturgeon related requirements associated with the continued operation of the Wells Project. Implementation of all of the WSMP related measures will be reported to the various agencies and tribes within the annual report for the WSMP.

2.0 BACKGROUND

2.1 White Sturgeon Biology

White sturgeon are the largest of all North American freshwater fish. They are found in marine waters and freshwaters of rivers along the Pacific coast from Monterey, California to Cook Inlet in northwestern Alaska (Wydoski and Whitney 2003). Significant populations of the Pacific coast appear to be restricted to three locations: the Sacramento, Fraser, and Columbia rivers (Lane 1991). White sturgeon are distributed throughout the U.S. portion of the Columbia River...
and in many of its larger tributaries. Historically, white sturgeon migrated throughout the mainstem Columbia River from the estuary to the headwaters, although passage was probably limited at times by large rapids and falls (Brannon and Setter 1992).

White sturgeon are long-lived fish, with fin ray analysis documenting fish over 100 years in age (Beamesderfer et al. 1995). This anadromous species has been reported to reach a length of 20 feet and a weight of 1,800 pounds (Wydoski and Whitney 2003). In the Columbia River, white sturgeon spawn in the spring between April and July. Only a small percentage of adult white sturgeon in the Columbia River spawn in a given year. Intervals between spawning have been estimated to be between 3 and 11 years. White sturgeon deposit eggs through broadcast spawning at water temperatures between 10 and 18°C. Mature white sturgeon commonly produce between 100,000 and 300,000 eggs, but larger fish may produce up to 3 million eggs (Wydoski and Whitney 2003). Spawning and egg incubation in the Columbia River occur in the swiftest water available (2.6-9.2 feet per second) at depths between 13.1 and 65.6 feet over cobble, boulder, and bedrock substrates (Wydoski and Whitney 2003). In mainstem Columbia River reservoirs, spawning occurred within 5 miles downstream of the mainstem dams. Eggs hatch in approximately 7 days at 15°C.

Columbia River white sturgeon are reported to have declined in numbers because of numerous factors, including obstruction of migration by mainstem hydroelectric dams, altered stream flows, altered hydrologic regimes, altered temperature regimes, reduced spawning habitat, and over harvest (van der Leeuw et al. 2006; Wydoski and Whitney 2003). Variations in population characteristics also have been attributed to differences in exploitation rates and recruitment success, access to marine food resources, and suitability of hydrologic conditions and available habitats (Devore et al. 1995). During the 1800s, prior to construction of mainstem hydroelectric dams on the Columbia River, white sturgeon were in great demand for their caviar and smoked flesh. In 1892, during the peak of commercial harvest activities, approximately 2.5 million kilograms of white sturgeon were harvested (Wydoski and Whitney 2003). Regulations of the white sturgeon fishery began with a 4-foot minimum size limit established in 1899. Several regulations were established from 1899 to 2000 to manage the fishery in the lower Columbia River, although, effective recovery efforts did not begin until spawners were protected in the 1950s (Wydoski and Whitney 2003).

Beginning in the 1930s, with the construction of Rock Island, Grand Coulee, and Bonneville dams, migration was disrupted because white sturgeon generally do not pass upstream through fishways that were built for salmon, although they do pass downstream through dams (Lepla et al. 2001). Construction of hydroelectric projects in the mid-Columbia River Basin, such as Priest Rapids, Wanapum, Rock Island, Rocky Reach, and Wells has also affected the upstream movement of white sturgeon. Current populations in the Columbia River basin can be divided into three groups: fish below the Bonneville Dam, with access to the ocean; fish isolated functionally, but not genetically, between dams; and fish in several large tributaries. However, the population dynamics and factors regulating production of white sturgeon within isolated populations in the mid-Columbia River reservoirs such as the Rocky Reach and Wells reservoirs are not well understood.
2.2 White Sturgeon Management and Recovery Efforts

Management programs to protect and restore white sturgeon in the Kootenai River and the upper Columbia River are on-going and have provided a relevant framework for the development of a white sturgeon management plan in the Wells Reservoir. The Kootenai and upper Columbia sturgeon recovery efforts have also provided a good technical framework for implementing a sturgeon management plan. The strategies and activities outlined in these aforementioned management programs have provided important information, which has been used to develop an effective WSMP.

2.2.1 Kootenai River White Sturgeon Recovery

In the early 1990s following concerns that white sturgeon populations were decreasing due to near total recruitment failure, a detailed monitoring program was instituted by the Idaho Department of Fish and Game (IDFG) to provide more information on white sturgeon species status in the Kootenai River system. In 1994, the USFWS listed the Kootenai stock of white sturgeon as an endangered species, which introduced a higher level of management and control by various authorities in the drainage and region. A Recovery Team was established to provide technical direction regarding hatchery supplementation efforts. A final Kootenai White Sturgeon Recovery Plan was signed by the USFWS in 1999.

Kootenai white sturgeon recovery efforts consist of a multi-faceted approach aimed at improving survival at various life history stages. Coordinated flow releases during spring are a major habitat restoration focus designed to increase natural recruitment, although currently it is difficult to assess the relationship between flows and recruitment success (USFWS 1999). Directed stocking programs, which address genetic concerns, stocking rates, and fish size at release, have also been implemented to boost juvenile sturgeon in the Kootenai system. The Kootenai Tribe of Idaho in collaboration with the Kootenay Trout Hatchery (KTH) in Canada are primarily responsible for producing high-quality juvenile white sturgeon for the directed stocking program. Information collected from annual monitoring activities, which assess survival, growth rates, and natural spawning success, allow for an adaptive management approach with regards to the stocking program.

2.2.2 Upper Columbia River White Sturgeon Recovery

In 2002, a bi-national Recovery Team, termed the Upper Columbia White Sturgeon Recovery Initiative (UCWSRI) finalized the Upper Columbia White Sturgeon Recovery Plan in response to concerns that the transboundary white sturgeon population residing between Hugh L. Keenleyside Dam and Grand Coulee Dam consists of an aging and declining population with extremely limited recruitment. The Recovery Team, consisting of technical representatives from Federal, Provincial, and State resource management agencies and from Canadian and U.S. tribes, directs the recovery program.

Due to near total recruitment failure over the past two decades, a decision was made early in the recovery planning process to move immediately to development of a hatchery program to produce juvenile sturgeon for stocking (UCWSRI 2002). The breeding plan (Kincaid 1993) developed for the Kootenai sturgeon program was used as a model for the upper Columbia
sturgeon. Rearing of all fish for the stocking program occurs at the KTH. Similar to the Kootenai recovery strategy, a juvenile index monitoring program to assess growth, survival, health, distribution, and relative abundance of released juveniles shall provide information essential to monitoring the upper Columbia sturgeon population and the success of the hatchery stocking program.

2.2.3 Rocky Reach White Sturgeon Management Plan

The relicensing process for the Rocky Reach Hydroelectric Project brought fisheries agencies, tribes, and interested parties together in a Natural Resources Working Group (Rocky Reach Fish Forum or RRFF) that provided an opportunity for comprehensive review of current and future management priorities for fish resources potentially impacted by ongoing Project operations (Chelan PUD 2005). In 2004 and 2005, RRFF members collaborated on the development of goals and objectives to manage the white sturgeon population within the Rocky Reach Project boundary under the new license. Based upon the information collected from white sturgeon field studies implemented by Chelan PUD in 2001 and 2002, a white sturgeon management plan was developed to promote population growth of sturgeon to a level commensurate with the available habitat. The Rocky Reach management plan measures include the implementation of a white sturgeon supplementation program, a monitoring program to determine population characteristics, and tracking surveys to determine movements and to assess potential spawning locations.

Following the issuance of Rocky Reach Dam’s operating license from the FERC Chelan PUD implemented the first year of broodstock collection in 2010. Few viable adults were obtained despite many adults being captured. Offspring from 1x2 cross and captive brood fish were released into the Rocky Reach Reservoir, for an approximate 2011 release of 6,500 fish. In 2011, viable broodstock capture increased; however offspring produced showed signs of White Sturgeon Iridovirus which prevented the release of very many fish in 2012. Approximately 130 fish were released into the Rocky Reach Project in 2012. In 2012, broodstock collection resulted in two spawning groups that contained multiple males and it is expected that 6,500 fish will be released in 2013.

2.2.4 Priest Rapids Project White Sturgeon Management Plan

As part of the Priest Rapids Project relicensing, white sturgeon populations were investigated in the Priest Rapids and Wanapum reservoirs from 1999 to 2003. Results of the study have assisted in identifying a framework for the future development and implementation of a Priest Rapids Project White Sturgeon Management Plan. Biological objectives associated with this management plan consist of increasing white sturgeon populations to a level commensurate with available habitat through a supplementation program and the implementation of a monitoring program to determine population characteristics such as natural recruitment, spawning, rearing, growth, survival, and rates of emigration.

Following the issuance of the Priest Rapids Dam license Order and the issuance of a Clean Water Act Section 401 Water Quality Certification (401 Certification) via the Washington Department of Ecology, Grant PUD has begun implementing white sturgeon stocking objectives. Similar to Chelan PUD, Grant PUD has participated in three years of juvenile sturgeon releases above
Priest Rapids and Wanapum Dams. Release numbers and broodstock collection for this effort is coordinated through the Priest Rapids Fish Forum (PRFF), but have targeted approximately 6,500 fish per year.

2.3  Project White Sturgeon Study

Since little information existed on the status of white sturgeon populations in the mid-Columbia, Chelan, Grant, and Douglas PUDs each initiated studies of white sturgeon to support their current or upcoming relicensing processes. The information gathered from these studies was intended to provide basic white sturgeon life history information, distribution, and current population sizes in the mid-Columbia River Basin. Additionally, study results provided the foundation for the development of appropriate management goals and objectives.

From 2001-2003, Douglas PUD implemented a study to examine the white sturgeon population within the Project. Prior to the implementation of this study, little information on white sturgeon was available for the Wells Reservoir. WDFW catch record card returns for 1993 and 1994 indicate that legal size white sturgeon were present in the Wells Reservoir (Brad James, WDFW, pers. comm.). Additionally, information from previous studies in reservoirs upstream and downstream supported the existence of a population. The primary objectives of the study were to provide basic information on the population abundance, age structure, size, and growth of Project white sturgeon; analyze movements of white sturgeon within the Reservoir; and compare the data collected during this study with data collected during assessments at other projects (Jerald 2007).

During the summers of 2001 and 2002, setlines were deployed in the Wells Reservoir. Sturgeon captured on setlines were measured, marked with passive integrated transponder (PIT) tags and with scute markings. Additionally, a select number of captured fish were fitted with radio-transmitters to track movements and had pectoral fin rays removed for age analysis using standard methodologies (Beamesderfer et al. 1989).

Setline sampling took place over a two-year timeframe with a total of 129 setlines deployed and retrieved from throughout the reservoir. In total, 13 white sturgeon were captured during the 2-year study with the majority of the fish being captured in the Columbia River within five miles of the mouth of the Okanogan River. Twelve of the captured fish were PIT tagged. Subsequently, five recapture events were recorded for a total of 18 capture events during the mark-recapture period (one fish was recaptured twice). Population abundance was estimated to be 31.35±17.51. The 95% confidence interval for sturgeon abundance was calculated to be CI (13<N<218). The results of the mark-recapture portion of the study indicated that the sturgeon population in the Wells Reservoir is small with a point estimate of 31 fish over 50 cm in length (Skalski and Townsend 2005).

The length of the 13 fish captured during the study ranged from 60-202 cm. Two of the fish were classified as juveniles (<90 cm fork length) while 11 were classified as sub-adults or adults. It is important to note that the capture methodology was not designed to provide accurate sampling of fish under 50 cm. Captured sturgeon ranged in age from 6 to 30 years old (based on 11 fish) demonstrating that all of these fish recruited to the Wells Reservoir after Wells Dam was
completed in 1967 with strong year class recruitment between the years 1972 and 1978 and again between 1988 and 1996. The presence of fish within these age classes suggests that successful recruitment within or to the Wells Reservoir is occurring either through (1) spawning within the Wells Reservoir and/or (2) immigration into the Wells Reservoir from populations upstream. Two white sturgeon were captured in 2001 and subsequently recaptured in 2002 to provide limited growth rate information. One juvenile fish was measured at 65 cm (fork length) on July 11, 2001. The fish was again captured on September 26, 2002 and measured 87 cm. This represented a growth rate of 22 cm in 14 months, or 18.9 cm/year. One adult fish was captured on August 9, 2001 measuring 197 cm (fork length). The fish was subsequently captured on September 6, 2002 and measured 199 cm representing a 2 cm growth rate over approximately 13 months, or 1.85 cm/year (Jerald 2007). In October 2006, this fish was found dead along the shoreline of the Columbia River adjacent to the mouth of the Okanogan River. At that time, biologists measured the fish at 228.5 cm representing a 29.5 cm increase in length over a four year period or an average of 7.4 cm of growth per year.

A total of six white sturgeon were fitted with radio-tags and monitored throughout the study period using mobile and fixed telemetry. Telemetry data along with setline capture data verify that white sturgeon congregate in the Columbia River near the Okanogan River confluence during the summer, fall, and winter months with none of the six fish being detected downstream from Brewster river mile (RM 530) or upstream of Park Island (RM 538). Very little movement of tagged sturgeon was observed during winter months. In the spring of 2002, one of the five mature fish radio-tagged made an upstream migration into the Okanogan River and two different radio-tagged mature sized sturgeon made movements into the Okanogan River during 2003.

In general, the results of the white sturgeon study in the Wells Reservoir were similar to the results of a study conducted in the neighboring Rocky Reach Reservoir in 2001-2002 (Chelan PUD 2005). Results indicate that the Wells Reservoir adult sturgeon population is estimated from 13-217 fish. These results are similar to the Rocky Reach assessment which estimated numbers of sturgeon from 50-115 fish. Both studies captured similar numbers of sturgeon using similar amounts of effort and similar capture techniques (Rocky Reach=18 sturgeon, Wells=13 sturgeon). Radio-telemetry data from both studies suggest that very little activity occurs during the overwintering period. Wells Reservoir sturgeon ranged in age from 6 to 30 years old while Rocky Reach sturgeon ranged in age from 7 to 50 years old. Both studies suggest that some recruitment into each population is occurring given the presence of juvenile fish in their respective reservoirs (Chelan PUD 2005; Jerald 2007).

3.0 GOAL AND OBJECTIVES

The goal of the WSMP is to increase the white sturgeon population in the Wells Reservoir to a level that can be supported by the available habitat and characterized by a diverse age structure consisting of multiple cohorts (juvenile and adult). In addition, the WSMP is intended to support spawning, rearing and migration as identified by the aquatic life designated use under WAC 173-201A in the Washington state water quality standards. Based upon the available information, the Aquatic SWG agreed that a rigorous and reliable assessment of ongoing Project effects on white sturgeon was not practical given sturgeon life history characteristics and the limited number of fish estimated to exist in the Wells Reservoir. Therefore, the Aquatic SWG concluded that
efforts should focus, initially, on supplementation efforts to increase the population within the Wells Reservoir in order to address Project effects. Once the population numbers have been increased to a level that can be studied, as determined by the Aquatic SWG, Douglas PUD shall implement a monitoring and evaluation program to accurately assess natural recruitment, juvenile habitat use, emigration rates, carrying capacity, and the potential for natural reproduction so as to inform the scope of a future, long-term supplementation strategy. The PMEs of the WSMP are designed to meet the following objectives:

Objective 1: Supplement the white sturgeon population in order to address Project effects, including impediments to migration and associated bottlenecks in spawning and recruitment;

Objective 2: Determine the effectiveness of the supplementation activities through a monitoring and evaluation program;

Objective 3: Determine the potential for natural reproduction in the Wells Reservoir in order to appropriately inform the scope of future supplementation activities;

Objective 4: Adaptively manage the supplementation program as warranted by the monitoring results and in consultation with the Aquatic SWG;

Objective 5: Evaluate whether there is biological merit to providing safe and efficient adult upstream passage;

Objective 6: Identify white sturgeon educational opportunities that coincide with WSMP activities.

This WSMP is intended to be compatible with other white sturgeon management plans in the Columbia River mainstem. Furthermore, this management plan is intended to be not inconsistent with other management strategies and recovery goals of federal, state and tribal natural resource management agencies. The WSMP is not intended to be a harvest management plan and does not create or supersede jurisdiction over fisheries management decisions made by the responsible fishery agencies and tribes. However, the WSMP activities are expected to ultimately support appropriate and reasonable harvest opportunities consistent with the goals of the responsible fishery agencies and tribes and designated use for harvest under WAC 173-201A identified in the Washington state water quality standards. Should the responsible fishery agencies and tribes determine that there is an ongoing harvestable surplus of sturgeon in the Wells Reservoir, then this indicates significant progress toward achievement of the goals and objectives of this plan.

The schedule for implementation of specific measures within the WSMP is based on the best information available at the time the Plan was developed. As new information becomes available, implementation of each activity may be adjusted through consultation with the Aquatic SWG.
4.0 PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

In order to fulfill the goal and objectives described in Section 3.0 of the WBMP, Douglas PUD, in consultation with the Aquatic SWG, has initiated the implementation of the following measures. The program shall be implemented in two phases. Phase I of the PMEs shall be implemented during the first ten years of the new license and consist of supplementation, monitoring and evaluation activities. Results of Phase I PMEs will be used to inform the scope of continued PMEs during Phase II, which shall be implemented for the remainder of the new license.

Douglas PUD, in consultation with the Aquatic SWG, shall initiate implementation of the following PMEs during the 50-year license term:

Phase I (Years 1-10)

- Development of a Broodstock Collection and Breeding Plan (Year 1 and updated as determined by the Aquatic SWG, see Section 4.1.1);
- Broodstock Collection (Years 1-4 and other years TBD by the Aquatic SWG, see Section 4.1.1);
- Juvenile Stocking (Years 2-5 and other years TBD by the Aquatic SWG, see Section 4.1.2);
- Index Monitoring Program (Years 3-5 and 2 more years prior to Year 10 TBD by the Aquatic SWG, see Section 4.2.1);
- Marked Fish Tracking (Years 3-5 and 2 more years prior to Year 10 TBD by the Aquatic SWG, see Section 4.2.2);
- Natural Reproduction Assessments (5 annual assessments over the license term, see Section 4.2.3)

* Natural reproduction assessments can be implemented over the term of the license (Phase I and Phase II) as determined by the Aquatic SWG.

Phase II (Years 11-50)

- Long-term juvenile stocking (stocking rate and frequency TBD by Aquatic SWG in Years 11-50, see Section 4.4.1);
- Supplementation Program Review (Years 11-50 TBD by the Aquatic SWG, see Section 4.4.2);
- Long-term Index Monitoring Program (Year 12 and once every 3-5 years thereafter TBD by the Aquatic SWG, see Section 4.4.3);
- Adult Passage Evaluation (Year 11 and once every 10 years thereafter, see Section 4.4)

As determined by the Aquatic SWG, appropriate educational opportunities coinciding with implementation of WSMP activities (Section 4.5) will be made available during the entire license term.
The following sections describe, in detail, the components, timing of implementation, and decision-making process of the PMEs to be conducted during Phase I and II of the white sturgeon management program.

4.1 Phase I Supplementation Program (Objective 1)

4.1.1 Broodstock Collection and Breeding Plan

Due to the low numbers of sturgeon indicated by the 2001-2003 white sturgeon study and the need to increase genetic variation, there is a low probability that broodstock from only the Wells Reservoir can be utilized as the basis for supplementation activities. Consequently, other sources of fish must be considered in addition to capturing fish from Wells Reservoir to increase the white sturgeon population. Within one year of issuance of the new license Douglas PUD shall prepare and implement a Broodstock Collection and Breeding Plan, in consultation with the Aquatic SWG, which considers such factors as genetics and questions of imprinting, and are consistent with the goal and objectives of the WSMP and includes the level of detail provided in other existing white sturgeon breeding plans.

Following is a prioritized list\(^1\) of juvenile fish source options that shall be incorporated into a Broodstock Collection and Breeding Plan:

- Broodstock collected from the Wells Reservoir;
- Broodstock collected from nearby reservoirs (Priest Rapids, Wanapum, Rocky Reach, Rock Island);
- Broodstock collected from McNary Reservoir;
- Juvenile production from the Lake Roosevelt white sturgeon recovery effort;
- Broodstock collected from below Bonneville Dam in the lower Columbia River;
- Juveniles purchased from a commercial facility.

A white sturgeon supplementation program may include, but may not be limited to, the following implementation options (Not listed in a priority order):

- Build new or retrofit existing Douglas PUD funded hatchery facilities to accommodate white sturgeon broodstock, egg incubation, and juvenile rearing;
- Development of a mid-Columbia hatchery facility funded by the three PUDs (Douglas, Chelan, and Grant) to accommodate various phases of white sturgeon supplementation; broodstock, egg incubation, and juvenile rearing;
- Direct release into the Wells Reservoir of juveniles produced via appropriate Breeding Plan criteria and reared at a commercial facility;
- Direct release into the Wells Reservoir juveniles or adults trapped and hauled from the lower Columbia River.

\(^1\) Although the original WSMP included a prioritized list, since the development of the WSMP the Aquatic SWG has approved the White Sturgeon Brood Stock Collection and Breeding Plan (filed with the FERC on February 14 2012) and a sturgeon collection location Statement of Agreement developed and approved in the Aquatic SWG on March 20th 2012. Collectively, these two documents approve all capture locations found in the WSMP and remove the prioritization found in the WSMP.
The initial source of broodstock shall be determined within the first year of issuance of the new license. Collection of broodstock shall occur consistent with the broodstock collection plan in years 1-4 of the new license. Any additional years during the Phase I program (first ten years of the new license) in which broodstock collection shall occur in order to facilitate additional juvenile stocking into the Wells Reservoir (Section 4.1.2) will be determined by the Aquatic SWG. The intent of broodstock collection is to use their progeny, if feasible, for future white sturgeon stocking activities in the Wells Reservoir. The broodstock collection plan shall be updated annually, or as otherwise recommended by Douglas PUD in consultation with the ASWG, to incorporate new and appropriate information.

4.1.1.1 Progress Towards Objective 1 in 2012 – Broodstock Collection and Breeding Plan

In September 2011 the Aquatic SWG completed and approved the Wells White Sturgeon Broodstock and Breeding Plan ahead of schedule (Sturgeon Plan). The Sturgeon Plan was filed with the FERC in February 2013. The Sturgeon Plan will be implemented in 2013.

At the end of 2011, Douglas PUD advertised and issued an Aquatic SWG approved Request for Proposals to obtain juvenile sturgeon or gametes in 2012 to begin early implementation of the sturgeon stocking efforts in the Wells Project. Two proposals were received and brought to the Aquatic SWG for consideration. Douglas PUD presented the proposals to the group with the intention of funding one of the proposals, provided the Aquatic SWG could arrive at unanimous decision. After thorough discussion unanimous approval could not be obtained and early implementation juvenile collection or gamete collection was put on hold.

In early 2012, Douglas PUD presented an SOA to the Aquatic SWG that involved Douglas PUD funding both of the two proposals received. One of the proposals was for the collection of wild spawned sturgeon larvae from reservoirs throughout the upper and middle Columbia River and the second proposal focused on the collection of broodstock for the artificial spawning of sturgeon at the Marion Drain Hatchery facility. After review and revision by the Aquatic SWG a final SOA supporting a dual-faceted sturgeon collection program was approved in June of 2012. In the spring and early summer of 2013 the Colville Tribes will collect naturally spawned larval sturgeon using drift nets and the Yakama Nation will collect broodstock for hatchery fertilization at Marion Drain. Both sources of fish will be transported to Wells Hatchery within days of collection.

In 2012, Douglas PUD modified the Wells Hatchery to facilitate the rearing of juvenile sturgeon. The hatchery upgrades included the installation of new 12 - 3’ x 5’ circular Combi- tanks, with heated well water as a rearing water source. The circular tanks were installed in two separate bio-secure configurations that allow Douglas PUD to rear both groups of juvenile sturgeon independently. The wild caught larvae fish will be reared in separate tanks from the artificially collected eggs provided by the Marion Drain program.

4.1.2 Juvenile White Sturgeon Stocking
Within two years following issuance of the new license, Douglas PUD shall release up to 5,000 yearling white sturgeon into the Wells Reservoir annually for four consecutive years (20,000 fish total). Additional years and numbers of juvenile sturgeon to be stocked during Phase I will be determined by the Aquatic SWG and will not exceed 15,000 juvenile sturgeon (total of 35,000 juvenile sturgeon during Phase I). In consultation with the Aquatic SWG, yearling fish for release shall be acquired through one or more of the sources listed in priority order in Section 4.1.1 above, or through other measures identified by the Aquatic SWG. If juvenile sturgeon stocking deadlines cannot be achieved, the Aquatic SWG will determine alternative implementation measures that will be undertaken by Douglas PUD (see Table 4.7-1, footnote 2).

Douglas PUD shall ensure that all hatchery-reared juvenile white sturgeon released into the Wells Reservoir are marked with PIT tags and year-specific scute marks for monitoring purposes described in Section 4.2 of this plan. In order to allow for tracking of juvenile white sturgeon emigration described under Section 4.2.2, Douglas PUD shall ensure that up to one percent (or a maximum of 50) of the juvenile white sturgeon released into the Wells Reservoir are large enough to allow implantation of an active tag prior to release. In addition, following the third year of supplementation (unless the Aquatic SWG determines more analysis is required), the Aquatic SWG may elect to release juveniles at an earlier or later life stage for the fourth year in order to compare success of fish released at varying life stages. For example, the Aquatic SWG may elect to have a proportion of the hatchery-reared juveniles released at differing size intervals (with the minimum size being that which permits PIT tagging), in order to monitor potential differences in survival and growth during future indexing periods.

### 4.1.2.1 Progress Towards Objective 1 in 2012 – Juvenile White Sturgeon Stocking

Rearing of juvenile fish from both the larval and egg collection program will take place for up to 12 months at the Wells Hatchery with the intention of rearing fish to approximately 250 mm fork length. Douglas PUD plans on planting up to 5,000 juvenile sturgeon in the summer of 2014 depending on the source and number of fish successfully collected and reared. All of these fish will be PIT-tagged and scute marked according to the marking plan described in Section 4.2 of the WSMP. Up to one percent (or 50) of the juvenile fish liberated into the Wells Reservoir will be tagged with active transmitters to facilitate the collection of data for the Phase I monitoring and evaluation program.

### 4.2 Phase I Monitoring and Evaluation Program (Objective 2)

Douglas PUD shall conduct a monitoring and evaluation program within the Wells Reservoir for the purpose of assessing the effectiveness of the supplementation activities described in Section 4.1 and outlined in Table 4.7-1. Monitoring shall include both an Index Monitoring Program (Section 4.2.1) and a Marked Fish Tracking Program (Section 4.2.2). Both of these studies will be used to collect life history and population dynamics information including rates of fish movements into and out of the Wells Reservoir and habitat use. Douglas PUD shall also obtain updated information, when available, on other white sturgeon recovery programs (e.g., Upper Columbia River, Kootenai River, mid-Columbia PUDs), in order to improve the monitoring and evaluation program and refine its implementation. The results of this information will also inform supplementation, monitoring and evaluation activities during implementation of Phase II of the WSMP.
4.2.1 Index Monitoring Program

Within three years following issuance of the New License, Douglas PUD shall initiate a three-year index monitoring program (Years 3-5) for juvenile and adult sturgeon in the Wells Reservoir to determine age-class structure, survival rates, abundance, density, condition factor, growth rates, and to identify distribution and habitat selection of juvenile sturgeon. The indexing methods shall include using gillnets, set lines or other appropriate recapture methods for juveniles and adults.

As a component of the Phase I indexing program, Douglas PUD shall capture and implant active tags in a portion of the juvenile and sexually mature adult sturgeon population found in the Wells Reservoir. This tagging effort shall be used to augment broodstock collection (Section 4.1.1), population level information and juvenile habitat use (Section 4.2.2) and natural reproduction potential (Section 4.2.3).

After the initial three-year indexing period (Years 3-5), Douglas PUD shall conduct an additional two years of index monitoring in Phase I as determined by the Aquatic SWG. After year 9, an additional year of index monitoring would take place in year 12 and then every three to five years over the term of the new license (Phase II) to assess age-class structure, survival rates, abundance, condition factor, growth rates; identify distribution and habitat selection of juvenile sturgeon; and to inform the supplementation program strategy (see Table 4.7-1).

Frequency (every 3, 4 or 5 years) of implementation of a long-term index monitoring activities (after year 12) will be determined by the Aquatic SWG. Phase II index monitoring activities will not consist of implantation of active tags in captured individuals.

4.2.1.1 Progress Towards Objective 2 in 2012 – Index Monitoring Program

Monitoring of naturally produced and hatchery produced juvenile and adult sturgeon will be initiated in 2015. During 2013 Douglas PUD will work with the Aquatic SWG to develop the details of the Index Monitoring Program in concert with the Marked Fish Tracking Program as part of the overall Sturgeon Monitoring and Evaluation Program.

4.2.2 Marked Fish Tracking Program

Beginning in year three of the new license and continuing for three years (Years 3-5), Douglas PUD shall conduct tracking surveys of the juvenile white sturgeon that were released with active tags as part of supplementation activities. This will require one percent of each of the annual classes of juvenile sturgeon (up to a maximum of 50 fish each year) released in years 2, 3, 4, and 5 to be reared large enough to implant an active tag for tracking purposes (See Table 4.7-1). The purpose of tracking active-tagged fish is to determine juvenile white sturgeon emigration rates out of the Wells Reservoir and habitat use within the Wells Reservoir.

Douglas PUD shall repeat the tracking survey for two additional years during Phase I (see Table 4.7-1). The additional two years of surveys shall track: 1) active tags implanted in a percentage of juvenile fish from previous years of supplementation activities (dependent upon tag life) and
2) any juvenile and adult fish implanted with active tags during the last indexing period preceding the survey. Subsequent Phase I surveys are likely to coincide with the additional Phase I index monitoring and juvenile stocking activities.
4.2.2.1 Progress Towards Objective 2 in 2012 – Monitoring and Evaluation Program

Monitoring of release sturgeon will take place in 2015. During 2013 Douglas PUD will work with the Aquatic SWG to develop the Objective 2 Monitoring and Evaluation Program. Monitoring design will be designed around the number of fish release, fish size and program goals.

4.2.3 Determining Natural Reproduction Potential (Objective 3)

In years where environmental conditions are appropriate, Douglas PUD shall track sexually mature adult sturgeon that were captured and implanted with active tags under Section 4.2.1 for the purpose of identifying potential spawning locations and determining natural reproduction potential. Appropriate environmental conditions may be determined by examining the following factors: water quality and quantity (i.e., flow, temperature, and turbidity), the presence of reproductively viable adults during index monitoring activities, and the status of maturity for supplemented fish. In years in which sexually mature adult sturgeon are tagged under Section 4.2.1, Douglas PUD may also utilize egg collection mats in combination with tracking in areas of the Wells Reservoir for the purpose of identifying potential spawning locations and activity. Five surveys of natural reproduction using adult tracking and/or egg mat placement shall occur over the term of the new license. Several of these surveys are intended to be implemented during the latter part of the license in order to examine the natural reproductive potential of supplemented fish recruiting to sexually maturity. These activities will support the aquatic life designated use for spawning under WAC 173-201A in the Washington state water quality standards.

4.2.3.1 Progress Towards Objective 3 in 2012 – Determining Natural Reproduction Potential

Natural reproduction evaluations may be coupled with the active tagging studies being implemented under Objective 2 the Index Monitoring Program. In 2013 and 2014, Douglas PUD will work with the Aquatic SWG to develop a strategy for monitoring natural reproduction in the Wells Project.

4.3 Phase II Supplementation and Monitoring Program (Objectives 2 and 4)

The information collected through activities described in Section 4.1-4.3 will provide insight into the population dynamics, habitat availability, and limiting factors that affect the natural population structure of white sturgeon within the Wells Reservoir. This information will inform supplementation, monitoring and evaluation activities during implementation of Phase II supplementation and monitoring activities in the WSMP for the duration of the new license term after year 10.
4.3.1 Long-Term Juvenile White Sturgeon Stocking

The number and frequency of yearlings released in Phase II of the white sturgeon supplementation program will range from 0 to 5,000 fish. Stocking rates shall be based on the results of the Phase I Monitoring and Evaluation Program (Section 4.2) and determination of carrying capacity (Section 4.3) and shall be consistent with the goal and objectives of the WSMP. The Phase II stocking rates can also be adjusted as determined by the Aquatic SWG (also see Table 4.7-1, footnotes 2 and 3).

4.3.1.1 Progress Towards Objectives 2 and 4 - Phase II Supplementation and Monitoring Program

Phase II goals will be addressed following the completion of Phase I in 2022.

4.3.2 Supplementation Program Review

Douglas PUD shall compile information on other white sturgeon supplementation programs in the Columbia River Basin in order to assess whether the white sturgeon supplementation program being implemented at the Project is: (i) consistent and comparable with the technology and methods being implemented by other supplementation programs in the region; (ii) reasonable in cost and effective to implement at the Project; and (iii) consistent with the supplementation program goals and objectives. The supplementation program review will be conducted annually in coordination with the development of the annual report (Section 4.6).

4.3.2.1 Progress Towards Objectives 2 and 4 - Phase II Supplementation and Monitoring Program

Phase II goals will be addressed following the completion of Phase I in 2022.

4.3.3 Long-term Index Monitoring Program

Beginning in Year Twelve of the new license and every 3 to 5 years thereafter for the duration of the new license, Douglas PUD shall continue to conduct a Phase II Index Monitoring Study for juvenile and adult sturgeon in the Wells Reservoir. This program will be used to monitor age-class structure, survival rates, abundance, condition factor, growth rates, identify distribution and habitat selection of juvenile sturgeon, and may continue to support broodstock collection activities. The indexing methods will include using gillnets or other appropriate recapture methods for juveniles and set lines for adults and will not consist of actively tracking fish. Frequency (every 3, 4, or 5 years) of implementation of long-term index monitoring activities (after year 12) will be determined by the Aquatic SWG.

4.3.3.1 Progress Towards Objectives 2 and 4 - Phase II Supplementation and Monitoring Program

Phase II goals will be addressed following the completion of Phase I in 2022.
4.4 Evaluation and Implementation of Adult Passage Measures (Objective 5)

In Year Eleven of the new license and every 10 years thereafter for the duration of the new license unless otherwise determined by the Aquatic SWG, the Aquatic SWG shall evaluate the biological merit to providing upstream passage for adult white sturgeon. The assessment of biological merit shall be determined by: (i) evaluating information gathered from monitoring and evaluation activities and determining whether there is significant biological benefit and need for upstream passage; (ii) the availability of reasonable and appropriate means to provide upstream passage; and (iii) consensus from all other operators of the mid-Columbia projects to implement adult upstream passage measures\(^1\). If all three criteria above are met, Douglas PUD, in consultation with the Aquatic SWG shall develop adult passage measures that are consistent with measures being implemented by other mid-Columbia project operators.

4.4.1 Progress Towards Objective 5 - Phase II Evaluation and Implementation of Adult Passage Measures

Phase two goals, including longer term indexing and evaluating the feasibility and biological merit of adult passage measures will be addressed one year after the completion of Phase I (2023).

4.5 Educational Opportunities Coinciding with WSMP Activities (Objective 6)

Douglas PUD, in consultation with the Aquatic SWG, shall identify appropriate WSMP activities as opportunities for education to local public entities such as schools, cities, fishing and recreation groups, and other interested local groups. WSMP activities that may be appropriate for public participation are hatchery tours, release of hatchery juveniles, and tagging of juveniles prior to release.

4.5.1 Progress Towards Objective 6 – Educational Opportunities Coinciding with WSMP Activities

Education opportunities will be discussed with the Aquatic SWG in 2013 and 2014. Potential opportunities include inviting elementary school children to attend a Wells Hatchery tour and to participate in the juvenile sturgeon release events in years 2014-2017. In addition, during the development of the new visitor center at Wells Dam, White sturgeon educational material will be provided consistent with requirements of the WSMP.

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\(^1\) The intent is to provide connectivity to the Hanford Reach white sturgeon population.
4.6 Reporting

Douglas PUD will provide a draft annual report to the Aquatic SWG summarizing the previous year’s activities undertaken in accordance with the WSMP. The report will document all white sturgeon activities conducted within the Project. Furthermore, any decisions, statements of agreement, evaluations, or changes made pursuant to this WSMP will be included in the annual report. If significant activity was not conducted in a given year, Douglas PUD will prepare a memorandum providing an explanation of the circumstances in lieu of the annual report.

4.6.1 Progress Towards Meeting Annual Reporting Requirements

Consistent with the reporting requirements in Article 406 of the FERC License for the Wells Project, the 401 Certification, and the Aquatic Settlement Agreement WSMP, the WSMP Annual Report will be updated annually in consultation with the Aquatic SWG. Each year the WSMP Annual Report will be provided to the Aquatic SWG for review and then filed with the FERC on or prior to May 31st. The report will include a summary of the annual progress made towards the implantation of the WSMP and focus on the previous year’s developments.
4.7 Implementation Schedule

Table 4.7-1 outlines the estimated long-term schedule of the activities described in Sections 4.1-4.4 of the WSMP.

Table 4.7-1 Project White Sturgeon Implementation Schedule

<table>
<thead>
<tr>
<th>New License Year</th>
<th>Broodstock Plan and Collection(^1)</th>
<th>Release Fish into Wells Reservoir(^2)</th>
<th>Index Monitoring(^3)</th>
<th>Tracking Marked Fish(^4)</th>
<th>Natural Production Assessment(^5)</th>
<th>Adult Passage Evaluation</th>
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<td>TBD</td>
<td>TBD</td>
<td>Every ten years after Year 11</td>
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</table>

\(^1\)Douglas PUD broodstock plan shall be completed within one year following this issuance of the new license. Broodstock collection activities will occur at a minimum in years 1-4 during the new license term. Additional years, during Phase I, will be determined by the Aquatic SWG. In Year 11 (Phase II), level and frequency of activity will be determined by the Aquatic SWG and will be based upon the level of long-term supplementation identified from monitoring results.

\(^2\)No more than a total of 35,000 fish will be stocked in Phase I (Years 1-10). The Phase II supplementation program will be determined by the Aquatic SWG and consistent with the goal of the WSMP.

\(^3\)Results of the index monitoring activities will be used to determine the scope of future supplementation activities. Index monitoring activities from year 12 through the remainder of the new license term will occur at a frequency of 3-5 years as determined by the Aquatic SWG.

\(^4\)Active-tagged juvenile and adult sturgeon will be tracked to assess emigration, habitat use, and potential spawning locations. This activity will occur in years 3, 4, and 5. Two additional years will be determined by the Aquatic SWG but will likely be consistent with years in which index monitoring activities are implemented.

\(^5\)Tracking of reproductively viable adult sturgeon in combination with deployment of egg collection mats to identify natural production in the Wells Reservoir during 5 separate years over the term of the new license based on flow conditions or other data as determined by the Aquatic SWG.

\(^6\)Phase II activities will consist only of broodstock plan and collection, stocking activities, index monitoring, and potentially natural reproduction assessments for the remainder of the new license.

\(^7\)Adult Passage Evaluations will occur in Year 11 and every 10 years thereafter for the term of the new license.
5.0 REFERENCES


2012 ANNUAL REPORT
BULL TROUT MANAGEMENT PLAN
WELLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 2149

April 2013

Prepared by:
Public Utility District No. 1 of Douglas County
East Wenatchee, Washington
EXECUTIVE SUMMARY

The Bull Trout Management Plan (BTMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP), will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification (401 Certification) for the Wells Hydroelectric Project (Project).

The goal of the BTMP is to identify, monitor, and address impacts, if any, on bull trout (*Salvelinus confluentus*) resulting from the Project in a manner consistent with the United States Fish and Wildlife Service (USFWS) Bull Trout Recovery Plan and the terms of the Section 7 Incidental Take Statement (ITS). This BTMP is intended to continue the implementation of management activities to protect bull trout during the new license term in a manner consistent with the original Wells Bull Trout Monitoring and Management Plan (WBTMMP) (Douglas 2004). The 2004 WBTMMP was developed in coordination with the USFWS, as required by the USFWS Bull Trout Section 7 Biological Opinion (BO) in association with the Federal Energy Regulatory Commission’s (FERC) approval of the HCP. The PMEs presented within the BTMP are designed to meet the following objectives:

Objective 1: Operate the upstream fishways and downstream bypass systems in a manner consistent with the HCP. In 2012 Public Utility District No. 1 of Douglas County (Douglas PUD) maintained safe, efficient and timely passage through the downstream juvenile fish bypass system and upstream adult fishway passage structures for bull trout and conducted video monitoring of the Wells Dam fishway viewing windows during fish passage season. Douglas PUD continued to operate the juvenile fish bypass system at Wells Dam in accordance with criteria outlined in the Wells HCP.

Objective 2: Identify any adverse Project-related impacts on adult and sub-adult bull trout passage. Douglas PUD will implement the year 5 Passage Evaluation Study in 2017 or earlier if the 5-year average adult bull trout count of 60 fish increases more than two times (120 or more bull trout counted in a single year). No significant changes in the operation of the fish ladders or hydrocombine have been implemented or are proposed that would trigger the implementation of bull trout passage evaluation. During 2012 Douglas PUD in consultation with the Aquatic Settlement Work Group (Aquatic SWG) developed a study plan to assess incidental take of bull trout at the Twisp River Weir broodstock collection facility. After discussions with the Aquatic SWG and specifically with the USFWS, the parties including the USFWS signatories agreed that Douglas PUD should postpone the Off-Project Passage Evaluation until year five (2017) of the new license when the Bull Trout Passage and Enumeration Study is scheduled to take place at Wells Dam. During 2012, one sub-adult bull trout was collected during winter maintenance related fish salvage activities in one of the adult fishways. No new sub-adult related monitoring activities were implemented or are proposed; fewer than 10 sub-adult bull trout have been observed at Wells in a single calendar year.
Objective 3: Implement reasonable and appropriate options to modify upstream fishway, downstream bypass, or operations if adverse impacts on bull trout are identified and evaluate the effectiveness of these measures. No new adverse impacts to bull trout were identified in 2012.

Objective 4: Periodically monitor for bull trout entrapment or stranding during low Wells Reservoir elevations. Stranding surveys were not conducted in 2012 since reservoir elevation did not fall below 773’ Mean Sea Level (MSL).

Objective 5: Participate in the development and implementation of the USFWS Bull Trout Recovery Plan including information exchange and genetic analysis. Should bull trout be delisted, the Aquatic SWG will re-evaluate the needs and objectives of the BTMP. Genetic samples were collected for all of the bull trout captured at the Twisp Weir in 2012. Samples will be analyzed if requested by the Aquatic SWG. Genetic samples will be taken at Wells Dam in year ten of the new license.

Objective 6: Identify any adverse impacts of Project-related hatchery operations on adult and sub-adult bull trout. In 2012, the number of bull trout encountered during hatchery operation activities was comparable to previous years. Hatchery actions in 2012 were very similar to other years where broodstock are collected at Wells Dam and the Twisp Weir traps.

This BTMP is intended to be compatible with other bull trout management plans and the Upper Columbia Salmon Recovery Plan (UCSRP) in the Columbia River mainstem. Furthermore, this management plan is intended to be not inconsistent with other management strategies of federal, state and tribal natural resource management agencies and supportive of designated uses for aquatic life under WAC 173-201A, the Washington state water quality standards.

The BTMP will be updated in 2013 to reflect additional requirements that have been added by the final 401 Certification, the 2012 Endangered Species Act Section 7 consultation for bull trout associated with the relicensing of the Wells Project and the new project license issued by the FERC. Implementation of all bull trout related measures implemented during the first full year of the FERC license will be reported within the 2013 BTMP Annual Report.
1.0 INTRODUCTION

The Bull Trout Management Plan (BTMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification (401 Certification) for the Wells Hydroelectric Project (Project).

To ensure active stakeholder participation and support, the Public Utility District No. 1 of Douglas County (Douglas PUD) developed all of the resource management plans in close coordination with agency and tribal natural resource managers (Aquatic Settlement Work Group or Aquatic SWG). During the development of this plan, the Aquatic SWG focused on developing management priorities for resources potentially impacted by Project operations. Entities invited to participate in the Aquatic SWG include the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Washington Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), and Douglas PUD.

The BTMP will direct implementation of measures to mitigate project impacts, if any, on bull trout (*Salvelinus confluentus*). To ensure active stakeholder participation and support, Douglas PUD developed this plan, along with the other aquatic management plans, in close coordination with the members of the Aquatic SWG.

The Aquatic SWG agrees on the need to develop a plan to direct the long-term management of bull trout in the Project. This management plan summarizes the relevant resource issues and background (Section 2), identifies goals and objectives of the plan (Section 3), and defines the relevant PMEs (Section 4) for bull trout during the term of the new license.

Additionally, this management plan is intended to continue implementation activities aimed at protecting bull trout in a manner consistent with measures specified in the original Wells Bull Trout Monitoring and Management Plan (WBTMMP) (Douglas 2004). The 2004 WBTMMP was developed in consultation with the USFWS, as required by the USFWS Bull Trout Biological Opinion (BO) in association with the implementation of the HCP.

In addition to the requirements found within the BTMP, the Endangered Species Act (ESA) Section 7 consultation for the relicensing of the Wells Project and the new Federal Energy Regulatory Commission (FERC) license has added several additional bull trout related requirements associated with the continued operation of the Wells Project. The 2013 annual report on the implementation of the BTMP will include all of the bull trout related activities that took place from the issuance of the new license in November 2012 to the end of December 2013 and will also include any bull trout related compliance reports or plans filed with the Aquatic SWG, USFWS and the FERC during calendar year 2013.
2.0 BACKGROUND

2.1 Bull Trout Biology

Bull trout are native to northwestern North America, historically occupying a large geographic range extending from California north into the Yukon and Northwest Territories of Canada, and east to western Montana and Alberta (Cavender 1978). They are generally found in interior drainages, but also occur on the Pacific Coast in Puget Sound and in the large drainages of British Columbia.

Bull trout currently occur in lakes, rivers and tributaries in Washington, Montana, Idaho, Oregon (including the Klamath River basin), Nevada, two Canadian Provinces (British Columbia and Alberta), and several cross-boundary drainages in extreme southeast Alaska. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta, and the McKenzie River system in Alberta and British Columbia (Cavender 1978; McPhail and Baxter 1996; Brewin and Brewin 1997). The remaining distribution of bull trout is highly fragmented.

Bull trout are a member of the char group within the family Salmonidae. Bull trout closely resemble Dolly Varden (Salvelinus malma), a related species. Genetic analyses indicate, however, that bull trout are more closely related to an Asian char (Salvelinus leucomaenis) than to Dolly Varden (Pleyte et al. 1992). Bull trout are sympatric with Dolly Varden over part of their range, most notably in British Columbia and the Coastal-Puget Sound region of Washington State.

Bull trout are believed to have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Growth, survival, and long-term persistence are dependent upon habitat characteristics such as clean, cold, connected, and complex instream habitat, a stable substrate with a low percentage of fine sediments, high channel stability, and stream/population connectivity (USFWS et al. 2000). Stream temperature and substrate type, in particular, are critical factors for the sustained long-term persistence of bull trout. Spawning is often associated with the coldest, cleanest, and most complex stream reaches within basins. However, bull trout may exhibit a patchy distribution, even in pristine habitats, and should not be expected to occupy all available habitats at the same time (Rieman and McIntyre 1995; Rieman et al. 1997).

Bull trout exhibit four distinct life history types: resident, fluvial, adfluvial, and anadromous. The fluvial, adfluvial, and resident forms exist throughout the range of the bull trout (Rieman and McIntyre 1993). These forms spend their entire life in freshwater. The anadromous life history form is currently known only to occur in the Coastal-Puget Sound region within the coterminous United States (Volk 2000; Kraemer 1994; Mongillo 1993). Multiple life history types may be expressed in the same population, and this diversity of life history types is considered important to the stability and viability of bull trout populations (Rieman and McIntyre 1993).

The majority of growth and maturation for anadromous bull trout occurs in estuarine and marine waters, adfluvial bull trout in lakes or reservoirs, and fluvial bull trout in large river systems.
Resident bull trout populations are generally found in small headwater streams where fish remain their entire lives.

For migratory life history types, juveniles tend to rear in tributary streams for 1 to 4 years before migrating downstream into a larger river, lake, or estuary and/or nearshore marine area to mature (Rieman and McIntyre 1993). In some lake systems, age 0+ fish (less than 1 year old) may migrate directly to lakes (Riehle et al. 1997). Juvenile and adult bull trout in streams frequently inhabit side channels, stream margins and pools with suitable cover and areas with cold hyporheic zones or groundwater upwellings (Sexauer and James 1993; Baxter and Hauer 2000).

2.2 Species Status

On June 10, 1998, the USFWS listed bull trout within the Columbia River basin as threatened under the Endangered Species Act (ESA) (FR 63(111)). Later (November 1, 1999), the USFWS listed bull trout within the coterminous United States as threatened under the ESA (FR 64(210)). The USFWS identified habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, and grazing; blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment into diversion channels; and introduced non-native species as major factors affecting the distribution and abundance of bull trout. They noted that dams (and natural barriers) have isolated population segments resulting in a loss of genetic exchange among these segments (FR 63(111)). The USFWS believes many populations are now isolated and disjunct. In October 2002, the USFWS completed the first draft of a bull trout recovery plan intended to provide information and guidance that will lead to recovery of the species, including its habitat (USFWS 2002). Threatened bull trout population segments are widely distributed over a large area and because population segments were subject to listing at different times, the USFWS adopted a two-tiered approach to develop the draft recovery plan for bull trout (USFWS 2002). In November 2002, the USFWS published in the federal register a proposed rule for the designation of critical habitat for the Klamath River and Columbia River distinct population segments of bull trout (67 FR 71235). In October 2004 the USFWS published a final rule in the Federal Register designating critical habitat for the Klamath River and Columbia River populations of bull trout (69 FR 59995).

In April 2008, the USFWS completed the 5-year status review for Columbia River bull trout with two recommendations: maintain “threatened” status for the species, and determine if multiple distinct population segments exist within the Columbia River and merit protection under the ESA. The recommendations intend to facilitate analysis of project effects over more specific and biologically appropriate areas, ultimately allowing a greater focus of regulatory protection and recovery resources (USFWS 2008a). The review also identified specific issues that limit the overall ability to accurately and quantitatively evaluate the current status of bull trout. Seven recommendations were made to improve future evaluation and management decisions, all of which are largely based on improvement and standardization of monitoring and evaluation techniques, better delineation and agreement of core areas and Recovery Units, and multi-agency cooperation and management (USFWS 2008b).
The Wells Project is situated within the Upper Columbia River Recovery Unit and the USFWS has identified the Wenatchee, Entiat, and Methow Rivers as its core areas. A core area represents the closest approximation of a biologically functioning unit for bull trout. A core area functions as a metapopulation for bull trout. Not all core areas are equal and each has specific functions that are unique. For example, the Entiat Core Area depends heavily on the mainstem Columbia River to provide overwinter, migration, and forage habitats. The Wenatchee Core Area has populations using lake and riverine (both the Wenatchee and Columbia Rivers) habitat for overwintering, migration, and foraging. Within a core area, many local populations may exist. A local population is assumed to be the smallest group of fish that is known to represent an interacting reproductive unit. Nineteen local populations have been identified in the Wenatchee (7), Entiat (2) and Methow (10) core areas (USFWS 2002).

2.3 Project Bull Trout Studies

2.3.1 2001-2003 Project Bull Trout Study

Listed Columbia River bull trout have been observed and counted at Wells Dam since 1998. In 2000, due to the potential for operations at mid-Columbia dams to affect the movement and survival of bull trout, the USFWS requested that the three mid-Columbia PUDs (Douglas, Chelan, and Grant PUDs) evaluate the movement and status of bull trout in their respective project areas. At that time, little was known about the life-history characteristics (e.g., movements, distribution, habitat use, etc.) of bull trout in the mid-Columbia River. Therefore, in order to assess the operational effects of hydroelectric projects on bull trout within the mid-Columbia, a three PUD coordinated radio-telemetry study was implemented beginning in 2001. The goal of the study was to monitor the movements and migration patterns of adult bull trout in the mid-Columbia River using radio-telemetry (Figure 2.3-1). The number of trout to be collected and tagged at each dam (Rock Island, Rocky Reach, and Wells) was based on the proportion of fish that migrated past those dams in 2000.

From 2001-2003, bull trout were collected from the Wells, Rocky Reach, and Rock Island dams and radio-tagged. Multiple-telemetry techniques were used to assess the movement of tagged bull trout within the study area. At Wells Dam, a combination of aerial and underwater antennas was deployed. The primary purpose for this system was to document the presence of bull trout at the Project, identify passage times and determine their direction of travel (upstream/downstream). In addition to these systems, a number of telemetry systems were deployed to address specific questions posed by the USFWS and Douglas PUD. At Wells Dam, several additional systems were installed to identify tagged bull trout that could enter, ascend, and exit specific gates and fish ladders. All possible access points to the adult fish ladders and the exits were monitored individually in 2001, 2002, and 2003, allowing the route of passage to be determined as well as the ability to establish the exact time of entrance and exit from the ladder system. English et al. (1998; 2001) provides a detailed description of the telemetry systems at each of the dams and within the tributaries.
To assess bull trout movements into and out of the Wells Reservoir, fixed-telemetry monitoring sites were established at the mouth of the Methow and Okanogan rivers and periodic aerial surveys were conducted on the reservoir and throughout both watersheds (English et al. 1998, 2001). Key findings of the multi-year study are as follows:

- Total upstream fishway counts (May 1st to November 15th) at Wells Dam from 2000 to 2003 were 90, 107, 76, and 53 bull trout, respectively.
- Adult bull trout migrate upstream through Wells Dam from May through November. Peak movement occurs in May and June with 94, 95, 92, and 89 percent of adult bull trout being detected during these months at Wells Dam for years 2000-2003, respectively.
- Tagged migratory adult bull trout successfully move both upstream and downstream past the Project (radio-telemetry). From the 79 bull trout radio-tagged in 2001 and 2002 at Rock Island, Rocky Reach, and Wells, five bull trout passed downstream through Wells Dam with no documented mortality. Twelve downstream passage events occurred at Rocky Reach (4) and Rock Island (8) through turbines from 2001 to 2003. None of the 17 (5 Wells, 4 Rocky Reach and 8 Rock Island) observed downstream passage events resulted in observed mortality of bull trout.
- Between 2001 and 2003, a total of 10 (2 tagged at Rock Island, 4 Rocky Reach, 4 Wells), 11 (4 Wells, 5 Rocky Reach, 2 from 2001), and 1 (1 Wells) tagged bull trout were detected moving upstream of the Project, respectively.
- Median tailrace times (tailrace detection to ladder entrance detection) during the telemetry study at Wells in 2001-2003 were 1.53, 7.84, and 1.00 days, respectively. Median travel times (tailrace detection to ladder exit detection) during the telemetry study at Wells in 2001-2003 were 8.87, 7.60, and 1.16 days, respectively. Median ladder passage times (entrance detection to ladder exit detection) during the telemetry study at Wells in 2001-2003 were 5.70, 0.23, and 0.16 days, respectively.
- Adult bull trout migrating upstream of Wells Dam appear to be destined for the Methow River. Between 2001 and 2003, no bull trout selected the Okanogan system (one trout moved into the Okanogan, but left shortly thereafter and moved into the Methow system).
- Median travel time from Wells Dam (detection at ladder exit) to first detection in the Methow River in 2001-2003 was 0.40, 2.78, and 1.09 days, respectively.
- All tributary entrance events (fixed station detections) into the Methow River by bull trout (28 total events, 2001-2003) occurred before June 27. An additional two bull trout, not detected by the tributary fixed station systems, were detected in the Methow River via 2002 aerial surveys. Bull trout in the Methow system selected two primary areas, the mainstem Methow River and the Twisp River.
- To date, 30% (9/30) of bull trout that entered the Methow River have been detected leaving the system. Tributary exit dates were recorded for 78% (7/9) of these emigrating bull trout and 86% (6/7) of bull trout with a recorded exit date left the Methow River system between October and December.
- Bull trout migrating upstream through Wells Dam in 2001 were 5 year old (n=2, mean fork length=55.6cm) and 6 year old (n=6, mean fork length= 54.6cm) fish as determined by scales.
92% (11/12) and 53% (8/15) of tagged bull trout detected in the vicinity of Wells Dam entered the Wells Hatchery Outfall in 2001 and 2002, respectively. It is possible that the bull trout frequented the outfall in search of prey. Typical operation at the hatchery is to volitionally release yearling chinook smolts between April 15 and 30, and subyearling chinook smolts in early June. Given that bull trout feed opportunistically (Goetz 1989), it is likely that the tagged bull trout were taking advantage of the large concentration of juvenile salmonids within the hatchery outfall system.

2.3.2 2005-2008 Project Bull Trout Study

On December 10, 2003, the USFWS received a request from the FERC for formal consultation to determine whether the proposed incorporation of the HCP into the FERC license for operation of the Project was likely to jeopardize the continued existence of the Columbia River distinct population segment (DPS) of ESA-listed bull trout, or destroy or adversely modify proposed bull trout critical habitat. In response to the FERC request and based upon the results of the 2001-2003 study, which suggested that continued operations are not likely to jeopardize bull trout, the USFWS filed the BO and Incidental Take Statement (ITS) with FERC. On June 21, 2004, FERC issued an order incorporating the HCP and the terms and conditions of the ITS into the FERC license for the Project.
Figure 2.3-1 Study area for assessing migration patterns of bull trout in the mid-Columbia River (2001-2003). Fixed radio-telemetry sites monitored the movement of bull trout near Priest Rapids, Wanapum, Rock Island, Rocky Reach and Wells dams. Fixed sites placed in the Wenatchee, Entiat, Methow and Okanogan rivers monitored time of entry and exodus of bull trout in large tributaries of the mid-Columbia River.

In 2004, Douglas in consultation with the USFWS and as required under the HCP BO, developed the WBTMMP. The goal of the WBTMMP is to continue monitoring and evaluating bull trout in the Project to quantify and address, to the extent feasible, potential Project impacts on bull trout. Implementation of WBTMMP measures specifically include: (1) address ongoing Project impacts through the life of the existing operating license; (2) provide consistency with recovery actions as outlined in the USFWS bull trout recovery plan; and (3) monitor and minimize the extent of incidental take of bull trout, if any, consistent with Section 7 of the ESA. WBTMMP implementation started in 2005 and continued through the spring of 2008. Objectives of the plan include identifying Project impacts, if any, on upstream and downstream passage of adult and sub-adult bull trout through Wells Dam, investigating the potential for sub-adult entrapment or stranding in off-channel or backwater areas of Wells Reservoir, and identifying the Core Areas and Local Populations, as defined in the USFWS Bull Trout Recovery Plan, of bull trout that utilize the Project.
To address Project impacts, if any, on upstream and downstream passage of adult bull trout, Douglas PUD captured and radio-tagged 6, 10, and 10 adult bull trout at Wells Dam in 2005, 2006, and 2007, respectively (LGL and Douglas PUD, 2008). In 2005, all six fish traveled upstream into the Methow River and no downstream passage events were recorded. Travel time from release (after tagging) until entrance into the Methow River ranged from 7 hours to 12 days. In 2006, in addition to the 10 adult bull trout radio-tagged at Wells Dam, the USFWS radio-tagged 13 bull trout in the Methow River Core Area and Public Utility District No.1 of Chelan County (Chelan PUD) released 29 tagged bull trout from Rocky Reach and Rock Island dams. In total, 13 downstream passage events and 8 upstream passage events were recorded at Wells Dam in 2006. There were no observed instances of bull trout mortality resulting from these passage events. In 2007, 10 bull trout were tagged at Wells Dam, the USFWS tagged 5 bull trout in the Methow River Core Area, and Chelan PUD released 19 tagged bull trout from Rocky Reach and Rock Island dams. In total, 1 downstream passage event and 3 upstream passage events were recorded at Wells Dam in 2007. Similar to 2006, no instances of bull trout mortality were observed resulting from these passage events. From 2005 to 2008 (all radio-tagged fish combined), 25 downstream passage events and 52 upstream passage events by 40 individual bull trout were recorded at Wells Dam with no observances of bull trout injury or mortality (LGL and Douglas PUD, 2008). From 2005-2007, no adult or sub-adult bull trout were observed utilizing Wells Dam fishways during the winter monitoring period (typically November 16 to April 30). Monitoring of radio-tagged adult bull trout ended in June 2008.

To address potential project-related impacts on sub-adult bull trout, fish were opportunistically tagged with passive integrated transponder (PIT) tags when encountered during standard fish sampling operations at Wells Dam or during off-Project tributary smolt trapping activities. In 2005, 2006, 2007, and 2008 a total of 16, 20, 14, and 17 sub-adult bull trout were PIT-tagged during tributary smolt sampling activities, respectively. No sub-adult bull trout were observed during Wells Dam fish sampling operations or by the adult PIT-tag detection system in the fishways. Over the 2005-2008 period, no sub-adult bull trout were observed utilizing Wells Dam fishways during the winter period.

In 2005, Douglas PUD collected high resolution bathymetric information of Project waters to address the potential for entrapment or stranding of bull trout in off-channel or backwater areas of the Wells Reservoir. This data combined with Wells inflow patterns, reservoir elevations, and backwater curves would allow Douglas PUD to begin identifying entrapment or stranding areas. In 2006, a field survey of potential bull trout stranding sites using bathymetric and operations information was conducted during a period of low reservoir elevation associated with the Methow River flood control program. Following a complete survey of the project, no stranded bull trout (sub-adult or adult) were found during the 2006 low water event. In 2007, reservoir conditions were not sufficiently low to warranted further field investigations.

In support of identifying the local populations and core areas of bull trout utilizing the Project area, Douglas PUD funded the collection of genetic samples from 22, 20, and 24 bull trout in 2005, 2006 and 2007, respectively. In 2005, 6 samples were collected at Wells Dam and 16 were collected at off-Project operations (Methow and Twisp river screw traps). In 2006, 10 samples were collected at Wells Dam and 10 samples were collected at off-Project operations. In 2007, 10 samples were collected at Wells Dam and 14 samples were collected at off-Project operations. All genetic samples were provided to the USFWS.
3.0 GOALS AND OBJECTIVES

The goal of the BTMP is to identify, monitor and address impacts, if any, on bull trout resulting from the Project in a manner consistent with the USFWS Bull Trout Recovery Plan and the terms of the Section 7 ITS (See Section 4.7). This BTMP is intended to continue the implementation of management activities to protect bull trout during the new license term in a manner consistent with the original WBTMMP (Douglas 2004). The 2004 WBTMMP was developed in coordination with the USFWS, as required by the USFWS Bull Trout BO in association with the HCP. The PMEs presented within the BTMP are designed to meet the following objectives:

Objective 1: Operate the upstream fishways and downstream bypass systems in a manner consistent with the HCP;

Objective 2: Identify any adverse Project-related impacts on adult and sub-adult bull trout passage;

Objective 3: Implement reasonable and appropriate options to modify upstream fishway, downstream bypass, or operations if adverse impacts on bull trout are identified and evaluate effectiveness of these measures;

Objective 4: Periodically monitor for bull trout entrapment or stranding during low Wells Reservoir elevations (similar to WBTMMP);

Objective 5: Participate in the development and implementation of the USFWS Bull Trout Recovery Plan, including information exchange and genetic analysis. Should bull trout be delisted, the Aquatic SWG will re-evaluate the needs and objectives of the BTMP;

Objective 6: Identify any adverse impacts of Project-related hatchery operations on adult and sub-adult bull trout.

This BTMP is intended to be compatible with other bull trout management plans and the Upper Columbia Salmon Recovery Plan (UCSRP) in the Columbia River mainstem. Furthermore, this management plan is intended to be not inconsistent with other management strategies of federal, state and tribal natural resource management agencies and supportive of designated uses for aquatic life under WAC 173-201A, the Washington state water quality standards.

The schedule for implementation of specific measures within the BTMP is based on the best information available at the time the Plan was developed. As new information becomes available, implementation of each activity may be adjusted through consultation with the Aquatic SWG.
4.0 PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

In order to fulfill the goals and objectives described in Section 3.0 of the BTMP, Douglas PUD, in consultation with the Aquatic SWG, has initiated the implementation of the following measures.

4.1 Operate the Upstream Fishways and Downstream Bypass Systems in a Manner Consistent with the HCP (Objective 1)

4.1.1 Provide Upstream and Downstream Passage for Adult and Sub-Adult Bull Trout

Douglas PUD will continue to provide upstream passage for adult bull trout through the existing upstream fishways and downstream passage of adult and sub-adult bull trout through the existing downstream bypass system. Both upstream fishway facilities (located on the west and east shores) are operational year around with maintenance occurring on each fishway at different times during the winter to ensure that one upstream fishway is always operational. Maintenance activities on Wells fishways occur during the winter when bull trout have not been observed passing Wells Dam. Operation of the downstream passage facilities for bull trout will be consistent with bypass operations for Plan Species identified in the HCP. Currently the bypass system is operated from April 12 through August 26 of each year. This operating period is consistent with the period of high bull trout and anadromous fish presence at the Project.

4.1.1.1 Progress Towards Meeting Objective 1 in 2012- Provide Upstream and Downstream Passage for Adult and Sub-Adult Bull Trout

Consistent with the BTMP and the Wells HCP, Douglas PUD maintained safe, efficient and timely passage through the downstream juvenile fish bypass system and upstream adult fishway passage structures for bull trout. Winter maintenance occurred in the adult fishway structures in January 2012 and December 2012. At least one of the adult fishways was in operation at all times during the winter maintenance period (December – February) and both adult fishways were in operation for the remainder of the year (March – November). Juvenile Fish Bypass operations were implemented consistent with the HCP Coordinating Committee approved Bypass Operations Plan for 2012. The dates of operation included initiation on April 9th at 000 hours with the bypass system operated continuously until midnight on August 19th. The 2012 dates of operation for the juvenile fish bypass system were developed in consultation with the Wells HCP Coordinating Committee and are the result of species run-timing estimates developed by the University of Washington, Columbia Basin Research that were reviewed, approved and adopted by the HCP Coordinating Committee and implemented by Douglas PUD prior to the beginning of the 2012 bypass season.
4.1.2 **Upstream Fishway Counts**

Douglas PUD shall continue to conduct video monitoring in the Wells Dam fishways from May 1st through November 15th to count and provide information on the population size of upstream moving bull trout.

4.1.2.1 **Progress Towards Meeting Objective 1 in 2012- Upstream Fishway Counts**

Seventy four bull trout were counted at Wells Dam fish ladder viewing windows in 2012. Counts at Wells represent a 14% increase in the 12 year average count of 65. Eighty nine percent (89%) of the passage occurred during the months of May and June, which is consistent with the 12 year average of eighty eight percent (88%) of bull trout passage occurring during these months. Bull trout passing Wells Dam in May and June are primarily destined to spawn in the Methow Basin and in particular the upper reaches of the Twisp River. Only three of the 74 bull trout counted at Wells Dam passed the project after July 26th.

4.1.3 **Upstream Fishway Operations Criteria**

Douglas PUD shall continue to operate the upstream fishway at Wells Dam in accordance with criteria outlined in the HCP.

4.1.3.1 **Progress Towards Meeting Objective 1 in 2012- Upstream Fishway Operations Criteria**

Consistent with the BTMP and the Wells HCP, Douglas PUD continued to operate the two upstream fishways at Wells Dam in accordance with upstream fishway criteria found in the HCP and as approved by the Wells HCP Coordinating Committee.

4.1.4 **Bypass Operations Criteria**

Douglas PUD shall continue to operate the bypass system at Wells Dam in accordance with criteria outlined in the HCP.

4.1.4.1 **Progress Towards Meeting Objective 1 in 2012- Bypass Operations Criteria**

Consistent with the BTMP and the HCP, Douglas PUD continued to operate the juvenile fish bypass system at Wells Dam in accordance with criteria outlined in the Wells HCP and as approved by the HCP Coordinating Committee.

4.2 **Identify Any Adverse Project-related Impacts on Adult and Sub-adult Bull Trout Passage (Objective 2)**

4.2.1 **Adult Bull Trout Upstream and Downstream Passage Evaluation**

Douglas PUD shall continue to monitor upstream and downstream passage and incidental take of adult bull trout through Wells Dam and in the Wells Reservoir through the implementation of a radio-telemetry study. Specifically, in years 5 and 10 of the new license, and continuing every
ten years thereafter during the new license term, Douglas PUD will conduct a one-year monitoring program to determine whether Douglas PUD remains in compliance with the ITS. The same study protocols used during past radio-telemetry assessments at Wells Dam (LGL and Douglas PUD 2007) will be employed for these monitoring studies.

If the adult bull trout counts at Wells Dam increases more than two times the existing 5-year average or if there is a significant change in the operation of the fish ladders or hydrocombine, then the Aquatic SWG will determine whether additional years of take monitoring are needed beyond those identified in this section of the BTMP. If the authorized incidental take level is exceeded during any one-year period, Douglas PUD will conduct another monitoring study in the succeeding year. If the authorized incidental take level is exceeded in this second year, Douglas PUD will develop a plan, in consultation with the Aquatic SWG, to address the identified factors contributing to exceedance of the allowable level of incidental take.

4.2.1.1 Progress Towards Meeting Objective 2 in 2012- Adult Bull Trout Upstream and Downstream Passage Evaluation

Douglas PUD will implement the year 5 Passage Evaluation Study in 2017 or earlier if the 5-year average adult bull trout count of 60 fish increases more than two times (120 or more bull trout counted in a single year). At the time that the Aquatic Settlement Agreement was signed the five year average count of bull trout at Wells Dam was 60 fish. In 2012 the number of observed fish was 74.

No significant changes in the operation of the fish ladders or hydrocombine have been implemented or are proposed that would trigger the early implementation of bull trout passage evaluation.

4.2.2 Adult Bull Trout Passage Evaluation at Off-Project Collection Facilities

Douglas PUD shall assess upstream and downstream passage and incidental take of adult, migratory bull trout at off-Project (outside of the Project boundary) adult salmon and steelhead broodstock collection facilities associated with the Wells HCP. Specifically, beginning in year one of the new license, Douglas PUD will conduct a one-year radio-telemetry study to assess passage and incidental take at off-Project adult collection facilities (i.e., Twisp weir). Douglas PUD will capture and tag up to 10 adult, migratory bull trout (>400mm) at adult collection facilities and use fixed receiver stations upstream and downstream of collection facilities to examine upstream and downstream passage characteristics and incidental take. Study protocols that have been used during past radio-telemetry assessments at Wells Dam (LGL and Douglas PUD 2008) will be employed for this assessment.

If negative impacts to passage associated with Off-Project collection facilities are observed or the authorized incidental take level is exceeded during any one-year period, Douglas PUD will conduct another monitoring study in the succeeding year. If negative impacts to passage continue to be observed or the authorized incidental take level is exceeded in this second year, Douglas PUD will develop a plan, in consultation with the Aquatic SWG, to address the identified factors contributing to passage impacts or the exceedance of the allowable level of incidental take.
After year one of the new license, the implementation of this sub-objective will be integrated into the one-year telemetry monitoring program that is to be conducted every ten years (beginning in year 10 of the new license) at Wells Dam as identified in Section 4.2.1. In year 10 of the new license and every 10 years thereafter, bull trout will be captured and tagged only at Wells Dam (Section 4.2.1) since data show that bull trout passing Wells Dam are migrating back into the Methow River watershed (LGL and Douglas PUD 2008). Through the continued deployment of fixed station monitoring at off-Project adult salmon and steelhead broodstock collection facilities, these tagged bull trout will continue to provide passage and take information in support of this sub-objective throughout the term of the new license.

4.2.2.1 Progress Towards Meeting Objective 2 in 2012- Adult Bull Trout Passage Evaluation at Off-Project Collection Facilities

During 2012 Douglas PUD in consultation with the Aquatic SWG developed a study plan to assess incidental take of bull trout at the Twisp River Weir broodstock collection facility. After discussions with the Aquatic SWG and specifically with the USFWS, the parties including the USFWS signatories agreed that Douglas PUD should postpone the Off-Project Passage Evaluation until year five (2017) of the new license when the Bull Trout Passage and Enumeration Study is scheduled to take place at Wells Dam. Combining the studies would provide a more comprehensive study and potentially require less study fish than two independent studies, thereby limiting the overall impact or take associated with these studies on the bull trout population in the Methow Basin. In 2013 Douglas PUD and the Aquatic SWG will submit a letter to the FERC recommending that the Bull Trout Off-Project Collection Facility Passage Evaluation be delayed until 2017.

4.2.3 Sub-Adult Bull Trout Monitoring

While an objective of the BTMP is to identify potential Project impacts on upstream and downstream passage of sub-adult bull trout, Aquatic SWG members (including the USFWS) agree that it is not feasible to assess sub-adult passage because sub-adult bull trout have not been observed at Wells Dam. During the previous six years of bull trout data collection at Wells Dam (BioAnalyst Inc. 2004; LGL and Douglas PUD 2008), sub-adult bull trout have not been documented passing Wells Dam (based upon fishway video counts and bull trout trapping for radio-telemetry). However, it is expected that through the increased monitoring associated with the implementation of the BTMP that there may be additional encounters with sub-adult bull trout. If at any time during the new license term, sub-adult bull trout are observed passing Wells Dam in significant numbers (>10 per calendar year), the Aquatic SWG will recommend reasonable and appropriate methods for monitoring sub-adult bull trout. Specifically, Douglas PUD may modify counting activities, continue to provide PIT tags and equipment, and facilitate training to enable fish sampling entities to PIT tag sub-adult bull trout when these fish are collected incidentally during certain fish sampling operations. This activity will occur the following year of first observation of sub-adult bull trout (>10 per calendar year) and subsequently as recommended by the Aquatic SWG.

4.2.3.1 Progress Towards Meeting Objective 2 in 2012- Sub-Adult Bull Trout Monitoring
On November 10\textsuperscript{th}, 2012, one sub-adult bull trout was observed at Wells Dam during window counts. The sub-adult bull trout collected from the ladder was estimated to be 12 inches or 305 mm. This is the first ever observation of a sub-adult bull trout at Wells Dam. No new sub-adult related monitoring activities were implemented or are proposed; fewer than 10 sub-adult bull trout have been observed at Wells in a single calendar year.

4.3 Implement Reasonable and Appropriate Measures to Modify the Upstream Fishway and Downstream Bypass if Adverse Impacts on Bull Trout are Identified (Objective 3)

Douglas PUD shall continue to operate the upstream fishway and downstream bypass at Wells Dam in accordance with the HCP. However, if upstream or downstream passage problems for bull trout are identified (as agreed to by the USFWS and Douglas PUD), Douglas PUD will identify and implement, in consultation with the Aquatic SWG and HCP Coordinating Committee, reasonable and appropriate options to modify the upstream fishway, downstream bypass, or operations to reduce the identified impacts to bull trout passage.

4.3.1 Progress Towards Meeting Objective 3 in 2012- Implement Reasonable and Appropriate Measures to Modify the Upstream Fishway and Downstream Bypass if Adverse Impacts on Bull Trout are Identified

No new adverse impacts to bull trout were identified in 2012. As a result, Douglas PUD is not proposing to implement any new upstream fishway or downstream bypass measures to reduce new impacts to bull trout.

4.4 Investigate Entrapment or Stranding of Bull Trout during Periods of Low Reservoir Elevation (Objective 4)

During the implementation of the WBTMMP from 2004-2008, Douglas PUD, through the use of high resolution bathymetric information, hydraulic and elevation data, and backwater curves, identified potential bull trout entrapment and stranding areas in the Wells Reservoir. Although no stranded bull trout were observed in these areas during the implementation of the WBTMMP, Douglas PUD will continue to investigate potential entrapment or stranding areas for bull trout through periodic monitoring when periods of low reservoir elevation expose identified sites. During the first five years of the new license, Douglas PUD will implement up to five bull trout entrapment/stranding assessments during periods of low reservoir elevation (below 773’ MSL). If no incidences of bull trout stranding are observed during the first five years of study, additional assessment will take place every fifth year during the remainder of the license term, unless waived by the Aquatic SWG. If bull trout entrapment and stranding result in take in exceedance of the authorized incidental take level, then reasonable and appropriate measures will be implemented by Douglas PUD, in consultation with the Aquatic SWG, to address the impact.

4.4.1 Progress Towards Meeting Objective 4 in 2012- Implement Reasonable and Appropriate Measures to Modify the Upstream Fishway and Downstream Bypass if Adverse Impacts on Bull Trout are Identified
Stranding surveys were not conducted in 2012 since reservoir elevation did not fall below 773’ MSL. Article 402 of the new FERC license requires Douglas PUD, in consultation with the Aquatic SWG and NMFS, to develop and file for approval by the FERC, a Bull Trout Stranding Survey Plan. This plan is required to be filed with the FERC by the end of October 2013.

4.5 **Participate in the Development and Implementation of the USFWS Bull Trout Recovery Plan (Objective 5)**

4.5.1 **Monitoring Other Aquatic Resource Management Plan Activities and Predator Control Program for Incidental Capture and Take of Bull Trout**

Douglas PUD will monitor activities associated with the implementation of other Aquatic Resource Management Plans (white sturgeon, Pacific lamprey, resident fish, aquatic nuisance species, and water quality) and Predator Control Program that may result in the incidental capture and take of bull trout. If the incidental take of bull trout is exceeded due to the implementation of other Aquatic Resource Management Plan activities, then Douglas PUD will develop a plan, in consultation with the Aquatic SWG, to address the identified factors contributing to the exceedance of the allowable level of incidental take. If the incidental take of bull trout is exceeded due to the implementation of the Predator Control Program, then Douglas PUD will develop a plan, in consultation with the HCP Coordinating Committee and the Aquatic SWG, to address the identified factors contributing to the exceedance of the allowable level of incidental take.

4.5.1.1 **Progress Towards Meeting Objective 5 in 2012 - Monitoring Other Aquatic Resource Management Plan Activities and Predator Control Program for Incidental Capture and Take of Bull Trout**

Two activities had the potential to encounter bull trout in 2012, the subyearling life history study and pikeminnow removal. The subyearling life history study is an HCP study focused on the life history and behavior of juvenile Chinook salmon in the Upper Columbia River and principally within the Wells Project. Juvenile subyearling Chinook are collected with beach seines in June and July of 2012 within the Wells Project. Although many non-target taxa were collected, no bull trout were encountered.

The HCP required predator control program, principally Douglas PUD’s pikeminnow control program, did not encounter any bull trout in 2012. The pikeminnow control program uses setlines to capture pikeminnow in deep water areas of the Wells Project, over the programs existence (more than fifteen years) no bull trout have been encountered.

4.5.2 **Funding Collection of Tissue Samples and Genetic Analysis**

Beginning in year 10 of the new license, and continuing every 10 years thereafter for the term of the new license, Douglas PUD will, if recommended by the Aquatic SWG, collect up to 10 adult bull trout tissue samples in the Wells Dam fishway facilities over a period of one year and fund their genetic analysis. Genetic tissue collection will take place concurrent with the implementation of the bull trout radio-telemetry monitoring study. Samples will be submitted to the USFWS Central Washington Field Office in Wenatchee, Washington. Any sub-adult bull
trout collected during these activities will also be incorporated into the bull trout genetic analysis.

Beginning in year one of the new license, Douglas PUD will collect up to 10 adult bull trout tissue samples from the Twisp River broodstock collection facility over a period of one year and will fund their genetic analysis. Genetic tissue collection will take place concurrent with the implementation of the Off-Project bull trout radio-telemetry monitoring study.

4.5.2.1 Progress Towards Meeting Objective 5 in 2012 - Funding Collection of Tissue Samples and Genetic Analysis

Genetic samples were collected for all of the bull trout captured at the Twisp Weir in 2012. Samples will be analyzed if requested by the Aquatic SWG. Genetic samples will be taken at Wells Dam in year ten of the new license.

4.5.3 Information Exchange and Regional Monitoring Efforts

Douglas PUD will continue to participate in information exchanges with other entities conducting bull trout research and regional efforts to explore availability of new monitoring methods and coordination of radio-tag frequencies for bull trout monitoring studies in the Project.

Douglas PUD will make available an informational and educational display at the Wells Dam Visitor Center to promote the conservation and recovery of bull trout in the Upper Columbia River and associated tributary streams.

4.5.3.1 Progress Towards Meeting Objective 5 in 2012 - Information Exchange and Regional Monitoring Efforts

Douglas PUD participated in bull trout recovery planning meetings held by the USFWS in 2012. These meetings focused on recovery planning and genetic assignment development in the Methow, Entiat and Wenatchee river basins. In addition, information was shared with regional partners via PTAGIS, a regional PIT tag database. All PIT tag data was made publicly available through this website.

4.6 Identify Any Adverse Impacts of Project-related Hatchery Operations on Adult and Sub-adult Bull Trout (Objective 6)

4.6.1 Bull Trout Monitoring During Hatchery Activities

During the term of the new license, Douglas PUD shall monitor hatchery actions (e.g., salmon trapping, sturgeon brood stocking and capture activities) that may encounter adult and sub-adult bull trout for incidental capture and take. Actions to be monitored shall be associated with the Wells Hatchery, the Methow Hatchery, and any future facilities directly funded by Douglas PUD.
If the incidental take of bull trout is exceeded due to Douglas PUD’s hatchery actions then Douglas PUD will develop a plan, in consultation with the Aquatic SWG, to address the identified factors contributing to the exceedance of the allowable level of incidental take.

### 4.6.1.1 Progress Towards Meeting Objective 6 in 2012 - Bull Trout Monitoring During Hatchery Activities

In 2012, the number of bull trout encountered during hatchery operation activities was comparable to previous years. Hatchery actions in 2012 were very similar to other years where broodstock are collected at Wells Dam and the Twisp Weir traps. In addition, the Twisp Weir is used to control the ratio of natural origin and hatchery steelhead and spring Chinook spawning in the upper reaches of the Twisp River. Screw traps used during HCP related smolt monitoring and evaluation activities in the Methow River Basin often encounter juvenile bull trout. All of these trapping activities are conducted by Douglas PUD’s lead hatchery contractor the Washington State Department of Fish and Wildlife.

During trapping activities in 2012, sixty-nine and two adult bull trout were incidentally captured at the Twisp Weir and at Wells Dam, respectively. All of these bull trout were given a PIT tag if they did not carry an existing tag. All captured fish were released in good condition, with no lethal take observed. Captured bull trout at both facilities are within allowable take limits. Seventeen sub-adult bull trout were captured at the Twisp River screw trap and none were encountered at the Methow River screw trap at McFarland (Carlton, WA). All bull trout captured at the Twisp screw trap were given PIT tags and released in good condition. No lethal take was observed. Take limits at screw trap facilities operated by Douglas PUD and its contractors were within allowable limits in 2012.

Article 402 of the FERC license for the Wells Project requires Douglas PUD to develop, in consultation with the Aquatic SWG and the NMFS, a study plan to monitor incidental take associated with the implementation of activities at the Wells Hatchery. Douglas PUD is planning to file this study plan with the FERC for approval by the end of October 2013.

### 4.7 USFWS Section 7 Consultation

The PMEs contained within the BTMP were specifically developed, in consultation with the USFWS, to address potential Reasonable and Prudent Measures (RPMs) for the Project relicensing and associated section 7 consultation. All of the USFWS’s potential RPMs for the Wells Project can be found in Appendix A. Each of these RPMs has been cross referenced with the specific supporting objective and PME (Sections 4.1 - 4.6) found within the BTMP. The purpose of Appendix A is to provide consistency with Douglas PUD’s Aquatic Settlement Agreement and the USFWS’ subsequent section 7 consultation on the relicensing of the Wells Project.

#### 4.7.1.1 Progress Towards Meeting Objective 5 in 2012 - USFWS Section 7 Consultation

On March 16th 2012, the USFWS issued a bull trout BO related to the relicensing of the Wells Project. The BO contained various RPMs and the terms and conditions (T&Cs). These RPM’s and T&Cs can be found within Appendix E of the FERC license for the Wells Project and they...
are entirely consistent and cross referenced with the measures found in the BTMP, and more specifically with the measures reported within this report (2012 BTMP annual report).

4.8 Reporting

Douglas PUD will provide a draft annual report to the Aquatic SWG summarizing the previous year’s activities undertaken in accordance with the BTMP. The report will document all bull trout activities conducted within the Project and describe activities proposed for the following year. Furthermore, any decisions, statements of agreement, evaluations, or changes made pursuant to this BTMP will be included in the annual report. If significant activity was not conducted in a given year, Douglas PUD will prepare a memorandum providing an explanation of the circumstances in lieu of the annual report.

4.8.1.1 Progress Towards Meeting Annual Reporting Requirements

In addition to the reporting requirements found within the Aquatic Settlement Agreement requiring the submission of annual reports for all six of the management plans including the BTMP, Article 406 of the FERC license for the Wells Project also requires Douglas PUD to submit annual reports detailing the implementation of each of the six Aquatic Settlement Agreement management plans.

In addition to the bull trout reporting requirements above, one addition bull trout reporting requirement can be found in the bull trout BO (Appendix E of the FERC license). The bull trout BO requires Douglas PUD to submit an annual take report to the Central Regional Office of the USFWS on or before April 15th of each year of the new license.

Because the measures required by the BO are entirely consistent with the measures found in the Aquatic Settlement Agreement’s BTMP and because the reporting requirements for the BTMP, bull trout BO and Article 406 are consistent, the 2012 BTMP Annual Report (this report) will be used to satisfy all three of the bull trout annual reporting requirements.
5.0 REFERENCES


Kraemer, C. 1994. Some observations on the life history and behavior of the native char, Dolly Varden (Salvelinus malma) and bull trout (Salvelinus confluentus) of the North Puget Sound Region. Washington Department of Wildlife. Draft.


APPENDIX A

CROSS REFERENCED UNITED STATES FISH AND WILDLIFE SERVICE (USFWS) REASONABLE AND PRUDENT MEASURES (RPMS) WITH WELLS BULL TROUT MANAGEMENT PLAN (BTMP) OBJECTIVES AND SUPPORTING PROTECTION, MITIGATION AND ENHANCEMENT MEASURES (PMES)
**FWS RPM 1:** FERC shall require Douglas PUD, in coordination with the Service, to provide adequate year-round passage conditions for all life history stages of bull trout at all Project facilities.

**Associated BTMP Objectives and PMEs:**

Objective 1: Operate the upstream fishways and downstream bypass systems in a manner consistent with the HCP (Section 4.1).

- PME: Provide Upstream and downstream Passages for Adult and Sub-Adult Bull Trout (Section 4.1.1).
- PME: Upstream Fishway Counts (Section 4.1.2).
- PME: Upstream Fishway Operations Criteria (Section 4.1.3).
- PME: Bypass Operations Criteria (Section 4.1.4).

Objective 2: Identify any adverse Project-related impacts on adult and sub-adult bull trout passage (Section 4.2).

- PME: Adult Bull Trout Upstream and Downstream Passage Evaluation (Section 4.2.1).
- PME: Adult Bull Trout Passage Evaluation at Off-Project Collection Facilities (Section 4.2.2).
- PME: Sub-Adult Bull Trout Monitoring (Section 4.2.3).

Objective 3: Implement reasonable and appropriate options to modify upstream fishway, downstream bypass, or operations if adverse impacts on bull trout are identified and evaluate effectiveness of these measures.
**FWS RPM 2.** FERC shall require Douglas PUD, in coordination with the Service, to minimize
the effect of spillway operations and hydrographic variation to all life history stages of bull trout
at all Project facilities.

**Associated BTMP Objectives and PMEs:**

Objective 1: Operate the upstream fishways and downstream bypass systems in a manner
consistent with the HCP (Section 4.1).

- PME: Provide Upstream and downstream Passages for Adult and Sub-Adult Bull Trout
  (Section 4.1.1).
- PME: Upstream Fishway Operations Criteria (Section 4.1.3).
- PME: Bypass Operations Criteria (Section 4.1.4).

Objective 3: Implement reasonable and appropriate options to modify upstream fishway,
downstream bypass, or operations if adverse impacts on bull trout are identified and evaluate
effectiveness of these measures (Section 4.3).

Objective 4: Periodically monitor for bull trout entrapment or stranding during low Wells
Reservoir elevations (Section 4.4).

**FWS RPM 3.** FERC shall require Douglas PUD, in coordination with the Service, to minimize
the effects of the Hatchery Supplementation Program to all life stages of bull trout.

**Associated BTMP Objectives and PMEs:**

Objective 2: Identify any adverse Project-related impacts on adult and sub-adult bull trout
passage (Section 4.2).

- PME: Adult Bull Trout Passage Evaluation at Off-Project Collection Facilities (Section
  4.2.2).

Objective 6: Identify any adverse impacts of Project-related hatchery operations on adult and
sub-adult bull trout.

- PME: Bull Trout Monitoring During Hatchery Activities (Section 4.6.1).
**FWS RPM 4.** FERC shall require Douglas PUD, in coordination with the Service, to minimize the effects of the other Aquatic Resource Management Plans and Predator Control Program to all life stages of bull trout.

**Associated BTMP Objectives and PMEs:**

Objective 5: Participate in the development and implementation of the USFWS Bull Trout Recovery Plan, including information exchange and genetic analysis (Section 4.5).

  PME: Monitor other Aquatic Resource Management Plan Activities and Predator Control Program for Incidental Capture and Take of Bull Trout (Section 4.5.1).

**FWS RPM 5.** FERC shall require Douglas PUD, in coordination with the Service, to design and implement a bull trout monitoring program that will adequately detect and quantify Project impacts. This information will reduce uncertainty regarding Project impacts over the life of the project and shall be used to modify Project operations to the extent practicable to further minimize the manner or extent of take.

**Associated BTMP Objectives and PMEs:**

Refer to Wells Bull Trout Management Plan in its entirety.

**Additional PMEs Proposed in the BTMP (not listed above):**

  PME: Funding Collection of Tissue Samples and Genetic Analysis (Section 4.5.2).
  PME: Information Exchange and Regional Monitoring Efforts (section 4.5.3).
EXECUTIVE SUMMARY

The Pacific Lamprey Management Plan (PLMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification (401 Certification) for the Wells Hydroelectric Project (Project).

The goal of the PLMP is to implement measures to monitor and address impacts, if any, on Pacific lamprey (*Lampetra tridentata*) resulting from the Project during the term of the new license. Public Utility District No. 1 of Douglas County (Douglas PUD), in collaboration with the Aquatic Settlement Work Group (Aquatic SWG), has agreed to implement several Pacific lamprey PMEs in support of the PLMP. This report summarizes actions carried out in 2012 that are associated with the PMEs presented within the ANSMP which are designed to meet the following objectives:

Objective 1: Identify and address any adverse Project-related impacts on passage of adult Pacific lamprey. In 2012, Douglas PUD carried out several activities associated with PMEs under objective 1 of the PLMP. Douglas PUD maintained safe, efficient and timely passage through the upstream adult fishway passage structures for all native fish species including Pacific lamprey and monitored fish passage 24 hours a day during fish passage season. The Wells Dam adult fishway collection galleries were operated at a reduced head differential each night during the peak of lamprey migration to enhance lamprey passage. During the fish ladder maintenance period in 2012, Douglas PUD implemented the practices and procedures in the Adult Ladder Dewatering Plan to minimize the presence of lamprey and other fish and to safely place any stranded fish back into the Columbia River. Douglas PUD also developed an adult Pacific lamprey passage study in 2012 that is scheduled for completion in 2013.

Objective 2: Identify and address any Project-related impacts on downstream passage and survival and rearing of juvenile Pacific lamprey. In 2012, to improve downstream passage and survival of juvenile fish, Douglas PUD operated the downstream bypass system at Wells Dam from April 9th to August 19th. During dewatering of the Wells Dam fishways for maintenance in 2012, Douglas PUD conducted salvage operations to salvage and release any stranded juvenile lamprey.

Objective 3: Participate in the development of regional Pacific lamprey conservation activities. In 2012, Douglas PUD representatives attended and participated in regional coordination and information exchange related to Pacific lamprey.

The PLMP is intended to be compatible with other Pacific lamprey management plans in the Columbia River mainstem. Furthermore, the PLMP is intended to be supportive of the HCP, the critical research needs identified by the Columbia River Basin Technical Working Group, the Resident Fish Management Plan, Bull Trout Management Plan, and White Sturgeon Management Plan by continuing to monitor and address ongoing impacts, if any, on Pacific lamprey resulting from Project operations. The PLMP is intended to be not inconsistent with
other management strategies of federal, state and tribal natural resource management agencies and supportive of designated uses for aquatic life under Washington state water quality standards found at WAC 173-201A.

In addition to the requirements found within the PLMP, the new FERC license for the Wells Project added several additional lamprey passage measures. The 2013 annual report on the implementation of the PLMP will include all of the lamprey related activities implemented at the Wells Project from the issuance of the new license in November 2012 to the end of December 2013 and will also include any Pacific lamprey-related reports filed with the Aquatic SWG and the Federal Energy Regulatory Commission during calendar year 2013.
1.0 INTRODUCTION

The Pacific Lamprey Management Plan (PLMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP), will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification (401 Certification) for the Wells Hydroelectric Project (Project).

To ensure active stakeholder participation and support, the Public Utility District No. 1 of Douglas County (Douglas PUD) developed all of the resource management plans in close coordination with agency and tribal natural resource managers (Aquatic Settlement Work Group or Aquatic SWG). During the development of this plan, the Aquatic SWG focused on developing management priorities for resources potentially impacted by Project operations. Entities invited to participate in the Aquatic SWG include the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Washington Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), and Douglas PUD.

The PLMP will direct implementation of measures to protect against and mitigate for potential Project impacts on Pacific lamprey (Lampetra tridentata). To ensure active stakeholder involvement and support, Douglas PUD developed this plan, along with the other aquatic management plans, in close coordination with the members of the Aquatic SWG.

The Aquatic SWG agrees on the need to develop a plan for the long-term management of Pacific lamprey in the Project. This management plan summarizes the relevant resource issues and background (Section 2), identifies the goal and objectives of the plan (Section 3), and describes the relevant PMEs (Section 4) for Pacific lamprey during the term of the new license.

In addition to the requirements found within the PLMP, the new Federal Energy Regulatory Commission (FERC) license has added several additional lamprey related requirements associated with the continued operation of the Wells Project. The 2013 annual report on the implementation of the PLMP will include all of the Pacific lamprey related activities that took place from the issuance of the new license in November 2012 to the end of December 2013 and will also include any lamprey related reports and plans filed with the Aquatic SWG and the FERC during calendar year 2013.
2.0 BACKGROUND

2.1 Pacific Lamprey Biology

Pacific lamprey are present in most tributaries of the Columbia River and in the mainstem Columbia River during their migration stages. They have cultural, utilitarian and ecological significance in the basin, because Native Americans have historically harvested them for subsistence, ceremonial and medicinal purposes (Close et al. 2002). As an anadromous species, they also play an important role in the food web by contributing marine-derived nutrients to the basin and may act as a predatory buffer for juvenile salmon and steelhead. Little specific information is available on the life history or status of lamprey in the mid-Columbia River watersheds. They are known to occur in the Methow, Wenatchee and Entiat rivers (NMFS 2002) and recently have been captured during juvenile salmon and steelhead trapping operations in the Okanogan River.

In general, adults are parasitic on fish in the Pacific Ocean while ammocoetes (larvae) are filter feeders that inhabit the fine silt deposits in backwaters and quiet eddies of streams (Wydoski and Whitney 2003). Adults generally spawn in low-gradient stream reaches in the tail areas of pools and in riffles, over gravel substrates (Jackson et al. 1997). Adults die after spawning. After hatching, the ammocoetes burrow into soft substrate for an extended larval period filtering particulate matter from the water column (Meeuwig et al. 2002). The ammocoetes undergo a metamorphosis into macropthalmia (outmigrating juvenile lamprey) between 3 and 7 years after hatching, and then migrate from their parent streams to the ocean (Close et al. 2002). Adults typically spend 1-4 years in the ocean before returning to freshwater tributaries to spawn.

Pacific lamprey populations of the Columbia River have generally declined in abundance over the last 40 years according to counts at dams on the lower Columbia and Snake rivers (Close et al. 2002). Starke and Dalen (1995) reported that adult lamprey counts at Bonneville Dam regularly exceeded 100,000 fish in the 1960s and more recently have ranged between 20,000 and 120,000 for the period 2000-2004 (DART - www.cqs.washington.edu/dart/adult.html).

In the mid-Columbia River Basin, adult lamprey count data at hydroelectric projects varies by site but is generally available for all projects since 1998 (with the exception of Wanapum Dam where data is only available for 2007). As is expected, the general trend for mid-Columbia River counts is relatively consistent with observations at Bonneville Dam from year to year (i.e., relatively high count years at Bonneville result in relatively high count years in the mid-Columbia River). It is important to note that the daily and seasonal time periods as well as the counting protocols may differ at each project. These differences may affect data reliability and need to be considered when examining and comparing these data. Table 2.1-1 provides a summary of adult lamprey passage data for mid-Columbia River hydroelectric facilities.
Table 2.1-1. Minimum, maximum, and average counts for adult Pacific lamprey at mid-Columbia River hydroelectric projects from 1998 to 2007.

<table>
<thead>
<tr>
<th></th>
<th>Priest Rapids</th>
<th>Wanapum*</th>
<th>Rock Island</th>
<th>Rocky Reach</th>
<th>Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>1,130</td>
<td>4,771</td>
<td>559</td>
<td>303</td>
<td>21</td>
</tr>
<tr>
<td>Max</td>
<td>6,593</td>
<td>4,771</td>
<td>5,074</td>
<td>2,583</td>
<td>1,417</td>
</tr>
<tr>
<td>Average</td>
<td>3,016</td>
<td>4,771</td>
<td>2,157</td>
<td>952</td>
<td>326</td>
</tr>
</tbody>
</table>

*Wanapum Dam counts are only available for 2007.

Close et al. (1995, 2002) identified several factors that may account for the decline in lamprey counts in the Columbia River Basin. This includes reduction in suitable spawning and rearing habitat from flow regulation and channelization and pollution, reductions of prey in the ocean, and juvenile and adult passage problems at dams. Mesa et al. (2003) found that adult Pacific lamprey had a mean critical swimming speed of approximately 85 cm/s which suggests that they may have difficulty negotiating fishways with high current velocities that were designed for salmon and steelhead passage.

The study of adult Pacific lamprey migration patterns past dams and through reservoirs in the lower Columbia River has provided the first data sets on lamprey passage timing, travel times, and passage success at hydroelectric projects (Vella et al. 2001; Ocker et al. 2001; Moser et al. 2002a; Moser et al. 2002b). These studies have shown that approximately 90% of the radio-tagged lamprey released downstream of Bonneville Dam migrated back to the tailrace below Bonneville Dam; however, less than 50% of the lamprey which encountered a fishway entrance actually passed through the ladder exit at the dam (Nass et al. 2005).

Similar collection and passage efficiency results were observed at Rocky Reach, Wanapum, and Priest Rapids dams during tagging studies conducted at those projects (Nass et al. 2003; Stevenson et al. 2005).

Of the 125 radio-tagged lampreys released approximately 7 kilometers downstream of Rocky Reach Dam, 93.6% were detected at the project, and of those fish, 94.0% entered the fishway. Of the fish that entered the Rocky Reach fishway, 55.5% exited the ladder (Stevenson et al. 2005).

During studies at Wanapum and Priest Rapids dams, a total of 51 and 74 lamprey were radio-tagged and released downstream of Priest Rapid Dam in 2001 and 2002, respectively. Over the two years of study, the proportion of fish that approached the fishway that exited the ladders was 30% and 70% at Priest Rapids and 100% and 51% at Wanapum Dam in 2001 and 2002, respectively (Nass et al. 2003).

Two recent reviews of Pacific lamprey (Hillman and Miller 2000; Golder Associates Ltd. 2003) in the mid-Columbia River have indicated that little specific information is available regarding their population status (Stevenson et al. 2005).
2.2 Status of Pacific Lamprey

In January 2003, the USFWS received a petition from 11 environmental groups seeking the listing of four lamprey species (Pacific lamprey, river lamprey, western brook lamprey, and Kern brook lamprey). The petition cited population declines and said lamprey are threatened by artificial barriers to upstream and downstream migration, de-watering and habitat degradation among other threats. In response to the petition, the USFWS conducted an initial review to determine whether an emergency listing was warranted and decided in March 2003 that such a situation did not exist.

In an agreement stemming from a lawsuit filed by the petitioners in response to the initial finding, the USFWS committed to the issuance of a 90-day finding on the petition by December 20, 2004. Again, the USFWS announced that the petition seeking a listing of the four lamprey species did not contain enough information to warrant further review and the agency was not going to place the lamprey species on the Endangered Species list. For Pacific lamprey, the petitioners provided information showing a drop in range and numbers, but did not provide information describing how the regional portion of the species’ petitioned range, or any smaller portion, is appropriate for listing under the Endangered Species Act (ESA). The agency did however decide it will continue to work with others on efforts to gather information related to the conservation of lamprey and their habitats.

2.3 Monitoring and Studies of Outmigrating Juvenile Lamprey (Macrophthalmia)

Little information in the mid-Columbia River Basin exists with regard to the outmigration timing and abundance of juvenile Pacific lamprey. Upstream of the Project, recent juvenile salmonid trapping operations by WDFW and the Colville Tribe have provided preliminary information on the presence of juvenile lamprey outmigrants in both the Methow and Okanogan rivers. This information represents incidental captures of juvenile lamprey, and may not be reflective of actual abundance or population trends. In the Okanogan River, information is available for 2006 and 2007 where 220 and 24 juvenile lamprey were observed, respectively, during spring trapping operations. In the Methow River watershed, information is available for two sites; the Twisp and Methow rivers. At the Twisp River site, no juvenile lamprey have been observed since data has been collected (2005). At the Methow River site, for the years 2004-2007, 89, 84, 831, and 37 juvenile lamprey were observed, respectively, in trapping operations that typically last from April to November with peaks generally occurring in the spring. Data collection from these activities is likely to continue and provide information on juvenile Pacific lamprey as they begin their outmigration through the Columbia River hydrosystem towards the Pacific Ocean.

Although there is a growing body of information on adult Pacific lamprey and their interactions at hydroelectric projects, relatively little information exists describing the effects of hydroelectric plant operations on macrophthalmia. Recent juvenile lamprey studies at hydroelectric projects have addressed testing for lamprey macrophthalmia survival through juvenile bypass facilities (Bleich and Moursund 2006), impingement at intake diversion screens (Moursund et al. 2000 and 2003), validation of existing screening criteria (Ostrand 2005), and responses of juvenile Pacific lamprey to simulated turbine passage environments (Moursund et al. 2001; INL 2006).
Results of other studies targeting predaceous birds and fish suggest that juvenile lamprey may compose a significant proportion of the diets of these predators (Poe et al. 1991; Merrell 1959).

A review of the recent body of work addressing juvenile lamprey at hydroelectric facilities concludes that there is a current lack of methods and tools to effectively quantify the level of survival for juvenile lamprey migrating through hydroelectric facilities. Furthermore, no studies exist that assign a level of survival attributed to a project’s operations. This is due to the lack of miniaturized active tag technologies to overcome two study limitations. Macrophthalmia are relatively small in size and unique in body shape and they tend to migrate low in the water column resulting in the rapid attenuation of active tag signal strength. In an effort to develop a tagging protocol, the Bonneville Power Administration (BPA) funded Oregon State University (OSU) to identify and develop tag technologies for lamprey macrophthalmia. Recent reports on this developmental effort have concluded that the smallest currently available radio-tag was still too large for implantation in the body cavity of a juvenile lamprey (Schreck et al. 2000). Additionally, external application was not effective as animals removed tags within the first week and fish performance was affected. This report also concluded that internal implantation of Passive Integrated Transponder (PIT) tags was the most viable option for tagging juvenile lamprey although this method included severe limitations such as the limited range of detection systems and the ability to tag only the largest outmigrating juvenile lamprey (Schreck et al. 2000).

2.4 Project Adult Pacific Lamprey Counts and Passage Timing

Returning adult Pacific lamprey have been counted at Wells Dam since 1998. Between the years of 1998 and 2007, the number of lamprey passing Wells Dam annually has averaged 326 fish and ranged from 21 fish in 2006 to 1,417 fish in 2003 (Table 2.4-1). In addition to the overriding condition that Pacific lamprey numbers are declining in the Columbia River system, the relatively small number of adult lamprey observed at Wells Dam may be attributed to fact that the Project is the last of nine passable dams on the mainstem Columbia River and the fact that the Project is over 500 miles upstream from the Pacific Ocean and the bioenergetic expenditure for a relatively poor swimming species such as Pacific lamprey is likely great.

Adult lamprey pass Wells Dam from early July until late November with peak passage times between mid-August and late October (Figures 2.4-1 and 2.4-2). In all years since counting was initiated, Pacific lamprey counts at the east fish ladder were greater than at the west fish ladder except for 2007. It is important to note that historically, counting protocols were designed to assess adult salmonids and did not necessarily conform to lamprey migration behavior (Moser and Close 2003). Traditional counting times for salmon did not coincide with lamprey passage activity which occurs primarily at night; the erratic swimming behavior of adult lamprey also makes them inherently difficult to count (Moser and Close 2003). Beamish (1980) also noted that lamprey overwinter in freshwater for one year prior to spawning. Consequently, lamprey counted in one year may actually have entered the system in the previous year (Moser and Close 2003) which confounds annual returns back into the Columbia River Basin. In addition to salmonid-specific counting protocols, adult fishway facilities have been constructed specifically for passage of salmonids. Recent research has identified areas such as picketed lead structures downstream of fish count windows that adult lamprey may access to bypass count stations and
avoid being enumerated (LGL 2008). It is unknown to what degree lamprey behavior and methodological and structural concerns are reflected in Columbia River lamprey passage data. However, it is important to consider such caveats when examining historic lamprey count data at Columbia River dams including Wells Dam.

Table 2.4-1  Adult Pacific lamprey counts at Wells Dam for east and west fish ladders, 1998-2007.

<table>
<thead>
<tr>
<th>Year</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
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</thead>
<tbody>
<tr>
<td>East</td>
<td>174</td>
<td>47</td>
<td>96</td>
<td>153</td>
<td>226</td>
<td>724</td>
<td>263</td>
<td>151</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>West</td>
<td>169</td>
<td>26</td>
<td>59</td>
<td>106</td>
<td>117</td>
<td>694</td>
<td>140</td>
<td>64</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>343</td>
<td>73</td>
<td>155</td>
<td>259</td>
<td>343</td>
<td>1418</td>
<td>403</td>
<td>215</td>
<td>21</td>
<td>35</td>
</tr>
</tbody>
</table>

Figure 2.4-1  Daily counts of adult Pacific lamprey at Wells Dam during the fish counting season, 1998-2002.
Figure 2.4-2  Daily counts of adult Pacific lamprey at Wells Dam during the fish counting season, 2003-2007.

2.5  Project Pacific Lamprey Studies

Until recently, relatively little information was available on Pacific lamprey in the mid-Columbia River Basin. However, with increased interest in the species coupled with a petition for listing under the ESA (Section 2.2), Douglas PUD has initiated studies to address Pacific lamprey passage and migratory behavior in the Project consistent with currently available technology.

2.5.1  2001-2003 Project Pacific Lamprey Study

In 2004, Douglas PUD contracted with LGL Limited to conduct a lamprey radio-telemetry study at Wells Dam in coordination with Chelan PUD, which was conducting a similar study at Rocky Reach Dam. A total of 150 lamprey were radio-tagged and released at or below Rocky Reach Dam. The radio tags used in this study had an expected operational life of 45 days (Nass et al. 2005). It is important to note that as a result of the lamprey release site being located over 50 miles downstream of Wells Dam, the value of the study results for the Project was limited by the relatively small numbers of tagged fish detected upstream at Wells (n=18) and the fact that many of the radio tags detected at Wells Dam were within days of exceeding their expected battery life.

The 2004 study at Wells Dam was implemented through a combination of fixed-station monitoring at the dam and fixed-stations at tributary mouths. Collectively, these monitoring sites were used to determine migration and passage characteristics of lamprey entering the
Project Area. Of the 150 adult lamprey released at or below Rocky Reach in 2004, 18 (12% of 150) were detected in the Wells Dam tailrace, and ten (56% of 18) of these were observed at an entrance to the fishways at Wells Dam. A total of 3 radio-tagged lamprey passed Wells Dam prior to expiration of the tags, resulting in a Fishway Efficiency estimate of 30% (3 of 10) for the study period. A single lamprey was detected upstream of Wells Dam at the mouth of the Methow River (Nass et al. 2005).

For lamprey that passed the dam, the majority (92%) of Project passage time was spent in the tailrace. Median time required to pass through the fishway was 0.3 d and accounted for 8% of the Project passage time (Nass et al. 2005).

Although the 2004 study at Wells Dam provided preliminary passage and behavioral information for migrating adult lamprey, the limited observations due to the small sample size (n=18) were insufficient in addressing the objectives of the 2004 study.

2.5.2 2007-2008 Project Pacific Lamprey Study

In 2007, Douglas PUD contracted with LGL Limited to conduct a second lamprey radio-telemetry study at Wells Dam. The study was scheduled to occur from early August through November and utilized tags that had 87 days of battery life. A total of 21 adult lamprey were tagged and released for the purpose of this study. However, due to very low adult lamprey returns to Wells Dam in 2007 (n=35) and low trapping efficiency, only 6 adult Pacific lamprey were captured at Wells Dam during trapping activities (August 14 to October 3). Therefore, 15 additional adult lamprey were collected at Rocky Reach Dam, transported to Wells Dam, tagged and released. The project was continued in 2008 to obtain additional information.

A comprehensive report was produced in February of 2009 containing the results from the two-year radio-telemetry behavior studies (Robichaud et al. 2009). Results indicated that the “greatest impediment to successful passage of adult lamprey at Wells Dam appears to be the conditions at the fishway entrance, probably related to water velocities that limit swimming and attachment capabilities.” An equally significant impediment to successful passage of adult lamprey at Wells Dam in 2008 was the installation of perforated plates on the floor of the weir orifices in an effort to increase trapping efficiency. Robichaud et al. further recommended the following:

- Implement a reduction in fishway head differential to reduce entrance velocities to levels within the swimming capabilities of Pacific lamprey (0.8 to 2.1 m/s). These proposed flow reductions should be restricted to hours of peak lamprey activity (i.e., nighttime) and within their primary migratory period at Wells Dam (August-September).
- Remove perforated plates from orifice floors at the current trapping locations and discontinue trapping efforts at Wells Dam.
- Consider using monitoring tools that are less intrusive, do not require the collection of fish from the ladders at Wells Dam, and minimize the surgical implantation of tags in fish that are nearing their physiological limits.
2.5.3  2009-2010 Pacific Lamprey Ladder Modification Study

In response to Robichaud et al. (2009), Douglas PUD, in consultation with the Aquatic Settlement Work Group (Aquatic SWG), prepared a plan to implement and evaluate measures to enhance entrance efficiency of adult Pacific lamprey at Wells Dam (Johnson et al. 2011). These measures, originally scheduled for year two after license issuance (2013), were designed to determine whether temporary velocity reductions at the fishway entrances would enhance the attraction and relative entrance success of adult lamprey at Wells Dam.

DIDSON units were deployed at Wells Dam fishway entrances during the peak of historic Pacific lamprey migration in 2009 (20 August to 24 September) and 2010 (7 August to 30 September). DIDSON was used to sample lamprey behavior and upstream passage events along the entire width of the fishway entrances and 1.3 m of vertical coverage above the sills (about 26% of the wetted vertical opening). Lamprey passage was examined relative to variable head differential treatments and entrance velocities. In 2009, three head differential treatments were tested: existing high (0.48 m; or 3.0 m/sec), moderate (0.31 m; or 2.4 m/sec) and low condition (0.15 m; or 1.8 m/sec) (Johnson et al. 2010). In 2010, only two of the 2009 treatments were used: existing high, and the moderate head differential conditions (Johnson et al. 2011). Treatments were grouped in 3-day blocks and lasted four hours each evening in 2009 (21:00 through 00:59). In 2010, the treatments were paired and lasted eight hours each evening (17:00 through 00:59). Data collected during the treatment periods were reviewed and all lamprey observations were described.

Combining both years, a total of seven lamprey observations were recorded where lamprey were observed to encounter the entrance sill heading upstream (N = 5 in 2009; and N = 2 in 2010). Five of these seven observations were in the east fishway and two were in the west fishway. Overall, five of the seven observations showed successful entry into the fishways (71%). During reduced head differential treatments, five observations were recorded with four of the five resulting in successful entry (80% efficiency). Three of three observations with the moderate head differential condition resulted in successful entry (100% entrance efficiency). During high head differential conditions, one of the two lamprey observed entered a fishway (50% entrance efficiency).

Four lamprey exhibited attach and burst behaviors (one during low (25%), two during moderate (50%) and one during high head differential conditions (25%)), all of which resulted in successful entry into the fishways. One of three lampreys that did not exhibit the former behavior successfully entered the fishway, under the moderate treatment condition. The other two lamprey that did not exhibit attach and burst behavior did not successfully enter the fishway.

Extremely low Columbia River basin lamprey runs in 2009 and 2010 resulted in few fish observed at Wells Dam (the ninth and last hydroelectric project on the Columbia River [river mile 516] with fish passage). Low sample sizes precluded statistical evaluation of these results. Nonetheless, operational modifications implemented in these two years of study suggest that lamprey entrance efficiency may be increased with lower head conditions. Pooling observations that occurred during reduced head differential treatments shows 80% (4 of 5) entrance efficiency compared to 50% (1 of 2) under the current operating condition (high condition). Study results
suggest that reduced head differentials show promise in providing an environment conducive to upstream passage of lamprey.

2.5.4 2011-2012 Lamprey Operations

As a best management practice in 2011 and 2012 Douglas PUD operated the fishways with a 1.0 ft head differential during the hours 17:00 and 00:59, once five lamprey had been counted at Rocky Reach Dam and continuing through September 30. Beyond those hours, fishway collection-gallery operations should be maintained at the “normal” head differential of 1.5 feet.

3.0 GOALS AND OBJECTIVES

The goal of the PLMP is to implement measures to monitor and address impacts, if any, on Pacific lamprey resulting from the Project during the term of the new license. Douglas PUD, in collaboration with the Aquatic SWG, has agreed to implement several Pacific lamprey PMEs in support of the PLMP. The PMEs presented within the PLMP are designed to meet the following objectives:

Objective 1: Identify and address any adverse Project-related impacts on passage of adult Pacific lamprey;

Objective 2: Identify and address any Project-related impacts on downstream passage and survival, and rearing of juvenile Pacific lamprey;

Objective 3: Participate in the development of regional Pacific lamprey conservation activities.

The PLMP is intended to be compatible with other Pacific lamprey management plans in the Columbia River mainstem. Furthermore, the PLMP is intended to be supportive of the HCP, the critical research needs identified by the Columbia River Basin Technical Working Group, the Resident Fish Management Plan, Bull Trout Management Plan, and White Sturgeon Management Plan by continuing to monitor and address ongoing impacts, if any, on Pacific lamprey resulting from Project operations. The PLMP is intended to be not inconsistent with other management strategies of federal, state and tribal natural resource management agencies and supportive of designated uses for aquatic life under Washington state water quality standards found at WAC 173-201A.

The schedule for implementation of specific measures within the PLMP is based on the best information available at the time the Plan was developed. As new information becomes available, implementation of each activity may be adjusted through consultation with the Aquatic SWG.

4.0 PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

Douglas PUD, in consultation with the Aquatic SWG, will implement PMEs for Pacific lamprey in the Project consistent with the goals and objectives identified in Section 3.0 of the PLMP. Douglas PUD, in consultation with the Aquatic Settlement Work Group and the HCP
Coordinating Committee has initiated the implementation of the following Pacific lamprey related measures.

4.1 Adult Pacific Lamprey Passage (Objective 1)

4.1.1 Upstream Fishway Operations Criteria

Douglas PUD shall operate the upstream fishways at Wells Dam in accordance with criteria outlined in the HCP. Based upon information collected from activities conducted in Sections 4.1.3 - 4.1.7, Douglas PUD, in consultation with the Aquatic SWG and the HCP Coordinating Committee, may evaluate various operational and structural modifications to the upstream fishways (e.g., reduction in fishway flows at night) for the benefit of Pacific lamprey passing upstream through Wells Dam during the new license term. If requested, the Aquatic SWG shall develop an Operations Study Plan (OS Plan) that specifically identifies all operational modifications to be evaluated, the proposed monitoring strategy, implementation timeline and criteria for success. The plan shall include a component to evaluate the effects of lamprey modifications on salmon. Upon completion of the evaluation, the Aquatic SWG, in consultation with the HCP Coordinating Committee, will determine whether the proposed modifications should be made permanent, removed, or modified.

4.1.1.1 Progress Towards Objective 1 in 2012 – Upstream Fishway Operations Criteria

Consistent with the PLMP and the Wells HCP, Douglas PUD maintained safe, efficient and timely passage through the upstream adult fishway passage structures for all native fish species including Pacific lamprey. The specific operating criteria for the adult fishways can be found in the Wells HCP. Per these requirements, at least one of the adult fishways was in operation at all times of the year including during the winter maintenance period (December – February) and with both adult fishways in operation for the remainder of the year (March – November).

Based on the results of previous studies, the Aquatic SWG and HCP Coordinating Committee once again approved the temporary operation of the adult fishway collection galleries at a 1.0-foot head differential each night during the peak of the 2012 lamprey migration. The normal operating head differential is 1.5 feet. This temporary fishway operating criteria was approved and employed as a best management practice with the intent to enhance lamprey fishway-entrance efficiency until a conclusive study can be conducted that identifies the best collection gallery operating criteria that is consistent for all species including salmon, steelhead, bull trout and lamprey.

Operation of the fishway collection at reduced head differential nightly, from 17:00 to 00:59, commenced August 6th 2012, following the cumulative passage of 5 lamprey at Rocky Reach Dam and ended September 30th 2012. Similar temporary fishway operating criteria will be adopted in 2013 in support of a large scale lamprey radio telemetry study focused on identifying the best collection gallery operating criteria to enhance Pacific lamprey entrance efficiency.

4.1.2 Salvage Activities During Ladder Maintenance Dewatering
Douglas PUD shall continue to implement the Adult Fish Passage Plan and associated Adult Ladder Dewatering Plan as required by the HCP. These plans include practices and procedures utilized during fishway dewatering operations to minimize fish presence in the fish ladders and then once dewatered directs Douglas PUD staff to remove stranded fish and safely place them back into the Columbia River. All fish species, including Pacific lamprey that are encountered during dewatering operations are salvaged consistent with the protocol identified in the HCP. Any adult lamprey that are captured during salvage activities will be released upstream of Wells Dam, unless otherwise determined by the Aquatic SWG. Douglas PUD will coordinate salvage activities with the Aquatic SWG and allow for member participation. Douglas will provide a summary of salvage activities in the annual report.

4.1.2.1 Progress Toward Objective 1 in 2012 – Salvage Activities During Ladder Maintenance Dewatering

During the fish ladder maintenance period in 2012, Douglas PUD implemented the practices and procedures in the Adult Ladder Dewatering Plan to minimize the presence of lamprey and other fish and to safely place any stranded fish back into the Columbia River. During the 2012 salvage activities in both fishways no adult lamprey were encountered.

4.1.3 Upstream Fishway Counts and Alternative Passage Routes

Douglas PUD shall continue to conduct annual adult fish passage monitoring in the Wells Dam fishways using the most current technology available, to count and provide information on upstream migrating adult Pacific lamprey 24-hours per day during the adult fishway monitoring season (May 1- November 15). Based upon information collected from activities conducted in Sections 4.1.6 - 4.1.7, Douglas PUD, in consultation with the Aquatic SWG, may choose to address the use of alternative upstream passage routes around Wells Dam fishway counting stations by adult Pacific lamprey. Potential measures to improve counting accuracy, following consultation and approval of the Aquatic SWG, may include, but may not be limited to, the development of a correction factor based upon data collected during passage evaluations (Sections 4.1.6 and 4.1.7) or utilization of an alternative passage route as a counting facility for adult Pacific lamprey.

4.1.3.1 Progress Towards Objective 1 in 2012 – Upstream Fishway Counts and Alternative Passage Routes

During 2012, Douglas PUD monitored adult fish passage, including Pacific lamprey, 24-hours a day during the fishway monitoring season. Three adult lamprey were enumerated at Wells Dam in 2012 (one on August 28 and two on September 9).

In addition, Douglas PUD, in consultation with the Aquatic SWG, developed the 2013 Adult Pacific Lamprey Passage and Enumeration Study Plan. The study is designed to evaluate measures implemented to improve adult Pacific lamprey passage and enumeration, which include the installation of temporary modifications to the fish count station area to improve passage and counting efficiency and temporary changes in fishway operations to enhance lamprey passage at the collection gallery entrances. The results from the 2013 Adult Pacific Lamprey Passage and Enumeration Study will be used to evaluate the performance of these
temporary modifications to the fish count station and entrance operating criteria. Should these temporary changes be determined to enhance passage and count station efficiency, then these actions will be made permanent following approval from the Wells HCP Coordinating Committee, the Aquatic SWG, and the FERC.

4.1.4 Upstream Passage Improvement Literature Review

If additional passage improvement measures are deemed necessary by the Aquatic SWG, then within six months after this determination, Douglas PUD, in consultation with the Aquatic SWG, shall complete a literature review on the effectiveness of upstream passage measures (i.e., lamprey passage systems, plating over diffuser grating, modifications to orifices, rounding sharp edges, fishway operational changes, etc.) implemented at other Columbia and Snake rivers hydroelectric facilities. The literature review will be conducted in support of activities identified in Section 4.1.5 to help in the selection of reasonable measures that may be implemented to improve adult lamprey passage at Wells Dam.

4.1.4.1 Progress Towards Objective 1 in 2012 – Upstream Passage Improvement Literature Review

Following a fishway tour and a summary of the modifications underway in December 2012, the Aquatic SWG did not deem additional passage improvement measures necessary in 2012, therefore no upstream passage improvement literature review was conducted. The value of conducting a literature review will be discussed in the fall of 2013 following the completion of the 2013 Adult Pacific Lamprey Passage and Enumeration Study.

4.1.5 Fishway Modifications to Improve Upstream Passage

If additional passage improvement measures are deemed necessary by the Aquatic SWG, based upon the results of studies conducted at Wells Dam, then within one year or as soon as practicable following consultation with the Aquatic SWG, Douglas PUD shall identify, design and implement any reasonable upstream passage modifications (structural and/or operational). Passage measures will be designed to improve passage performance by providing safe, effective, and volitional passage for Pacific lamprey through the Wells Dam fishways without negatively impacting the passage performance of adult anadromous salmonids. The following components shall be included in these passage measures:

- Fishway Inspection: Within one year of license issuance or as soon as practicable following consultation with the Aquatic SWG, Douglas PUD shall conduct a fishway inspection with the Aquatic SWG and regional lamprey passage experts to identify and prioritize measures to improve adult lamprey passage and enumeration at Wells Dam. Additional ladder inspections will be conducted at the request of the Aquatic SWG, consistent with winter ladder dewatering operations.

- Entrance Efficiency: Within one year of license issuance or as soon as practicable following consultation with the Aquatic SWG, Douglas PUD shall develop a Lamprey Entrance Efficiency Plan (LEE Plan) for evaluating operational and physical ladder entrance modifications intended to create an environment at the fishway entrances that are conducive to adult lamprey passage without significantly impacting
the passage of adult salmonids. These improvements shall be evaluated until compliance, as described below, is attained.

- Diffuser Gratings: Within five years of license issuance or as soon as practicable following consultation with the Aquatic SWG, Douglas PUD shall identify and address, if needed, diffuser gratings within fishways at Wells Dam that adversely affect passage of adult Pacific lamprey.

- Transition Zones: Within five years of license issuance or as soon as practicable following consultation with the Aquatic SWG, Douglas PUD shall identify and address, if needed, transition zones within fishways at Wells Dam that adversely affect passage of adult Pacific lamprey.

- Ladder Traps and Exit Pools: Within five years of license issuance or as soon as practicable following consultation with the Aquatic SWG, Douglas PUD shall identify and address, if needed, lamprey ladder traps and exit pools within fishways at Wells Dam that adversely affect passage of adult Pacific lamprey.

Douglas PUD shall exhibit steady progress, as agreed to by the Aquatic SWG, towards improving adult lamprey passage until performance at Wells Dam is determined to be similar to other mid-Columbia River hydroelectric dams, or until scientifically rigorous standards and evaluation techniques are established by the Lamprey Technical Workgroup, or its successor, and adopted regionally. The Aquatic SWG will then evaluate, and if applicable and appropriate, adopt these standards for use at Wells Dam. If compliance is achieved, Douglas PUD shall only be required to implement activities pursuant to Section 4.1.7 (Periodic Monitoring) for adult Pacific lamprey passage.

4.1.5.1 Progress Towards Objective 1 in 2012 – Fishway Modifications to Improve Upstream Passage

In 2012, Douglas PUD, in consultation with the Aquatic SWG and Wells HCP Coordinating Committee, developed the Adult Pacific Passage and Enumeration Study Plan. The study, scheduled for the summer of 2013, is designed to evaluate the effects of structural and operational modifications to the Wells Dam fishways on adult Pacific lamprey entrance efficiency and enumeration. Results of the study will be used to evaluate the effectiveness of temporary count station features added to the ladders in 2012, prior to license issuance, temporary modifications to the fishway operating criteria was intended to improve upstream passage of lamprey.

During December 2012, the Aquatic SWG was invited to participate in a fishway tour at Wells Dam. Participating signatories included the USFWS and the WDFW. In 2013 Douglas PUD will again provide a fishway tour and inspection period for all members of the Aquatic SWG. In addition, Douglas PUD plans to develop an Entrance Efficiency Plan in 2013. Per the requirements in the PLMP and Article 401 of the FERC license, the Entrance Efficiency Plan will be developed in consultation with the Aquatic SWG and the HCP Coordinating Committee. It is also possible that these committees will propose postponing the development of the Entrance Efficiency Plan until the results from the Adult Pacific Lamprey Passage and Enumeration Study are available.

4.1.6 Adult Pacific Lamprey Upstream Passage Evaluation
Should upstream passage measures be implemented under Section 4.1.5, then within one year following the implementation of such measures, Douglas PUD, in consultation with the Aquatic SWG, shall conduct a one-year study to monitor the effectiveness of such measures on upstream passage performance of adult Pacific lamprey through Wells Dam. If monitoring results indicate that passage rates at Wells Dam are not similar to passage rates at other mid-Columbia River dams or within standards as described in Section 4.1.5, Douglas PUD, in consultation with the Aquatic SWG, shall develop and implement additional measures to improve upstream Pacific lamprey passage. Measures described in Sections 4.1.5 and 4.1.6 may be repeated, as necessary, until adult passage through Wells Dam is similar to passage rates at other mid-Columbia River hydroelectric dams or within standards as described in Section 4.1.5.

4.1.6.1 Progress Towards Objective 1 in 2012 – Adult Pacific Lamprey Upstream Passage Evaluation

Following the implementation of the recommended upstream passage improvement measures in 2012, the Aquatic SWG and Wells HCP Coordinating Committee approved an Adult Pacific Lamprey Passage and Enumeration Study Plan. This study will fulfill the requirements of this section of the PLMP. Preliminary results from the study are expected to be available in late 2013 to early 2014 with the results of the study included in the 2013 PLMP Annual Report.

4.1.7 Periodic Monitoring

Once adult Pacific lamprey upstream passage rates at Wells Dam are similar to rates at other mid-Columbia River dams or within standards as described in Section 4.1.5, Douglas PUD, in consultation with the Aquatic SWG, shall periodically monitor adult Pacific lamprey passage performance through Wells Dam fishways to verify the effectiveness of passage improvement measures. Specifically, every ten years after compliance has been achieved, or as determined by the Aquatic SWG, Douglas PUD shall implement a one-year study to verify the effectiveness of the adult fish ladders with respect to adult lamprey passage. If results of the monitoring program confirm the effectiveness of adult lamprey passage measures and the results indicate that passage rates are still in compliance, then no additional measures are needed. If the results indicate that adult upstream passage rates are out of compliance, then the upstream passage study will be replicated to confirm the results. If the results after two years of study both indicate that passage rates have not been maintained, Douglas PUD, in consultation with the Aquatic SWG, shall develop and implement measures to improve upstream Pacific lamprey passage, if any (see Section 4.1.5).

4.1.7.1 Progress Towards Objective 1 in 2012 – Periodic Monitoring

Periodic monitoring will take place following the evaluation and adoption of final fishway configurations and operating criteria.
4.2 Juvenile Pacific Lamprey Downstream Passage and Survival and Rearing (Objective 2)

4.2.1 Downstream Bypass Operations Criteria

Douglas PUD is required to operate the downstream bypass system at Wells Dam in accordance with criteria outlined in the HCP.

4.2.1.1 Progress Towards Objective 2 in 2012 – Downstream Bypass Operations Criteria

In 2012, Douglas PUD operated the downstream bypass system at Wells Dam in accordance with the criteria outlined in the Wells HCP. Juvenile Fish Bypass operations were implemented consistent with the HCP Coordinating Committee approved Bypass Operations Plan for 2012. The dates of operation included initiation on April 9th at 000 hours with the bypass system operated continuously until midnight on August 19th. The 2012 dates of operation for the juvenile fish bypass system were developed in consultation with the Wells HCP Coordinating Committee and are the result of species run-timing estimates developed by the University of Washington, Columbia Basin Research that were reviewed, approved and adopted by the HCP Coordinating Committee and implemented by Douglas PUD prior to the beginning of the 2012 bypass season.

4.2.2 Salvage Activities During Ladder Maintenance Dewatering

Douglas PUD shall continue to conduct salvage activities as required by the HCP’s Adult Fish Passage Plan during fishway dewatering operations. All fish species, including Pacific lamprey that are encountered during dewatering operations shall be salvaged consistent with the protocol identified in the HCP. Any juvenile Pacific lamprey that are captured during salvage activities will be released downstream of Wells Dam. Douglas PUD will coordinate salvage activities with the Aquatic SWG and allow for member participation. Douglas PUD will provide a summary of salvage activities in the annual report.

4.2.2.1 Progress Towards Objective 2 in 2012 – Salvage Activities During Ladder Maintenance Dewatering

Douglas PUD conducted salvage activities during dewatering of the Wells Dam east fishway on December 4 and December 5, 2012. During salvage operations three juvenile lamprey were captured in the fishway collection gallery during dewatering. All three juvenile lamprey were released into the Columbia River unharmed.

4.2.3 Juvenile Pacific Lamprey Passage and Survival Literature Review

Beginning in year five and every five years thereafter during the new license, Douglas PUD, in consultation with the Aquatic SWG, shall conduct a literature review to summarize available technical information related to juvenile lamprey passage and survival through Columbia and
Snake rivers hydroelectric facilities. This information will be used to assess the feasibility of conducting activities identified in Section 4.2.4.

4.2.3.1 Progress Towards Objective 2 in 2012 – Juvenile Pacific Lamprey Passage and Survival Literature Review

A literature review of technical information related to juvenile lamprey passage and survival through Columbia and Snake rivers hydroelectric facilities is scheduled for year 5 (2017) of the new license.

4.2.4 Juvenile Pacific Lamprey Downstream Passage and Survival Evaluation

Based upon the current state of the science regarding tag technology and methodologies for Pacific lamprey macrophthalmia (Section 2.3), coupled with the challenges of obtaining macrophthalmia in sufficient numbers within the Project to meet sample size requirements for a statistically rigorous study, a juvenile downstream passage and survival evaluation is not feasible at this time.

During the term of the new license, if tag technology and methodologies are developed and field tested and a sufficient source of macrophthalmia in or upstream of the Project are identified to ensure that a field study will yield statistically rigorous and unbiased results, Douglas PUD, in consultation with the Aquatic SWG, shall implement a one-year juvenile Pacific lamprey downstream passage and survival study.

If statistically valid study results indicate that Project operations have a significant negative impact on the Pacific lamprey population above the Wells Dam, Douglas PUD, in consultation with the Aquatic SWG, shall identify and implement scientifically rigorous and regionally accepted measures (e.g., translocation, artificial production or habitat enhancement), if any, or additional studies to address such impacts. If operational changes are needed to improve passage survival of juvenile lamprey migrants, then those changes need to be coordinate with the HCP Coordinating Committee.

4.2.4.1 Progress Towards Objective 2 in 2012 – Juvenile Pacific Lamprey Downstream Passage and Survival Evaluation

Currently no tag technologies and methodologies exist for use to study downstream passage and survival of juvenile Pacific lamprey. Current limitations include but are not limited to, tag burden and tag retention, detection efficiencies, fish source, tag life, and the unpredictability of juvenile lamprey migration.

4.2.5 Juvenile Pacific Lamprey Habitat Evaluation

Within three years of the effective date of the new license, Douglas PUD shall implement a one-year study to examine presence and relative abundance of juvenile Pacific lamprey in habitat areas within the Project that may be affected by Project operations. As part of this measure,
Douglas PUD shall identify areas of potential juvenile Pacific lamprey habitat for future evaluation. Sampling of these areas will assess presence/absence and relative abundance. Any sampling methodologies used in support of this activity will require coordination with the HCP Coordinating Committee and regulatory approval of the federal and state agencies.

4.2.5.1 Progress Towards Objective 2 in 2012 – Juvenile Pacific Lamprey Habitat Evaluation

No juvenile Pacific lamprey habitat evaluation took place in 2012. This evaluation is scheduled within three years of the license effective date and therefore will take place in 2015.

4.3 Participate in Regional Pacific Lamprey Conservation Activities (Objective 3)

4.3.1 Regional Lamprey Working Groups

Douglas shall participate in Pacific lamprey work groups in order to support regional conservation efforts (e.g., the Pacific Lamprey Technical Work Group and the USFWS Lamprey Conservation Initiative). Activities may include but are not limited to information exchanges with other entities, meeting attendance, and coordination of Douglas PUD’s Pacific lamprey activities with other entities conducting lamprey research in the mid-Columbia River. Activities may also include conducting PLMP research within the Project, and sharing that information with other entities.

4.3.1.1 Progress Towards Objective 3 in 2012 – Regional Lamprey Working Groups

In 2012, Douglas PUD representatives attended and participated in regional coordination and information exchange related to Pacific lamprey including: Juvenile Pacific Lamprey Seminar on August 1 (Wenatchee, WA), the Pacific Lamprey Technical Work Group on November 28 (Portland, OR), and the Army Corps of Engineers Anadromous Fish Evaluation on November 27 to November 29 (Portland, OR).

4.3.2 Reporting

Douglas PUD will provide an annual report to the Aquatic SWG summarizing the previous year’s activities and proposed activities for the following year undertaken in accordance with the PLMP. The report will document all Pacific lamprey activities conducted within the Project and describe activities proposed for the following year. Furthermore, any decisions, statements of agreement, evaluations, or changes made pursuant to this PLMP will be included in the annual report. If significant activity was not conducted in a given year, Douglas PUD will prepare a memorandum providing an explanation of the circumstances in lieu of the annual report.

4.3.3 Progress Towards Annual Reporting Requirements

In addition to the reporting requirements found within the Aquatic Settlement Agreement requiring the submission of annual reports for all six of the management plans including the PLMP, Article 406 of the FERC license for the Wells Project also requires Douglas PUD to
submit annual reports detailing the implementation of each of the six Aquatic Settlement Agreement management plans.

Consistent with Article 406 of the FERC License for the Wells Project, the Wells Dam Water Quality 401 Certification, and the PLMP, this report (PLMP Annual Report) will be updated annually in consultation of the Aquatic SWG. Each year the PLMP Annual Report will be filed on or prior to May 31st. The report will include a summary of the progress made towards the implementation of the PLMP and additional lamprey related measures found within the FERC license.
5.0 REFERENCES


EXECUTIVE SUMMARY

The Resident Fish Management Plan (RFMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification (401 Certification) for the Wells Hydroelectric Project (Project).

The goal of the RFMP is to protect and enhance native resident fish populations and habitat in the Project during the term of the new license. Public Utility District No. 1 of Douglas County (Douglas PUD), in collaboration with the Aquatic Settlement Work Group, has agreed to implement several resident fish PMEs in support of the RFMP. This report summarizes actions carried out in 2012 that are associated with the PMEs presented within the RFMP which are designed to meet the following objectives:

Objective 1: Continue to provide additional benefits to resident fishery resources in the Project as a result of continued implementation of the HCP, Predator Control Programs and Douglas PUD’s Land Use Policy. In 2012, Douglas PUD continued to implement the HCP Predator Control Programs and the Land Use Policy.

Objective 2: In year 2 and every 10 years thereafter during the new license term, Douglas PUD will conduct a resident fish study to determine the relative abundance of the various resident fish species found within the Project. The study objectives will focus on (1) identifying whether there have been major shifts in the resident fish populations resulting from the implementation of the White Sturgeon, Bull Trout, Pacific Lamprey, and Aquatic Nuisance Species (ANS) Management Plans, and (2) collecting information on resident predator fish populations found within the Wells Reservoir. The results of this study may be used to inform the implementation activities of the other Wells aquatic resource management (ANS, bull trout, Pacific lamprey, and white sturgeon) plans and HCP predator control activities. The resident fish assemblage study is scheduled for 2014.

Objective 3: If any statistically significant negative changes to native resident fish populations of social, economic, and cultural importance are identified, and are not caused by and cannot be addressed through implementation of other aquatic resource management plans or activities (white sturgeon, Pacific lamprey, bull trout, ANS, HCP, predator control), reasonable and appropriate implementation measures to address negative changes, if any, will be undertaken by Douglas PUD. Actions under objective 3 are contingent upon the findings of the resident fish assemblage study in 2014.

Objective 4: In response to proposed major changes in Wells Dam operations requiring FERC approval, Douglas PUD will assess the potential effects, if any, on Project habitat functionally related to spawning, rearing, and migration of native resident fish, in order to make informed management decisions towards the success of the RFMP. Douglas PUD will implement
reasonable and appropriate measures to address any effects on social, economic, and culturally important native species. No major changes in Project operations occurred in 2012.

This RFMP is intended to be compatible with other resident fish management plans in the Columbia River mainstem. Furthermore, the RFMP is intended to be supportive of the HCP, Bull Trout Management Plan, Pacific Lamprey Management Plan and White Sturgeon Management Plan by continuing to monitor changes, if necessary, in the resident fish assemblage within the Project. The RFMP is intended to be not inconsistent with other management strategies of federal, state and tribal natural resource management agencies and supportive of designated uses for aquatic life under WAC 173-201A, the Washington state water quality standards.

Implementation of all of the RFMP related measures during the first full year of the FERC license will be reported within the 2013 annual report for the RFMP.
1.0 INTRODUCTION

The Resident Fish Management Plan (RFMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification for the Wells Hydroelectric Project (Project).

To ensure active stakeholder participation and support, the Public Utility District No. 1 of Douglas County (Douglas PUD) developed all of the resource management plans in close coordination with agency and tribal natural resource managers (Aquatic Settlement Work Group or Aquatic SWG). During the development of this plan, the Aquatic SWG focused on developing management priorities for resources potentially impacted by Project operations. Entities invited to participate in the Aquatic SWG include the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Washington Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), and Douglas PUD.

The RFMP will direct implementation of measures to protect and enhance native resident fish populations in the Wells Reservoir. To ensure active stakeholder involvement and support, Douglas PUD developed this plan, along with the other aquatic management plans, in close coordination with the members of the Aquatic SWG.

The Aquatic SWG agrees on the need to develop a plan for the long-term management of native resident fish populations in the Project. This management plan summarizes the relevant resource issues and background (Section 2), identifies goals and objectives of the plan (Section 3), and describes the relevant PMEs (Section 4) for native resident fish during the term of the new license.

The 2013 annual report on the implementation of the RFMP will include all of the native resident fish related activities implemented during the first full year of the new FERC license.

2.0 BACKGROUND

2.1 Resident Fish Species

The resident fish assemblage present in the Wells Reservoir is composed of a diverse community of native and introduced, warm and coldwater, and recreational and non-recreational fish species. Since the construction of Wells Dam several studies have either directly (McGee 1979; Beak 1999) or indirectly (Dell et al. 1975; Burley and Poe 1994) addressed the resident fish assemblage in the Wells Reservoir.
2.1.1 Project Resident Fish Assessments

In assessing the occurrence of gas bubble disease in fish in the mid-Columbia River reservoirs, Dell et al. (1975) observed that the most abundant resident fish species in the Wells Reservoir were northern pikeminnow \textit{(Ptychocheilus oregonensis)}, stickleback \textit{(Gasterosteus spp.)}, and suckers \textit{(Catostomus spp.)}. They also determined that mountain whitefish \textit{(Prosopium williamsoni)} and pumpkinseed \textit{(Lepomis gibbosus)} were the most abundant resident game fish, although these two species accounted for less than two percent of the total 32,289 fish sampled. Overall, 27 species of resident and migratory fish were identified in the study area (Table 2.1-1).

In 1993, a one-year study was conducted to determine the relative predation by northern pikeminnow on outmigrating juvenile salmonids and to develop relative predation indices for each of the five mid-Columbia River reservoirs. During the study, incidental catch (species captured other than northern pikeminnow) was high with over 25 fish species recorded and catch dominated by Catostomidae (suckers) (Burley and Poe 1994).

<table>
<thead>
<tr>
<th>Native Species</th>
<th>Non-Native Species</th>
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<tbody>
<tr>
<td>White sturgeon \textit{Acipenser transmontanus}</td>
<td>Carp \textit{Cyprinus carpio}</td>
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<tr>
<td>Chiselmouth \textit{Acrocheilus alutaceus}</td>
<td>Black bullhead \textit{Ictalurus melas}</td>
</tr>
<tr>
<td>Longnose sucker \textit{Catostomus catostomus}</td>
<td>Brown bullhead \textit{Ictalurus nebulosus}</td>
</tr>
<tr>
<td>Bridgelip sucker \textit{Catostomus columbianus}</td>
<td>Pumpkinseed \textit{Lepomis gibbosus}</td>
</tr>
<tr>
<td>Largescale sucker \textit{Catostomus macrocheilus}</td>
<td>Bluegill \textit{Lepomis macrochirus}</td>
</tr>
<tr>
<td>Lake whitefish \textit{Coregonus clupeaformis}</td>
<td>Smallmouth bass \textit{Micropterus dolomieu}</td>
</tr>
<tr>
<td>Prickly sculpin \textit{Cottus asper}</td>
<td>Largemouth bass \textit{Micropterus salmoides}</td>
</tr>
<tr>
<td>Threespine stickleback \textit{Gasterosteus aculeatus}</td>
<td>Yellow Perch \textit{Perca flavescens}</td>
</tr>
<tr>
<td>Burbot \textit{Lota lota}</td>
<td>Black crappie \textit{Pomoxis nigromaculatus}</td>
</tr>
<tr>
<td>Peamouth \textit{Mylocheilus caurinus}</td>
<td>Walleye \textit{Stizostedion vitreum}</td>
</tr>
<tr>
<td>Rainbow trout \textit{Oncorhynchus mykiss}</td>
<td>Tench \textit{Tinca tinca}</td>
</tr>
<tr>
<td>Mountain whitefish \textit{Prosopium williamsoni}</td>
<td>Northern pikeminnow \textit{Ptychocheilus oregonensis}</td>
</tr>
<tr>
<td>Redside shiner \textit{Richardsonius balteatus}</td>
<td></td>
</tr>
<tr>
<td>Dace \textit{Rhinichthys spp.}</td>
<td></td>
</tr>
<tr>
<td>Bull Trout \textit{Salvelinus confluentus}</td>
<td></td>
</tr>
</tbody>
</table>

Individual management plans for both white sturgeon and bull trout have been developed and as such, they are not addressed in this Resident Fish Management Plan.

McGee (1979) noted that chiselmouth \textit{(Acrocheilus alutaceus)}, redside shiners \textit{(Richardsonius balteatus)}, and largescale suckers \textit{(Catostomus macrocheilus)} were the most abundant non-game fish captured during Wells Reservoir surveys while pumpkinseed were the most abundant game fish caught. Similar sampling design and methodology to the 1974 study (Dell et al. 1975) were employed in order to ensure that results of the study were comparable with past observations. In total, 2,480 fish were collected during the study using live traps, beach seines and angling.
Twenty of the 27 known species previously trapped in other mid-Columbia reservoirs (Dell et al. 1975) were captured in the Wells Reservoir during the study.

In 1998, Douglas PUD conducted an updated Wells Reservoir resident fish assessment (Beak 1999). Again, an effort was made to implement a sampling design similar to the two previous studies (1974 and 1979) so as to be consistent and allow comparisons with past results. In total, 22 species of fish were identified with 5,657 fish captured using beach seines and 716 fish observed via diving transects. Beak (1999) reported suckers as the most abundant resident fish captured in beach seining sampling in the Wells study area. These species represented 41 percent of the beach seining catch and 46 percent of the underwater dive survey count. Other abundant species in the beach seine catch were bluegill (*Lepomis macrochirus*) (32 percent), northern pikeminnow (10 percent), peamouth (*Mylocheilus caurinus*) (6 percent), and carp (*Cyprinus carpio*) (5 percent). Fifteen other species represented the remaining 7 percent of the total catch of 3,783 fish. Table 2.1-2 ranks the relative abundance of dominant fish species captured in the 1974, 1979, and 1998 Project studies and how species abundance has shifted over time.

<table>
<thead>
<tr>
<th>Species</th>
<th>1974</th>
<th>1979</th>
<th>1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Largescale sucker <em>Catostomus macrocheilus</em></td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Redside Shiner <em>Richardsonius balteatus</em></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Northern Pikeminnow <em>Ptychocheilus oregonensis</em></td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Bluegill <em>Lepomis macrochirus</em></td>
<td>16</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Pumpkinseed <em>Lepomis gibbosus</em></td>
<td>11</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Chiselmouth <em>Mylocheilus alutaceus</em></td>
<td>4</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

2.1.2 Recreational Fish Species

Kokanee

Landlocked sockeye (*Oncorhynchus nerka*), known as kokanee are a native fish which occur in several lakes in the mid and upper Columbia basins including Lake Wenatchee, Lake Chelan, Lake Osoyoos, and Lake Roosevelt. Although previous resident fish assessments have not detected the presence of this fish species in the Project, anecdotal information exists indicating that low numbers of kokanee may be present in the Project. These fish likely originate from Lake Roosevelt, above Grand Coulee Dam, and during periods of high spring flow are displaced downstream through Grand Coulee and Chief Joseph dams and into the Wells Reservoir.

Largemouth Bass

Largemouth bass (*Micropterus salmoides*) were widely introduced in Washington in the late 1800s (Wydoski and Whitney 2003). They are listed as a priority species in Washington State because of their vulnerability to habitat loss or degradation and their recreational importance (WDFW 2002). They prefer clear water habitat with mud and sand substrates, which is best suited for aquatic vegetation production (Wydoski and Whitney 2003). Little is known about the
populations in the Wells Reservoir as they are infrequently captured (Beak 1999; Duke 2001; Burley and Poe 1994).

**Mountain Whitefish**

Mountain whitefish are assumed to occur in all small-order tributaries to the Methow, Okanogan, Wenatchee and Entiat rivers, and in connecting larger lake systems. They are also believed to occur in the mainstem reservoirs, although their behavior patterns are not known. They mostly inhabit riffles in summer and large pools in winter (Wydoski and Whitney 2003). Spawning typically occurs from October through December, generally in riffles, but also on gravel shoals of lake shores. Mountain whitefish feed primarily on instar forms of benthic aquatic insects, although they also occasionally eat crayfish, freshwater shrimp, leeches, fish eggs and small fish. In lakes, they feed extensively on zooplankton, particularly cladocerans. There is evidence that mountain whitefish still spawn in the lower reaches of some tributaries (NMFS 2002). Mountain whitefish appear to use the Wells Reservoir principally as a migration route between spawning areas in the Methow River and the Wells Dam tailrace (Zook 1983).

**Northern Pikeminnow**

Northern pikeminnow are a slow-growing, long-lived predator native to the Columbia River basin. In summer, adult northern pikeminnow prefer shallow, low velocity areas in cool lakes or rivers. During the winter, they use deeper water and pools (Scott and Crossman 1973). Spawning occurs during the summer, in shallow water areas with gravel substrate. They tend to concentrate in tailrace areas downstream of mainstem dams during the juvenile salmonid migration period, holding in relatively slow-moving water areas (less than about 3 feet per second) near passage routes (NMFS 2002). Due to their large numbers and distribution throughout the Columbia River basin, northern pikeminnow are considered to pose the greatest predation threat to migrating juvenile anadromous salmonids (NMFS 2002).

**Resident Rainbow Trout**

Rainbow trout (Oncorhynchus mykiss) are an inland (remains in freshwater) form of steelhead. However, some rainbow trout remain in freshwater for most of their life but undergo a physiological change to a smolt and migrate to the ocean late in life. In addition to the potential for rainbow trout to become anadromous, the progeny of steelhead are believed to have the potential to become resident rainbow (Peven 1990). Inland rainbow and juvenile steelhead are not distinguishable from each other until the steelhead undergo smoltification. The mid-Columbia River tributaries contain a mixture of resident rainbow and ocean-migrating steelhead. Resident rainbow trout are likely present in low numbers in the Wells Reservoir. During the 1998 resident fish assessment, rainbow trout consisted of 0.05 percent of the relative catch (Beak 1999).

**Smallmouth Bass**

Smallmouth bass (Micropterus dolomieu) are a non-native game fish that have inhabited the mid-Columbia River reach since at least the 1940s. They are listed as a priority species in Washington State because of their vulnerability to habitat loss or degradation and their
recreational importance (WDFW 2002). Preferred habitat for this species includes rocky shoals, banks, or gravel bars. Adult smallmouth bass in the mid-Columbia River are most abundant around the deltas of warmer tributary rivers. In the Wells Reservoir, smallmouth bass are typically found in the lower Okanogan River and the confluence of the Okanogan and Columbia rivers (Beak 1999). They are also abundant in areas upstream of the mid-Columbia River.

Smallmouth bass were the second most abundant predator species captured in the mid-Columbia River during predator assessment sampling conducted in 1994. They were most frequently captured from forebay sampling sites (Burley and Poe 1994). Similar relative abundance estimates of smallmouth bass were observed in recent sampling programs in other mid-Columbia River reservoirs (Beak 1999; Duke 2001). They are a significant fish predator species in the Columbia River, and prey on juvenile salmonids. In the 1994 predator assessment, fish composed 87 percent of the smallmouth bass diet, with salmonids consisting of 11 percent of the prey fish.

**Walleye**

Walleye (*Stizostedion vitreum*) are a cool-water, piscivorous game fish believed to have moved downstream into the mid-Columbia River reach from a population established for recreational fishing in Lake Roosevelt in the late 1950s (Zook 1983). They were the least abundant predator species captured in the mid-Columbia River in 1994 (Burley and Poe 1994). They are listed as a priority species in Washington State because of their vulnerability to habitat loss or degradation and their recreational importance (WDFW 2002).

Walleye occur throughout the mainstem reservoirs but are not typically found in the tributaries. Although suitable spawning habitat appears to be plentiful in the mid-Columbia River, peak summer temperatures in this section of river are suboptimal and appear to restrict the recruitment of subyearling walleye to the yearling age class (Zook 1983). Recruitment of walleye into the mid-Columbia River reservoirs is suspected to result from the entrainment of young fish through Grand Coulee Dam during spring run-off (Zook 1983).

### 2.1.3 Other Resident Species

Resident, non-recreational species make up the bulk of the standing crop of fish in the Wells Reservoir. Many of these species are native to the Wells Reservoir, including burbot (*Lota lota*), chiselmouth, peamouth chub, redside shiner, largescale sucker, bridgelip sucker (*C. columbianus*), longnose sucker (*C. catostomus*), lake whitefish (*Coregonus clupeaformis*), Prickly sculpin (*Cottus asper*), threespine stickleback (*Gasterosteus aculeatus*), and dace species (*Rhinichthys spp.*) (See Table 2.1-1). Currently, no management actions or active fisheries for these species occur.
2.2 **Resident Fish Habitat**

2.2.1 **Spawning habitat**

Objectives of past resident fish studies (McGee 1979; Zook 1983; Beak 1999) did not specifically address spawning habitat but rather focused on species diversity, relative abundance and spatial distribution. Therefore, little information exists about the location and availability of spawning habitat for resident fish species in Project waters. It is likely that some resident fish species (cyprinids, catostomids, cottids) that spend their entire lives in Project waters utilize areas of the Wells Reservoir, tailrace, and lower tributaries (Methow and Okanogan rivers) to reproduce while other resident species, although present in the Wells Reservoir, utilize areas outside of the Project Boundary. Zook (1983) in his review of resident fish in the Wells Reservoir, hypothesized that some resident species such as mountain whitefish, rainbow trout, and walleye, although present, may not be successfully reproducing. Zook’s review (1983) suggests that resident rainbow trout are primarily a product of residualism of hatchery-produced steelhead and that mountain whitefish appear to use the Wells Reservoir principally as a migration route between spawning areas in the Methow River and the Wells Tailrace. The report also suggests that walleye populations in the Wells Reservoir are recruited from the Lake Roosevelt population that was introduced in the late 1950s. The report also states that although spawning habitat appears to be available, evidence of successful reproduction has not been observed (Zook 1983).

Northern pikeminnow control efforts have been implemented at the Wells Reservoir starting in 1995. Part of these efforts included the identification of known spawning locations through the use of radio-telemetry. Based upon results of this study, northern pikeminnow spawning habitat is located in the Wells Reservoir near Park Island, near river mile (RM) 1.5 on the Methow River and in the Wells tailrace immediately downstream of the east bank fish ladder (Bickford and Skillingstad 2000).

2.2.2 **Rearing habitat**

Past resident fish surveys (McGee 1979; Beak 1999) observed significant spatial trends in species distribution within the Wells Reservoir. Both McGee (1979) and Beak (1999) noted that in general, spiny ray species (centrarchids) were most abundant between RM 530 and RM 540 and in the lower Okanogan River portion of the Project. This unique area of the Wells Reservoir is shallow and broad with slower water velocities, finer substrate, warmer water temperatures, and higher turbidity (Beak 1999) and is conducive to rearing spiny ray fish species while excluding more streamlined fish that prefer fast flowing water. Both surveys also found that the more streamlined resident fish species, such as chiselmouth and redside shiner (cyprinids), were most abundant downstream of RM 530 where water velocities increased, turbidity decreased, and the amount of shallow littoral habitat decreased. Other resident fish such as various sucker species and white sturgeon are most likely distributed throughout the Wells Reservoir but reside and feed at depths near the river bottom. Migratory, cold water species such as bull trout and whitefish spawn outside of the Wells Reservoir and it is likely that the majority of juvenile fish of these species rear in tributary habitats. Sub-adult bull trout, however, have been observed passing over other mid-Columbia River dams and recent studies suggest that bull trout forage for resident species present in the Wells Reservoir (BioAnalysts Inc. 2004).
2.3 Management Activities Affecting Resident Fish

2.3.1 Habitat Conservation Plan’s Predator Control Program

Section 4.3.3 of the Wells HCP includes the requirement that Douglas PUD implement a northern pikeminnow and piscivorous bird harassment and control program to reduce the level of predation upon anadromous salmonids in the mid-Columbia Basin. The northern pikeminnow removal program includes a northern pikeminnow control program, participation in fishing derbies and tournaments and the use of long-line fishing equipment. These efforts are designed to provide an immediate and substantial reduction in the predator populations present within the waters of the Project.

Since efforts were first initiated in 1995, Douglas PUD’s northern pikeminnow removal program has captured over 134,000 northern pikeminnow (1995-2006). The continual harvest of northern pikeminnow from these waters will provide additional decreases in predator abundance. Yearly removal efforts will also keep the northern pikeminnow population in a manageable state.

The other component of the predator control program is the implementation of control measures for piscivorous birds. The focus of Douglas PUD’s piscivorous bird control program is not removal but hazing and access deterrents. Hazing includes propane cannons, pyrotechnics and the physical presence of hazing staff. Access deterrents include steel wires across the hatchery ponds and tailrace, fencing and covers for hatchery ponds, and electric fencing. When hazing and access deterrents fail, options for removal are also implemented by the US Department of Agriculture (DOA) Animal Control staff hired to conduct the hazing programs.

Although the intent of the predator control program is for the protection of anadromous salmonids, reductions in aquatic and terrestrial predator abundance within the Reservoir may benefit many native resident fish species.

2.3.2 Project Shoreline Management and Land Use Policy

Douglas PUD owns approximately 89 miles of shoreline in fee title and addresses shoreline management issues through the implementation of a strict Land Use Policy that requires formal approval of all land use activities that take place within the Project Boundary. Applications to permit activities such as construction of boat docks, piers, and landscaping are reviewed and considered for approval by Douglas PUD after all required regulatory permits are acquired by the applicant. Additionally, when making land use or related permit decisions on Douglas PUD owned lands that affect habitat within the Project Boundary, Douglas PUD is required by Section 5 of the HCP to notify and consider comments from the HCP signatory parties (Douglas 2002). Shoreline management activities directly related to Project land use benefit resident fish, juvenile anadromous fish, and aquatic invertebrates and plants by minimizing impact in littoral areas within the Project Boundary.
3.0 GOALS AND OBJECTIVES

The goal of the RFMP is to protect and enhance native resident fish populations and habitat in the Project during the term of the new license. Douglas PUD, in collaboration with the Aquatic SWG, has agreed to implement several resident fish PMEs in support of the RFMP. The PMEs presented within the RFMP are designed to meet the following objectives:

Objective 1: Continue to provide additional benefits to resident fishery resources in the Project as a result of continued implementation of the HCP, Predator Control Programs and Douglas PUD’s Land Use Policy.

Objective 2: In year 2 and every 10 years thereafter during the new license term, Douglas PUD will conduct a resident fish study to determine the relative abundance of the various resident fish species found within the Project. The study objectives will focus on (1) identifying whether there have been major shifts in the resident fish populations resulting from the implementation of the White Sturgeon, Bull Trout, Pacific Lamprey, and Aquatic Nuisance Species (ANS) Management Plans, and (2) collecting information on resident predator fish populations found within the Wells Reservoir. The results of this study may be used to inform the implementation activities of the other Wells aquatic resource management (ANS, bull trout, Pacific lamprey, and white sturgeon) plans and HCP predator control activities.

Objective 3: If any statistically significant negative changes to native resident fish populations of social, economic, and cultural importance are identified, and are not caused by and cannot be addressed through implementation of other aquatic resource management plans or activities (white sturgeon, Pacific lamprey, bull trout, ANS, HCP, predator control), reasonable and appropriate implementation measures to address negative changes, if any, will be undertaken by Douglas PUD.

Objective 4: In response to proposed major changes at Wells Dam requiring FERC approval, the Aquatic SWG will assess the potential effects, if any, on Project habitat functionally related to spawning, rearing, and migration of native resident fish, in order to make informed management decisions towards the success of the RFMP. Douglas PUD will implement reasonable and appropriate measures to address any effects on social, economic, and culturally important native species.

This RFMP is intended to be compatible with other resident fish management plans in the Columbia River mainstem. Furthermore, the RFMP is intended to be supportive of the HCP, Bull Trout Management Plan, Pacific Lamprey Management Plan, and White Sturgeon Management Plan by continuing to monitor changes, if necessary, in the resident fish assemblage within the Project. This management plan is intended to be not inconsistent with other management strategies of federal, state and tribal natural resource management agencies and supportive of designated uses for aquatic life under WAC 173-201A, the Washington state water quality standards.
The schedule for implementation of specific measures within the RFMP is based on the best information available at the time the Plan was developed. As new information becomes available, implementation of each activity may be adjusted through consultation with the Aquatic SWG.

4.0 PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

In order to fulfill the goal and objectives described in Section 3.0 of the RFMP, Douglas PUD, in consultation with the Aquatic SWG has initiated the implementation of the following measures.

4.1 Implementation Of Programs that Benefit Resident Fish (Objective 1)

4.1.1 HCP Predator Control Programs

Douglas PUD shall continue to conduct annual predator control activities for northern pikeminnow and avian predators as outlined in the HCP (Douglas 2002). Although implementation of this program is targeted at reducing predation on anadromous species covered by the HCP, it is also anticipated to have direct benefits for resident fish species.

4.1.1.1 Progress Towards Objective 1 in 2012 – Implementation of Programs that Benefit Resident Fish

Douglas PUD implemented predator control activities for northern pikeminnow in 2012. The pikeminnow control program resulted in the removal of 12,596 pikeminnow from the Wells Project. A total of 5,426 non-target fish were incidentally captured and released representing 34.1% of the overall catch. Incidental encounters of resident fish consisted of nine taxa: 3,203 burbot, 724 peamouth, 603 sucker spp., 528 chiselmouth, 161 sculpin spp., 142 pikeminnow / chiselmouth hybrids, 72 white sturgeon (Acipenser transmontanus), 47 redside shiner, and 18 brown bullhead catfish (Ameiurus nebulosus). All non-target fish were released alive.

4.1.2 Project Shoreline Management and Land Use Policy

Douglas PUD shall continue to implement the Douglas Land Use Policy which requires approval of all land use activities that take place within the Project Boundary. All permit activities such as construction of boat docks, piers, and landscaping within Project Boundary will be subject to review and approval by Douglas PUD only after the applicant has received all other required regulatory permits, in addition to consideration by the HCP signatory parties and permit review by state and federal action agencies. The intent of the review and approval process captured in the Land Use Policy is to protect aquatic habitats and aquatic species that may be affected by proposed land use activities within the Project.
4.1.2.1 Progress Towards Objective 1 in 2012 – Project Shoreline Management and Land Use Policy

Douglas PUD continued to implement the Land Use Policy in 2012 per Article 412 of the new FERC license for the Wells Project.

4.2 Monitoring the Resident Fish Assemblage within the Wells Reservoir (Objective 2)

Douglas PUD shall conduct a resident fish study to determine the relative abundance of the various resident fish species found within the Wells Reservoir. This assessment shall occur in year 2 and every 10 years thereafter during the term of the new license. The study objectives will focus on (1) identifying whether there have been major shifts in the resident fish populations resulting from the implementation of the White Sturgeon, Bull Trout, Pacific Lamprey, and Aquatic Nuisance Species Management Plans, and (2) collecting information on resident predator fish populations found within the Wells Reservoir.

In order to maintain comparative assemblage information over time to inform Project resident fish status and trends, methodology for monitoring activities shall remain consistent with the methods described in Beak (1999). Information collected from these monitoring activities may be used to inform the implementation activities of the other Wells aquatic resource management plans and the HCP predator control activities.

4.2.1 Progress Towards Objective 2 in 2012 – Monitor Resident Fish Assemblage within the Wells Reservoir

Monitoring of the resident fish assemblage in the Wells Reservoir is scheduled for 2014. The study plan for this study will be developed by Douglas PUD and will be approved by the Aquatic SWG prior to implementation in 2014.

4.3 Actions to Address Major Shifts in Native Resident Fish Assemblage (Objective 3)

Based upon information collected during the resident fish status and trends monitoring (Section 4.2), if any statistically significant negative changes to native resident fish populations of social, economic, and cultural importance are identified, and are not caused by and cannot be addressed through the implementation of other Aquatic Resource Management Plans or activities (white sturgeon, Pacific lamprey, bull trout, ANS, HCP, predator control), reasonable and appropriate implementation measures to address negative changes, if any, will be undertaken by Douglas PUD.

4.3.1 Progress Towards Objective 3 in 2012 – Actions to Address Major Shifts in Native Resident Fish Assemblage

Implementation of actions under Objective 3 are contingent upon the findings of the resident fish assemblage study scheduled for 2014.
4.4 Monitoring in Response to Proposed Changes in Project Operations (Objective 4)

If at any time during the new license term, future changes in Wells Dam operations are proposed that require FERC approval and the Aquatic SWG concludes that either reservoir or tailrace habitat within Project Boundary may be affected with regards to spawning, rearing, and migration (aquatic life designated uses) of native resident fish, an assessment will be implemented to identify potential effects, if any, in order to make informed license decisions. If the results of the assessment identify adverse effects to native resident fish species of social, economic and cultural importance, attributable to such changes in Project operations, then Douglas PUD will consult with the Aquatic SWG to select and implement reasonable and appropriate measures to address such effects.

4.4.1 Progress Towards Objective 4 in 2012 – Monitoring in Response to Proposed Changes in Project Operations

No changes in Project operations occurred in 2012 or are proposed for 2013 that would trigger the need for a resident fish impact assessment.

4.5 Reporting

Douglas PUD will provide a draft annual report to the Aquatic SWG summarizing the previous year’s activities undertaken in accordance with the RFMP. The report will document all native resident fish activities conducted within the Project. Furthermore, any decisions, statements of agreement, evaluations, or changes made pursuant to this RFMP will be included in the annual report. If significant activity was not conducted in a given year, Douglas PUD will prepare a memorandum providing an explanation of the circumstances in lieu of the annual report.

4.5.1 Progress Towards Annual Reporting Requirements

Consistent with the reporting requirements found in Article 406 of the FERC License for the Wells Project, 401 Certification, and the Aquatic Settlement Agreement RFMP, the RFMP Annual Report will be updated annually with the assistance of the Aquatic SWG. Each year the RFMP Annual Report will be filed on or prior to May 31st. The report will include a summary of the annual progress made towards the implementation of the RFMP and focus on the previous year’s developments.
5.0 REFERENCES


EXECUTIVE SUMMARY

The Aquatic Nuisance Species Management Plan (ANSMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification for the Wells Hydroelectric Project (Project).

The goal of the ANSMP is to prevent the introduction and/or spread of aquatic nuisance species (ANS) in Project waters. Public Utility District No. 1 of Douglas County (Douglas PUD), in collaboration with the Aquatic Settlement Work Group (Aquatic SWG), has agreed to implement several PMEs in support of the ANSMP. This report summarizes actions carried out in 2012 that are associated with the PMEs presented within the ANSMP which are designed to meet the following objectives:

Objective 1: Implement best management practices to prevent Eurasian watermilfoil (Myriophyllum spicatum) proliferation during in-water (i.e., construction, maintenance, and recreation improvements) improvement activities in the Project. In 2012, no in-water construction took place. Modifications to the best management practices contained in the current ANSMP, required by Article 405 of the new Federal Energy Regulatory Commission (FERC) license issued in November 2012, began in December 2012.

Objective 2: Continue participation in regional and state efforts to prevent the introduction and spread of aquatic nuisance species. Activities include continued monitoring for the presence of ANS, monitoring bycatch data collected during other aquatic management plan activities, and conducting education outreach within the Project. In 2012, Douglas PUD participated in coordination with regional and state efforts to prevent the introduction and spread of ANS which continued during zebra and quagga mussel monitoring and the 2012 Well Project Crayfish Distribution Study. By-catch monitoring also occurred during the sub-yearling Chinook life-history study and the Northern pikeminnow removal program. In 2012, signage designed to inform and educate the public about ANS was maintained year-round at all public boat launch facilities in the Wells Project. In addition, development of educational pamphlets for placement at public use facilities in May 2013 began in 2012.

Objective 3: In response to proposed changes in the Project requiring FERC approval, the Aquatic SWG will assess the potential effects, if any, with respect to the introduction or proliferation of ANS in the Project to inform management decisions to support success of the ANSMP and will implement reasonable and appropriate measures to address any potential effects. No significant changes in Project operations occurred in 2012.
1.0 INTRODUCTION

The Aquatic Nuisance Species Management Plan (ANSMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish agreement and Habitat Conservation Plan (HCP), will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification (401 Certification) for the Wells Hydroelectric Project (Project).

To ensure active stakeholder participation and support, the Public Utility District No. 1 of Douglas County (Douglas PUD) developed all of the resource management plans in close coordination with agency and tribal natural resource managers (Aquatic Settlement Work Group or Aquatic SWG). During the development of this plan, the Aquatic SWG focused on developing management priorities for resources potentially impacted by Project operations. Entities invited to participate in the Aquatic SWG include the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Washington Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Indian Nation (Yakama Nation), and Douglas PUD.

The ANSMP will direct implementation of measures to prevent the introduction and/or spread of aquatic nuisance species (ANS) in Project waters. To ensure active stakeholder participation and support, Douglas PUD developed this plan, along with the other aquatic management plans, in close coordination with the members of the Aquatic SWG.

The Aquatic SWG agrees on the need to develop a plan for the long-term management and prevention of ANS in the Project. This management plan summarizes the relevant resource issues and background (Section 2), identifies goals and objectives of the plan (Section 3), and describes the relevant PMEs (Section 4) for ANS during the term of the new license.

2.0 BACKGROUND

Nonnative aquatic species may be released or “introduced” into an aquatic environment intentionally or unintentionally. Most often, such species are unable to adapt to their new environments and do not form self-sustaining populations (ANSC 2001). However, if such a species is able to adapt, become established, and thrive, it has the potential to threaten the diversity or abundance of native species and aquatic habitats and may even affect economic resources and human health.

RCW 77.60.130 defines the term ANS as a “nonnative aquatic plant or animal species that threatens the diversity or abundance of native species, the ecological stability of infested waters, or commercial, agricultural, or recreational activities dependent on such waters” (RCW 2007). Since few natural controls exist in their new habitat, ANS may spread rapidly, damaging
recreational opportunities, lowering property values, clogging waterways, impacting irrigation and power generation, destroying native plant and animal habitat, and sometimes destroying or endangering native species (ANSC 2001).

2.1 Aquatic Nuisance Species of Concern

2.1.1 Eurasian Watermilfoil (*Myriophyllum spicatum*)

Eurasian watermilfoil (EWM) is an aquatic plant native to Europe, Asia, northern Africa, and Greenland. It was once commonly sold as an aquarium plant (Ecology 2007). EWM may have been introduced to the North American continent at Chesapeake Bay in the 1880’s, although evidence shows that the first collection was made from a pond in the District of Columbia during the fall of 1942. By 1985, EWM had been found in 33 states, the District of Columbia, and the Canadian provinces of British Columbia, Ontario, and Quebec (Ecology 2007). The first documented occurrence of EWM in the State of Washington was in 1965. The source of introduction was most likely from sources in Canada and despite an effort to stop its spread, EWM infestations in Lake Osoyoos, British Columbia spread down through the Okanogan Lakes and into the Okanogan River and the Columbia River in 1974 (Duke 2001).

EWM is extremely adaptable with the ability to thrive in a variety of environmental conditions. It grows in still to flowing waters, can tolerate salinities of up to 15 parts per thousand, grows rooted in water depths from 1 to 10 meters, and can survive under ice (Ecology 2007). Relative to other submerged plants, EWM requires high light, has a high photosynthetic rate, and can grow over a broad temperature range (Ecology 2007). EWM exhibits an annual pattern of growth. In the spring, shoots begin to grow rapidly as water temperatures approach 15 degrees centigrade. When they near the surface, shoots branch profusely, forming a dense canopy (Ecology 2007). Typically, plants flower upon reaching the surface and die back to the root crowns, which sprout again in the spring.

Although EWM can potentially spread by both sexual and vegetative means, vegetative spread is considered the major method of reproduction. During the growing season, the plant undergoes autofragmentation. The plant fragments often develop roots at the nodes before separation from the parent plants. Fragments are also produced by wind and wave action, control harvest activity and boating activities, with each plant fragment having the potential to develop into a new plant (Ecology 2007).

EWM is classified as a class B noxious weed by the Washington State Noxious Weed Control Board (WNWCB 2007). Class B noxious weeds are nonnative plants whose distribution is limited to portions of Washington State. Additionally, EWM has been identified as a nuisance species in the Washington State Aquatic Nuisance Species Management Plan (ANSC 2001). EWM can adversely impact aquatic ecosystems by forming dense canopies that often shade out native vegetation. Monospecific stands of EWM affect aquatic habitat, water quality, can impact power generation and irrigation, and interfere with recreational activities. In Washington, private and government sources spend about $1,000,000 per year on EWM control (Ecology 2007).
2.1.2 **Zebra Mussel** (*Dreissena polymorpha*) and **Quagga Mussel** (*Dreissena rostriformis bugensis*)

Zebra and quagga mussels are freshwater, bivalve mollusks that typically have a dark and white (zebra-like) pattern on their shells. They are native to Eurasia and were both introduced into the Great Lakes as a result of ballast water discharge from transoceanic ships that were carrying veligers, juveniles, or adult mussels (USGS 2007). Zebra mussels first invaded North America in the mid-1980s and quagga mussels invaded a few years later in 1989 (USFWS 2007). These two species are closely related with subtle morphological differences. More research is needed on North American quagga mussels to assess ecological differences between the two species, but the practical implications of both species are essentially identical (USFWS 2007). The North American distribution of these species has been concentrated in the Great Lakes region of the U.S. with the zebra mussel distribution also spanning farther into the southern U.S. (Figure 2.1-1). Despite recent measures to prevent their westward expansion, quagga mussels were discovered in the Lake Mead Recreation Area. Populations have subsequently been found throughout the Boulder Basin of Lake Mead (Figure 2.1-1) and in more than a dozen reservoirs serving Southern California (Pam Meacham, pers. comm.).

![Zebra and Quagga Mussel Sightings Distribution Map (USGS 2007).](image-url)
Zebra and quagga mussel size varies from microscopic to two inches long. Typical lifespan is up to 5 years. Both species may spawn year around if conditions are favorable. Peak spawning typically occurs in spring and fall. *Dreissena* are dioecious (either male or female) with external fertilization. Both species are prolific reproducers. Fecundity is high with a few individuals having the capability of producing millions of eggs and sperm (USFWS 2007). After fertilization, pelagic microscopic larvae, or veligers, develop within a few days and these veligers soon acquire minute bivalve shells. Free-swimming veligers drift with currents for three to four weeks until suitable substrate for settling is located. Adults attach to hard surfaces via byssal threads, but can detach and move to new habitat. Both species can tolerate a wide range of water temperatures (1-30°C), low velocities (<2 m/sec), and prefer hard surfaces for attachment although quagga mussels can live in soft sediments (USFWS 2007). Zebra mussels are typically found just below the surface to about 12 meters and quagga mussels are typically found at any depth where oxygen is available (USFWS 2007).

Zebra mussels have caused major ecological and economic problems since their arrival in North America, and quagga mussels pose many of the same threats. Both species are prolific filter feeders, removing substantial amounts of phytoplankton and suspended particulate from the water thus impacting aquatic ecosystems by potentially altering food webs (USGS 2007). *Dreissena’s* ability to rapidly colonize hard surfaces causes serious economic problems. These major bio-fouling organisms can clog water intake structures such as pipes and screens, therefore reducing capabilities for power and water treatment plants. Recreation-based industries and activities have also been heavily impacted; docks, breakwalls, buoys, boats, and beaches have all been heavily colonized (USGS 2007). Zebra mussel densities have been reported to be over 700,000 individuals per square meter in some facilities in the Great Lakes area. Each year, the economic impact to the U.S. and Canada is approximately $140 million in damage and control costs (Sea Grant 2007).

### 2.2 Project Information

Past aquatic studies contributing information to aquatic nuisance species of concern, discussed above, consisted of an aquatic macrophyte species composition and mapping survey (Lê and Kreiter 2005) and a macroinvertebrate assessment and rare, threatened, and endangered (RTE) species survey (Bioanalysts 2006). Results of these studies and other Project aquatic studies indicate that the aquatic ecosystem within the Project is composed of a diverse community of flora and fauna consisting of varied aquatic taxa such as plankton, macroinvertebrates (insects, snails and bivalves), fish, and plants. Although nonnative species are present within Project waters, the aquatic community is characterized by a native species dominated assemblage. It is important to note the varying degree to which a nonnative species can be characterized as a “nuisance” species. The many factors that determine a nonnative species’ magnitude of infestation and impact are complex and not always well understood.

### 2.2.1 Aquatic Macrophytes

Some information exists on aquatic macrophyte communities in the mid-Columbia River system. Vegetation mapping in and around the Rocky Reach Reservoir (River Miles (RM) 473.6 to 515.5) identified 979 acres of aquatic macrophytes (Duke 2001) out of a total surface area of 8,167 acres (Duke 2001). Nonnative EWM represented 34 percent of the biomass samples.
collected from within the Rocky Reach Reservoir (Duke 2001). In the Priest Rapids and Wanapum reservoirs, the composition of EWM in the aquatic macrophyte community was higher at 42 percent of littoral plant biomass (Normandeau et al. 2000).

In August and September 2005, Douglas PUD conducted an aquatic macrophyte study in the Wells Reservoir. Sixty-one transects totaling 369 sample points were completed during the 2005 study (Lê and Kreiter 2005). Depths of up to 30 feet were sampled and sampling points along transects were completed at intervals of 5 feet or less. A total of nine aquatic plant species were documented (Table 2.2-1). Table 2.2-1 presents the percentage of samples in which each of the identified aquatic species was categorized as the dominant species (consisting of >60 percent of the sample composition). The two most dominant species in samples collected were common waterweed (*Elodea canadensis*) and leafy pondweed (*Potamogeton foliosus*) at 24.7 percent and 16.7 percent, respectively. Both of these species are native. EWM was dominant in only 6.3 percent of samples (Table 2.2-1). Samples with no plants (absent) consisted of 41.7 percent of all samples taken. This observation supports the concept that macrophyte communities maintain a patchy distribution.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Percentage of samples in which dominant</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Chara spp.</em></td>
<td>Muskgrass</td>
<td>.003% (1/396)</td>
</tr>
<tr>
<td><em>Elodea canadensis</em></td>
<td>Common waterweed</td>
<td>24.7% (98/396)</td>
</tr>
<tr>
<td><em>Myriophyllum spicatum</em></td>
<td>Eurasian watermilfoil</td>
<td>6.3% (25/396)</td>
</tr>
<tr>
<td><em>Potamogeton crispus</em></td>
<td>Curly leaf pondweed</td>
<td>4.3% (17/396)</td>
</tr>
<tr>
<td><em>Potamogeton foliosus</em></td>
<td>Leafy pondweed</td>
<td>16.7% (66/396)</td>
</tr>
<tr>
<td><em>Potamogeton nodosus</em></td>
<td>American pondweed</td>
<td>1.3% (5/396)</td>
</tr>
<tr>
<td><em>Potamogeton pectinatus</em></td>
<td>Sago pondweed</td>
<td>0.8% (3/396)</td>
</tr>
<tr>
<td><em>Potamogeton zosteriformis</em></td>
<td>Flat-stemmed or eelgrass pondweed</td>
<td>2.3% (9/396)</td>
</tr>
<tr>
<td>Absent</td>
<td></td>
<td>41.7% (165/396)</td>
</tr>
</tbody>
</table>

Although EWM is present in the Project, the 2005 study indicated that it is not a dominant component of the Project aquatic plant community. During the Project study, EWM was often sub-dominant to several native species in samples collected. These contrasting observations between the Wells Reservoir and downstream reservoirs (Rocky Reach, Priest Rapids, and
Wanapum) where EWM was found to be the most abundant species are not clearly understood. One possible explanation may be that EWM, which is a species that can proliferate from plant fragments (Ecology 2001), has increased its ability to colonize due to potentially higher levels of disturbance in the downstream reservoirs as compared to the Wells Reservoir. The Rocky Reach Reservoir serves a larger population base, maintains an EWM removal program at recreational sites, and has higher levels of recreational use and development as compared to the Wells Reservoir. It is possible that these activities directly and indirectly re-mobilize EWM plant fragments and increase the potential for colonization in the Rocky Reach Reservoir as well as in downstream reservoirs (Lê and Kreiter 2005).

2.2.2 Aquatic Macroinvertebrates

In September and October 2005, Douglas PUD conducted an aquatic invertebrate inventory and an assessment of the presence of RTE aquatic invertebrates within the Wells Reservoir. The overall objective of the study was to document the distribution, habitat associations and qualitative abundance of the current aquatic invertebrate (e.g., clams, snails and insects) assemblage in the Wells Reservoir.

Samples were collected within representative habitats throughout the Wells Reservoir using an air lift suction device, Ponar grabs and colonization baskets. A total of 17 sites were sampled. In addition to the varied aquatic insects and worms found during the survey, approximately 20 species of freshwater mollusks were identified during the inventory from dredge samples (Table 2.3-1). Within the Methow, Okanogan and Columbia portions of the Wells Reservoir, 13, 11, and nine species of mollusks were present, respectively. Of the 20 species, 10 gastropods (snails) and 10 bivalves (clams, mussels) were identified. The gastropods included nine native species and one nonnative species (Big-ear radix, Radix auricularia). Similarly, the bivalves also included nine native species and one nonnative species (Asian clam, Corbicula fluminea) (BioAnalysts, Inc. 2006). The 2005 macroinvertebrate assessment did not discover the presence of any zebra mussels or quagga mussels within the Project.

2.2.3 Project Aquatic Nuisance Species Monitoring

In 2006, Douglas PUD, in coordination with the Aquatic Nuisance Species Division of WDFW, began monitoring for zebra mussels and quagga mussels in Project waters. Activities consisted of monthly plankton tows to target mussel veligers at sites downstream of boat launches within the Wells Reservoir. Sampling activities were conducted during the summer and early fall when recreational boating activity is at a peak. Sampling protocols were provided by WDFW. All samples were sent back to WDFW for analysis. To date, none of the samples collected within the Project have contained any signs of zebra or quagga mussel presence.

In 2007, Douglas PUD, in coordination with the Center for Lakes and Reservoirs at Portland State University, installed a permanent substrate sampler in the Wells Dam forebay to monitor for zebra and quagga mussel colonization within the Project. Douglas PUD staff checks the substrate sampler monthly throughout the year as specified by the monitoring protocol. To date, no signs of zebra or quagga mussel presence have been detected. Both of these monitoring activities are ongoing.
<table>
<thead>
<tr>
<th>Location</th>
<th>Common Name</th>
<th>Taxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methow River</td>
<td>Western pearlshell</td>
<td><em>Margaritinopsis falcata</em></td>
</tr>
<tr>
<td></td>
<td>Striate fingernail clam</td>
<td><em>Sphaerium striatum</em></td>
</tr>
<tr>
<td></td>
<td>Ridgebeak peaclam</td>
<td><em>Pisidium compressum</em></td>
</tr>
<tr>
<td></td>
<td>Western lake fingernail clam</td>
<td><em>Musculium raymondi</em></td>
</tr>
<tr>
<td></td>
<td>Shortface lanx</td>
<td><em>Fisherola nutalli</em></td>
</tr>
<tr>
<td></td>
<td>Ashy pebblesnail</td>
<td><em>Fluminicola fuscus</em></td>
</tr>
<tr>
<td></td>
<td>Western floater</td>
<td><em>Anodonta kennerlyi</em></td>
</tr>
<tr>
<td></td>
<td>Ubiquitous peaclam</td>
<td><em>Pisidium casertanum</em></td>
</tr>
<tr>
<td></td>
<td>Big-ear radix*</td>
<td><em>Radix auricularia</em></td>
</tr>
<tr>
<td></td>
<td>Golden fossaria</td>
<td><em>Fossaria obrussa</em></td>
</tr>
<tr>
<td></td>
<td>Prairie fossaria</td>
<td><em>Fossaria (Bakerilymnaea) bulimoides</em></td>
</tr>
<tr>
<td></td>
<td>Ash gyro</td>
<td><em>Gyraulus parvus</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Corbicula sp.</em></td>
</tr>
<tr>
<td>Okanogan River</td>
<td>Western ridgemussel</td>
<td><em>Gonidea angulata</em></td>
</tr>
<tr>
<td></td>
<td>Striate fingernail clam</td>
<td><em>Sphaerium striatum</em></td>
</tr>
<tr>
<td></td>
<td>Ridgebeak peaclam</td>
<td><em>Pisidium compressum</em></td>
</tr>
<tr>
<td></td>
<td>Ubiquitous peaclam</td>
<td><em>Pisidium casertanum</em></td>
</tr>
<tr>
<td></td>
<td>Asian clam*</td>
<td><em>Corbicula fluminea</em></td>
</tr>
<tr>
<td></td>
<td>Ashy pebblesnail</td>
<td><em>Fluminicola fuscus</em></td>
</tr>
<tr>
<td></td>
<td>Fragile ancyllid</td>
<td><em>Ferrissia californica</em></td>
</tr>
<tr>
<td></td>
<td>Ash gyro</td>
<td><em>Gyraulus parvus</em></td>
</tr>
<tr>
<td></td>
<td>Western lake fingernail clam</td>
<td><em>Musculium raymondi</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Physella sp.</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Anodonta sp.</em></td>
</tr>
<tr>
<td>Columbia River</td>
<td>Western floater</td>
<td><em>Anodonta kennerlyi</em></td>
</tr>
<tr>
<td></td>
<td>Asian clam*</td>
<td><em>Corbicula fluminea</em></td>
</tr>
<tr>
<td></td>
<td>Ridgebeak peaclam</td>
<td><em>Pisidium compressum</em></td>
</tr>
<tr>
<td></td>
<td>Three ridge valvata</td>
<td><em>Valvata tricarinata</em></td>
</tr>
<tr>
<td></td>
<td>Rocky Mountain physa</td>
<td><em>Physella propinququa propinququa</em></td>
</tr>
<tr>
<td></td>
<td>Ash gyro</td>
<td><em>Gyraulus parvus</em></td>
</tr>
<tr>
<td></td>
<td>Golden fossaria</td>
<td><em>Fossaria (F.) obrussa</em></td>
</tr>
<tr>
<td></td>
<td>Prairie fossaria</td>
<td><em>Fossaria (Bakerilymnaea) bulimoides</em></td>
</tr>
<tr>
<td></td>
<td>Big-ear radix*</td>
<td><em>Radix auricularia</em></td>
</tr>
</tbody>
</table>

*Nonnative taxon.
3.0 GOAL AND OBJECTIVES

The goal of the ANSMP is to prevent the introduction and/or spread of ANS in Project waters. Douglas PUD, in collaboration with the Aquatic SWG, has agreed to implement several PMEs in support of the ANSMP. The PMEs presented within the ANSMP are designed to meet the following objectives:

Objective 1: Implement best management practices to prevent Eurasian watermilfoil proliferation during in-water (i.e., construction, maintenance and recreation improvements) improvement activities in the Project.

Objective 2: Continue participation in regional and state efforts to prevent the introduction and spread of aquatic nuisance species. Activities include continued monitoring for the presence of ANS, monitoring bycatch data collected during other aquatic management plan activities and conducting education outreach within the Project.

Objective 3: In response to proposed changes in the Project requiring Federal Energy Regulatory Commission (FERC) approval, the Aquatic SWG will assess the potential effects, if any, with respect to the introduction or proliferation of aquatic nuisance species in the Project to inform management decisions to support success of the ANSMP and will implement reasonable and appropriate measures to address any potential effects.

The ANSMP is intended to be compatible with other ANS management plans in the Columbia River mainstem. Furthermore, this management plan is intended to be supportive of the HCP, Bull Trout Management Plan, Pacific Lamprey Management Plan, Resident Fish Management Plan, White Sturgeon Management Plan, and Water Quality Management Plan by continuing to prevent the introduction and/or spread of ANS in Project waters. The ANSMP is intended to be not inconsistent with other management strategies of federal, state, and tribal natural resource management agencies.

The schedule for implementation of specific measures within the ANSMP is based on the best information available at the time the Plan was developed. As new information becomes available, implementation of each activity may be adjusted through consultation with the Aquatic SWG.

4.0 PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

In order to fulfill the goals and objectives described in the new FERC license, 401 Certification and Section 3.0 of the ANSMP, Douglas PUD, in consultation with the Aquatic SWG, has initiated the implementation of the following measures.
4.1 Implement Best Management Practices During Recreational Improvement Activities (Objective 1)

If at any time during the new license term, Douglas PUD is required to construct, improve or maintain recreation access at boat launches and swim areas and the removal or disturbance of aquatic macrophyte beds that contain Eurasian watermilfoil may potentially occur, Douglas PUD will implement containment efforts utilizing best management practices agreed to by the Aquatic SWG during such activities.

4.1.1 Progress Towards Objective 1 in 2012 – Implement Best Management Practices During Recreational Improvement Activities

The new license for the Wells Project was issued on November 9, 2012. Between the issuance of the license and the end of the 2012 calendar year (December 31st) Douglas PUD did not implement any new recreation improvements in the Wells Project that required the use of Best Management Practices.

Toward meeting the requirement to file an updated ANSMP by May 2013, Douglas PUD has been working closely with the parties to the Aquatic Settlement Work Group and the National Marine Fisheries Service to develop a revised ANSMP that adheres to the requirements of Article 405 of the new FERC License.

The new ANSMP is currently being updated to include: 1) specific best management practices that will be implemented to prevent the spread of aquatic nuisance species during construction of recreation enhancement measures and 2) specific reasonable and appropriate measures that are consistent with aquatic nuisance species management protocols and will be implemented if ANS are detected during monitoring activities at the project. The revised ANSMP is being developed in consultation with the Aquatic SWG and will be filed with the FERC for approval prior to May 31, 2013.

4.2 Participation in Regional and State ANS Efforts (Objective 2)

4.2.1 Coordination with Regional and State Entities

Douglas PUD shall continue to coordinate with regional and state entities to implement activities in Project waters to monitor for the presence of ANS, specifically zebra and quagga mussels. Activities covered by this objective will consist of monitoring for the presence of zebra and quagga mussels as is identified in Section 2.2.3. If ANS are detected during monitoring activities, Douglas PUD will immediately notify the appropriate regional and state agencies and assist in the implementation of reasonable and appropriate measures to address the ANS presence as is consistent with ANS Management protocols.

Douglas PUD shall participate in information exchanges and regional efforts to coordinate monitoring activities.
4.2.1.1 Progress Towards Objective 2 in 2012 – Coordination with Regional and State ANS Efforts

Similar to in previous years, Douglas PUD closely coordinated zebra and quagga mussel monitoring with WDFW during 2012. Sampling took place during the spring, summer, and fall months when water temperatures are conducive to veliger production. Collected samples were sent to WDFW for analysis. All samples came back negative for the presence of invasive mussels.

Douglas PUD also developed and conducted a study of the distribution of non-native northern crayfish in the Wells Project. Results of the study were shared with the Aquatic ASWG. In August and September, approximately 700 hours of trapping effort was carried out in areas throughout the Wells Project. Traps failed to capture any crayfish. Physical searching commenced following unsuccessful trapping, with both native, Signal (*Pacifastacus leniusculus*), and non-native, Northern (*Orconectes virilis*) crayfish being found. However both species were found in low abundance throughout the Wells Project and the two species did not co-inhabit the same locations. In an effort to gain more information on the crayfish population in the Wells Reservoir, Douglas PUD has developed a database where incidental captures of crayfish during other fisheries activities will be recorded.

4.2.2 Monitor Bycatch from other Project Aquatic Resource Management Activities

Douglas PUD shall monitor bycatch data collected from ongoing Project aquatic resource management activities for aquatic nuisance species presence to support regional and state efforts and the ANSMP. Such ongoing activities may consist of broodstock collection activities at Wells Dam and in associated Project tributaries, the northern pikeminnow removal program, water quality monitoring and any other aquatic resource activities related to implementation of Aquatic Resource Management Plans for bull trout, Pacific lamprey, white sturgeon, and resident fish.

4.2.2.1 Progress Towards Objective 2 in 2012 – Monitor Bycatch from other Project Aquatic Resource Management Activities

Douglas PUD monitored bycatch for aquatic nuisance species during aquatic resource management activities in 2012. Specific activities in which monitoring of bycatch occurred included: the subyearling Chinook life-history study, northern pikeminnow removal program, temperature station monitoring, and the crayfish distribution study. In addition, a database for tracking the presence of non-native crayfish encountered during other management activities was established in 2012.

Bycatch results were presented in respective reports for each activity. Briefly, non-native bycatch during all activities was consistent with previous resident fish sampling with no new non-natives found. Bycatch was dominated by, Triploid Rainbow Trout (*O. mykiss*), Common Carp (*Cyprinus carpio*), Suckers (*Catostomus sp.*), Tench (*T. tinca*), Smallmouth bass (*Micropterus dolomieu*), Chiselmouth (*Acrocheilus alutaceus*), White fish (*Prosopium sp.*). Species composition was function of depth of collection and water temperature.
4.2.3 ANS Information and Education

Douglas PUD shall make information regarding the effects of ANS introductions and the importance of prevention available to the public. Such outreach activities may consist of posting signage at Project recreation areas and boat launches.

Douglas PUD shall also provide literature produced by appropriate state entities (Ecology and WDFW) for distribution at the visitor centers of local communities of the Project (Pateros, Brewster, Bridgeport) including Wells Dam.

4.2.3.1 Progress Towards Objective 2 in 2012 – ANS Information and Education

In 2012, Douglas PUD maintained ANS signage year-round at all public boat launch facilities in the Wells Project. Signs included information about preventing the spread of ANS. Douglas PUD also began developing literature in the form of brochures and fact sheets on ANS prevention measures and the risks of ANS introductions. This information will be made available to the public by May 2013 at public use facilities and visitor centers.

4.3 Monitor and Address ANS Effects to Aquatic Communities During Changes in Project Operations (Objective 3)

If at any time during the new license term, future changes in Project operations requiring FERC approval are proposed and the Aquatic SWG concludes that such proposed operations may encourage the introduction or proliferation of aquatic nuisance species within the Project, the Aquatic SWG will assess the potential effects, if any, in order to make informed management decisions.

If the assessment identifies adverse effects to Aquatic Resources due to aquatic nuisance species attributable to changes in Project operations, Douglas PUD shall consult with the Aquatic SWG to select and implement reasonable and appropriate PMEs to address the identified adverse effect(s).

4.3.1 Progress Towards Objective 3 in 2012 - Monitor and Address ANS Effects to Aquatic Communities During Changes in Project Operations

No significant changes in Project operations occurred in 2012.

4.4 Reporting

Douglas PUD will provide a draft annual report to the Aquatic SWG summarizing the previous year’s activities undertaken in accordance with the ANSMP. The report will document all ANS activities conducted within the Project. Furthermore, any decisions, statements of agreement, evaluations, or changes made pursuant to this ANSMP will be included in the annual report. If significant activity was not conducted in a given year, Douglas will prepare a memorandum providing an explanation of the circumstances in lieu of the annual report.
4.4.1 Progress Towards Annual Reporting Requirements

Consistent with Article 406 of the new FERC License for Wells Dam, the Wells Dam 401 Certification, and the ANSMP, this annual ANSMP report will be updated annually with the assistance of the Aquatic SWG. Each year the report will be provided to the members for a 30 days review prior to May 31st. The report will include a summary of the progress made towards the implementation of the ANSMP and focus on the previous year’s developments.
5.0 REFERENCES


2012 ANNUAL REPORT
WATER QUALITY MANAGEMENT PLAN
WELLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 2149

April 2013

Prepared by:
Public Utility District No. 1 of Douglas County
East Wenatchee, Washington
EXECUTIVE SUMMARY

The Water Quality Management Plan (WQMP) is one of six Aquatic Resource Management Plans (Plans) contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP), will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification (401 Certification) for the Wells Hydroelectric Project (Project).

The goal of the WQMP is to protect the quality of the surface waters affected by the Wells Project with regard to the numeric criteria. Studies conducted during the relicensing process have found water quality within the Wells Project to be within compliance. Public Utility District No. 1 of Douglas County (Douglas PUD), in collaboration with the Aquatic Settlement Work Group (Aquatic SWG), has agreed to implement measures in support of the WQMP. Reasonable and feasible measures will be implemented in order to maintain compliance with the numeric criteria of the Washington State Water Quality Standards (WQS), Chapter 173-201A WAC. The measures presented within the WQMP (Section 4.0) are designed to meet the following objectives:

Objective 1: Maintain compliance with state WQS for Total dissolved Gas (TDG). If non-compliance is observed, the Aquatic SWG will identify reasonable and feasible measures, which will be implemented by Douglas PUD. In April 2012 Washington Department of Ecology (Ecology) approved Douglas PUD’s Gas Abatement Plan (GAP) and issued a fish passage TDG adjustment waiver for the 2012 spill season. The final 2012 GAP requires Douglas PUD to monitor TDG in the forebay and tailrace of Wells Dam throughout the entire fish passage season (April 19th – August 19th). Hourly forebay and tailrace TDG values were reported on the U.S. Army Corps of Engineers Water Management Division webpage and the Columbia River Data Access Real Time webpage, consistent with regional fish management agencies. The GAP also included a biological monitoring plan, which involved the collection of adult salmonids at Wells Dam and juvenile salmonids at Rocky Reach Dam when TDG at Wells Dam exceeded 125% in the tailrace during any hour. In 2012, over 500 juvenile and 800 adult salmon were assessed for signs of Gas Bubble Trauma (GBT) when TDG values were above 125%. During the 2012 water year, Ecology was updated regularly when flows were exceptionally high and when TDG standards exceeded those required by the fish passage TDG exemption. In addition, Douglas PUD provided Ecology with weekly TDG and water reports.

Objective 2: Maintain compliance with state WQS for water temperature. If information becomes available that suggests non-compliance is occurring or likely to occur, the Aquatic SWG will identify reasonable and feasible measures, which will be implemented by Douglas

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1 During the 2011 spill season Wells Dam had measurable TDG exceedances, which fell above water quality standards. As such, during the issuance of the Wells 401 Certification and as part of the relicensing of the Wells Project, Ecology requires that compliance with state WQS for TDG is achieved at the Wells Project. Compliance is to be achieved within ten years of the issuance of the New License and approved Water Quality Attainment Plan.
PUD. Water temperature monitoring in 2012 was consistent with the requirements listed in the WQMP and 401 Certification.

Objective 3: Maintain compliance with state WQS for other numeric criteria. If information becomes available that suggests non-compliance is occurring or likely to occur, the Aquatic SWG will identify reasonable and feasible measures, which will be implemented by Douglas PUD. In 2012 samples of floating algae were taken and sent to King County laboratories. Toxicity levels were such that the Washington Department of Ecology recommended posting information at recreational sites designed to prevent people and pets from coming in contact with floating algae mats.

Objective 4: Operate the Project in a manner that will avoid, or where not feasible to avoid, minimize, spill of hazardous materials and implement effective countermeasures in the event of a hazardous materials spill; and

Objective 5: Participate in regional forums tasked with improving water quality conditions and protecting designated uses in the Columbia River basin. Consistent with the WQMP, 401 Certification, Operating License, during calendar year 2012, Douglas PUD participated in regional forums lead by the Washington Department of Ecology, the Sovereign Technical Team, and U. S. Army Corps of Engineers and other managers. In addition, the Wells Project was operated in a manner to minimize spill and TDG production consistent with the developed Spill Playbook and Gas Abatement Plan.

The WQMP is intended to be compatible with other water quality management plans in the Columbia River mainstem, including Total Maximum Daily Loads (TMDL). Furthermore, the WQMP is intended to be supportive of the Habitat Conservation Plan (HCP), Bull Trout Management Plan, Pacific Lamprey Management Plan, Resident Fish Management Plan, White Sturgeon Management Plan, and Aquatic Nuisance Species Management Plan through the protection of designated uses (WAC 173-201A-600) in Project waters. The WQMP is intended to be not inconsistent with other management strategies of federal, state and tribal natural resource management agencies.

The 2013 annual report on the implementation of the WQMP will include all of the water quality compliance related activities implemented from the issuance of the new license in November 2012 to the end of December 2013 and will include all of the new water quality related compliance reports and plans added into the new license by the 401 Certification.
1.0 INTRODUCTION

The Water Quality Management Plan (WQMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license (issued November 9, 2012).

During the development of this plan, the Aquatic Settlement Work Group (Aquatic SWG) focused on management priorities for resources potentially impacted by Wells Hydroelectric Project (Project) operations. Entities that participated in the Aquatic SWG include the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Washington Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), and Douglas PUD.

The Washington State Water Quality Standards (WQS) found at WAC 173-201A include designated uses (recreation, agriculture, domestic and industrial use, and habitat for aquatic life) and supporting numeric criteria. The WQMP is intended to address only the numeric criteria of the WQS. Aquatic life uses of the Project identified by the WQS shall be addressed by the five other Aquatic Resource Management Plans within the Agreement and by the measures implemented in the Wells Anadromous fish Agreement and Habitat Conservation Plan (HCP).

This management plan summarizes the relevant resource issues and background (Section 2), identifies goals and objectives of the plan (Section 3), and describes the relevant measures (Section 4) to maintain compliance with the numeric criteria of state WQS during the term of the new license.

The WQMP will be updated in 2013 to reflect additional requirements that have been added by the final Clean Water Act (CWA) Section 401 Water Quality Certification (401 Certification) and the new project license issued by the Federal Energy Regulatory Commission (FERC). The 2013 annual report on the implementation of the WQMP will include all of the water quality related activities that took place from the issuance of the new license in November 2012 to the end of December 2013. The 2013 annual report will also specifically address the implementation of the new water quality related measures found exclusively in the FERC license.

2.0 BACKGROUND

Section 401 of the Clean Water Act (33 USC Chapter 26 § 1341 et seq.) requires that applicants for a hydroelectric project license from the FERC provide FERC with a 401 Certification that provides reasonable assurance that the Project will comply with applicable WQS and any other appropriate requirements of state law. In Washington State, Ecology is responsible for issuing 401 Certifications. The 401 Certification for the Wells Project was issued on February 27th 2012.
2.1 Water Quality Standards

Congress passed the CWA in 1972, and designated the U.S. Environmental Protection Agency (EPA) as the administering federal agency. This federal law requires that a state’s water quality standards protect the surface waters of the U.S. for beneficial or designated uses, such as recreation, agriculture, domestic and industrial use, and habitat for aquatic life. Any state WQS, or amendments to these standards, do not become effective under the CWA until they have been approved by EPA.

Ecology is responsible for the protection and restoration of Washington State’s waters. Ecology establishes WQS that set limits on pollution in lakes, rivers, and marine waters in order to protect water quality and specified designated uses of such water bodies. These standards are found in WAC 173-201A.

2.1.1 Water Quality Standards for the Project

The Project includes the mainstem Columbia River above Wells Dam, one mile of the mainstem Columbia River below Wells Dam, the Methow River (up to river mile [RM] 1.5) and the Okanogan River (up to RM 15.5).

Under the 2006 WQS, the Project includes designated uses for spawning/rearing (aquatic life), primary contact recreation, and all types of water supply and miscellaneous uses. Numeric criteria to support the protection of these designated uses consist of various physical, chemical, and biological parameters including total dissolved gas (TDG), temperature, dissolved oxygen (DO), pH, turbidity, and toxins.

Unless stated otherwise in the subsections below, WQS criteria discussed in subsections 2.1.1.1 to 2.1.1.6 apply to all waters within the Project.

2.1.1.1 Total Dissolved Gas

TDG is measured as a percent saturation. Based upon criteria developed by Ecology, TDG measurements shall not exceed 110% at any point of measurement in any state water body. The WQS state that an operator of a dam is not held to the TDG standards when the river flow exceeds the seven-day, 10-year-frequency (7Q10) flood. The 7Q10 flow is the highest value of a running seven consecutive day average using the daily average flows that may be seen in a 10-year period. The 7Q10 total river flow for the Project was computed by Ecology (Pickett et al 2004) using the hydrologic record from 1974 through 1998 and a statistical analysis to develop the number from 1930 through 1998. The U.S. Geological Survey Bulletin 17B, “Guidelines for Determining Flood Flow Frequency” was followed. The resulting 7Q10 flow at Wells Dam is 246,000 cubic feet per second (cfs).

In addition to allowances for TDG standard exceedances during natural flood flows in excess of 7Q10, the TDG criteria may be adjusted to accommodate spill to facilitate fish passage over hydropower dams when consistent with an Ecology-approved Gas Abatement Plan (GAP). Ecology has approved on a per application basis, an interim exemption to the TDG standard (110%) to allow spill for juvenile fish passage on the Columbia and Snake rivers (WAC 173-
201A-200(1)(f)(ii)). Dams in the Columbia and Snake rivers may be granted such an exemption. The GAP must be accompanied by fisheries management, physical, and biological monitoring plans (173-201A-200(1)(f)(ii)).

Columbia and Snake River TDG Exemption

On the Columbia and Snake rivers, three conditions apply to the TDG exemption. First, in the tailrace of a dam, TDG shall not exceed 125% as measured in any one-hour period during spillage for fish passage. Second, TDG shall not exceed 120% in the tailrace of a dam, as an average of the 12 highest consecutive hourly readings in any one day (24-hour period), relative to atmospheric pressure. Third, TDG shall not exceed 115% in the forebay of the next dam downstream, also based on an average of the 12 highest consecutive hourly readings in any one day (24-hour period), relative to atmospheric pressure.

The increased levels of spill resulting in elevated TDG levels are intended to allow increased fish passage without causing more harm to fish populations than caused by turbine passage. The TDG exemption provided by Ecology is based on a risk analysis study conducted by the National Marine Fisheries Service (NMFS; NMFS 2000).

2.1.1.2 Temperature

Temperature is measured by the 7-day average of the daily maximum temperatures (7-DADMax). The 7-DADMax for any individual day is calculated by averaging that day’s daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date (WAC 173-201A-020).

Under the WQS, the 7-DADMax temperature within the Columbia, Methow, and Okanogan river portions of the Project shall not exceed 17.5°C (63.5°F) (WAC 173-201A-602 and 173-201A-200(1)(c)). Additionally, the WQS contains additional supplemental temperature requirements for the Project portion of the Methow River (see Methow River Supplemental Requirements section below). When a water body's temperature is warmer than 17.5°C (or within 0.3°C (0.54°F) of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F).

When the background condition of the water is cooler than 17.5°C, the allowable rate of warming up to, but not exceeding, the numeric criteria from human actions is restricted as follows:

(A) Incremental temperature increases resulting from individual point source activities must not, at any time, exceed 28/(T+7) as measured at the edge of a mixing zone boundary (where "T" represents the background temperature as measured at a point or points unaffected by the discharge and representative of the highest ambient water temperature in the vicinity of the discharge).

(B) Incremental temperature increases resulting from the combined effect of all non-point source activities in the water body must not, at any time, exceed 2.8°C (5.04°F).
Temperatures are not to exceed the criteria at a probability frequency of more than once every ten years on average. Temperature measurements should be taken to represent the dominant aquatic habitat of the monitoring site. This typically means samples should:

(A) Be taken from well mixed portions of rivers and streams.

(B) Not be taken from shallow stagnant backwater areas, within isolated thermal refuges, at the surface, or at the water's edge.

The following guidelines on preventing acute lethality and barriers to migration of salmonids are also used in determinations of compliance with the narrative requirements for use protection established in WAC 173-201A (e.g., WAC 173-201A-310(1), 173-201A-400(4), and 173-201A-410 (1)(c)). The following site-level considerations do not, however, override the temperature criteria established for waters in WAC 173-201A-200(1)(c) or WAC 173-201A-602:

(A) Moderately acclimated (16-20°C, or 60.8-68.0°F) adult and juvenile salmonids will generally be protected from acute lethality by discrete human actions maintaining the 7-DADMax temperature at or below 22°C (71.6°F) and the 1-day maximum (1-DMax) temperature at or below 23°C (73.4°F).

(B) Lethality to developing fish embryos can be expected to occur at a 1-DMax temperature greater than 17.5°C (63.5°F).

(C) To protect aquatic organisms, discharge plume temperatures must be maintained such that fish could not be entrained (based on plume time of travel) for more than two seconds at temperatures above 33°C (91.4°F) to avoid creating areas that will cause near instantaneous lethality.

(D) Barriers to adult salmonid migration are assumed to exist any time the 1-DMax temperature is greater than 22°C (71.6°F) and the adjacent downstream water temperatures are 3°C (5.4°F) or cooler.

Methow River Supplemental Requirements

Ecology has identified water bodies, or portions thereof, which require special protection for spawning and incubation in accordance with Ecology publication 06-10-038. This publication indicates where and when the following criteria are to be applied to protect the reproduction of native char, salmon, and trout. Water temperatures are not to exceed 13°C from October 1 to June 15 in the lower Methow River including the portion within the Project boundary (up to RM 1.5).

2.1.1.3 Dissolved Oxygen

DO criteria are measured in milligrams per liter (mg/L). Under the WQS, DO measurements shall not be under the 1-day minimum of 8.0 mg/L. 1-day minimum is defined as the lowest DO reached on any given day. When a waterbody's DO is lower than the 8.0 mg/L criteria (or within 0.2 mg/L of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the DO of that water body to decrease more than 0.2
mg/L. Concentrations of DO are not to fall below 8.0 mg/L at a probability frequency of more than once every ten years on average.

DO measurements should be taken to represent the dominant aquatic habitat of the monitoring site. This typically means samples should:

(A) Be taken from well mixed portions of rivers and streams.

(B) Not be taken from shallow stagnant backwater areas, within isolated thermal refuges, at the surface, or at the water's edge.

2.1.1.4 pH

pH is defined as the negative logarithm of the hydrogen ion concentration. Under the WQS, pH measurements shall be in the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.5 units.

2.1.1.5 Turbidity

Turbidity is measured in nephelometric turbidity units (NTUs). Turbidity shall not exceed 5 NTU over background when the background is 50 NTU or less; or a 10% increase in turbidity when the background turbidity is more than 50 NTU.

2.1.1.6 Toxins

Toxic substances shall not be introduced above natural background levels in waters of the state which have the potential either singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by Ecology.

Ecology shall employ or require chemical testing, acute and chronic toxicity testing, and biological assessments, as appropriate, to evaluate compliance with WAC 173-201-240 and to ensure that aquatic communities and the existing and characteristic beneficial uses of waters are being fully protected.

Within the Project Area, specifically within the Project portion of the Okanogan River, two toxic substances are of concern: Dichloro-Diphenyl-Trichloroethane (DDT) and Polychlorinated Biphenyls (PCBs). DDT is a synthetic organochlorine insecticide that was frequently used in agriculture prior to being banned in 1972. PCBs are an organic compound that were used as coolants and insulating fluids for transformers, and capacitors. PCBs are classified as persistent organic pollutants and production was banned in the 1970s due to its high level of toxicity.

Toxic substances criteria identified in the WQS for these two substances are as follow:

(A) In freshwater, DDT (and metabolites) shall not exceed 1.1 μg/L as an instantaneous concentration at any time. Exceedance of the criteria is defined as an acute condition. DDT (and
metabolites) shall not exceed 0.001 µg/L as a 24-hour average. Exceedance of the criteria is defined as a chronic condition.

(B) In freshwater, PCBs shall not exceed 2.0 µg/L as a 24-hour average. Exceedance of the criteria is defined as an acute condition. PCBs shall not exceed 0.01 µg/L as a 24-hour average. Exceedance of the criteria is defined as a chronic condition.

2.1.2 305(b) Report, 303(d) List and Total Maximum Daily Loads

Every two years, the EPA, as specified in section 305(b) of the CWA, requires Ecology to compile an assessment of the state’s water bodies. Data collected from the water quality assessment are used to develop a 305(b) report. The report evaluates and assigns each water body into five categories based upon the Ecology’s evaluation of the water quality parameters collected from within each water body.

Category 1 states that a water body is in compliance with the State WQS for the parameter of interest.

Category 2 states a water body of concern.

Category 3 signifies that insufficient data are available to make an assessment.

Categories 4a-4c indicates an impaired water body that does not require a Total Maximum Daily Load (TMDL) for one of three reasons:

- Category 4a indicates a water body with a finalized TMDL.
- Category 4b indicates a water body with a Pollution Control Program.
- Category 4c indicates a water body impaired by a non-pollutant (e.g., low water flow, stream channelization, and dams).

Category 5 represents all water bodies within the state that are considered impaired and require a Water Quality Implementation Plan (WQIP) (formerly TMDL). The 303(d) list consists of only water bodies with Category 5 listings.

Information presented below in subsections 2.1.2.1 to 2.1.2.6 are based upon the Draft 2008 Water Quality Assessment and candidate 303(d) list that has been finalized by Ecology and submitted to the EPA for approval.

2.1.2.1 Total Dissolved Gas

The reach of the Columbia River within the Project is on the state’s 1998 303(d) list for TDG impairment (Category 5 listing). In 2004, Ecology developed a TDG TMDL (which was approved by EPA) for the mid-Columbia River and as such, this reach of the Columbia River, which includes the Project, is no longer on the 303(d) list for TDG (Category 4a).

Neither the reach of the Methow River within the Project (RM 1.5) nor the reach of the Okanogan River within the Project (RM 15.5) are listed on the 2008 303(d) list for TDG.

2.1.2.2 Temperature

The reach of the Columbia River within the Project is on the state’s 2004 303(d) list for temperature impairment. The EPA has developed a draft temperature TMDL for the mainstem
Columbia River, including that portion of the Columbia River contained within the Project. It is anticipated that the EPA will issue the final temperature TMDL for the Columbia River at some future date. The TMDL will address the water temperature effects of dams and other human actions, including model analyses and load allocations for mainstem hydroelectric projects including Wells Dam.

The reach of the Methow River within the Project (RM 1.5) is not on the 2008 303(d) list for temperature.

The reach of the Okanogan River within the Project (RM 15.5) is not on the 2008 303(d) list for temperature. However, reaches of the Okanogan River upstream of the Wells Project boundary are listed on the 2008 303(d) list for temperature.

2.1.2.3 DO
No part of the Project area is on the 2008 303(d) list for DO.

2.1.2.4 pH
No part of the Project area is on the 2008 303(d) list for pH.

2.1.2.5 Turbidity
No part of the Project area is on the 2008 303(d) list for turbidity.

2.1.2.6 Toxins
Neither the reach of the Columbia River within the Project nor the reach of the Methow River within the Project (RM 1.5) is on the 2008 303(d) list for toxins.

The reach of the Okanogan River within the Project (RM 15.5) is not listed on the 2008 303(d) list for toxins. In 1998, Ecology put the portion of the Okanogan River within Project boundary on the 303(d) list for 4, 4’-DDE, 4,4’-DDD, PCB-1254, and PCB 1260 concentrations above standards in edible carp tissue (Ecology 1998). In 2004, Ecology completed the Lower Okanogan River DDT and PCB TMDL (which was approved by EPA).

2.2 Project Water Quality Monitoring Results

2.2.1 Total Dissolved Gas

TDG supersaturation is a condition that occurs in water when atmospheric gasses are forced into solution at pressures that exceed the pressure of the overlying atmosphere. Water containing more than 100% TDG is in a supersaturated condition. Water may become supersaturated through natural or dam-related processes that increase the amount of air dissolved in water. Supersaturated water in the Columbia River may result from the spilling of water at Columbia River dams. The occurrence of TDG supersaturation in the Columbia River system is well
documented and has been linked to mortalities and migration delays of salmon and steelhead (Beiningen and Ebel 1970; Ebel et al. 1975).

At Wells Dam, Douglas PUD has monitored TDG for compliance with state and federal water quality regulations since 1998 and more recently in support of its GAP and TDG exemption issued by Ecology for juvenile fish passage (Le 2008). Douglas PUD is required to monitor TDG in the Wells Dam forebay and tailrace area (on the Columbia River, near RM 515.6). Douglas PUD uses Rocky Reach forebay TDG data collected by Chelan County PUD for downstream forebay monitoring compliance data.

A TDG study conducted in 2006 indicated that the current location of the TDG compliance monitoring stations are appropriate in providing representative TDG production information both longitudinally and laterally downstream of Wells Dam (EES Consulting et al. 2007). Detailed information regarding the study is provided in Section 2.3.1.2.

Since 2003, Douglas PUD has operated the Project during the juvenile fish passage season (April – August) in accordance with an Ecology-approved GAP and associated TDG exemption. TDG monitoring at Wells Dam is facilitated through the deployment of Hydrolab Minisonde probes in the center of the Wells forebay and approximately 3 miles downstream of Wells Dam. TDG data are logged every fifteen minutes, averaged (4 in an hour) and transmitted on the hour. Probes are serviced and checked monthly for accuracy and calibrated if necessary.

Levels of TDG at Wells Dam and the Rocky Reach Dam forebay that result in exceedances of the numeric criteria are most likely to occur during April through August as a result of high flows caused by either rapid snow melt or federal flow augmentation intended to aid downstream juvenile salmonid passage. Douglas PUD monitors for TDG at Wells Dam between April 1 and September 15 annually to coincide with this observation. Chelan County PUD monitors for TDG at Rocky Reach Dam between April 1 and August 31. High TDG values at both Wells Dam and Rocky Reach Dam resulting in exceedances are often associated with various factors including high spring flows, unit outages, and upstream Federal Columbia River Power System operations, including federal flow augmentation, resulting in water entering the Project with relatively high TDG levels. During these time periods, river conditions in the mid-Columbia River system are conducive to exceedances of the TDG criteria.

In past years, Wells forebay monitoring data show that on average TDG values at this location frequently exceed 115%, especially during the high flow years of 2011 and 2012. For example, in July of 2012 nearly twice as much water passed the Wells Project than the previous forty two year average for the month of July. In general, Wells Dam adds relatively small amounts of TDG through the use of spill intended to aid in the passage of juvenile salmonids (0-2%). However, similar to other hydroelectric facilities on the Columbia River system, probabilities for exceedances are more likely during late spring periods of high river flow and low electrical demand or during high flow years such as 2011 and 2012. Table 2.2-1 contains historic average, minimum and maximum flow values associated with the Wells Project. Over the last ten years Wells Dam has demonstrated high compliance with TDG requirements. Specific TDG performance during the 2012 spill season is contained in the 2012 GAP report filed with the FERC in February 2013.
Table 2.2-1  Average monthly river flow volume (kcfs) during the TDG monitoring season at the Wells Project in 2012 compared to the previous 42-year average (1969-2011), by month.

<table>
<thead>
<tr>
<th>Month</th>
<th>1969-2011 Mean</th>
<th>2012 Mean</th>
<th>Percent Difference from 42-year Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>115.6</td>
<td>174.1</td>
<td>+151%</td>
</tr>
<tr>
<td>May</td>
<td>149.4</td>
<td>217.2</td>
<td>+145%</td>
</tr>
<tr>
<td>June</td>
<td>164.5</td>
<td>232.9</td>
<td>+142%</td>
</tr>
<tr>
<td>July</td>
<td>132.2</td>
<td>253.8</td>
<td>+192%</td>
</tr>
<tr>
<td>August</td>
<td>104.6</td>
<td>158.7</td>
<td>+152%</td>
</tr>
<tr>
<td>All</td>
<td>133.3</td>
<td>207.34</td>
<td>+156%</td>
</tr>
</tbody>
</table>

2.2.2 Temperature

Beginning in 2001, an extensive water temperature monitoring effort was initiated by Douglas PUD in order to better understand the temperature dynamics throughout the Wells Reservoir. Temperature data was collected by Douglas PUD at four locations in the Columbia River (RM 544.5, RM 535.3, RM 530.0, and RM 515.6) and at one site each on the Okanogan (RM 10.5) and Methow (RM 1.4) rivers. Data collected by Douglas PUD were collected hourly using Onset tidbit temperature loggers. Monitoring start and end dates varied from year to year but generally began in the early spring and ended in late fall. Quality assurance and control measures were implemented prior to deploying and upon retrieving temperature loggers to ensure that data collected were accurate. Due to sensor loss or sensor malfunction in some years, the availability of data at some of these monitoring locations is sporadic.

In general, 7-DAD Max temperature data indicate that the portion of the Columbia River upstream of and within the Project generally warms to above 17.5°C (WQS numeric criteria) in mid-July and drops below the numeric criteria by early October (Figure 2.2-1). Water temperatures in the Methow River upstream of the Project warm to above 17.5°C in mid-July and drop below the numeric criteria by September (Figure 2.2-2), while trends in the Okanogan River (upstream of the Project) indicate warming above 17.5°C from early June with cooling by late September (Figure 2.2-3). Maximum water temperatures typically occur in late summer (August) with temperatures below Chief Joseph Dam, the Methow River (RM 1.4), and the Okanogan River (RM 10.5) reaching 20.0°C, 22.5°C, and 27.0°C, respectively. It is important to note that these data are representative of water temperatures as they flow into the Project. In 2006, Douglas PUD expanded the Project temperature monitoring season to cover the entire year and implemented a more frequent downloading schedule. Douglas PUD also added additional monitoring stations at the mouths of the Okanogan (RM 0.5) and Methow (RM 0.1) rivers. These have been used to model temperature and allocate the effects of Project operations on water temperatures at Wells Dam and within the Wells Reservoir as they relate to compliance with the WQS numeric criteria for temperature.
Figure 2.2-1 7-DAD Max water temperature collected in the tailrace of Chief Joseph Dam (RM 544) using Onset temperature loggers for years 2001-2007.
Figure 2.2-2  7-DADMax water temperature collected in the Methow River upstream from the influence of Wells Dam (RM 1.4) using Onset temperature loggers for years 2001-2007. Data were unavailable in 2002 and 2003.

Figure 2.2-3  7-DADMax water temperature collected in the Okanogan River (RM 10.5) using Onset temperature loggers for years 2001-2007.
2.2.2.1 Wells Dam Fish Ladder Temperature Monitoring

Wells Dam has two fish ladders, one at each end of the dam. The two fish ladders are conventional staircase type fish ladders with 73 pools. The water source for the upper pools is the Wells Dam forebay. The flow through the upper 17 pools varies from 44 cfs at full reservoir to approximately 31 cfs at maximum reservoir drawdown. The lower 56 pools discharge a constant 48 cfs of water. To maintain the flow at 48 cfs in the lower ladder pools, supplementary water (auxiliary water supply) is introduced into Pool No. 56 through a pipeline from the reservoir. Pools are numbered in order from the bottom (near the collection gallery and entrance) to the top (exit to the Wells Dam forebay). The ladders are enclosed.

According to the HCP Biological Opinion (BO) issued by NMFS, all entities that use the fish trapping facilities at Wells Dam are required to discontinue trapping operations when fish ladder water temperatures exceed 68.0°F (20.6°C). In 2001 and 2003, Douglas PUD added supplemental temperature recording equipment at Pool 39 near the broodstock collection facilities in the east fishway at Wells Dam to ensure compliance with requirements in the NMFS BO. In 2001, hourly data indicated that water temperatures at this location in the east fish ladder did not exceed 68.0°F (20.6°C) at any time during the monitoring period (Figure 2.2-4), which ran from late July to early December. In 2003, data were recorded every two hours and exceedances of greater than 68.0°F (20.6°C) were observed on three hourly occasions (Figure 2.2-5).

![Figure 2.2-4 Hourly water temperatures collected at the Wells Dam east fish ladder trap during 2001.](image_url)
2.2.3 DO, pH, and Turbidity

2.2.3.1 DO and pH

In 2005, Douglas PUD added sensors to its existing forebay TDG monitoring equipment (Hydrolab Minisonde) in order to collect preliminary information on pH and DO within the Project to monitor these parameters during the late summer when probabilities of exceedance are highest. In 2006, Douglas PUD expanded the monitoring period to include the entire late summer period. In 2007, Douglas PUD further expanded the monitoring period to begin in July and end in early December (Figure 2.2-6 and 2.2-7). The monitoring data indicate that values for these parameters are generally in compliance with the WQS numeric criteria at this site. pH values are consistently within the range of 6.5 to 8.5 as specified by the numeric criteria. During August and September periods of this study, there were periodic excursions of DO below the numeric criteria of 8.0 mg/L. Probable causes are likely due to the physiological processes of aquatic plants; however, these exceedances do not appear to be the dominant trend.

Figure 2.2-5 Water temperatures collected every two hours at the Wells Dam east fish ladder trap during 2003.
Figure 2.2-6  pH measurements collected at the Wells Forebay TDG monitoring station (Hydrolab MiniSonde), 2005-2007.

Figure 2.2-7  DO measurements collected at the Wells Forebay TDG monitoring station (Hydrolab MiniSonde), 2005-2007.
2.2.3.2 Turbidity

At Wells Dam, Secchi disk readings are taken daily during the adult fish passage assessment period of May 1 to November 15 to examine turbidity. A standard Secchi disk is lowered into the forebay on the west side of Wells Dam near the exit to the west fishway. Measurements are recorded in meters of visibility and records have been made since the early 1970s; however, continuous, reliable information adhering to a standard protocol has been collected since 1998. General trends of Secchi disk data suggest relatively lower periods of visibility (0.6 meters to 1.2 meters) during the spring and early summer. These relatively low periods of visibility are highly correlated with high flows during the spring runoff period. As the high flow period subsides, Secchi disk values increase to between 3.4 and 4.6 meters for the remainder of the monitoring period. In 2008, Douglas PUD installed a fixed turbidity sensor near the east fishway exit in the Wells forebay and collected turbidity data in the Wells Dam forebay.

2.3 Project Water Quality Studies

2.3.1 Total Dissolved Gas

Each year from 2003-2008, Douglas PUD implemented spill testing activities to examine the relationship between water spilled over the dam and the production of TDG. These results were subsequently used by IIHR-Hydroscience and Engineering of University of Iowa to develop and calibrate an unsteady state three-dimensional (3D), two-phase flow computational fluid dynamics (CFD) tool to predict the hydrodynamics of gas saturation and TDG distribution within the Wells tailrace. These tools were then used to reliably predict TDG production at Wells Dam and establish how preferred operating conditions and spillway configurations can be used as methods to manage TDG within WQS numeric criteria (Politano et al. 2009b).

2.3.1.1 Project TDG Assessments 2003-2005

In 2003 and 2004, Douglas PUD hired Columbia Basin Environmental (CBE) to determine the effectiveness of the tailwater sensor relative to the tailwater cross section profile for TDG and better define the relationship between spillway releases and TDG production (CBE 2003, 2004). CBE deployed TDG sensors along two transects. Based on the results of these studies, the tailwater station provided an accurate record of daily average TDG values in the Wells Dam tailrace. The studies also showed that at times, gas levels from some turbine flows were being affected by spill.

In spring 2005, Douglas PUD contracted with CBE to implement a TDG study at Wells Dam designed to measure TDG pressures resulting from various spill patterns at the dam (CBE 2006). An array of water quality data loggers was installed in the Wells Dam tailwater for a period of two weeks between May 23, 2005 and June 6, 2005. The Wells Dam powerhouse and spillway were operated through a predetermined range of operational scenarios that varied both total flow and shape of the spillway discharge. A total of eight configurations were tested including flat spill patterns (near equal distribution of spill across the entire spillway), crowned spill patterns (spill is concentrated towards the center of the spillway) and spill over loaded and unloaded units (Table 2.3-1).
Table 2.3-1  Test matrix for 2005 Wells Dam TDG Production Dynamics Study.

<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>Spill over load, east spill/east generation</td>
</tr>
<tr>
<td>1B</td>
<td>Spill over unloaded units, east spill/west generation</td>
</tr>
<tr>
<td>1C</td>
<td>Spill over unloaded units, west spill/east generation</td>
</tr>
<tr>
<td>1D</td>
<td>Spill over load, west spill/west generation</td>
</tr>
<tr>
<td>2A</td>
<td>Crowned spill, modest flow</td>
</tr>
<tr>
<td>2B</td>
<td>Dentated spill, modest flow</td>
</tr>
<tr>
<td>2C</td>
<td>Crowned spill, high flow</td>
</tr>
<tr>
<td>2D</td>
<td>Flat spill, high flow</td>
</tr>
</tbody>
</table>

Results from the study indicated that spill from the west side of the spillway resulted in consistently higher TDG saturations than similar spill from the east side. All Dentated spill patterns and flat spill patterns at high river flow yielded higher TDG saturations than crowned spill for similar total discharges. The results of this study also indicated that TDG levels of powerhouse flows may have been influenced by spill.

2.3.1.2  EES Consulting 2006 Project TDG Production Dynamics Study

In 2006, Douglas PUD continued TDG assessments at the Project by examining the best spillway configurations and project operations to minimize the production of TDG. Douglas PUD hired a team of hydraulic and TDG experts from the Pacific Northwest to help design a monitoring program for a study that would examine various operational scenarios and their respective TDG production dynamics.

Thirteen sensors were placed along three transects at 1,000, 2,500, and 15,000 feet below Wells Dam. There were also three sensors placed across the forebay, one being the fixed monitoring station midway across the face of the dam and two more a distance of 300 feet from the dam. The sensors were programmed to collect data in 15-minute intervals for both TDG and water temperature. Each test required the operations of the dam to maintain static flows through the powerhouse and spillway for at least a three-hour period. While there were 30 scheduled spill events, there were an additional 50 events where the powerhouse and spillway conditions were held constant for a minimum three-hour period. These “incidental” events provided an opportunity to collect additional TDG data on a variety of Project operations that met study criteria and are included in the results of the 2006 TDG Abatement Study. Spill amounts ranged from 5.2 to 52% of project flow; the volume of spill ranged from 2.2 to 124.7 kcf and the total discharge ranged from 16.4 to 254.0 kcf. There were six tests that were done at flows that exceeded the Wells Dam 7Q10 flows of 246 kcf.

Results of the study indicated that two operational scenarios, spread spill and concentrated spill, produced the lowest levels of TDG. The EES Consulting team recommended continued testing of operational measures to ameliorate TDG production at Wells Dam (EES Consulting et al. 2007). The 2006 study confirmed that the current locations of the forebay and tailwater TDG compliance monitoring station are appropriate in providing representative TDG production information both longitudinally and laterally downstream of Wells Dam.
2.3.1.3 IIHR-Hydroscience and Engineering TDG Modeling

A study was initiated with the University of Iowa IIHR-Hydroscience and Engineering in 2007 to develop a numerical model capable of predicting the hydrodynamics and TDG concentrations in the tailrace of the Wells Project. The purpose of the model was to assist in the understanding of the underlying dynamics of TDG production allowing an accurate evaluation of the effectiveness of various spill configurations and plant operations in reducing TDG at Wells Dam. The modeling efforts were divided into three phases. Phase I was a developmental stage for calibration and validation. The results from Phase I were successful and the model was proven to provide a reliable predictor of tailrace TDG and therefore a useful tool to identify Project operations that can minimize TDG concentrations downstream of Wells Dam (Politano et al. 2008). Phase II was a series of model runs using varying spill configurations based on typical 7Q10 events observed over the past decade. The final model run, referred to as Scenario-9, showed that preferred operating conditions and spillway configurations are able to reduce tailrace TDG to levels within Washington State WQS (< 120%) during a 7Q10 flow (Politano et al. 2009a).

Phase III included a final series of model runs aimed at gaining further reductions in tailrace TDG by reconfiguring the spillway operations used to achieve the tailrace standard in Phase II (Scenario-9). In addition to gaining additional reductions in TDG, IIHR-Hydroscience and Engineering ran a “Standard Compliance Comparison” scenario. The Standard Compliance Comparison scenario included a forebay TDG of 115%, along with 9 of 10 units operating at full capacity (i.e., 90% of total powerhouse capacity), to provide results comparable to downstream hydroelectric project TDG evaluations. The Phase III report also demonstrated compliance with two other requirements of the state WQS: (1) the ability to meet 115% in the forebay of Rocky Reach Dam during fish spill; and (2) the ability to maintain 110% in the tailrace during non-fish spill periods (Politano et al. 2009b).

2.3.1.4 Project TDG Playbooks

Since 2007, spill playbooks have been developed annually for operators at Wells Dam. The original spill playbook in 2007 focused on a range of operations to evaluate TDG production along with potential operational constraints. The subsequent playbooks evolved to the current 2012 format that simply focuses on strategies that have been identified to effectively manage TDG production in the tailrace of Wells Dam.

Since the Wells Project is a “run-of-the river” project with a relatively small storage capacity, river flows in excess of the ten-turbine hydraulic capacity must be passed over the spillways. Outside of system coordination and gas abatement spill (Douglas PUD has adopted a policy of not accepting the latter), minimization of involuntary spill has primarily focused on minimizing TDG production dynamics of water spilled based upon a reconfiguration of spillway operations. The 2009 Wells Project GAP (Lê and Murauskas, 2009) introduced the latest numerical model developed by the University of Iowa’s IIHR-Hydroscience and Engineering Hydraulic Research Laboratories. The two-phase flow computational fluid dynamics tool was used to predict hydrodynamics of TDG distribution within the Wells Dam tailrace and further identify operational configurations that would minimize TDG production at the Project. In an April 2009 report, the model demonstrated that Wells Dam can be operated to meet the TDG adjustment.
criteria during the passage season with flows up to 7Q-10 levels provided the forebay TDG levels are below 115%. Compliance was achieved through the use of a concentrated spill pattern through Spillbay No. 7 and surplus flow volume through adjacent odd numbered spillbays in a defined pattern and volume. These preferred operating conditions create surface-oriented flows by engaging submerged spillway lips below the ogee, thus increasing degasification at the tailrace surface, decreasing supersaturation at depth, and preventing high-TDG waters from bank attachment. These principles were the basis of the 2009 Wells Project Spill Playbook and were fully implemented for the first time during the 2009 fish passage (spill) season with success. Overall, no exceedances were observed in either the Wells Dam tailrace or the Rocky Reach forebay in 2009.

In 2010, the concepts from the 2009 Spill Playbook were integrated into the 2010 Wells Project Spill Playbook given their effectiveness in maintaining levels below TDG criteria during the previous year. High Columbia River flows in June, which exceeded the preceding 15-year average flow, resulted in several exceedances of the hourly (125% maximum) and 12C-High (120%) TDG limits in the Wells Dam tailrace, and Rocky Reach forebay (115%). In response, Douglas PUD implemented an in-season analysis of the 2010 Spill Playbook and determined that full implementation of the recommendations from IIHR Engineering Laboratory would require the removal of the juvenile fish bypass system flow barriers in one even numbered spillbay. Following the in-season analysis and consultation with the HCP Coordinating Committee, changes were made to the 2010 Spill Playbook that allowed for the removal of the juvenile fish bypass system barriers in spillbay 6. Specifically, the Spill Playbook was modified to state that when spill levels approach the 53 kcfs threshold, the JBS barriers in spillbay 6 would be removed in order to remain in compliance with the TDG criteria in the Wells Dam tailrace and Rocky Reach Dam forebay. When spill exceeded 53 kcfs, excess spill would be directed through spillbays 6 and 7 rather than through spillbays 5 and 7. This operational configuration resulted in a more compact spill pattern that reduced the air-water interface surface area between spillway flows and the subsequent potential for lateral mixing and air entrainment.

In February 2011, Douglas PUD conducted an additional technical analysis of the 2010 Spill Playbook (after in-season changes) and confirmed that continued implementation would be appropriate for 2011 with additional minor modifications. Following approval of the 2011 GAP by Ecology, the 2011 Spill Playbook was implemented. Only minor changes were made to the 2012 spill playbook as a result of high compliance during the 2011 spill season.

In December of 2012 the final GAP report was completed for the 2012 spill season. After analysis it was determined that the 2012 spill season had the third highest average monthly flows since 1969 (April- August). In addition incoming flows were reliably above 115%. Despite these conditions Wells Dam demonstrated high compliance with all standards aside from the Rocky Reach 115% 12C-high forebay standard since incoming flows to Wells were above 115% greater than 50% of the spill season days. Given these unique conditions, and high compliance performance in 2011 no changes were suggested for the 2012 spill playbook.

In summary, the resulting 2012 spill strategies are based on four basic principles:
Spill operations concentrated through a single spillbay (as opposed to spread through several spillbays) reduce TDG production and increase degasification at the tailwater surface.

Discharge from spillbays (denoted S hereafter) located near the middle of the dam (e.g., S7) prevent water with high TDG from attaching to the shoreline.

Forced spill exceeding Juvenile Bypass System (JBS) flows of 2.2 kcfs must be increased to ≥ 15 kcfs to ensure that the submerged spillway lip below the ogee is engaged. The resulting force creates flows that are surface oriented, ultimately promoting degasification at the tailwater surface.

Operations of spillbays should change with expected incoming flows, which include the removal and reinstallation of bypass barriers. Active management of the spillbays and bypass barriers should improve TDG performance.

The above principles are used as a guideline for Project operators to spill at a range of outflows to ensure the future compliance with the Washington State WQS for TDG.

### 2.3.2 EES Consulting 2006 Project Limnology

In 2005, Douglas PUD implemented a study to collect baseline limnological information for waters within the Project (EES Consulting 2006). The objectives of this study were to further document existing water quality conditions within the Project and to collect information to fill water quality data gaps identified by Douglas PUD to support the water quality certification process administered by Ecology. A total of nine sampling sites, consisting of 5 mainstem sites, 2 tributaries and 2 littoral habitats, were selected to represent the spatial variability within the Project (Table 2.3-2). The year-long study began in May 2005 and investigated various water quality parameters at each of the nine sampling sites. Sampling included physical, chemical and biological water quality characteristics. A total of 22 water quality characteristics were sampled. All procedures used for the purpose of collecting, preserving and analyzing samples followed established EPA 40 CFR 136 protocol.

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Downstream of Chief Joseph Dam (at Hwy 17 bridge)</td>
</tr>
<tr>
<td>2</td>
<td>Columbia River just downstream of the Brewster Bridge</td>
</tr>
<tr>
<td>3</td>
<td>Bridgeport Bar littoral site</td>
</tr>
<tr>
<td>4</td>
<td>Columbia River downstream of Pateros where the thalweg approaches maximum depth in the lower Wells Reservoir</td>
</tr>
<tr>
<td>5</td>
<td>Okanogan River upstream of confluence with Columbia River</td>
</tr>
<tr>
<td>6</td>
<td>Methow River upstream of confluence with Columbia River</td>
</tr>
<tr>
<td>7</td>
<td>Lower Wells Reservoir/Starr Boat Launch littoral site</td>
</tr>
<tr>
<td>8</td>
<td>Wells Forebay</td>
</tr>
<tr>
<td>9</td>
<td>Wells Tailrace</td>
</tr>
</tbody>
</table>

Results from the limnological investigation showed that the Project is characterized by low to moderately low levels for nutrients, slightly basic pH (range 7.5–8.5), well-oxygenated water and
low turbidity with moderately low algae growth. Average Secchi depth for the Wells Reservoir varied minimally during May through August with only a slight increase as the season progressed (study average per site range 4.1 meters to 4.5 meters). Secchi depth (transparency) increased to a seasonal peak in September of 6.25 meters before slightly decreasing in October to a mean depth of 5.3 meters. Transparency increased downstream at the Brewster Bridge and Wells Forebay relative to the head of the reservoir at the Chief Joseph Dam tailrace for all months.

Turbidity in the Columbia River showed little seasonal variation with an annual average of 0.98 NTU and a variation of 0.38 NTU in September, 2005 (Wells Forebay site) to 3.81 NTU in February, 2006 (Brewster Bridge site). Longitudinal variation in turbidity was also minimal; sampling did not occur within the mixing zone plume of the Okanogan River. Turbidity in the Okanogan River was consistently higher than the Columbia River. Turbidity in the Methow River was higher than in the Columbia River in May (due to sediment load) and in August due to phytoplankton growth. The only turbidity reading over 5.0 NTU was in the Methow River during May where turbidity was 5.6 NTU.

Under the EES Consulting limnology study, water temperature in the Wells Reservoir is primarily governed by the temperature of inflowing water at Chief Joseph Dam with little warming occurring as water traverses the Wells Reservoir’s length. Similar to the Wells hourly temperature monitoring data (Section 2.2.2), results of the study indicate that the Project waters remained unstratified throughout the entire study period and was vertically homogeneous for DO. Figure 2.3-1 shows a vertical water profile of the Project. Low respiration rates at depth, a lack of vertical stratification and short water retention times resulted in homogeneous DO levels at all depths within the Project.

Figure 2.3-1 Vertical water quality profile of the Project forebay from sampling date August 17, 2005.
DO levels at one meter depth increased from upriver to downriver; the average difference (May through October) was 1.07 mg/L. The difference was more pronounced during May through August. The difference in September and October was 0.3 mg/L, which is at the limit of instrument reliability. Upstream to downstream differences in surface DO were negligible for the February 2006 sampling event. Littoral DO was similar or slightly higher than pelagic DO for surface waters. DO saturation levels were equal to or greater than 100% for all sites and all depths in all months except October when DO percent saturation for surface waters ranged from 110% to 91% saturation. The lower saturation levels in October may be due to reduced primary productivity while water temperatures were still relatively warm. All DO readings were above 8.0 mg/L and in compliance with the WQS numeric criteria.

Nitrogen and phosphorus are the two primary macronutrients needed for plant growth. Silica is important for diatomaceous phytoplankton. Ammonia (Nitrogen) levels were near or below detection levels for pelagic and littoral Columbia River Project waters as well as the Okanogan River for May through August and in February. Ammonia levels were only slightly higher in September and October. Ammonia peaked in the Methow River in August. Nitrates/Nitrites (Nitrogen) for Columbia River Project waters were higher in May before leveling off during the summer and fall. Nitrates/Nitrites were significantly higher at all sites for the February sample than any other month. Nitrates within littoral waters were lower than pelagic waters except in February when levels were similar. Nitrates/Nitrites in both the Okanogan and Methow rivers showed an increasing trend during the growing season. Total nitrogen levels for Columbia River pelagic and littoral waters were similar and relatively constant with the exception of significantly higher levels at most sites during February.

Orthophosphorus peaked for all stations in July. Orthophosphorus levels for pelagic and littoral waters were similar in all months except July when littoral orthophosphorus concentrations were significantly higher than observed for pelagic areas. Orthophosphorus levels in the Methow and Okanogan rivers were higher than in the Columbia River. Orthophosphorus was partially depleted in the Okanogan River but not in the Methow River at the time of the August sampling. Total phosphorus was slightly higher in littoral waters than in pelagic areas. Wave disturbance to bottom sediments may be a factor for this difference. Total phosphorus levels in pelagic surface waters ranged from below detection limits to 30.8 ug/L. Total phosphorus was higher for the Okanogan River than elsewhere, which is likely due to the higher sediment load. Total phosphorus for all stations peaked in July before gradually declining throughout the rest of the growing season.

The range in Nitrogen to Phosphorus (N:P) ratios for the Project waters was 2.5 to 30.8. The average Total Nitrogen to Total Phosphorus (TN:TP) ratio in the Project waters was 13.7 for the photic zone and averaged 14.8 for samples from all depths. These values are within the suggested literature ranges for phosphorus limitation. The N:P ratios peaked in July with pelagic and littoral waters showing similar trends. A decreasing N:P ratio through the major part of the algae growing season is typical of moderate to low nutrient waters as algae assimilate available nutrients. The N:P ratios were higher in the tributary rivers relative to the Columbia River. The N:P ratios are an indicator but not an absolute confirmation of factors limiting productivity.
Moderate to low chlorophyll a concentrations (range 0.5 μg/L to 5.8 μg/L) occurred throughout the sample period with peaks in July and October for the Project waters. Concentrations were lowest in August and also had the least variability among sites for the August sampling event. Pelagic and littoral waters were similar for chlorophyll a concentrations in most months except October when littoral waters reported twice as high chlorophyll a levels.

Phytoplankton were dominated by diatoms for all months at all sites sampled with Chryrophyta (small unincellular flagellates) being second dominant based on biovolume. Diatoms and Chryrophyta are both considered a good food source for the rest of the aquatic food web. Diatoms comprised 75% to 84% of the total phytoplankton biomass for the Project sites. Chlorophytes (green algae) were sub-dominant in the tailrace but only a minor component elsewhere. Total phytoplankton biomass was relatively low for all Project sample sites; total biomass was generally less than 200,000 um³/ml. Biomass peaked in July and August for pelagic areas of the Project waters and minor peaks occurred in October for littoral sites. The timing of peaks varied among all stations. Cyanophyta (blue-green algae) were only recorded in the Project sites for the July sample at Brewster Bridge where they comprised 16% of the total biomass; however, the biomass of Cyanophytes were comprised of relatively few but very large multincellular units. Cyanophytes also were recorded in the Wells Tailrace (4.7% biomass) in July. Diatoms dominated phytoplankton in the Methow River where peak biomass occurred in August (1,455,158 um³/ml). This peak is much higher than biomass observed anywhere else in the Project. Biomass levels in the Okanogan River were only slightly higher than in the Columbia River for most months with minor peaks occurring in May and October. Cyanophytes were a small proportion of the August biomass sample for the Okanogan River.

Diatoms also dominated periphyton. Seasonal lows occurred in July for all sites except Bridgeport shallows where the trend was decreasing periphyton biovolume as the season progressed.

Zooplankton density for pelagic waters was greatest in July (6,080/m³) and lowest (1,289/m³) in August. Copepods dominated the zooplankton population. Zooplankton densities in the tributary river mouths peaked in May. Although rotifers were present in all months, their density dropped to very low levels after May. Cladocera were the third most prevalent group with a minor peak occurring in July for this group.

Trophic Status Index (TSI) developed by Carlson (1977, 1996) and modified for nitrogen by Kratzer and Brezonik (1981) is an indication of the productivity of a lake based on Secchi depth, TP, TN and chlorophyll a concentrations for summer months (June through September). Project waters are classified as oligo-mesotrophic based on a mean TSI score of 36.5 with 40 to 50 being the range for mesotrophic classification (EES 2006).

2.3.3 Okanogan River Sediment Loading Analysis

In 2006, Douglas PUD, at Ecology’s request, conducted an analysis to assess sediment accumulation within the Project portion of the Okanogan River (lower 15.5 miles). The request was based upon concerns that Project operations might be contributing to the accumulation of DDT and PCB-laden sediment that could impact aquatic life designated use. Douglas PUD contracted with Erlandsen and Associates to collect bathymetric information at nine transects
(RM 0.8, 1.3, 2.7, 4.9, 8.2, 10.5, 14.4, 16.6, and 19.0) within and above the Project portion of the Okanogan River. Bathymetric data of these same nine transects were collected previously by the Bechtel Corporation in 1997. A comparison of the bathymetric data for all nine transects between 1997 and 2006 indicated that sediment is not accumulating in the Project portion of the Okanogan River. It was concluded that with regard to sediment loading, the Okanogan River is exhibiting natural riverine processes and is not affected by Project operations. Douglas PUD presented the results of the information to Ecology and the issue has been resolved.

2.3.4 Temperature, Dissolved Oxygen, pH, and Turbidity

2.3.4.1 Water Temperature Modeling

To assess compliance with the State temperature standards, two 2D laterally-averaged temperature models (using CE-QUAL-W2) were developed that represent existing (or “with Project”) conditions and “without Project” conditions of the Wells Project including the Columbia River from the Chief Joseph Dam tailrace to Wells Dam, the lowest 15.5 miles of the Okanogan River, and the lowest 1.5 miles of the Methow River. The results were processed to develop daily values of the 7-DADMax, and then compared for the two conditions (West Consultants, Inc. 2008).

The model analyses demonstrated that “with Project” temperatures in the Columbia, Okanogan and Methow rivers do not increase more than 0.3°C compared to ambient (“without Project”) conditions anywhere in the reservoir, and that the Project complies with state water quality standards for temperature. The analyses also show that backwater from the Wells Project can reduce the very high summer temperatures observed in the lower Okanogan and Methow rivers. The intrusion of Columbia River water into the lowest 1-2 miles of the Okanogan River and lowest 1.5 miles of the Methow River can significantly decrease the temperature of warm summer inflows from upstream, and can also moderate the cold winter temperatures by 1-3°C, reducing the extent and length of freezing.

2.3.4.2 Dissolved Oxygen, pH, and Turbidity

A study to collect additional DO, pH, and turbidity data from within the Wells Project was proposed by the Aquatic Resource Work Group in 2007. The goal of this study was to obtain required DO, pH, and turbidity information for the Wells Dam forebay and lower Okanogan River, both above and within the Wells Project boundary. The information gathered from these monitoring efforts demonstrated that the Project, as proposed to be operated under the new license, will meet the numeric criteria for WQS (Parametrix, Inc. 2009).

DO measurements demonstrated that the Okanogan River and the forebay of Wells Dam were in compliance with WQS. Project effects on DO concentrations in the Okanogan River were not evident as incoming water quality closely resembled that of the inundated portions of the Okanogan River. Changes in background minimum DO levels at Malott (above Project boundary) have a strong and significant linear relationship (P < 0.0001) with minimum values recorded within Project boundaries at both Monse and the Highway 97 Bridge. These results indicate that there is no statistically significant difference between minimum DO measurements collected above the Project and within the Project. DO concentrations in the forebay of Wells
Dam remained well above the minimum numeric water quality criterion, excluding an instrument-related malfunction observed in early October (Parametrix, Inc. 2009).

Only on one occasion did pH within the Project exceed background measurements, but only by 0.06 units, well within the water quality allowance for human caused conditions. These results indicate that pH measurements within the Project boundary are well within the numeric criteria for WQS (Parametrix, Inc. 2009).

It is not clear what effect, if any, the Wells Project may have had on turbidity. Elevated turbidity values appeared to coincide with snowmelt and precipitation causing increased river flow. Turbidity levels in the Okanogan River above the Project (at Malott) were inconsistent with readings collected at both Monse (5 of 122 comparable days, or 4%) and Highway 97 (8 of 165 comparable days, or 5%), suggesting that such events are not widespread or persistent within the Wells Project (Parametrix, Inc. 2009). In 2009, Douglas PUD contracted Columbia Basin Environmental to continue monitoring turbidity for an additional year. Results from the 2009 field season indicate that turbidity decreases from the background monitoring location (Malott, RM 17.0), to both Monse (RM 5.0) and the Highway 97 Bridge (RM 1.3). No exceedances were observed and the data showed that the Wells Project is in compliance with the Washington State water quality standards for turbidity (DCPUD and CBE 2009).

### 2.3.5 Summary of Compliance with WQS

Based on the Initial and Updated Study Reports the Aquatic SWG was able to determine that waters within the Wells Project currently meet state numeric criteria of WQS as defined in Chapter 173-201A WAC. The following table presents supporting studies, by standard:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Studies</th>
<th>Result(s)</th>
<th>Continued Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDG</td>
<td>Politano et al. 2008, 2009a, 2009b.</td>
<td>Compliance met under preferred operating conditions and standard compliance scenario.</td>
<td>Yes</td>
</tr>
<tr>
<td>Temperature</td>
<td>West Consultants, Inc. 2008</td>
<td>Compliance met, zero exceedances. Potential future TMDL.</td>
<td>Yes</td>
</tr>
<tr>
<td>DO</td>
<td>Parametrix, Inc. 2009</td>
<td>Compliance met, zero exceedances</td>
<td>No</td>
</tr>
<tr>
<td>pH</td>
<td>Parametrix, Inc. 2009</td>
<td>Compliance met, zero exceedances</td>
<td>No</td>
</tr>
<tr>
<td>Turbidity</td>
<td>Parametrix, Inc. 2009; DCPUD and CBE 2009.</td>
<td>Compliance met, zero exceedances</td>
<td>No</td>
</tr>
</tbody>
</table>

### 3.0 GOAL AND OBJECTIVES

The goal of the WQMP is to protect the quality of the surface waters affected by the Project with regard to the numeric criteria. Studies conducted during the relicensing process have found water quality within the Wells Project to be within compliance. Douglas PUD, in collaboration
with the Aquatic SWG, has agreed to implement measures in support of the WQMP. Reasonable and feasible measures will be implemented in order to maintain compliance with the numeric criteria of the Washington State WQS, Chapter 173-201A WAC. The measures presented within the WQMP (Section 4.0) are designed to meet the following objectives:

Objective 1: Maintain compliance with state WQS for TDG. If non-compliance is observed, the Aquatic SWG will identify reasonable and feasible measures, which will be implemented by Douglas PUD;

Objective 2: Maintain compliance with state WQS for water temperature. If information becomes available that suggests non-compliance is occurring or likely to occur, the Aquatic SWG will identify reasonable and feasible measures, which will be implemented by Douglas PUD;

Objective 3: Maintain compliance with state WQS for other numeric criteria. If information becomes available that suggests non-compliance is occurring or likely to occur, the Aquatic SWG will identify reasonable and feasible measures, which will be implemented by Douglas PUD;

Objective 4: Operate the Project in a manner that will avoid, or where not feasible to avoid, minimize, spill of hazardous materials and implement effective countermeasures in the event of a hazardous materials spill; and

Objective 5: Participate in regional forums tasked with improving water quality conditions and protecting designated uses in the Columbia River basin.

The WQMP is intended to be compatible with other water quality management plans in the Columbia River mainstem, including TMDLs. Furthermore, the WQMP is intended to be supportive of the HCP, Bull Trout Management Plan, Pacific Lamprey Management Plan, Resident Fish Management Plan, White Sturgeon Management Plan, and Aquatic Nuisance Species Management Plan through the protection of designated uses (WAC 173-201A-600) in Project waters. The WQMP is intended to be not inconsistent with other management strategies of federal, state and tribal natural resource management agencies.

The schedule for implementation of specific measures within the WQMP is based on the best information available at the time the plan was developed. As new information becomes available, the measures proposed in the WQMP may be adjusted through consultation with the Aquatic SWG.

### 4.0 WATER QUALITY MEASURES

In order to fulfill the goals and objectives described in Section 3.0 of the WQMP, Douglas PUD, in consultation with the Aquatic SWG, has initiated the implementation of the following measures.
4.1 TDG Compliance (Objective 1)

4.1.1 Monitoring

Douglas PUD shall continue to maintain fixed monitoring stations in the forebay and tailrace area of Wells Dam to monitor TDG and barometric pressure. TDG will be monitored hourly during the fish spill season each year. Data from the Wells forebay and tailrace stations will be transmitted on a daily basis to the applicable web-accessible database used by Ecology and regional fish management agencies. Douglas PUD shall maintain this monitoring program consistent with activities described in the then-current Wells GAP (Section 4.1.3).

Douglas PUD shall provide an annual report of all spill (and predicted TDG levels in the tailrace) occurring outside the fish passage season (currently October 1 to March 15).

4.1.1.1 Progress Towards Meeting Objective 1 in 2012 - Monitoring

In February 2012 Ecology issued a 401 Certification for Wells Dam, consistent with Federal Power Act Requirement for licensing non-federal hydro-projects. Requirements in the 401 Certification are consistent with the WQMP. In November 2012 the FERC issued a new license for the Wells Project. Requirements in the license are consistent with the 401 Certification and the WQMP.

In April 2012 Ecology approved Douglas PUD’s GAP and issued a fish passage TDG adjustment waiver for the 2012 spill season. The final 2012 GAP requires Douglas PUD to monitor TDG in the forebay and tailrace of Wells Dam throughout the entire fish passage season (April 19th to – August 19th). Hourly forebay and tailrace TDG values were reported on the U.S. Army Corps of Engineers Water Management Division webpage and the Columbia River Data Access Real Time webpage, consistent with regional fish management agencies. Flows at Wells Dam were the third highest during the spill season on record. Douglas PUD provided Ecology and the Aquatic SWG in-season reports on water quality. Following the completion of the spill season, and consistent with requirements, Douglas PUD prepared a 2012 GAP/TDG report. The GAP report was approved by Ecology and the ASWG and filed with the FERC in February 2013, consistent with FERC license requirements. The Ecology and the FERC approved the 2012 GAP prior to the April 9th initiation of juvenile fish bypass operations and forced spill for fish.

As required by the Wells 401 Certification Douglas PUD will also collect TDG data outside of the fish spill/bypass season. Data will be collected in the same manner as collected during the spill season and will be consistent with an approved Quality Assurance Project Plan approved by the Aquatic SWG and Washington State Department of Ecology. Douglas PUD will start collecting the data following the completion of the 2013 spill season in August 2013, which is consistent with the license requirement deadline. Data collected outside of bypass season will be used to determine compliance with the 110% water quality standard.

4.1.2 Spill Operations

Within one year of issuance of the new license, Douglas PUD shall coordinate the annual HCP Project Fish Bypass/Spill Operations Plan with the Aquatic SWG and the GAP, using best
available information to minimize the production of TDG during periods of spill. All operations identified within the plan shall require the approval of the Wells HCP Coordinating Committee and the Aquatic SWG in order to ensure that spill operations are aimed at protect designated uses and complying with the WQS numeric criteria for TDG in the Columbia River at the Project. In consultation with the Wells HCP Coordinating Committee and Aquatic SWG, the spill operations plan will be reviewed and updated, as necessary.

4.1.2.1 Progress Towards Meeting Objective 1 in 2012 - Spill Operations

In early 2013 Douglas PUD developed a 2013 GAP concomitant with the 2013 Spill and Bypass Operations Plan and coordinated the review of these two documents with the HCP Coordinating Committee. Both plans will be filed with the FERC after approved by Ecology, the NMFS and the USFWS. In late March 2013, the FERC approved the Juvenile Fish Bypass Plan and the Gas Abatement Plan and Spillway Play Book for 2013.

4.1.3 Project Gas Abatement Plan and TDG Exemption

Pending Ecology’s approval of each subsequent GAP (which provides for the TDG exemption), Douglas PUD shall continue to implement the activities identified within the previously-approved plan. Douglas PUD shall submit the GAP to Ecology by February 28th of each year, or on a less frequent basis, as documented by Ecology in writing. Douglas PUD shall submit the GAPs through the term of the new license or until no longer required by Ecology.

The GAP will include the Spill Operations Plan (Section 4.1.2) and will be accompanied by a fisheries management plan and physical and biological monitoring plans. The GAP shall include information on any new or improved technologies to aid in the reduction in TDG.

It is anticipated that: (1) the TDG monitoring activities described in Section 4.1.1 will be adequate for the physical monitoring plan requirement; and (2) the Wells HCP and Aquatic Resource Management Plans in the Aquatic Settlement Agreement with respect to fish passage will be adequate for fish management plans, for the purposes of the GAP. Additional biological monitoring studies for purposes of Gas Bubble Trauma Monitoring may be required.

Douglas PUD shall provide an annual TDG report as required by the Ecology-approved GAP.

4.1.3.1 Progress Towards Meeting Objective 1 in 2012 - Project Gas Abatement Plan and TDG Exemption

In 2012, Douglas PUD implemented the Aquatic SWG and Ecology approved 2012 GAP. The GAP was submitted to Ecology prior to February 28th and was approved by Ecology in early April 2012. The 2012 GAP included Douglas PUD’s Spill Playbook for 2012 (Playbook), which serves as the Spill Operations Plan identified above. The Playbook is consistent with methods used at Wells to minimize the production of TDG during differing flow regimes up to 246.0 kcfs of river flow. Additional details of spill and TDG performance were provided in the 2012 GAP report filed with Ecology and the FERC in February 2013 and as approved by the FERC in late March 2013.
The GAP also included a biological monitoring plan, which involved the collection of adult salmonids at Wells Dam and juvenile salmonids at Rocky Reach Dam when TDG at Wells Dam exceeded 125% in the tailrace during any hour. In 2012, over 500 juvenile and 800 adult salmon were assessed for signs of GBT when TDG values were above 125%. No adult salmon showed GBT expression even when TDG values were above 125%. Less than 2% of all juvenile salmon examined in 2012 showed signs of GBT expression and in all cases the symptoms were mild. Additional details of GBT expression were provided in the 2012 GAP report filed with Ecology and the FERC in February 2013.

4.1.4 Measures to Address Non-Compliance

Douglas PUD shall report all occurrences of non-compliance with TDG numeric criteria immediately to Ecology for regulatory discretion and to the Aquatic SWG for consideration.

If the Project is found to be consistently out of compliance with TDG at any time during the new license term, Douglas PUD shall, in coordination with the Aquatic SWG, take the following steps:

(A) Evaluate any new reasonable and feasible technologies that have been developed; and

(B) After the evaluation, if no new reasonable and feasible improvements have been identified, propose an alternative to achieve compliance with the standards, such as site-specific criteria, a use attainability analysis, or a water quality offset.

4.1.4.1 Progress Towards Meeting Objective 1 in 2012 - Measures to Address Non-Compliance

During the 2012 water year, Ecology was updated regularly when flows were exceptionally high and when TDG standards exceeded those required by the fish passage TDG exemption. In addition, Douglas PUD provided Ecology with weekly TDG and water reports.

Douglas PUD expects that both (A) and (B) above will be addressed through the development of a Quality Assurance Project Plan (QAPP) for TDG and water temperature and a Water Quality Attainment Plan (WQAP in early 2013). These two plans are additional requirements found in the 401 Certification and the FERC issued license. The plans are specifically designed to determine if the Wells Project is in compliance for TDG and what measures will be used to improve or address compliance concerns. Both plans are scheduled to be completed by no later than the end of October 2013.

4.2 Water Temperature Compliance (Objective 2)

4.2.1 Monitoring

Douglas PUD shall continue to monitor temperature at the Wells Dam forebay and tailrace in conjunction with its TDG monitoring program (currently April 1-September 15). Temperature data from the TDG monitoring program will be recorded hourly and reported daily to regional
databases. Water temperatures shall also be monitored at all boundary conditions of the Project (Methow River RM 1.5, Okanogan River RM 10.5, and Columbia River RM 544.5) and in the Well Dam forebay and tailrace as required by the Aquatic SWG.

Douglas PUD shall continue to collect hourly fish ladder temperatures 24 hours a day during the fish passage season (May 1 to November 15) at Pool No. 39 on the east ladder. Water temperatures shall also be monitored hourly in the auxiliary water supply system and near the east shore of the Wells Dam forebay (bottom, middle, and surface depths) during this same time period.

4.2.1.1 Progress Towards Meeting Objective 2 in 2012 - Monitoring

Water temperature monitoring in 2012 was consistent with the requirements above. In 2013 Douglas PUD will move to year round monitoring of TDG in the forebay and tailrace at Wells Dam. Per the requirements of the new license and 401 Certification, several new water temperature stations will be installed throughout the reservoir and will be accessible via a remote wireless connection. All water quality data will be transmitted hourly and provided on a public website. Additional information on monitoring will be contained within the QAPP. Monitoring will be consistent with the WQMP, the Wells Project 401 Certification and the Wells Dam Operating License issued by the FERC.

4.2.2 Temperature TMDL Development and Implementation

Douglas PUD shall participate in EPA Region 10’s water temperature TMDL development for the U.S. portion of the Columbia River, in coordination with the Parties of the Aquatic SWG. Temperature data from the monitoring program at Wells Dam (Section 4.2.1) and software and results of the CE-QUAL-W2 model will be made available to EPA and other entities to assist in the development of the Columbia River temperature TMDL.

Where the measures identified in the TMDL are more protective than other measures in this plan, provisions of the temperature TMDL and implementation plans relevant to the Project and its operations, including specified time frames for implementing improvement measures, shall be implemented at the Project.

If a TMDL is not timely approved by EPA, Ecology may establish an allocation. In this case, Ecology will work with the Aquatic SWG and other interested parties to identify reasonable and feasible measures.

This plan does not exclude the option of the Aquatic SWG to consider modifying the water quality standard through a use attainability analysis or other process.

4.2.2.1 Progress Towards Meeting Objective 2 in 2012 - Temperature TMDL Development and Implementation

No TMDL planning took place in 2012. When the EPA’s TMDL development occurs, Douglas PUD will participate.
On a related note, Douglas PUD provided the United States Army Corps of Engineers with the CE-QUAL-W2 data and model for the Wells Project. This model output was used to inform the Columbia River Treaty Sovereign Technical Team.

4.2.3 Measures to Address Non-Compliance

Douglas PUD shall report information indicative of non-compliance with water temperature immediately to Ecology for regulatory discretion and to the Aquatic SWG for consideration. Such information may include changes in Project operations likely to increase water temperature or observations inconsistent with related environmental parameters.

If the Project is found to be consistently out of compliance with water temperature at any time during the new license term, Douglas PUD shall, in coordination with the Aquatic SWG, take the following steps:

(A) Evaluate alternative Project operations or any new reasonable and feasible technologies that have been developed; and

(B) After the evaluation, if no new reasonable and feasible improvements have been identified, propose an alternative to achieve compliance with the standards, such as site-specific criteria, a use attainability analysis, or a water quality offset.

4.2.3.1 Progress Towards Meeting Objective 2 in 2012 - Measures to Address Non-Compliance

No issues of non-compliance with the state’s water temperature standards were observed during 2012. As a result, no new measures are proposed to address non-compliance of the water temperature standards.

4.3 Compliance with Other Numeric Criteria (Objective 3)

Douglas PUD shall report information indicative of non-compliance with other numeric criteria immediately to Ecology for regulatory discretion and to the Aquatic SWG for consideration. This includes existing or developed criteria for toxic substances in water or sediments within Project Boundaries. The Aquatic SWG shall evaluate the information, and, if needed, require Douglas PUD to develop a plan to identify and address Project-related impacts, if any.

After the evaluation, if no reasonable and feasible improvements have been identified, Douglas PUD may propose an alternative to achieve compliance with the standards, such as site-specific criteria, a use attainability analysis, or a water quality offset.

4.3.1.1 Progress Towards Meeting Objective 3 in 2012 - Compliance with Other Numeric Criteria
In 2012 samples of floating cyanobacteria algae were taken and sent to King County laboratories. Toxicity levels for microcystins and anatoxin-a were such that the Washington Department of Ecology recommended posting information at recreational sites designed to prevent people and pets from coming in contact with floating algae mats (Hardy 2008). As such, information was posted at all boat launches and swimming areas around the Wells Project. Following weekly sampling and a reduction of toxicity the posted information was removed several weeks after the initial incident was reported and confirmed. Douglas PUD will monitoring the prevalence of cyanobacteria in 2013 and share additional findings with Ecology and the Aquatic SWG in subsequent summer seasons.

4.4 Spill Prevention and Control (Objective 4)

4.4.1 Spill Prevention and Control Requirements

Douglas PUD shall operate the Project in a manner that will minimize spill of hazardous materials and implement effective countermeasures in the event of a hazardous materials spill. The Project Spill Prevention Control and Countermeasures Plan (SPCC) will be updated pursuant to FERC requirements and recommendations as provided by Ecology. Douglas PUD shall comply with the updated version(s) of the SPCC.

4.4.1.1 Progress Towards Meeting Objective 4 in 2012 - Spill Prevention and Control Requirements

The Wells Project is operated in strict compliance with the Spill Prevention and Control requires of the WQMP, 401 Certification and the FERC license. No spills of toxic or hazardous materials were identified during the 2012 reporting period.

4.4.2 Participation in the Columbia and Snake River Spill Response Initiative

Douglas PUD shall continue participation in the Columbia and Snake River Spill Response Initiative (CSR-SRI). The CSR-SRI is a collaborative effort made up of local, state, and federal oil spill response community as well as members of industry and was developed to address the immediate need for oil spill preparedness and response in the area along the Columbia and Snake rivers. In addition to participation in the CSR-SRI, Douglas PUD shall continue to operate the Project in accordance with its SPCC (Jacobs 2007).

4.4.2.1 Progress Towards Meeting Objective 4 in 2012 - Participation in the Columbia and Snake River Spill Response Initiative

Douglas PUD has been an active participant in the Snake-Columbia Spill Response Initiative toward the minimization of TDG throughout the Columbia and Snake rivers. The project continues to be operated in a manner that is consistent with the SPCC (2007).

4.4.3 Inspections

For the term or the new license, Douglas PUD shall, upon reasonable notice, allow Ecology staff or representatives access to inspect the Project, including inside the dam, for the purpose of...
assessing Spill Prevention and Control measures and compliance with Section 4.4.1. Following inspection, Douglas PUD shall address oil and hazardous material prevention and control issues identified by Ecology.

4.4.3.1 Progress Towards Meeting Objective 4 in 2012 - Inspections

Ecology’s oil spill inspection team visited Wells Dam in late 2012 toward the development of a coordinated sampling process.

4.5 Regional Forums (Objective 5)

4.5.1 Participation in Regional Water Quality Forums

Douglas PUD shall continue its participation in both the Water Quality Team and Adaptive Management Team meetings to address regional water quality issues, including sharing the results from monitoring, measuring, and evaluating water quality in the Wells Project. However, Douglas PUD will not advocate for any water quality measures in regional forums without consulting with the Aquatic SWG.

4.5.1.1 Progress Towards Meeting Objective 5 in 2012 - Participation in Regional Water Quality Forums


4.5.2 Project Operations

Douglas PUD may, following notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with other mid-Columbia hydroelectric operations to the extent practicable. Coordinated operations are intended to reduce spill, increase generating efficiencies and thereby reduce the potential for exceedances of the TDG numeric criteria. These coordinated operations should be beneficial to TDG compliance and Aquatic Resources.

4.5.2.1 Progress Towards Meeting Objective 5 in 2012 - Project Operations

Douglas PUD continued implementation of the Hourly Coordination Agreement in 2012, consistent with the WQMP, 401 Certification, and FERC Operating License.

4.6 Reporting

Douglas PUD shall provide a draft annual report to the Aquatic SWG summarizing the previous year’s water quality activities and activities proposed for the coming year, in accordance with the
WQMP and as determined by the Aquatic SWG. The report will include any decisions, statements of agreement, evaluations, or changes made pursuant to this WQMP. If significant activity was not conducted in a given year, Douglas PUD may prepare a memorandum providing an explanation of the circumstances in lieu of the annual report. A summary of monitoring results, any analyses and compliance with the WQS numeric criteria will be included in an appendix to the annual report.

4.6.1 Progress Towards Meeting Annual Reporting Requirements

In addition to the reporting requirements found within the Aquatic Settlement Agreement requiring the submission of annual reports for all six of the management plans including the WQMP, Article 406 of the FERC license for the Wells Project also requires Douglas PUD to submit annual reports detailing the implementation of each of the six Aquatic Settlement Agreement management plans. This report is intended to satisfy those reporting requirements associated with the new license for the Wells Project.

4.6.2 Study Plans

Douglas PUD shall prepare study plan(s) that include QAPP(s) for each parameter to be monitored. The QAPPs shall follow the Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies (July 2004 Ecology Publication Number 04-03-030) or its successor. The QAPPs shall contain, at a minimum, a list of parameter(s) to be monitored, a map of sampling locations, and descriptions of the purpose of the monitoring, sampling frequency, sampling procedures and equipment, analytical methods, quality control procedures, data handling and data assessment procedures and reporting protocols.

Douglas PUD shall review and update the QAPPs annually based on a yearly review of data and data quality. Ecology may also require future revisions to the QAPP based on monitoring results, regulatory changes, changes in Project operations, and/or the requirements of TMDLs.

The initial QAPPs and any changes shall be submitted to the Aquatic SWG for review and are subject to approval by Ecology. Implementation of the monitoring program shall begin upon Ecology’s written approval of the QAPP, unless otherwise provided by Ecology.

4.6.2.1 Progress Towards Meeting Objective 5 in 2012 - Study Plans

As discussed above, Douglas PUD has been working with Ecology on the development of a plan for the accurate monitoring necessary to inform the QAPP for water temperature and TDG. In the event that Aquatic SWG identifies additional measures to be monitored, Douglas PUD will prepare a QAPP in consultation with the Aquatic SWG to provide quality data and assess compliance with standards.
5.0 REFERENCES


APPENDIX D
2013 AQUATIC SETTLEMENT AGREEMENT ACTION PLAN
2013 AQUATIC SETTLEMENT AGREEMENT AND WORKGROUP ACTION PLAN

A) Annual Report and Webpage Development
1. Distributed to ASWG, BIA and NMFS March 30, 2013
2. Final Annual Report Approved by ASWG and NMFS April 30, 2013
3. Annual Report Filed with FERC May 28, 2013
5. Public Website Live Oct 2013

B) White Sturgeon MP
1. 2011 Brood Stock Collection and Breeding Plan filed with FERC for approval Mar 2013
2. Sturgeon Hatchery Construction Updates to ASWG Jan-Apr 2013
3. Collection location and logistical coordination Apr 2013
4. Larval and brood collection/ Wells rearing Jun-Dec 2013
5. Technical participation in regional forums Throughout 2013
6. Incorporate sturgeon activities into Aquatic SA Annual report to FERC Mar 2013

C) Bull Trout MP
1. Letter to FERC postponing Twisp Weir bull trout “take” study to year 5 Feb 2013
2. OR Twisp Weir Bull Trout Passage Evaluation Study Plan to ASWG for approval Mar 2013
3. Prepare a Bull Trout Stranding and Incidental Take Study Plan1 (Article 402) Jun 2013
4. Stranding and Incidental Take Study Plan HCP and ASWG review1 (Article 402) Jul 2013
5. Stranding and Incidental Take Study Plan File with FERC1 (Article 402) Oct 2013
6. Stranding surveys as necessary (below 773’ MSL) As required throughout 2013
8. Monitor for sub-adults at Wells Dam (>10/year triggers additional measures) Throughout 2013
9. PIT tagging at the Twisp Weir and genetic tissue collection May-Aug 2013
11. Recovery planning participation/regional coordination Throughout 2013
12. Include PIT histories summary in memo in lieu of RT study at Weir in 2013 Nov 2013
13. Incorporate 2012 Bull Trout Activities and Incidental Take Monitoring into Aquatic SA Annual report to FERC Mar 2013

1 Bull trout stranding and incidental take plan is actually three measures: 4.4, 4.5.1, and 4.6.1 in the BTMP. These items speak specifically to bull trout stranding during low reservoir conditions, incidental take monitoring during other field studies, and incidental take occurrences during hatchery operations. This comprehensive plan will cover implementation guidance for all three. Requirement is identified in the FERC License Order; page 54; Article 402.
D) Water Quality MP

1. 2012 Gas Abatement Plan Report to ASWG and NMFS for approval Jan 2012


5. 2013 Gas Abatement Plan to ASWG and HCP CC for approval Jan- Feb 28 2013
6. 2013 Gas Abatement Plan filed with FERC for approval Feb 28 2013
7. 2013 Gas Abatement Plan (w/ non-fish spill) Report to ASWG and NMFS for approval Dec 2013

9. 2013 Bypass/spill Operation Plan to HCP CC and ASWG for comment Dec 2012
10. 2013 Bypass/spill Operations Plan to HCP CC for approval Jan 2013
11. 2013 Bypass/spill Operations Plan to FERC for approval Feb 28 2013

12. Quality Assurance Plans (QAPP) - water temp/TDG to ASWG and NMFS for approval Feb 2013
13. Quality Assurance Plans (QAPP) filed with FERC for approval Mar 2013

14. Year-round TDG monitoring initiated at 2 stations (hourly with web-accessibility) Mar 2013
15. Remote Washburn and backup tailrace TDG Stations Installed May 2013
16. All TDG stations collecting year-round hourly data and web accessible Oct 2013

17. Water Quality Attainment Plan (WQAP) for TDG (10-year plan) development May 2013
18. WQAP for TDG sent to ASWG and NMFS for approval Aug 2013
19. WQAP for TDG sent to FERC for approval Oct 2013

20. Water temperature monitoring stations installed (N=5) April – June 2013
21. Water temperature monitoring hourly (April 1 to Oct 31) river stations (N=7) Oct 2013
22. Water temperature monitoring hourly (April 30 – Nov 15) fish ladders April 2013
23. Annual Water Temperature Report to ASWG and NMFS for approval Dec 2013

25. Updated Oil Spill Prevention, Control and Countermeasures Plan (5a 401 Cert) May 2013
26. Oil Spill Prevention, Control and Countermeasures Plan to ASWG and NMFS July 2013
27. Oil Spill Prevention, Control and Countermeasures Plan to FERC for approval Sept 2013

29. Participate in WQ forums: TMDL, Columbia River Treaty, STT-WQ, CSR-SRI Throughout 2013
30. Incorporate Water Quality MP Activities into Aquatic SA Annual report to FERC Mar 2013
E) Pacific Lamprey MP

31. Finish radio antenna install Jan 2013
32. Finish HD PIT antenna installation Jan 2013
33. Complete count station maintenance Jan 2013
34. License amendment: Counting facility modifications Mar 2013
35. License amendment: Temporary operational modifications (head differential) May 2013
36. Fish collection and tagging for Lamprey Passage and Enumeration Study Jun-Oct 2013
37. Passage and Enumeration Study report Dec 2013; Updates throughout 2013
38. Passage and Enumeration Study to ASWG and NMFS for approval Jan 2014
39. Passage and Enumeration Study to FERC March 2014
40. Lamprey Entrance Efficiency Plan to ASWG and NMFS for approval June 2013
41. Lamprey Entrance Efficiency Plan to FERC for approval Oct 2013
42. Upstream passage literature review TBD as needed within 6 months of ASWG request
43. Fishway inspection Jan 2013 and Dec 2013
44. Improved Carpenter Island boat launch salvage and monitoring Oct 2013
45. Ladder Salvage during winter maintenance Dec 2013
46. Regional participation in technical forums and planning Throughout 2013
47. Incorporate Lamprey MP Activities into Aquatic SA Annual report to FERC Mar 2013

F) Aquatic Nuisance Species MP

48. ANS BMP Plan and Appropriate ANS Countermeasures/Containment Plan (Article 405) Feb 2013
49. Art. 405 Plans to ASWG and NMFS for approval Feb 2013
50. Art. 405 Plans to FERC for approval Apr 2013
51. Update ANS MP for BMP and Countermeasure plans by Oct 2013
52. ANS Education Plan to ASWG and NMFS for approval Jul 2013
53. ANS Education Plan to FERC for approval Oct 2013
54. Pamphlet development and signage for education measures Feb 2013
55. Install ANS signs and print new ANS pamphlets for launches available by May 2013
56. ANS Education Plan posted to new Aquatic SWG public website May 2013
57. Zebra mussel monitoring with substrate mats and plankton tows Apr-Oct 2013
58. Crayfish monitoring and database management Throughout 2013
59. Milfoil monitoring adjacent to recreation sites summer 2013
60. Regional coordination Throughout 2013
61. Incorporate ANS MP Activities into Aquatic SA Annual report to FERC Mar 2013

2 See Section 5.6.2 in USFWS fishway prescription for greater detail on above lamprey passage measures.
G) Resident Fish MP

62. 2012 Pikeminnow Report to ASWG and HCP CC for review Feb 2013
63. 2012 Pikeminnow Report incorporated into Aquatic SA Annual Report to FERC Mar 2013
64. 2013 Pikeminnow Angling March – Oct 2013
65. Resident fish abundance and diet study plan development (year two study) Oct 2013
66. Resident Fish abundance and diet study 2014
67. Regional coordination Throughout 2013
68. Incorporate Resident Fish MP Activities into Aquatic SA Annual report to FERC Mar 2013
APPENDIX E
WHITE STURGEON COLLECTION PLAN
SOA
During the first year of Douglas PUD’s white sturgeon collection efforts (2013), the Aquatic Settlement Workgroup (Aquatic SWG) agrees that larvae will be collected in the Mid-Columbia River from the Vernita Bridge upstream to the Rock Island tailrace, and in Lake Roosevelt. Collection from Mid-Columbia locations will be the highest priority. In addition, the Aquatic SWG agrees that broodstock will be collected in the pools of the Columbia River between Bonneville Dam upstream to Rock Island Dam. Finally, the Aquatic SWG agrees that the relative number of fish from each program (larvae and brood collected offspring) released into the Wells Project will be agreed upon prior to planting in spring 2014 following the completion of the larvae and brood collection season and following the results from initial incubation and rearing efforts.
Appendix A

Background

The Aquatic Settlement Agreement White Sturgeon Management Plan (WSMP) requires that Douglas PUD fund the collection of white sturgeon offspring starting in 2013, and begin releasing up to 5,000 juvenile sturgeon per year beginning in the summer of 2014 (year two of Douglas PUD’s FERC license); the total Phase One goal is to release up to 20,000 juvenile sturgeon by the end of 2017. The intent of this program is to increase the abundance and genetic diversity of white sturgeon found within the Wells Project, and concomitantly increasing population size in the Wells Project.

In June of 2012 the Aquatic SWG agreed via SOA that Douglas PUD should implement a dual strategy for the collection of white sturgeon offspring starting in the spring/summer of 2013. These two approaches will include the implementation of a wild larvae collection program lead by the Colville Confederated Tribes (CCT) and an adult brood collection programs lead by the Bands of the Yakama Nations (YN).

In order to maximize genetic diversity in the two programs and maximize numbers of offspring available for planting in 2014, during 2013 the Aquatic SWG agrees that the CCT larvae program will focus on collecting white sturgeon larvae in the Mid-Columbia River from the Vernita Bridge upstream to the Rock Island tailrace, and in Lake Roosevelt, with the greater effort focusing on collection in the Mid-Columbia. The YN program will focus on capturing broodstock for egg and milt collection from the pools of the Columbia River between Bonneville Dam upstream to Rock Island Dam

Consistent with the June 2012 SOA, to address differential success within and between programs the Aquatic SWG will be consulted annually to determine the numbers of fish from each to be released into the Wells Project. The assessment of the results and the determination of program release numbers will be conducted by the Aquatic SWG in October 2013. Release numbers for each program will be determined based on trying to meet or improve upon family representation goals outlined in the 2011 Wells Broodstock and Breeding Plan or a revised version of this plan.
APPENDIX F
PHASE ONE WHITE STURGEON
MANAGEMENT PLAN MONITORING AND
EVALUATION STUDY PLAN
Introduction

As part of Public Utility District No. 1 of Douglas County’s (Douglas PUD) implementation of the White Sturgeon Management Plan (WSMP) contained within the Aquatic Settlement Agreement, Douglas PUD will begin implementing the white sturgeon monitoring in year 3 of the Wells Dam License (2014-2015). The plan may be revised by the unanimous approval of the Aquatic Settlement Work Group (Aquatic SWG) as outlined in the WSMP. Revisions to this plan will follow the adaptive management framework outlined in section 3.1 of the definitions section of the Aquatic Settlement Agreement. The following sections of the WSMP will be fulfilled through the implementation of this plan. Sections below are number to coincide with relevant sections of Douglas PUD’s WSMP.

4.2.1 Index Monitoring Program

Within three years following issuance of the new license, Douglas PUD shall initiate a three-year index monitoring program (Years 3-5) for juvenile and adult sturgeon in the Wells Reservoir to determine size structure\(^1\), survival rates, abundance, density, condition factor, growth rates, and to identify distribution and habitat selection of juvenile sturgeon. The indexing methods shall include using set lines or other appropriate recapture methods for juveniles and adults.

As a component of the Phase I indexing program, Douglas PUD shall capture and implant active tags in a portion of the juvenile and sexually mature adult sturgeon population found in the Wells Reservoir. This tagging effort shall be used to augment broodstock collection (Section 4.1.1), population level information and juvenile habitat use (Section 4.2.2) and natural reproduction potential (Section 4.2.3).

After the initial three-year indexing period (Years 3-5), Douglas PUD shall conduct an additional two years of index monitoring in Phase I as determined by the Aquatic SWG (during years 6-9). After year 9, an additional year of index monitoring would take place in year 12 and then every three to five years over the term of the new license (Phase II: Years 11 to end of license) to assess age-class structure, survival rates, abundance, condition factor, and growth rates; identify distribution and habitat selection of juvenile sturgeon; and to inform the supplementation program strategy (see Section 4.7 in WSMP, Table 1).

Frequency (every 3, 4 or 5 years) of implementation of long-term index monitoring activities (after year 12) will be determined by the Aquatic SWG. Phase II index monitoring activities will not consist of implantation of active tags in captured individuals.

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\(^1\) The WSMP calls for age-class structure analysis but given recent research from similar programs the uncertainty around aging techniques prevents accurate assessments and therefore size structure analysis will be more useful to the Douglas PUD WSMP program.
4.2.2 Marked Fish Tracking Program

Beginning in year 3 of the new license and continuing for three years (Years 3-5), Douglas shall conduct tracking surveys of the juvenile white sturgeon that were released with active tags as part of supplementation activities. This will require one percent of each of the annual classes of juvenile sturgeon (up to a maximum of 50 fish each year) released in years 2, 3, 4, and 5 to be reared large enough to implant an active tag for tracking purposes (See Section 4.7 in WSMP, Table 1). The purpose of tracking active-tagged fish is to determine juvenile white sturgeon emigration rates out of the Wells Reservoir and habitat use within the Wells Reservoir.

Douglas PUD shall repeat the tracking survey for two additional years during Phase I (see Section 4.7 in WSMP, Table 1). The additional two years of surveys shall track: 1) active tags implanted in a percentage of juvenile fish from previous years of supplementation activities (dependent upon tag life) and 2) any juvenile and adult fish implanted with active tags during the last indexing period preceding the survey. Subsequent Phase I surveys are likely to coincide with the additional Phase I index monitoring and juvenile stocking activities.

4.2.3 Determining Natural Reproduction Potential

In years where environmental conditions are appropriate, Douglas PUD shall track sexually mature adult sturgeon that were captured and implanted with active tags under Section 4.2.1 for the purpose of identifying potential spawning locations and determining natural reproduction potential. Appropriate environmental conditions may be determined by examining the following factors: water quality and quantity (i.e., flow, temperature, and turbidity), the presence of reproductively viable adults during index monitoring activities, and the status of maturity for supplemented fish. In years in which sexually mature adult sturgeon are tagged under Section 4.2.1, Douglas PUD may also utilize egg collection mats in combination with tracking in areas of the Wells Reservoir for the purpose of identifying potential spawning locations and activity. Five surveys of natural reproduction using adult tracking and/or egg mat placement shall occur over the term of the new license. Several of these surveys are intended to be implemented during the latter part of the license in order to examine the natural reproductive potential of supplemented fish recruiting to sexual maturity. These activities will support the aquatic life designated use for spawning under WAC 173-201A in the Washington State Water Quality Standards.

Methods

The following methods will be employed to meet tasks described above. Note that the WSMP is written to separate Index Monitoring (4.2.1), Marked Fish Tracking Program (4.2.2), and Determining Natural Reproduction Potential (4.2.3). Components of each overlap and therefore are inherently linked. Therefore, certain objectives and tasks in each section of the Monitoring and Evaluation Plan (M&E) are separated to indicate the specific WSMP section it is intended to meet, but are coupled with other elements and tasks in the M&E Plan. Total M&E tasks and objectives are summarized in Table 1 for simplicity.
Table 1. **Summarized tasks for Douglas PUD’s white sturgeon M&E 2014-2017.**

<table>
<thead>
<tr>
<th>WSMP Reference</th>
<th>Task Description</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.2.1 Index Monitoring</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Setline fishing</td>
<td>25 days/spring and fall</td>
<td>25 days/spring and fall</td>
<td>25 days/spring and fall</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Conventional angling</td>
<td>480 hours</td>
<td>480 hours</td>
<td>480 hours</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Collect biological data</td>
<td>All fish from 1&amp;2</td>
<td>All fish from 1&amp;2</td>
<td>All fish from 1&amp;2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Acoustic tag</td>
<td>First 20 over 100 cm FL</td>
<td>Conditional on 2015 marking</td>
<td>Conditional on 2015 &amp; 2016</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Install and maintain array</td>
<td>10-20 arrays</td>
<td>10-20 arrays</td>
<td>10-20 arrays</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Analysis</td>
<td>Size structure, growth, habitat</td>
<td>Size structure, growth, habitat</td>
<td>Size structure, growth, habitat</td>
<td></td>
</tr>
</tbody>
</table>

| **4.2.2 Marked Fish Tracking Program** | | | | | |
| 1 | Scute and PIT | 5000 | 5000 | 5000 | 5000 |
| 2 | Acoustic tag 2014 releases | 50 recaptures | none | none | none |
| 3 | Acoustic tag 2015 releases | 40 before release from WFH | 10 recaptures | none | none |
| 4 | Acoustic tag 2016 releases | | 40 before release from WFH | | 10 recaptures |
| 5 | Analysis | Survival, emigration, habitat | Survival, emigration, habitat | Survival, emigration, habitat |

| **4.2.3 Assessment of Adult Reproductive Potential** | | | | | |
| 1 | Track adults | From 4.2.1 task 4 | From 4.2.1 task 4 | From 4.2.1 task 4 |
| 2 | Egg and larvae collection | 15 nights or 360 frame hrs. | 15 nights or 360 frame hrs. | 15 nights or 360 frame hrs. |
| 3 | Sex and state or maturity | From 4.2.1 task 1 & 2 | From 4.2.1 task 1 & 2 | From 4.2.1 task 1 & 2 |

**Notes.**

In all cases effort and release numbers are defined as "up to" values described above.
Fish collected in 4.2.1 task 3 will be assessed slightly differently based on maturity. For example, Juveniles will not be sexed and scoped.
If 4.2.3 occurred in all three years (2015-2017) This would be 3 of 5 reproductive studies required over the course of the 40 year license term.
4.2.1 Index Monitoring Program (Years 2015, 2016, 2017)

The purpose of the three-year index monitoring program (Years 3-5) for juvenile and adult sturgeon in the Wells Reservoir is to determine size structure, survival rates, abundance, density, condition, growth, and to identify distribution and general physical habitat characteristics at locations where juvenile sturgeon are captured. The methods designed to fulfill section 4.2.1 of the WSMP are specifically designed toward assessing the remaining natural population in the Wells Project but will also be used to monitor and evaluate fish released in the Wells Project from 2014-2017. Specific methods are outlined as follows:

1. Collect juveniles and adult sturgeon in the Wells Project
2. Recapture hatchery released juvenile white sturgeon
3. Collect adults during spawning periods to see if they can be used in brood programs
4. PIT tag all captured resident/wild juveniles and adults and acoustic tag up to (n=20 resident/wild fish in years 2015-2017) resident juveniles and adults.

Note that the WSMP is written to separate Index Monitoring (4.2.1), Marked Fish Tracking Program (4.2.2), and Determining Natural Reproduction Potential (4.2.3). Components of each overlap and therefore are inherently linked. Therefore, certain objectives and tasks in each section of the Monitoring and Evaluation Plan (M&E) are separated to indicate the specific WSMP section it is intended to meet, but are coupled with other elements and tasks in the M&E Plan. Total M&E tasks and objectives are summarized in Table 1 for simplicity.

Methods
Specific methods are outlined as follows:

Collection techniques and benchmarks

Task 1
Use up to 2 samples/year spring and fall and use 25 days a piece per year of long setline efforts (up to 10 setlines that will target all size classes of interest will be determined in coordination with the ASWG) per monitoring and evaluation year. Up to 135 days of long lines over the three year period (up to 10 setlines each day)\(^2\) will be used. A spring collection will be conducted, together this sampling regime may support ongoing brood collection efforts. The collection effort will be a stratified and random with greater effort focused in strata where sturgeon are expected to be found in the Wells Project. In subsequent years (following stocking activities), at the discretion of the Aquatic SWG, collection effort will be spread evenly or stratified across the Wells Project to determine habitat use of resident and hatchery sturgeon.

\(^2\) Two years of targeted fishing using a similar effort as proposed yielded 13 white sturgeon in 2001 and 2012 with 5 additional recaptures. Two of the fish were juveniles and the balance were classified as adults. At that time n= 35 adults were estimated in the Wells Project (95% confidence interval range of 13.15-217.5; Jerald 2007).
Task 2
Use up to 480 angling rod hours targeting all size classes and split between spring and fall sampling effort. Use up to 1,440 rod hours over three years using gear that targets resident adults. Collection may be focused on areas where setlines cannot be effectively used.

Task 3
Record tag information or PIT tag all captured fish, measure fork length (cm), weight (kg), apply scute mark to newly captured fish (no existing PIT tag) and apply PIT tag, record scute marks present on recaptured fish (hatchery and wild), examine wild fish greater than 120 cm fork length.

Task 4
Acoustic tagging of captured fish from Tasks 1 and 2 (wild population only n=20 tags\(^3\)). Tag choices may include V16 (ten year life and average PRI of 4 min) or alternate tag but will be a function of fish size. Douglas PUD will aim to use tags with tag burdens below 2% and PRI (pulse rate interval or burst rate) of 60 seconds. The first twenty wild sturgeon captured during Tasks 1 and 2 over 100 cm fork length will be tagged.

Task 5
Install and maintain acoustic node (receiver) array. Ten to twenty VR2 (or equivalent) acoustic receivers will be used to monitor white sturgeon movement in the Wells Project. Estimated receiver placement is shown in Figure 1 (tag interrogation locations on the Wells Project). Receiver locations will be selected based on tag testing and expected coverage of the water column. Receivers will be fixed to docks, piers or submerged with releases in the river column. Expected detection range is 150-300 meters but will be confirmed during receiver install. Initial receiver location was selected in order to assess emigration of released juvenile sturgeon, assess tributary use and to focus on areas where previous work suggests concentrations of sturgeon in the Wells Project. Receiver locations can be modified following the completion of the first year of acoustic telemetry results and in consultation with the Aquatic SWG. Receivers will be serviced monthly or every 1.5 months.

Task 6
Summarize habitat use descriptive statistics and estimate wild and hatchery survival and abundance using capture-recapture (including telemetry) data.

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\(^3\) Note: 20 acoustic tags are dedicated to resident/wild fish collected during indexing efforts. Additionally, as part of the marked fish tracking program 150 acoustic tags will be implanted in hatchery released sturgeon in the years 2015-2017. Therefore, acoustic receivers will be listening for up to 170 unique acoustic tag codes over an initial 3-year M&E plan.
FIGURE 1. Estimated VR2 receiver locations for white sturgeon acoustic telemetry in the Wells Project. Actual locations will be modified to balance detection capability/range, obscurity from the public and minimal channel width.

Deliverables:

1. Survival and abundance will be assessed as a function of mark recapture (including telemetry data).
2. Described seasonal distribution, which can be measured as a function of Project zone (area between receivers), grouped Project zones, or whole Project area.
3. Condition will be assessed using the relative weight index (Beamesderfer 1993).
4. Growth rates will be determined through recaptures and computed as cm/yr at given size classes and known or estimated age of fish.
5. Habitat use will be determined by date, location (lat/lon), depth, and substrate.
6. Catch rate will be estimated by capture season and as a function of fish per line. Size structure of the population will be determined using length frequency distributions.
7. Sex and maturity will be described as the proportion of the population that is sexually mature, ratio sex and size distribution of immature and mature fish with the Project.
An annual update containing collection effort, fish size, age, location of capture, population size and habitat use summaries will be included in the WSMP Annual Report. The final update will be a 3-year comprehensive report provided by January 2019. This three year report will be used to update the existing M&E plan, modify stocking techniques, and inform subsequent M&E efforts. Revisions to this plan and stocking/rearing efforts shall use the adaptive management approach as defined in the definition section of the Aquatic Settlement Agreement.

**4.2.2 Marked Fish Tracking Program (Years 2015, 2016, 2017)**

The purpose of tracking active-tagged fish using the telemetry study is to estimate the survival rates, estimate determine juvenile white sturgeon emigration rates out of the Wells Reservoir, and describe gross-level habitat use within the Wells Reservoir. The methods designed to fulfill section 4.2.2 of the WSMP are specifically designed towards assessing movements and habitat use of white sturgeon released from Wells Hatchery (age-1 repatriated or direct gamete fish) in the Wells Project from 2014-2017. Telemetry data from 4.2.1 will also be coupled with data collected in 4.2.2 to assess survival of released hatchery-reared sturgeon.

Note that the WSMP is written to separate Index Monitoring (4.2.1), Marked Fish Tracking Program (4.2.2), and Determining Natural Reproduction Potential (4.2.3). Components of each overlap and therefore are inherently linked. Therefore, certain objectives and tasks in each section of the Monitoring and Evaluation Plan (M&E) are separated to indicate the specific WSMP section it is intended to meet, but are coupled with other elements and tasks in the M&E Plan. Total M&E tasks and objectives are summarized in Table 1 for simplicity.

**Methods**

Specific methods are outlined as follows:

**Tagging**

**Task 1**
All hatchery-released fish will be given a PIT and hatchery origin specific scute mark (Direct Gamete Take vs. wild larvae) prior to release. Index monitoring activities described above will be used to recapture and interrogate fish.

**Task 2**
2014 hatchery releases: Acoustic tag n=50 releases in spring of 2015 following setline recapture (see index monitoring in 4.2.1 above). Acoustic tags (1% of released fish) will be split by proportion of direct gamete releases and larvae releases. Index monitoring above will be used to recapture and interrogate fish.

**Task 3**
2015 hatchery releases: Acoustic ~ n=40 prior to release and an additional ~ n=10 following 6 months in the Wells Project (as recaptures). This tagging schedule provides an opportunity to provide retention estimates of hatchery releases, while also improving sample size strength for those fish surviving in the first six months of release and therefore allow for improved estimates of habitat use. Index monitoring activities described above will be used to recapture and interrogate fish.
**Task 4**
2016 hatchery releases: Acoustic tag ~ n=40 prior to release and an additional ~ n=10 following 6 months in the Wells Project (as recaptures). This tagging schedule provides an opportunity to provide retention estimates of hatchery releases, while also improving sample size strength for those fish surviving in the first six months of release and therefore allow for improved estimates of habitat use. Index monitoring activities described above will be used to recapture and interrogate fish.

**Task 5**
Summarize detections and movements. Estimate survival and emigration.

**Deliverables and Results:**

1. Estimate emigration of released fish using detection histories from recaptures, PIT and acoustic interrogations as well as fixed PIT arrays within fishways, bypass facilities and tributaries.
2. Describe gross-level habitat use within the Project based on data from telemetry detections and physical recaptures.
3. Use telemetry detections and physical recaptures to estimate survival of hatchery and wild white sturgeon.
4. Tributary entries will be determined using acoustics tags and PIT stations and acoustics.
5. Assess whether preferred stocking techniques exist by examining stocking years that apply different techniques such as larger stocking size, different stocking periods, night plants, different stocking locations etc. These independent variables will be used when examining relative survival or other appropriate endpoints during the three years of M&E activities.
6. Describe seasonal distribution.

An annual update containing collection effort, fish size, age, location of capture, population size and habitat use summaries will be included in the WSMP Annual Report. The final update will be a 3-year comprehensive report provided by January 2019. This three year report will be used to update the existing M&E plan, modify stocking techniques, and inform subsequent M&E efforts. Revisions to this plan and stocking/rearing efforts shall use the adaptive management approach as defined in the definition section of the Aquatic Settlement Agreement.

**4.2.3 Determining Natural Reproduction Potential (In years with expected spawning)**

In years where environmental conditions are appropriate, Douglas PUD shall track sexually mature sturgeon expected to spawn that were captured and implanted with acoustic tags under Section 4.2.1 for the purpose of identifying potential spawning locations and determining natural reproduction potential. Five natural reproduction potential studies are scheduled over the term of Douglas PUD’s license. As such, Douglas PUD will work with the Aquatic SWG to decide which years are most appropriate for these analyses.
Note that the WSMP is written to separate Index Monitoring (4.2.1), Marked Fish Tracking Program (4.2.2), and Determining Natural Reproduction Potential (4.2.3). Components of each overlap and therefore are inherently linked. Therefore, certain objectives and tasks in each section of the Monitoring and Evaluation Plan (M&E) are separated to indicate the specific WSMP section it is intended to meet, but are coupled with other elements and tasks in the M&E Plan. Total M&E tasks and objectives are summarized in Table 1 for simplicity.

**Methods**

Specific methods are outlined as follows:

**Task 1**
Track tagged adults from 4.2.1 to suspected spawning locations.

**Task 2**
Deploy up to 6 dual net drift frames and up to 6 egg mats for up to 15 nights or up to 360 frame hours during each year of reproductive potential studies. Concentrate fishing in suspected spawning locations or adjacent to spawning locations in subsequent or current tracking year as recommended by the Aquatic SWG. Determine development stage or day-age of collected offspring.

**Task 3**
Use captured adult fish in 4.2.1 to examine for sex and state of maturity. These data will support Aquatic SWG discussions on decision-making for the implementation of natural reproduction surveys (Task 2).

**Deliverables:**

1. Locate suspected spawning sites using telemetry data.
2. Confirm spawning activity by capturing white sturgeon early life stages. Stage captured embryos and larvae to estimate dates of spawning events.

An annual update containing the results of the collection effort and natural reproduction summaries will be included in the WSMP Annual Report. The final update will be a 3-year comprehensive report provided by January 2019. Comprehensive analyses should be used to predict spawning locations and conditions of hatchery released fish as they enter reproductive maturity and wild fish captured and tagged as part of the Index Monitoring Program, identify critical areas for spawning, physical conditions under which spawning was confirmed, and help determine reproductive potential in terms of spawning success and recruitment.

Drauch Schreier, A. In Preperation. Title to be determined.


APPENDIX G
2012 BULL TROUT MANAGEMENT PLAN
ANNUAL REPORT
2012 ANNUAL REPORT

BULL TROUT MANAGEMENT PLAN

WELLS HYDROELECTRIC PROJECT

FERC PROJECT NO. 2149

April 2013

Prepared by:
Public Utility District No. 1 of Douglas County
East Wenatchee, Washington

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EXECUTIVE SUMMARY

The Bull Trout Management Plan (BTMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP), will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification (401 Certification) for the Wells Hydroelectric Project (Project).

The goal of the BTMP is to identify, monitor, and address impacts, if any, on bull trout \((Salvelinus confluentus)\) resulting from the Project in a manner consistent with the United States Fish and Wildlife Service (USFWS) Bull Trout Recovery Plan and the terms of the Section 7 Incidental Take Statement (ITS). This BTMP is intended to continue the implementation of management activities to protect bull trout during the new license term in a manner consistent with the original Wells Bull Trout Monitoring and Management Plan (WBTMMP) (Douglas 2004). The 2004 WBTMMP was developed in coordination with the USFWS, as required by the USFWS Bull Trout Section 7 Biological Opinion (BO) in association with the Federal Energy Regulatory Commission’s (FERC) approval of the HCP. The PMEs presented within the BTMP are designed to meet the following objectives:

Objective 1: Operate the upstream fishways and downstream bypass systems in a manner consistent with the HCP. In 2012 Public Utility District No. 1 of Douglas County (Douglas PUD) maintained safe, efficient and timely passage through the downstream juvenile fish bypass system and upstream adult fishway passage structures for bull trout and conducted video monitoring of the Wells Dam fishway viewing windows during fish passage season. Douglas PUD continued to operate the juvenile fish bypass system at Wells Dam in accordance with criteria outlined in the Wells HCP.

Objective 2: Identify any adverse Project-related impacts on adult and sub-adult bull trout passage. Douglas PUD will implement the year 5 Passage Evaluation Study in 2017 or earlier if the 5-year average adult bull trout count of 60 fish increases more than two times (120 or more bull trout counted in a single year). No significant changes in the operation of the fish ladders or hydrocombine have been implemented or are proposed that would trigger the implementation of bull trout passage evaluation. During 2012 Douglas PUD in consultation with the Aquatic Settlement Work Group (Aquatic SWG) developed a study plan to assess incidental take of bull trout at the Twisp River Weir broodstock collection facility. After discussions with the Aquatic SWG and specifically with the USFWS, the parties including the USFWS signatories agreed that Douglas PUD should postpone the Off-Project Passage Evaluation until year five (2017) of the new license when the Bull Trout Passage and Enumeration Study is scheduled to take place at Wells Dam. During 2012, one sub-adult bull trout was collected during winter maintenance related fish salvage activities in one of the adult fishways. No new sub-adult related monitoring activities were implemented or are proposed; fewer than 10 sub-adult bull trout have been observed at Wells in a single calendar year.
Objective 3: Implement reasonable and appropriate options to modify upstream fishway, downstream bypass, or operations if adverse impacts on bull trout are identified and evaluate the effectiveness of these measures. No new adverse impacts to bull trout were identified in 2012.

Objective 4: Periodically monitor for bull trout entrapment or stranding during low Wells Reservoir elevations. Stranding surveys were not conducted in 2012 since reservoir elevation did not fall below 773’ Mean Sea Level (MSL).

Objective 5: Participate in the development and implementation of the USFWS Bull Trout Recovery Plan including information exchange and genetic analysis. Should bull trout be delisted, the Aquatic SWG will re-evaluate the needs and objectives of the BTMP. Genetic samples were collected for all of the bull trout captured at the Twisp Weir in 2012. Samples will be analyzed if requested by the Aquatic SWG. Genetic samples will be taken at Wells Dam in year ten of the new license.

Objective 6: Identify any adverse impacts of Project-related hatchery operations on adult and sub-adult bull trout. In 2012, the number of bull trout encountered during hatchery operation activities was comparable to previous years. Hatchery actions in 2012 were very similar to other years where broodstock are collected at Wells Dam and the Twisp Weir traps.

This BTMP is intended to be compatible with other bull trout management plans and the Upper Columbia Salmon Recovery Plan (UCSRP) in the Columbia River mainstem. Furthermore, this management plan is intended to be not inconsistent with other management strategies of federal, state and tribal natural resource management agencies and supportive of designated uses for aquatic life under WAC 173-201A, the Washington state water quality standards.

The BTMP will be updated in 2013 to reflect additional requirements that have been added by the final 401 Certification, the 2012 Endangered Species Act Section 7 consultation for bull trout associated with the relicensing of the Wells Project and the new project license issued by the FERC. Implementation of all bull trout related measures implemented during the first full year of the FERC license will be reported within the 2013 BTMP Annual Report.
1.0 INTRODUCTION

The Bull Trout Management Plan (BTMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification (401 Certification) for the Wells Hydroelectric Project (Project).

To ensure active stakeholder participation and support, the Public Utility District No. 1 of Douglas County (Douglas PUD) developed all of the resource management plans in close coordination with agency and tribal natural resource managers (Aquatic Settlement Work Group or Aquatic SWG). During the development of this plan, the Aquatic SWG focused on developing management priorities for resources potentially impacted by Project operations. Entities invited to participate in the Aquatic SWG include the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Washington Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), and Douglas PUD.

The BTMP will direct implementation of measures to mitigate project impacts, if any, on bull trout (*Salvelinus confluentus*). To ensure active stakeholder participation and support, Douglas PUD developed this plan, along with the other aquatic management plans, in close coordination with the members of the Aquatic SWG.

The Aquatic SWG agrees on the need to develop a plan to direct the long-term management of bull trout in the Project. This management plan summarizes the relevant resource issues and background (Section 2), identifies goals and objectives of the plan (Section 3), and defines the relevant PMEs (Section 4) for bull trout during the term of the new license.

Additionally, this management plan is intended to continue implementation activities aimed at protecting bull trout in a manner consistent with measures specified in the original Wells Bull Trout Monitoring and Management Plan (WBTMMP) (Douglas 2004). The 2004 WBTMMP was developed in consultation with the USFWS, as required by the USFWS Bull Trout Biological Opinion (BO) in association with the implementation of the HCP.

In addition to the requirements found within the BTMP, the Endangered Species Act (ESA) Section 7 consultation for the relicensing of the Wells Project and the new Federal Energy Regulatory Commission (FERC) license has added several additional bull trout related requirements associated with the continued operation of the Wells Project. The 2013 annual report on the implementation of the BTMP will include all of the bull trout related activities that took place from the issuance of the new license in November 2012 to the end of December 2013 and will also include any bull trout related compliance reports or plans filed with the Aquatic SWG, USFWS and the FERC during calendar year 2013.
2.0 BACKGROUND

2.1 Bull Trout Biology

Bull trout are native to northwestern North America, historically occupying a large geographic range extending from California north into the Yukon and Northwest Territories of Canada, and east to western Montana and Alberta (Cavender 1978). They are generally found in interior drainages, but also occur on the Pacific Coast in Puget Sound and in the large drainages of British Columbia.

Bull trout currently occur in lakes, rivers and tributaries in Washington, Montana, Idaho, Oregon (including the Klamath River basin), Nevada, two Canadian Provinces (British Columbia and Alberta), and several cross-boundary drainages in extreme southeast Alaska. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta, and the McKenzie River system in Alberta and British Columbia (Cavender 1978; McPhail and Baxter 1996; Brewin and Brewin 1997). The remaining distribution of bull trout is highly fragmented.

Bull trout are a member of the char group within the family Salmonidae. Bull trout closely resemble Dolly Varden (Salvelinus malma), a related species. Genetic analyses indicate, however, that bull trout are more closely related to an Asian char (Salvelinus leucomaenis) than to Dolly Varden (Pleyte et al. 1992). Bull trout are sympatric with Dolly Varden over part of their range, most notably in British Columbia and the Coastal-Puget Sound region of Washington State.

Bull trout are believed to have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Growth, survival, and long-term persistence are dependent upon habitat characteristics such as clean, cold, connected, and complex instream habitat, a stable substrate with a low percentage of fine sediments, high channel stability, and stream/population connectivity (USFWS et al. 2000). Stream temperature and substrate type, in particular, are critical factors for the sustained long-term persistence of bull trout. Spawning is often associated with the coldest, cleanest, and most complex stream reaches within basins. However, bull trout may exhibit a patchy distribution, even in pristine habitats, and should not be expected to occupy all available habitats at the same time (Rieman and McIntyre 1995; Rieman et al. 1997).

Bull trout exhibit four distinct life history types: resident, fluvial, adfluvial, and anadromous. The fluvial, adfluvial, and resident forms exist throughout the range of the bull trout (Rieman and McIntyre 1993). These forms spend their entire life in freshwater. The anadromous life history form is currently known only to occur in the Coastal-Puget Sound region within the coterminous United States (Volk 2000; Kraemer 1994; Mongillo 1993). Multiple life history types may be expressed in the same population, and this diversity of life history types is considered important to the stability and viability of bull trout populations (Rieman and McIntyre 1993).

The majority of growth and maturation for anadromous bull trout occurs in estuarine and marine waters, adfluvial bull trout in lakes or reservoirs, and fluvial bull trout in large river systems.
Resident bull trout populations are generally found in small headwater streams where fish remain their entire lives.

For migratory life history types, juveniles tend to rear in tributary streams for 1 to 4 years before migrating downstream into a larger river, lake, or estuary and/or nearshore marine area to mature (Rieman and McIntyre 1993). In some lake systems, age 0+ fish (less than 1 year old) may migrate directly to lakes (Riehle et al. 1997). Juvenile and adult bull trout in streams frequently inhabit side channels, stream margins and pools with suitable cover and areas with cold hyporheic zones or groundwater upwellings (Sexauer and James 1993; Baxter and Hauer 2000).

2.2 Species Status

On June 10, 1998, the USFWS listed bull trout within the Columbia River basin as threatened under the Endangered Species Act (ESA) (FR 63(111)). Later (November 1, 1999), the USFWS listed bull trout within the coterminous United States as threatened under the ESA (FR 64(210)). The USFWS identified habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, and grazing; blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment into diversion channels; and introduced non-native species as major factors affecting the distribution and abundance of bull trout. They noted that dams (and natural barriers) have isolated population segments resulting in a loss of genetic exchange among these segments (FR 63(111)). The USFWS believes many populations are now isolated and disjunct. In October 2002, the USFWS completed the first draft of a bull trout recovery plan intended to provide information and guidance that will lead to recovery of the species, including its habitat (USFWS 2002). Threatened bull trout population segments are widely distributed over a large area and because population segments were subject to listing at different times, the USFWS adopted a two-tiered approach to develop the draft recovery plan for bull trout (USFWS 2002). In November 2002, the USFWS published in the federal register a proposed rule for the designation of critical habitat for the Klamath River and Columbia River distinct population segments of bull trout (67 FR 71235). In October 2004 the USFWS published a final rule in the Federal Register designating critical habitat for the Klamath River and Columbia River populations of bull trout (69 FR 59995).

In April 2008, the USFWS completed the 5-year status review for Columbia River bull trout with two recommendations: maintain “threatened” status for the species, and determine if multiple distinct population segments exist within the Columbia River and merit protection under the ESA. The recommendations intend to facilitate analysis of project effects over more specific and biologically appropriate areas, ultimately allowing a greater focus of regulatory protection and recovery resources (USFWS 2008a). The review also identified specific issues that limit the overall ability to accurately and quantitatively evaluate the current status of bull trout. Seven recommendations were made to improve future evaluation and management decisions, all of which are largely based on improvement and standardization of monitoring and evaluation techniques, better delineation and agreement of core areas and Recovery Units, and multi-agency cooperation and management (USFWS 2008b).
The Wells Project is situated within the Upper Columbia River Recovery Unit and the USFWS has identified the Wenatchee, Entiat, and Methow Rivers as its core areas. A core area represents the closest approximation of a biologically functioning unit for bull trout. A core area functions as a metapopulation for bull trout. Not all core areas are equal and each has specific functions that are unique. For example, the Entiat Core Area depends heavily on the mainstem Columbia River to provide overwinter, migration, and forage habitats. The Wenatchee Core Area has populations using lake and riverine (both the Wenatchee and Columbia Rivers) habitat for overwintering, migration, and foraging. Within a core area, many local populations may exist. A local population is assumed to be the smallest group of fish that is known to represent an interacting reproductive unit. Nineteen local populations have been identified in the Wenatchee (7), Entiat (2) and Methow (10) core areas (USFWS 2002).

2.3 Project Bull Trout Studies

2.3.1 2001-2003 Project Bull Trout Study

Listed Columbia River bull trout have been observed and counted at Wells Dam since 1998. In 2000, due to the potential for operations at mid-Columbia dams to affect the movement and survival of bull trout, the USFWS requested that the three mid-Columbia PUDs (Douglas, Chelan, and Grant PUDs) evaluate the movement and status of bull trout in their respective project areas. At that time, little was known about the life-history characteristics (e.g., movements, distribution, habitat use, etc.) of bull trout in the mid-Columbia River. Therefore, in order to assess the operational effects of hydroelectric projects on bull trout within the mid-Columbia, a three PUD coordinated radio-telemetry study was implemented beginning in 2001. The goal of the study was to monitor the movements and migration patterns of adult bull trout in the mid-Columbia River using radio-telemetry (Figure 2.3-1). The number of trout to be collected and tagged at each dam (Rock Island, Rocky Reach, and Wells) was based on the proportion of fish that migrated past those dams in 2000.

From 2001-2003, bull trout were collected from the Wells, Rocky Reach, and Rock Island dams and radio-tagged. Multiple-telemetry techniques were used to assess the movement of tagged bull trout within the study area. At Wells Dam, a combination of aerial and underwater antennas was deployed. The primary purpose for this system was to document the presence of bull trout at the Project, identify passage times and determine their direction of travel (upstream/downstream). In addition to these systems, a number of telemetry systems were deployed to address specific questions posed by the USFWS and Douglas PUD. At Wells Dam, several additional systems were installed to identify tagged bull trout that could enter, ascend, and exit specific gates and fish ladders. All possible access points to the adult fish ladders and the exits were monitored individually in 2001, 2002, and 2003, allowing the route of passage to be determined as well as the ability to establish the exact time of entrance and exit from the ladder system. English et al. (1998; 2001) provides a detailed description of the telemetry systems at each of the dams and within the tributaries.
To assess bull trout movements into and out of the Wells Reservoir, fixed-telemetry monitoring sites were established at the mouth of the Methow and Okanogan rivers and periodic aerial surveys were conducted on the reservoir and throughout both watersheds (English et al. 1998, 2001). Key findings of the multi-year study are as follows:

- Total upstream fishway counts (May 1st to November 15th) at Wells Dam from 2000 to 2003 were 90, 107, 76, and 53 bull trout, respectively.
- Adult bull trout migrate upstream through Wells Dam from May through November. Peak movement occurs in May and June with 94, 95, 92, and 89 percent of adult bull trout being detected during these months at Wells Dam for years 2000-2003, respectively.
- Tagged migratory adult bull trout successfully move both upstream and downstream past the Project (radio-telemetry). From the 79 bull trout radio-tagged in 2001 and 2002 at Rock Island, Rocky Reach, and Wells, five bull trout passed downstream through Wells Dam with no documented mortality. Twelve downstream passage events occurred at Rocky Reach (4) and Rock Island (8) through turbines from 2001 to 2003. None of the 17 (5 Wells, 4 Rocky Reach and 8 Rock Island) observed downstream passage events resulted in observed mortality of bull trout.
- Between 2001 and 2003, a total of 10 (2 tagged at Rock Island, 4 Rocky Reach, 4 Wells), 11 (4 Wells, 5 Rocky Reach, 2 from 2001), and 1 (1 Wells) tagged bull trout were detected moving upstream of the Project, respectively.
- Median tailrace times (tailrace detection to ladder entrance detection) during the telemetry study at Wells in 2001-2003 were 1.53, 7.84, and 1.00 days, respectively. Median travel times (tailrace detection to ladder exit detection) during the telemetry study at Wells in 2001-2003 were 8.87, 7.60, and 1.16 days, respectively. Median ladder passage times (entrance detection to ladder exit detection) during the telemetry study at Wells in 2001-2003 were 5.70, 0.23, and 0.16 days, respectively.
- Adult bull trout migrating upstream of Wells Dam appear to be destined for the Methow River. Between 2001 and 2003, no bull trout selected the Okanogan system (one trout moved into the Okanogan, but left shortly thereafter and moved into the Methow system).
- Median travel time from Wells Dam (detection at ladder exit) to first detection in the Methow River in 2001-2003 was 0.40, 2.78, and 1.09 days, respectively.
- All tributary entrance events (fixed station detections) into the Methow River by bull trout (28 total events, 2001-2003) occurred before June 27. An additional two bull trout, not detected by the tributary fixed station systems, were detected in the Methow River via 2002 aerial surveys. Bull trout in the Methow system selected two primary areas, the mainstem Methow River and the Twisp River.
- To date, 30% (9/30) of bull trout that entered the Methow River have been detected leaving the system. Tributary exit dates were recorded for 78% (7/9) of these emigrating bull trout and 86% (6/7) of bull trout with a recorded exit date left the Methow River system between October and December.
- Bull trout migrating upstream through Wells Dam in 2001 were 5 year old (n=2, mean fork length=55.6cm) and 6 year old (n=6, mean fork length= 54.6cm) fish as determined by scales.
92% (11/12) and 53% (8/15) of tagged bull trout detected in the vicinity of Wells Dam entered the Wells Hatchery Outfall in 2001 and 2002, respectively. It is possible that the bull trout frequented the outfall in search of prey. Typical operation at the hatchery is to volitionally release yearling chinook smolts between April 15 and 30, and subyearling chinook smolts in early June. Given that bull trout feed opportunistically (Goetz 1989), it is likely that the tagged bull trout were taking advantage of the large concentration of juvenile salmonids within the hatchery outfall system.

2.3.2 2005-2008 Project Bull Trout Study

On December 10, 2003, the USFWS received a request from the FERC for formal consultation to determine whether the proposed incorporation of the HCP into the FERC license for operation of the Project was likely to jeopardize the continued existence of the Columbia River distinct population segment (DPS) of ESA-listed bull trout, or destroy or adversely modify proposed bull trout critical habitat. In response to the FERC request and based upon the results of the 2001-2003 study, which suggested that continued operations are not likely to jeopardize bull trout, the USFWS filed the BO and Incidental Take Statement (ITS) with FERC. On June 21, 2004, FERC issued an order incorporating the HCP and the terms and conditions of the ITS into the FERC license for the Project.
In 2004, Douglas in consultation with the USFWS and as required under the HCP BO, developed the WBTMMP. The goal of the WBTMMP is to continue monitoring and evaluating bull trout in the Project to quantify and address, to the extent feasible, potential Project impacts on bull trout. Implementation of WBTMMP measures specifically include: (1) address ongoing Project impacts through the life of the existing operating license; (2) provide consistency with recovery actions as outlined in the USFWS bull trout recovery plan; and (3) monitor and minimize the extent of incidental take of bull trout, if any, consistent with Section 7 of the ESA. WBTMMP implementation started in 2005 and continued through the spring of 2008. Objectives of the plan include identifying Project impacts, if any, on upstream and downstream passage of adult and sub-adult bull trout through Wells Dam, investigating the potential for sub-adult entrapment or stranding in off-channel or backwater areas of Wells Reservoir, and identifying the Core Areas and Local Populations, as defined in the USFWS Bull Trout Recovery Plan, of bull trout that utilize the Project.
To address Project impacts, if any, on upstream and downstream passage of adult bull trout, Douglas PUD captured and radio-tagged 6, 10, and 10 adult bull trout at Wells Dam in 2005, 2006, and 2007, respectively (LGL and Douglas PUD, 2008). In 2005, all six fish traveled upstream into the Methow River and no downstream passage events were recorded. Travel time from release (after tagging) until entrance into the Methow River ranged from 7 hours to 12 days. In 2006, in addition to the 10 adult bull trout radio-tagged at Wells Dam, the USFWS radio-tagged 13 bull trout in the Methow River Core Area and Public Utility District No.1 of Chelan County (Chelan PUD) released 29 tagged bull trout from Rocky Reach and Rock Island dams. In total, 13 downstream passage events and 8 upstream passage events were recorded at Wells Dam in 2006. There were no observed instances of bull trout mortality resulting from these passage events. In 2007, 10 bull trout were tagged at Wells Dam, the USFWS tagged 5 bull trout in the Methow River Core Area, and Chelan PUD released 19 tagged bull trout from Rocky Reach and Rock Island dams. In total, 1 downstream passage event and 3 upstream passage events were recorded at Wells Dam in 2007. Similar to 2006, no instances of bull trout mortality were observed resulting from these passage events. From 2005 to 2008 (all radio-tagged fish combined), 25 downstream passage events and 52 upstream passage events by 40 individual bull trout were recorded at Wells Dam with no observances of bull trout injury or mortality (LGL and Douglas PUD, 2008). From 2005-2007, no adult or sub-adult bull trout were observed utilizing Wells Dam fishways during the winter monitoring period (typically November 16 to April 30). Monitoring of radio-tagged adult bull trout ended in June 2008.

To address potential project-related impacts on sub-adult bull trout, fish were opportunistically tagged with passive integrated transponder (PIT) tags when encountered during standard fish sampling operations at Wells Dam or during off-Project tributary smolt trapping activities. In 2005, 2006, 2007, and 2008 a total of 16, 20, 14, and 17 sub-adult bull trout were PIT-tagged during tributary smolt sampling activities, respectively. No sub-adult bull trout were observed during Wells Dam fish sampling operations or by the adult PIT-tag detection system in the fishways. Over the 2005-2008 period, no sub-adult bull trout were observed utilizing Wells Dam fishways during the winter period.

In 2005, Douglas PUD collected high resolution bathymetric information of Project waters to address the potential for entrapment or stranding of bull trout in off-channel or backwater areas of the Wells Reservoir. This data combined with Wells inflow patterns, reservoir elevations, and backwater curves would allow Douglas PUD to begin identifying entrapment or stranding areas. In 2006, a field survey of potential bull trout stranding sites using bathymetric and operations information was conducted during a period of low reservoir elevation associated with the Methow River flood control program. Following a complete survey of the project, no stranded bull trout (sub-adult or adult) were found during the 2006 low water event. In 2007, reservoir conditions were not sufficiently low to warranted further field investigations.

In support of identifying the local populations and core areas of bull trout utilizing the Project area, Douglas PUD funded the collection of genetic samples from 22, 20, and 24 bull trout in 2005, 2006 and 2007, respectively. In 2005, 6 samples were collected at Wells Dam and 16 were collected at off-Project operations (Methow and Twisp river screw traps). In 2006, 10 samples were collected at Wells Dam and 10 samples were collected at off-Project operations. In 2007, 10 samples were collected at Wells Dam and 14 samples were collected at off-Project operations. All genetic samples were provided to the USFWS.
3.0 GOALS AND OBJECTIVES

The goal of the BTMP is to identify, monitor and address impacts, if any, on bull trout resulting from the Project in a manner consistent with the USFWS Bull Trout Recovery Plan and the terms of the Section 7 ITS (See Section 4.7). This BTMP is intended to continue the implementation of management activities to protect bull trout during the new license term in a manner consistent with the original WBTMMP (Douglas 2004). The 2004 WBTMMP was developed in coordination with the USFWS, as required by the USFWS Bull Trout BO in association with the HCP. The PMEs presented within the BTMP are designed to meet the following objectives:

Objective 1: Operate the upstream fishways and downstream bypass systems in a manner consistent with the HCP;

Objective 2: Identify any adverse Project-related impacts on adult and sub-adult bull trout passage;

Objective 3: Implement reasonable and appropriate options to modify upstream fishway, downstream bypass, or operations if adverse impacts on bull trout are identified and evaluate effectiveness of these measures;

Objective 4: Periodically monitor for bull trout entrapment or stranding during low Wells Reservoir elevations (similar to WBTMMP);

Objective 5: Participate in the development and implementation of the USFWS Bull Trout Recovery Plan, including information exchange and genetic analysis. Should bull trout be delisted, the Aquatic SWG will re-evaluate the needs and objectives of the BTMP;

Objective 6: Identify any adverse impacts of Project-related hatchery operations on adult and sub-adult bull trout.

This BTMP is intended to be compatible with other bull trout management plans and the Upper Columbia Salmon Recovery Plan (UCSRP) in the Columbia River mainstem. Furthermore, this management plan is intended to be not inconsistent with other management strategies of federal, state and tribal natural resource management agencies and supportive of designated uses for aquatic life under WAC 173-201A, the Washington state water quality standards.

The schedule for implementation of specific measures within the BTMP is based on the best information available at the time the Plan was developed. As new information becomes available, implementation of each activity may be adjusted through consultation with the Aquatic SWG.
4.0 PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

In order to fulfill the goals and objectives described in Section 3.0 of the BTMP, Douglas PUD, in consultation with the Aquatic SWG, has initiated the implementation of the following measures.

4.1 Operate the Upstream Fishways and Downstream Bypass Systems in a Manner Consistent with the HCP (Objective 1)

4.1.1 Provide Upstream and Downstream Passage for Adult and Sub-Adult Bull Trout

Douglas PUD will continue to provide upstream passage for adult bull trout through the existing upstream fishways and downstream passage of adult and sub-adult bull trout through the existing downstream bypass system. Both upstream fishway facilities (located on the west and east shores) are operational year around with maintenance occurring on each fishway at different times during the winter to ensure that one upstream fishway is always operational. Maintenance activities on Wells fishways occur during the winter when bull trout have not been observed passing Wells Dam. Operation of the downstream passage facilities for bull trout will be consistent with bypass operations for Plan Species identified in the HCP. Currently the bypass system is operated from April 12 through August 26 of each year. This operating period is consistent with the period of high bull trout and anadromous fish presence at the Project.

4.1.1.1 Progress Towards Meeting Objective 1 in 2012- Provide Upstream and Downstream Passage for Adult and Sub-Adult Bull Trout

Consistent with the BTMP and the Wells HCP, Douglas PUD maintained safe, efficient and timely passage through the downstream juvenile fish bypass system and upstream adult fishway passage structures for bull trout. Winter maintenance occurred in the adult fishway structures in January 2012 and December 2012. At least one of the adult fishways was in operation at all times during the winter maintenance period (December – February) and both adult fishways were in operation for the remainder of the year (March – November). Juvenile Fish Bypass operations were implemented consistent with the HCP Coordinating Committee approved Bypass Operations Plan for 2012. The dates of operation included initiation on April 9th at 000 hours with the bypass system operated continuously until midnight on August 19th. The 2012 dates of operation for the juvenile fish bypass system were developed in consultation with the Wells HCP Coordinating Committee and are the result of species run-timing estimates developed by the University of Washington, Columbia Basin Research that were reviewed, approved and adopted by the HCP Coordinating Committee and implemented by Douglas PUD prior to the beginning of the 2012 bypass season.
4.1.2 Upstream Fishway Counts

Douglas PUD shall continue to conduct video monitoring in the Wells Dam fishways from May 1st through November 15th to count and provide information on the population size of upstream moving bull trout.

4.1.2.1 Progress Towards Meeting Objective 1 in 2012- Upstream Fishway Counts

Seventy four bull trout were counted at Wells Dam fish ladder viewing windows in 2012. Counts at Wells represent a 14% increase in the 12 year average count of 65. Eighty nine percent (89%) of the passage occurred during the months of May and June, which is consistent with the 12 year average of eighty eight percent (88%) of bull trout passage occurring during these months. Bull trout passing Wells Dam in May and June are primarily destined to spawn in the Methow Basin and in particular the upper reaches of the Twisp River. Only three of the 74 bull trout counted at Wells Dam passed the project after July 26th.

4.1.3 Upstream Fishway Operations Criteria

Douglas PUD shall continue to operate the upstream fishway at Wells Dam in accordance with criteria outlined in the HCP.

4.1.3.1 Progress Towards Meeting Objective 1 in 2012- Upstream Fishway Operations Criteria

Consistent with the BTMP and the Wells HCP, Douglas PUD continued to operate the two upstream fishways at Wells Dam in accordance with upstream fishway criteria found in the HCP and as approved by the Wells HCP Coordinating Committee.

4.1.4 Bypass Operations Criteria

Douglas PUD shall continue to operate the bypass system at Wells Dam in accordance with criteria outlined in the HCP.

4.1.4.1 Progress Towards Meeting Objective 1 in 2012- Bypass Operations Criteria

Consistent with the BTMP and the HCP, Douglas PUD continued to operate the juvenile fish bypass system at Wells Dam in accordance with criteria outlined in the Wells HCP and as approved by the HCP Coordinating Committee.

4.2 Identify Any Adverse Project-related Impacts on Adult and Sub-adult Bull Trout Passage (Objective 2)

4.2.1 Adult Bull Trout Upstream and Downstream Passage Evaluation

Douglas PUD shall continue to monitor upstream and downstream passage and incidental take of adult bull trout through Wells Dam and in the Wells Reservoir through the implementation of a radio-telemetry study. Specifically, in years 5 and 10 of the new license, and continuing every
ten years thereafter during the new license term, Douglas PUD will conduct a one-year monitoring program to determine whether Douglas PUD remains in compliance with the ITS. The same study protocols used during past radio-telemetry assessments at Wells Dam (LGL and Douglas PUD 2007) will be employed for these monitoring studies.

If the adult bull trout counts at Wells Dam increases more than two times the existing 5-year average or if there is a significant change in the operation of the fish ladders or hydrocombine, then the Aquatic SWG will determine whether additional years of take monitoring are needed beyond those identified in this section of the BTMP. If the authorized incidental take level is exceeded during any one-year period, Douglas PUD will conduct another monitoring study in the succeeding year. If the authorized incidental take level is exceeded in this second year, Douglas PUD will develop a plan, in consultation with the Aquatic SWG, to address the identified factors contributing to exceedance of the allowable level of incidental take.

4.2.1.1 Progress Towards Meeting Objective 2 in 2012- Adult Bull Trout Upstream and Downstream Passage Evaluation

Douglas PUD will implement the year 5 Passage Evaluation Study in 2017 or earlier if the 5-year average adult bull trout count of 60 fish increases more than two times (120 or more bull trout counted in a single year). At the time that the Aquatic Settlement Agreement was signed the five year average count of bull trout at Wells Dam was 60 fish. In 2012 the number of observed fish was 74.

No significant changes in the operation of the fish ladders or hydrocombine have been implemented or are proposed that would trigger the early implementation of bull trout passage evaluation.

4.2.2 Adult Bull Trout Passage Evaluation at Off-Project Collection Facilities

Douglas PUD shall assess upstream and downstream passage and incidental take of adult, migratory bull trout at off-Project (outside of the Project boundary) adult salmon and steelhead broodstock collection facilities associated with the Wells HCP. Specifically, beginning in year one of the new license, Douglas PUD will conduct a one-year radio-telemetry study to assess passage and incidental take at off-Project adult collection facilities (i.e., Twisp weir). Douglas PUD will capture and tag up to 10 adult, migratory bull trout (>400mm) at adult collection facilities and use fixed receiver stations upstream and downstream of collection facilities to examine upstream and downstream passage characteristics and incidental take. Study protocols that have been used during past radio-telemetry assessments at Wells Dam (LGL and Douglas PUD 2008) will be employed for this assessment.

If negative impacts to passage associated with Off-Project collection facilities are observed or the authorized incidental take level is exceeded during any one-year period, Douglas PUD will conduct another monitoring study in the succeeding year. If negative impacts to passage continue to be observed or the authorized incidental take level is exceeded in this second year, Douglas PUD will develop a plan, in consultation with the Aquatic SWG, to address the identified factors contributing to passage impacts or the exceedance of the allowable level of incidental take.
After year one of the new license, the implementation of this sub-objective will be integrated into the one-year telemetry monitoring program that is to be conducted every ten years (beginning in year 10 of the new license) at Wells Dam as identified in Section 4.2.1. In year 10 of the new license and every 10 years thereafter, bull trout will be captured and tagged only at Wells Dam (Section 4.2.1) since data show that bull trout passing Wells Dam are migrating back into the Methow River watershed (LGL and Douglas PUD 2008). Through the continued deployment of fixed station monitoring at off-Project adult salmon and steelhead broodstock collection facilities, these tagged bull trout will continue to provide passage and take information in support of this sub-objective throughout the term of the new license.

4.2.2.1 Progress Towards Meeting Objective 2 in 2012- Adult Bull Trout Passage Evaluation at Off-Project Collection Facilities

During 2012 Douglas PUD in consultation with the Aquatic SWG developed a study plan to assess incidental take of bull trout at the Twisp River Weir broodstock collection facility. After discussions with the Aquatic SWG and specifically with the USFWS, the parties including the USFWS signatories agreed that Douglas PUD should postpone the Off-Project Passage Evaluation until year five (2017) of the new license when the Bull Trout Passage and Enumeration Study is scheduled to take place at Wells Dam. Combining the studies would provide a more comprehensive study and potentially require less study fish than two independent studies, thereby limiting the overall impact or take associated with these studies on the bull trout population in the Methow Basin. In 2013 Douglas PUD and the Aquatic SWG will submit a letter to the FERC recommending that the Bull Trout Off-Project Collection Facility Passage Evaluation be delayed until 2017.

4.2.3 Sub-Adult Bull Trout Monitoring

While an objective of the BTMP is to identify potential Project impacts on upstream and downstream passage of sub-adult bull trout, Aquatic SWG members (including the USFWS) agree that it is not feasible to assess sub-adult passage because sub-adult bull trout have not been observed at Wells Dam. During the previous six years of bull trout data collection at Wells Dam (BioAnalyst Inc. 2004; LGL and Douglas PUD 2008), sub-adult bull trout have not been documented passing Wells Dam (based upon fishway video counts and bull trout trapping for radio-telemetry). However, it is expected that through the increased monitoring associated with the implementation of the BTMP that there may be additional encounters with sub-adult bull trout. If at any time during the new license term, sub-adult bull trout are observed passing Wells Dam in significant numbers (>10 per calendar year), the Aquatic SWG will recommend reasonable and appropriate methods for monitoring sub-adult bull trout. Specifically, Douglas PUD may modify counting activities, continue to provide PIT tags and equipment, and facilitate training to enable fish sampling entities to PIT tag sub-adult bull trout when these fish are collected incidentally during certain fish sampling operations. This activity will occur the following year of first observation of sub-adult bull trout (>10 per calendar year) and subsequently as recommended by the Aquatic SWG.

4.2.3.1 Progress Towards Meeting Objective 2 in 2012- Sub-Adult Bull Trout Monitoring
On November 10\textsuperscript{th}, 2012, one sub-adult bull trout was observed at Wells Dam during window counts. The sub-adult bull trout collected from the ladder was estimated to be 12 inches or 305 mm. This is the first ever observation of a sub-adult bull trout at Wells Dam. No new sub-adult related monitoring activities were implemented or are proposed; fewer than 10 sub-adult bull trout have been observed at Wells in a single calendar year.

### 4.3 Implement Reasonable and Appropriate Measures to Modify the Upstream Fishway and Downstream Bypass if Adverse Impacts on Bull Trout are Identified (Objective 3)

Douglas PUD shall continue to operate the upstream fishway and downstream bypass at Wells Dam in accordance with the HCP. However, if upstream or downstream passage problems for bull trout are identified (as agreed to by the USFWS and Douglas PUD), Douglas PUD will identify and implement, in consultation with the Aquatic SWG and HCP Coordinating Committee, reasonable and appropriate options to modify the upstream fishway, downstream bypass, or operations to reduce the identified impacts to bull trout passage.

#### 4.3.1 Progress Towards Meeting Objective 3 in 2012- Implement Reasonable and Appropriate Measures to Modify the Upstream Fishway and Downstream Bypass if Adverse Impacts on Bull trout are Identified

No new adverse impacts to bull trout were identified in 2012. As a result, Douglas PUD is not proposing to implement any new upstream fishway or downstream bypass measures to reduce new impacts to bull trout.

### 4.4 Investigate Entrapment or Stranding of Bull Trout during Periods of Low Reservoir Elevation (Objective 4)

During the implementation of the WBTMMP from 2004-2008, Douglas PUD, through the use of high resolution bathymetric information, hydraulic and elevation data, and backwater curves, identified potential bull trout entrapment and stranding areas in the Wells Reservoir. Although no stranded bull trout were observed in these areas during the implementation of the WBTMMP, Douglas PUD will continue to investigate potential entrapment or stranding areas for bull trout through periodic monitoring when periods of low reservoir elevation expose identified sites. During the first five years of the new license, Douglas PUD will implement up to five bull trout entrapment/stranding assessments during periods of low reservoir elevation (below 773’ MSL). If no incidences of bull trout stranding are observed during the first five years of study, additional assessment will take place every fifth year during the remainder of the license term, unless waived by the Aquatic SWG. If bull trout entrapment and stranding result in take in exceedance of the authorized incidental take level, then reasonable and appropriate measures will be implemented by Douglas PUD, in consultation with the Aquatic SWG, to address the impact.

#### 4.4.1 Progress Towards Meeting Objective 4 in 2012- Implement Reasonable and Appropriate Measures to Modify the Upstream Fishway and Downstream Bypass if Adverse Impacts on Bull trout are Identified

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Stranding surveys were not conducted in 2012 since reservoir elevation did not fall below 773’ MSL. Article 402 of the new FERC license requires Douglas PUD, in consultation with the Aquatic SWG and NMFS, to develop and file for approval by the FERC, a Bull Trout Stranding Survey Plan. This plan is required to be filed with the FERC by the end of October 2013.

4.5 Participate in the Development and Implementation of the USFWS Bull Trout Recovery Plan (Objective 5)

4.5.1 Monitoring Other Aquatic Resource Management Plan Activities and Predator Control Program for Incidental Capture and Take of Bull Trout

Douglas PUD will monitor activities associated with the implementation of other Aquatic Resource Management Plans (white sturgeon, Pacific lamprey, resident fish, aquatic nuisance species, and water quality) and Predator Control Program that may result in the incidental capture and take of bull trout. If the incidental take of bull trout is exceeded due to the implementation of other Aquatic Resource Management Plan activities, then Douglas PUD will develop a plan, in consultation with the Aquatic SWG, to address the identified factors contributing to the exceedance of the allowable level of incidental take. If the incidental take of bull trout is exceeded due to the implementation of the Predator Control Program, then Douglas PUD will develop a plan, in consultation with the HCP Coordinating Committee and the Aquatic SWG, to address the identified factors contributing to the exceedance of the allowable level of incidental take.

4.5.1.1 Progress Towards Meeting Objective 5 in 2012 - Monitoring Other Aquatic Resource Management Plan Activities and Predator Control Program for Incidental Capture and Take of Bull Trout

Two activities had the potential to encounter bull trout in 2012, the subyearling life history study and pikeminnow removal. The subyearling life history study is an HCP study focused on the life history and behavior of juvenile Chinook salmon in the Upper Columbia River and principally within the Wells Project. Juvenile subyearling Chinook are collected with beach seines in June and July of 2012 within the Wells Project. Although many non-target taxa were collected, no bull trout were encountered.

The HCP required predator control program, principally Douglas PUD’s pikeminnow control program, did not encounter any bull trout in 2012. The pikeminnow control program uses setlines to capture pikeminnow in deep water areas of the Wells Project, over the programs existence (more than fifteen years) no bull trout have been encountered.

4.5.2 Funding Collection of Tissue Samples and Genetic Analysis

Beginning in year 10 of the new license, and continuing every 10 years thereafter for the term of the new license, Douglas PUD will, if recommended by the Aquatic SWG, collect up to 10 adult bull trout tissue samples in the Wells Dam fishway facilities over a period of one year and fund their genetic analysis. Genetic tissue collection will take place concurrent with the implementation of the bull trout radio-telemetry monitoring study. Samples will be submitted to the USFWS Central Washington Field Office in Wenatchee, Washington. Any sub-adult bull
trout collected during these activities will also be incorporated into the bull trout genetic analysis.

Beginning in year one of the new license, Douglas PUD will collect up to 10 adult bull trout tissue samples from the Twisp River broodstock collection facility over a period of one year and will fund their genetic analysis. Genetic tissue collection will take place concurrent with the implementation of the Off-Project bull trout radio-telemetry monitoring study.

4.5.2.1 Progress Towards Meeting Objective 5 in 2012 - Funding Collection of Tissue Samples and Genetic Analysis

Genetic samples were collected for all of the bull trout captured at the Twisp Weir in 2012. Samples will be analyzed if requested by the Aquatic SWG. Genetic samples will be taken at Wells Dam in year ten of the new license.

4.5.3 Information Exchange and Regional Monitoring Efforts

Douglas PUD will continue to participate in information exchanges with other entities conducting bull trout research and regional efforts to explore availability of new monitoring methods and coordination of radio-tag frequencies for bull trout monitoring studies in the Project.

Douglas PUD will make available an informational and educational display at the Wells Dam Visitor Center to promote the conservation and recovery of bull trout in the Upper Columbia River and associated tributary streams.

4.5.3.1 Progress Towards Meeting Objective 5 in 2012 - Information Exchange and Regional Monitoring Efforts

Douglas PUD participated in bull trout recovery planning meetings held by the USFWS in 2012. These meetings focused on recovery planning and genetic assignment development in the Methow, Entiat and Wenatchee river basins. In addition, information was shared with regional partners via PTAGIS, a regional PIT tag database. All PIT tag data was made publicly available through this website.

4.6 Identify Any Adverse Impacts of Project-related Hatchery Operations on Adult and Sub-adult Bull Trout (Objective 6)

4.6.1 Bull Trout Monitoring During Hatchery Activities

During the term of the new license, Douglas PUD shall monitor hatchery actions (e.g., salmon trapping, sturgeon brood stocking and capture activities) that may encounter adult and sub-adult bull trout for incidental capture and take. Actions to be monitored shall be associated with the Wells Hatchery, the Methow Hatchery, and any future facilities directly funded by Douglas PUD.
If the incidental take of bull trout is exceeded due to Douglas PUD’s hatchery actions then Douglas PUD will develop a plan, in consultation with the Aquatic SWG, to address the identified factors contributing to the exceedance of the allowable level of incidental take.

4.6.1.1 Progress Towards Meeting Objective 6 in 2012 - Bull Trout Monitoring During Hatchery Activities

In 2012, the number of bull trout encountered during hatchery operation activities was comparable to previous years. Hatchery actions in 2012 were very similar to other years where broodstock are collected at Wells Dam and the Twisp Weir traps. In addition, the Twisp Weir is used to control the ratio of natural origin and hatchery steelhead and spring Chinook spawning in the upper reaches of the Twisp River. Screw traps used during HCP related smolt monitoring and evaluation activities in the Methow River Basin often encounter juvenile bull trout. All of these trapping activities are conducted by Douglas PUD’s lead hatchery contractor the Washington State Department of Fish and Wildlife.

During trapping activities in 2012, sixty-nine and two adult bull trout were incidentally captured at the Twisp Weir and at Wells Dam, respectively. All of these bull trout were given a PIT tag if they did not carry an existing tag. All captured fish were released in good condition, with no lethal take observed. Captured bull trout at both facilities are within allowable take limits. Seventeen sub-adult bull trout were captured at the Twisp River screw trap and none were encountered at the Methow River screw trap at McFarland (Carlton, WA). All bull trout captured at the Twisp screw trap were given PIT tags and released in good condition. No lethal take was observed. Take limits at screw trap facilities operated by Douglas PUD and its contractors were within allowable limits in 2012.

Article 402 of the FERC license for the Wells Project requires Douglas PUD to develop, in consultation with the Aquatic SWG and the NMFS, a study plan to monitor incidental take associated with the implementation of activities at the Wells Hatchery. Douglas PUD is planning to file this study plan with the FERC for approval by the end of October 2013.

4.7 USFWS Section 7 Consultation

The PMEs contained within the BTMP were specifically developed, in consultation with the USFWS, to address potential Reasonable and Prudent Measures (RPMs) for the Project relicensing and associated section 7 consultation. All of the USFWS’s potential RPMs for the Wells Project can be found in Appendix A. Each of these RPMs has been cross referenced with the specific supporting objective and PME (Sections 4.1 - 4.6) found within the BTMP. The purpose of Appendix A is to provide consistency with Douglas PUD’s Aquatic Settlement Agreement and the USFWS’ subsequent section 7 consultation on the relicensing of the Wells Project.

4.7.1.1 Progress Towards Meeting Objective 5 in 2012 - USFWS Section 7 Consultation

On March 16th 2012, the USFWS issued a bull trout BO related to the relicensing of the Wells Project. The BO contained various RMPs and the terms and conditions (T&Cs). These RPM’s and T&Cs can be found within Appendix E of the FERC license for the Wells Project and they
are entirely consistent and cross referenced with the measures found in the BTMP, and more specifically with the measures reported within this report (2012 BTMP annual report).

4.8 Reporting

Douglas PUD will provide a draft annual report to the Aquatic SWG summarizing the previous year’s activities undertaken in accordance with the BTMP. The report will document all bull trout activities conducted within the Project and describe activities proposed for the following year. Furthermore, any decisions, statements of agreement, evaluations, or changes made pursuant to this BTMP will be included in the annual report. If significant activity was not conducted in a given year, Douglas PUD will prepare a memorandum providing an explanation of the circumstances in lieu of the annual report.

4.8.1.1 Progress Towards Meeting Annual Reporting Requirements

In addition to the reporting requirements found within the Aquatic Settlement Agreement requiring the submission of annual reports for all six of the management plans including the BTMP, Article 406 of the FERC license for the Wells Project also requires Douglas PUD to submit annual reports detailing the implementation of each of the six Aquatic Settlement Agreement management plans.

In addition to the bull trout reporting requirements above, one additional bull trout reporting requirement can be found in the bull trout BO (Appendix E of the FERC license). The bull trout BO requires Douglas PUD to submit an annual take report to the Central Regional Office of the USFWS on or before April 15th of each year of the new license.

Because the measures required by the BO are entirely consistent with the measures found in the Aquatic Settlement Agreement’s BTMP and because the reporting requirements for the BTMP, bull trout BO and Article 406 are consistent, the 2012 BTMP Annual Report (this report) will be used to satisfy all three of the bull trout annual reporting requirements.
5.0 REFERENCES


Kraemer, C. 1994. Some observations on the life history and behavior of the native char, Dolly Varden (Salvelinus malma) and bull trout (Salvelinus confluentus) of the North Puget Sound Region. Washington Department of Wildlife. Draft.


APPENDIX A

CROSS REFERENCED UNITED STATES FISH AND WILDLIFE SERVICE (USFWS) REASONABLE AND PRUDENT MEASURES (RPMS) WITH WELLS BULL TROUT MANAGEMENT PLAN (BTMP) OBJECTIVES AND SUPPORTING PROTECTION, MITIGATION AND ENHANCEMENT MEASURES (PMES)
**FWS RPM 1:** FERC shall require Douglas PUD, in coordination with the Service, to provide adequate year-round passage conditions for all life history stages of bull trout at all Project facilities.

**Associated BTMP Objectives and PMEs:**

Objective 1: Operate the upstream fishways and downstream bypass systems in a manner consistent with the HCP (Section 4.1).

- PME: Provide Upstream and downstream Passages for Adult and Sub-Adult Bull Trout (Section 4.1.1).
- PME: Upstream Fishway Counts (Section 4.1.2).
- PME: Upstream Fishway Operations Criteria (Section 4.1.3).
- PME: Bypass Operations Criteria (Section 4.1.4).

Objective 2: Identify any adverse Project-related impacts on adult and sub-adult bull trout passage (Section 4.2).

- PME: Adult Bull Trout Upstream and Downstream Passage Evaluation (Section 4.2.1).
- PME: Adult Bull Trout Passage Evaluation at Off-Project Collection Facilities (Section 4.2.2).
- PME: Sub-Adult Bull Trout Monitoring (Section 4.2.3).

Objective 3: Implement reasonable and appropriate options to modify upstream fishway, downstream bypass, or operations if adverse impacts on bull trout are identified and evaluate effectiveness of these measures.
**FWS RPM 2.** FERC shall require Douglas PUD, in coordination with the Service, to minimize the effect of spillway operations and hydrographic variation to all life history stages of bull trout at all Project facilities.

**Associated BTMP Objectives and PMEs:**

Objective 1: Operate the upstream fishways and downstream bypass systems in a manner consistent with the HCP (Section 4.1).

- **PME:** Provide Upstream and downstream Passages for Adult and Sub-Adult Bull Trout (Section 4.1.1).
- **PME:** Upstream Fishway Operations Criteria (Section 4.1.3).
- **PME:** Bypass Operations Criteria (Section 4.1.4).

Objective 3: Implement reasonable and appropriate options to modify upstream fishway, downstream bypass, or operations if adverse impacts on bull trout are identified and evaluate effectiveness of these measures (Section 4.3).

Objective 4: Periodically monitor for bull trout entrapment or stranding during low Wells Reservoir elevations (Section 4.4).

**FWS RPM 3.** FERC shall require Douglas PUD, in coordination with the Service, to minimize the effects of the Hatchery Supplementation Program to all life stages of bull trout.

**Associated BTMP Objectives and PMEs:**

Objective 2: Identify any adverse Project-related impacts on adult and sub-adult bull trout passage (Section 4.2).

- **PME:** Adult Bull Trout Passage Evaluation at Off-Project Collection Facilities (Section 4.2.2).

Objective 6: Identify any adverse impacts of Project-related hatchery operations on adult and sub-adult bull trout.

- **PME:** Bull Trout Monitoring During Hatchery Activities (Section 4.6.1).
**FWS RPM 4.** FERC shall require Douglas PUD, in coordination with the Service, to minimize the effects of the other Aquatic Resource Management Plans and Predator Control Program to all life stages of bull trout.

**Associated BTMP Objectives and PMEs:**

Objective 5: Participate in the development and implementation of the USFWS Bull Trout Recovery Plan, including information exchange and genetic analysis (Section 4.5).

PME: Monitor other Aquatic Resource Management Plan Activities and Predator Control Program for Incidental Capture and Take of Bull Trout (Section 4.5.1).

**FWS RPM 5.** FERC shall require Douglas PUD, in coordination with the Service, to design and implement a bull trout monitoring program that will adequately detect and quantify Project impacts. This information will reduce uncertainty regarding Project impacts over the life of the project and shall be used to modify Project operations to the extent practicable to further minimize the manner or extent of take.

**Associated BTMP Objectives and PMEs:**

Refer to Wells Bull Trout Management Plan in its entirety.

**Additional PMEs Proposed in the BTMP (not listed above):**

PME: Funding Collection of Tissue Samples and Genetic Analysis (Section 4.5.2).
PME: Information Exchange and Regional Monitoring Efforts (section 4.5.3).
APPENDIX H
BULL TROUT STRANDING AND TAKE STUDY PLAN
Via Electronic Filing

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington DC 20426

Subject: Wells Hydroelectric Project No. 2149
Bull Trout Stranding, Entrapment and Take Study Plan-License Article 402

Dear Secretary:

Pursuant to Article 402 of the new license for the Wells Hydroelectric Project (Wells Project), the Public Utility District No. 1 of Douglas County (Douglas PUD) hereby submits for approval the attached Bull Trout Stranding, Entrapment and Take Study Plan (Plan).

Article 402 requires Douglas PUD to file a Bull Trout Stranding, Entrapment and Take Study Plan with the Federal Energy Regulatory Commission (FERC) within one year of issuance of the license following consultation with the parties to the Aquatic Settlement Agreement (ASA), as well as following consultation with the National Marine Fisheries Service (NMFS) and the Bureau of Indian Affairs (BIA). The final Plan is attached as Exhibit A and was developed in consultation with the parties to the ASA including the United States Fish and Wildlife Service (USFWS), U.S. Bureau of Land Management (BLM), Washington State Department of Fish and Wildlife (WDFW), Washington State Department of Ecology (Ecology), the Confederated Tribes of the Colville Reservation (CCT) and the Confederated Tribes and the Bands of the Yakama Nation (YN). The BIA and the NMFS were also provided an opportunity to review and comment on the Plan during the 30-day ASA comment period.

The only comments received on the Plan were provided by the USFWS. Douglas PUD revised the Plan to address all of the comments received from the USFWS. The revised Plan (Exhibit A) was approved by the Aquatic Settlement Work Group following the close of the 30 day comment period during a conference call on Wednesday September 11, 2013.
The proposed Plan is intended to provide a strategy and schedule for conducting the following actions: a) bull trout stranding evaluations as described in section 4.4 of the ASA’s Bull Trout Management Plan (BTMP); b) bull trout incidental take monitoring studies described in section 4.5.1 of the BTMP; and c) bull trout incidental take monitoring studies to be implemented at the Wells Hatchery as described in section 4.6.1 of the BTMP.

Douglas PUD respectfully requests that the FERC approve the enclosed Bull Trout Stranding, Entrapment and Take Study Plan prior to December 31, 2013. Several of the actions proposed in the plan require implementation starting in early January 2014. The pre-filing consultation record supporting the approval of the plan is attached as Exhibit B.

If you have any questions related to the Bull Trout Stranding, Entrapment and Take Study Plan, please feel free to contact me at (509) 881-2208 or sbickford@dcpud.org.

Sincerely,

Shane Bickford
Supervisor of Natural Resources

Enclosure:
Exhibit A – Bull Trout Stranding, Entrapment and Take Study Plan.
Exhibit B – Pre-filing consultation record for Bull Trout Stranding, Entrapment and Take Study Plan.

Copy: Steve Lewis, USFWS
Wells HCP Coordinating Committee – Members List
Wells Aquatic Settlement Work Group – Members List
Andrew Gingerich, Douglas PUD
Brad Hawkins, Douglas PUD
Exhibit A

Bull Trout Stranding, Entrapment and Take Study Plan
BULL TROUT STRANDING, ENTRAPMENT AND TAKE STUDY PLAN
LICENSE ARTICLE 402

WELLS HYDROELECTRIC PROJECT

FERC PROJECT NO. 2149

Prepared by:
Public Utility No. 1 Utility of Douglas County
East Wenatchee, WA
98802

September 2013
For copies of this plan, contact:

Public Utility District No. 1 of Douglas County
Attention: Natural Resources
1151 Valley Mall Parkway
East Wenatchee, WA 98802-4497
Phone: (509) 884-7191
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EXECUTIVE SUMMARY

The Bull Trout Evaluations Study Plan (Plan) is intended to satisfy Article 402 of the Wells Hydroelectric Project (Wells Project) Federal Energy Regulatory Commission (FERC) Operating License, which requires Public Utility District No. 1 of Douglas County (Douglas PUD) to file a bull trout study plan with the FERC for approval that addresses the requirements found in sections 4.4, 4.5.1, and 4.6.1 of the Bull Trout Management Plan (BTMP). The BTMP is one of six aquatic resource management plans contained within Douglas PUD’s Aquatic Settlement Agreement. Specifically, within one year of license issuance (by October 31, 2013), Douglas PUD is required to file a study plan and schedule for FERC approval to conducting the following:

(a) the bull trout stranding evaluations described in section 4.4 of the Aquatic Settlement Agreement’s BTMP, filed May 27, 2010;

(b) the bull trout incidental take monitoring studies described in section 4.5.1 of the Aquatic Settlement Agreement’s BTMP, filed May 27, 2010; and

(c) the bull trout incidental take monitoring studies to be implemented at the Wells Hatchery as described in section 4.6.1 of the Aquatic Settlement Agreement’s BTMP, filed May 27, 2010.


The Plan has been written to include an introduction, brief summary of the biology of bull trout, their current status, previous Wells Project bull trout research and monitoring implemented by Douglas PUD, the goal, objectives and the proposed measures pertaining to this Plan, and reporting.
1.0 INTRODUCTION

On May 27th, 2010 Public Utility District No. 1 of Douglas County (Douglas PUD) filed with the Federal Energy Regulatory Commission (FERC) an Aquatic Settlement Agreement (ASA), which was signed by state, federal and tribal stakeholders. The ASA was intended to meet all other fish and aquatic resource obligations outside of Douglas PUD’s Anadromous Salmonid Habitat Conservation Plan (HCP). The ASA contains six management plans, one of which is the Bull Trout Management Plan (BTMP). The goal of the BTMP is to identify, monitor and address impacts, if any, on bull trout resulting from the Wells Hydroelectric Project (Wells Project or Project) in a manner consistent with the U.S. Fish and Wildlife Service’s (USFWS) Bull Trout Recovery Plan, and the terms of the Section 7 Incidental Take Statement (ITS) and the Federal Power Act section 18 fishway prescriptions associated with the relicensing of the Wells Project. The BTMP includes a suite of Protection, Mitigation and Enhancement measures (PMEs) to address plan objectives that include protecting adult and sub-adult bull trout through fishway operations; identification of adverse impacts on passage; implementation and evaluation of fishway modifications to address impacts, as needed; monitoring entrapment and stranding during low reservoir operations; participation in recovery planning; and identification of adverse impacts of Project-related hatchery operations.

On November 9th, 2012 the FERC issued a new Operating License (License) for the Wells Project. As part of the license issuance, FERC determined that three proposed BTMP PMEs lacked sufficient detail to enable administration and enforcement as license conditions. License Article 402 requires Douglas PUD to file a bull trout study plan to address sections 4.4, 4.5.1, and 4.6.1 of the BTMP. The FERC license requires that Douglas PUD file a study plan and schedule (herein called the Bull Trout Evaluations Study Plan [Plan]) with the FERC for approval by October 31, 2013. The Bull Trout Evaluations Study Plan was developed to address the following requirements of the BTMP:

(a) the bull trout stranding evaluations described in section 4.4 of the Aquatic Settlement Agreement’s BTMP, filed May 27, 2010;
(b) the bull trout incidental take monitoring studies described in section 4.5.1 of the Aquatic Settlement Agreement’s BTMP, filed May 27, 2010; and
(c) the bull trout incidental take monitoring studies to be implemented at the Wells Hatchery as described in section 4.6.1 of the Aquatic Settlement Agreement’s BTMP, filed May 27, 2010.

2.0 BULL TROUT BIOLOGY

Bull trout (Salvelinus confluentus) are native to northwestern North America, historically occupying a large geographic range extending from California north into the Yukon and Northwest Territories of Canada, and East to Western Montana and Alberta (Cavender 1978). Bull trout occupy lakes, rivers and tributaries in Washington, Montana, Idaho, Oregon, Nevada, two Canadian Provinces (British Columbia and Alberta), and several cross-boundary drainages in extreme southeast Alaska. They are a member of the char group within the family Salmonidae and closely resemble Dolly Varden (Salvelinus malma), a related species. Genetic analyses
indicate, however, that bull trout are more closely related to an Asian char (*Salvelinus leucomaenis*) than to Dolly Varden (Pleyte et al. 1992).

Bull trout are believed to have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Growth, survival, and long-term persistence are dependent upon habitat characteristics that include clean, cold, connected, and complex instream habitat (USFWS et al. 2000), and stream/population connectivity.

Bull trout exhibit four distinct life history types: resident, fluvial, adfluvial, and anadromous. The fluvial, adfluvial, and resident forms exist throughout the range of the bull trout (Rieman and McIntyre 1993), although each form is not present everywhere. The majority of growth and maturation for anadromous bull trout occurs in estuarine and marine waters, adfluvial bull trout in lakes or reservoirs, and fluvial bull trout in large river systems. Resident bull trout populations are generally found in small headwater streams where fish remain their entire lives. Sexually mature resident bull trout are often much smaller at maturation than sexually mature adults of other life histories (McPhail and Baxter 1996).

For migratory life history types, juveniles tend to rear in tributary streams for 1 to 4 years before migrating downstream into a larger river, lake, or estuary and/or nearshore marine area to mature (Rieman and McIntyre 1993). In some lake systems, age 0+ fish (less than 1 year old) may migrate directly to lakes, but it is unknown if this emigration is a result of density dependent effects from limited stream rearing habitat, or if these young-of-the-year actually survive in the lake environment (Riehle et al. 1997). Juvenile bull trout in streams frequently inhabit side channels, stream margins and pools with suitable cover (Sexauer and James 1993) with maximum summer water temperatures generally less than 16ºC (Dunham et al. 2003) and areas with cold hyporheic zones or groundwater upwellings (Baxter and Hauer 2000).

For more detailed information on bull trout biology, refer to the Biological Opinion (BO) for the Proposed Relicensing of the Wells Hydroelectric Project (USFWS 2012a).

### 2.1 Status

On June 10, 1998, the USFWS listed bull trout within the Columbia River basin as threatened under the Endangered Species Act (ESA; FR 63(111)). Later (November 1, 1999), the USFWS listed bull trout within the coterminous United States as threatened under the ESA (FR 64(210)). In April, 2004, the USFWS initiated a 5-year review on the status of bull trout which was released in 2008 and recommended no change to the current “threatened” listing status. The USFWS has cited habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, and grazing; blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment into diversion channels; and introduced non-native species as major factors affecting the distribution and abundance of bull trout. They noted that dams (and natural barriers) have isolated population segments resulting in a loss of genetic exchange among these segments (FR 63(111)). The USFWS believes many populations are now isolated and disjunct.
In 2002, the USFWS released draft bull trout recovery plans for all recovery units in the Columbia River Distinct Population Segment (DPS) including the Upper Columbia River Recovery Unit\(^1\) (USFWS 2002). The USFWS also designated critical habitat for bull trout, which was finalized on September 30, 2010. Since the issuance of a final critical habitat designation, the USFWS has turned its attention to recovery planning intended to provide information and guidance that will lead to recovery of the species, including its habitat. No time frame has been given for the release of a final recovery plan.

The Wells Project is situated within the Upper Columbia River Recovery Unit which includes three core areas; the Wenatchee, Entiat, and Methow rivers. A core area represents the closest approximation of a biologically functioning unit for bull trout and may function as a metapopulation for bull trout. Not all core areas are equal and each has specific functions that are unique. For example, the Entiat Core Area depends heavily on the mainstem Columbia River to provide overwintering, migration, and foraging habitats. The Wenatchee Core Area has populations using lake and riverine habitat (both the Wenatchee and Columbia rivers) for overwintering, migration, and foraging. Within a core area, many local populations may exist. A local population is assumed to be the smallest group of fish that is known to represent a regularly interacting reproductive unit. Sixteen local populations have been identified in the Wenatchee (6), Entiat (2), and Methow (8) core areas (USFWS 2002). Recently, genetic baselines have been established for these local populations (DeHaan and Neibauer 2012).

### 2.2 Wells Project Research and Monitoring Activities

Listed Columbia River bull trout have been observed and counted at Wells Dam since 1998. In 2000, due to the potential for operations at mid-Columbia dams to affect the movement and survival of bull trout, the USFWS requested that the three mid-Columbia PUDs (Douglas, Chelan, and Grant PUDs) evaluate the movement and status of bull trout in their respective project areas. At that time, little was known about the life-history characteristics (e.g., movements, distribution, habitat use, etc.) of bull trout in the mid-Columbia River. Therefore, in order to assess the operational effects of hydroelectric projects on bull trout within the mid-Columbia, Douglas PUD has supported and carried out a series of research tasks.

From 2001 to 2003, bull trout were collected from the Wells, Rocky Reach, and Rock Island dams, radio-tagged, and monitored through 2004. The primary purpose of the study was to document the presence of bull trout at the project, identify passage times, determine their direction of travel (i.e., upstream/downstream), and assess bull trout movements into and out of the Wells Reservoir. Multiple-telemetry techniques over a broad spatial area were used for the assessment. Successful upstream and downstream passage was observed at the Wells Project. In addition, no bull trout injury or mortality was observed associated with the Wells Project. Radio-tagged bull trout that migrated upstream past Wells Dam used the Methow River subbasin during the bull trout spawning period (for more detailed information refer to BioAnalyst, Inc. 2004).

\(^1\) Note that while the USFWS refers to the area encompassing the Wells Project as the Upper Columbia Recovery Unit for bull trout, the section of the Columbia River from Chief Joseph Dam to the confluence of the Yakima and Columbia rivers is often termed the "mid-Columbia" for other purposes, and is the term used in this document when referring to the reach.
In 2004, Douglas in consultation with the USFWS and as required under the HCP BO developed the Wells Project Bull Trout Monitoring and Management Plan (WBTMMP). The goal of the WBTMMP is to continue monitoring and evaluating bull trout in the Project to quantify and address, to the extent feasible, potential Project impacts on bull trout. To address Project impacts on bull trout, Douglas captured, radio-tagged, and monitored adult bull trout in the Wells Project area (2005-2007); PIT-tagged sub-adult bull trout during tributary smolt sampling activities (2005-2007); conducted reservoir entrapment and stranding surveys (2005); and collected genetic samples to support identification of local populations and core area origins of bull trout utilizing the Project area (2005-2007). Results of the study were consistent with the previous 3-year study showing successful upstream and downstream passage, similar migration timing, and no documented impacts to bull trout from the Wells Project (for more detailed information refer to LGL 2007, LGL 2008).

Between 2008 and 2012, Douglas PUD continued to operate under the WBTMMP conducting year round Project fishway counts, PIT-tagging bull trout during off-site hatchery related activities, and conducting several entrapment and stranding surveys when normal reservoir surface elevation operations were at or below 773 feet mean sea level (MSL; Douglas PUD 2004).

Bull trout fishway counts up to 2012 indicate that an average of 62 fish are counted moving through Wells fishways each year. Ninety percent of this movement occurs within the May-June timeframe and is almost exclusively composed of adult fish.

Each year, Douglas PUD (via Washington Department of Fish and Wildlife [WDFW]) has PIT-tagged and collected biological data on all bull trout captured in tributary, hatchery-related smolt outmigrant (rotary-screw traps) and brood stock collection (weirs) activities in the Methow River watershed. Information from these activities is available on PTAGIS (www.ptagis.org).

Entrapment and stranding surveys were conducted in 2008 and 2011. Locations were selected based upon an analysis of detailed bathymetric maps produced in 2005 combined with Wells Reservoir hydraulic information. Six total potential stranding locations were identified; the Methow River mouth, the Okanogan River mouth, the Kirk Islands, the shallow water habitat in the Columbia River directly across from the mouth of the Okanogan River, Schlunegert Flats and the off-channel areas of the Bridgeport Bar Islands. Boat and foot surveys were conducted and included a combination of shoreline transects and inspection of isolated sanctuary pools. Similar to the 2005 bull trout stranding surveys, no bull trout were observed during the 2008 or 2011 surveys which suggest that bull trout are able to avoid stranding and entrapment areas when the Wells Reservoir fluctuates to elevations below 773 MSL (Douglas PUD, 2012).

3.0 GOALS AND OBJECTIVES

The goal of the Plan is to satisfy Article 402 of the Wells Project FERC license, which requires Douglas PUD to file a bull trout study plan to address sections 4.4, 4.5.1, and 4.6.1 of the BTMP. The Plan must provide sufficient detail to enable administration and enforcement as license conditions of the following activities:
(a) the bull trout stranding evaluations described in section 4.4 of the Aquatic Settlement Agreement’s BTMP, filed May 27, 2010;
(b) the bull trout incidental take monitoring studies described in section 4.5.1 of the Aquatic Settlement Agreement’s BTMP, filed May 27, 2010; and
(c) the bull trout incidental take monitoring studies to be implemented at the Wells Hatchery as described in section 4.6.1 of the Aquatic Settlement Agreement’s BTMP, filed May 27, 2010.

4.0 STUDY MEASURES

4.1 Bull Trout Entrapment or Stranding Surveys

The Wells Project is a run-of-river project meaning that average daily inflow equals daily outflow. As a result, the limited active storage capacity is only sufficient to regulate flow on a daily basis. Alterations in water volume or reservoir fluctuations are minimal and largely driven by the discharge of water from Chief Joseph Dam and Grand Coulee Dam. Typical operational fluctuations of the Wells Project are gradual, repetitive changes in reservoir stage that occur on a daily basis and generally result in reservoir elevation fluctuations of one to two ft. (Douglas PUD 2010). Infrequent reservoir operations necessitated by unusual circumstances, such as extreme runoff from the Methow or Okanogan rivers can result in reservoir elevation of 773-771 (Devine Tarbell & Associates 2006). From January 1998 to July 2013, the reservoir has typically operated within the upper four ft. (781 to 777 ft. MSL in elevation) 96.7 percent of the time (average daily reservoir elevation). Reservoir operations below 774 ft. occur infrequently (generally no more than one a year) but do have a limited potential to entrap and strand bull trout.

As proposed in the BTMP, during the first five years of the new license, Douglas PUD will implement up to five bull trout entrapment/stranding assessments during periods of low reservoir elevation (below 773’ MSL). Assessments will be implemented on an opportunistic basis (i.e., low reservoir elevations will not be manufactured for the purposes of an assessment). If no incidences of bull trout stranding are observed during the first five years of study, additional assessment will take place every fifth year, when reservoir conditions are appropriate, during the remainder of the license term, unless waived by the Aquatic Settlement Work Group (Aquatic SWG). If bull trout entrapment and stranding result in an observed take in exceedance of the authorized incidental take level (see USFWS Biological Opinion), then reasonable and appropriate measures will be implemented by Douglas PUD, in consultation with the Aquatic SWG, to address the impact.

During reservoir elevations below 773’ MSL, Douglas PUD shall visit the six locations identified as potential reservoir stranding locations identified in 2005 based upon an analysis of detailed bathymetric maps combined with Wells Reservoir hydraulic information. These six locations include and are featured in Figure 1:

1. Methow River mouth;
2. Okanogan River mouth;
3. Kirk Islands;
4. shallow water habitat in the Columbia River directly across from the mouth of the Okanogan River;
5. Schluneger Flats; and
6. off-channel areas of the Bridgeport Bar Islands.
Once Wells Project operations staff has confirmed that reservoir elevations are 773 msl or lower and that elevation is expected to be maintained for at least 24-hours, Douglas PUD shall notify the USFWS of its intention to conduct a stranding survey within 24 hours of the low reservoir condition. Surveys will be conducted by boat and/or foot, as appropriate, at each of the six sites identified above in the following order 3, 4, 6, 2, 1, and 5 (prioritized based on expected size and depth of stranding pools). Sampling will include visual inspections through a combination of shoreline transects and inspection of isolated sanctuary pools. Any locations too deep for visual inspections may be seined. Any bull trout that are observed will be captured, removed, and placed back into the main channel of the river. Procedures for capture and removal will follow USFWS guidance (2012b). Seines of the appropriate mesh size will be used to capture bull trout (typically 3/16 – 1/4 inch mesh size) and composed of soft (non-abrasive) nylon material. Seines, once pursed, will remain partially in the water while fish are removed with dip nets. Seining will be conducted until all bull trout have been removed from a stranding location. In deeper stranding areas with less than 100% visibility to the bottom, two consecutive passes with the seine without capture will indicate that the sampling area is free of bull trout. All bull trout removed will be transferred from stranding area to dark-colored, aerated containers and immediately transported to the main river channel for release. Bull trout will be enumerated and estimates of size and condition will be made prior to release. No anesthetics shall be used. All other fish captured during seining operations will be removed by dip net, and transported to the main channel (i.e., non-stranding location with river connectivity) for release. Incidentally captured species will be identified to species and enumerated up to the first 25 of each species. Additional counts beyond 25 will be estimated (e.g. approximately 100 stickle back). Non-target taxa will also be identified as adult or subadult. Any bull trout mortality will have a tissue sample taken (for genetic analysis in support of BTMP section 4.5.2), be placed in a zip lock bag and refrigerated as soon as possible. All mortalities will be provided to the USFWS. Finally, water temperatures will be taken in each pool when fish of any species are present.

After each stranding survey, a brief email summary of the results will be provided to the USFWS, the Aquatic SWG, and the FERC. The ASWG will may choose to discontinue stranding surveys consistent with the language found in the BTMP. A more detailed presentation of information will be included as a part of Douglas PUD’s incidental take report due April 15th of each year and the annual report of activities accomplished related to the implementation of the BTMP. If after three consecutive stranding surveys bull trout are not observed the Aquatic SWG may choose to revisit the stranding survey approach and submit a revised plan with the FERC.

### 4.2 Bull Trout Incidental Take Monitoring of Other Aquatic Resource Management Plan Activities

The implementation of activities associated with other Aquatic Resource Management Plans (white sturgeon, Pacific lamprey, resident fish, aquatic nuisance species, and water quality) and Predator Control Program may result in the incidental capture and take of bull trout. If the incidental take of bull trout is exceeded due to the implementation of other Aquatic Resource Management Plan activities, then Douglas PUD will develop a plan, in consultation with the...
Aquatic SWG, to address the identified factors contributing to the exceedance of the allowable level of incidental take. If the incidental take of bull trout is exceeded due to the implementation of the Predator Control Program, then Douglas PUD will develop a plan, in consultation with the HCP Coordinating Committee and the Aquatic SWG, to address the identified factors contributing to the exceedance of the allowable level of incidental take.

In the past, Douglas PUD has implemented a variety of aquatic resources sampling activities in support of license compliance, relicensing, and prior to new license issuance. Many of these activities employ sampling gear and approaches specific to the species or parameters of interest (e.g., longline fishing for the northern pikeminnow, overflow weir traps for lamprey, water quality sampling, plankton tows for zebra/quagga mussels, etc.) and as such, don’t generally encounter bull trout. However, bull trout are present within the Wells Project at specific times of the year and the potential for capture and incidental take of bull trout associated with aquatic sampling activities exists.

For all fish sampling activities (Table 1) implemented in support of the plans and program described above, Douglas PUD shall ensure that implementation staff (Douglas PUD or contractor) are aware of and trained in proper handling, release and communication protocols required when encountering bull trout. All bull trout incidentally captured will be released immediately after estimates of size and general condition are recorded. No anesthetics shall be used. Any fish that need to be held shall be placed in an aerated, dark-colored container consistent with USFWS guidance (2012b) and released near the point of capture as soon as possible. Douglas PUD will notify the USFWS of any bull trout encounters. Any mortality will have a tissue sample taken (for genetic analysis in support of BTMP section 4.5.2), be placed in a zip lock bag and refrigerated as soon as possible. All mortalities will be provided to the USFWS.

Table 1. Wells Project implementation activities where bull trout incidental take monitoring protocols will be employed including the schedule of these activities over the term of the license.

<table>
<thead>
<tr>
<th>Implementation Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSMP - Monitoring for quagga/zebra mussels using plankton tows and other methods</td>
<td>Annually during summer months.</td>
</tr>
<tr>
<td>Predator Control Program – longline sets to remove northern pikeminnow from Wells Project waters.</td>
<td>Annually during spring/summer months</td>
</tr>
<tr>
<td>WQMP – Gas bubble trauma monitoring at Rocky Reach Dam</td>
<td>As needed, when hourly TDG values in the Wells Project tailrace exceed 125%.</td>
</tr>
<tr>
<td>PLMP – Salvage activities during ladder maintenance dewatering</td>
<td>Annually during winter ladder maintenance period (typically December and January).</td>
</tr>
<tr>
<td>PLMP – sampling in support of upstream passage evaluation</td>
<td>As needed, within one year of lamprey passage improvement measures.</td>
</tr>
<tr>
<td>PLMP – periodic monitoring</td>
<td>Every ten years after upstream passage rates are similar to other mid-Columbia River dams.</td>
</tr>
<tr>
<td>PLMP – juvenile lamprey habitat evaluation</td>
<td>Within three years of license issuance (one year study).</td>
</tr>
<tr>
<td>RFMP – resident fish community assessment</td>
<td>In year 2 and every 10 years thereafter during</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>RFMP</td>
<td>Monitoring in response to proposed changes in Project operations</td>
</tr>
<tr>
<td>WSMP</td>
<td>Brood stock and larval collection activities</td>
</tr>
<tr>
<td>WSMP</td>
<td>Phase I index monitoring program</td>
</tr>
</tbody>
</table>

Acronyms in the table above are ANSMP; Aquatic Nuisance Species Management Plan, WQMP; Water Quality Management Plan, PLMP; Pacific Lamprey Management Plan, RFMP; Resident Fish Management Plan, and WSMP; White Sturgeon Management Plan. All Management Plans are found within Douglas PUD’s Aquatic Settlement Agreement.

### 4.3 Bull Trout Monitoring During Hatchery Activities

The Wells and Methow hatcheries implement brood stock collection activities and Douglas PUD conducts spring Chinook and steelhead stock assessment activities at the Wells Dam fishway traps. Brood stock collection and stock assessment activities take place each year during May and June for spring Chinook, July and August for summer Chinook and August through October for steelhead. On the west fishway, trap operators may re-direct upstream migrating anadromous salmonids into a transport pipe that terminates at an adult holding pond at the adjacent Wells Hatchery. On the east fishway, trap operators re-direct potential hatchery brood stock into an aerated live well for processing and transport fish by truck across Wells Dam to the Wells Hatchery and other appropriate facilities. The Wells Fish Hatchery volunteer channel is also used to collect brood stock for the Wells Hatchery. Adult summer/fall Chinook, steelhead and coho readily volunteer into the hatchery collection trap and are manually handled and either retained for brood stock or released back into the Columbia River downstream of Wells Dam via a water/fish transport pipe. Unlike, incidental encounters at other hatchery locations, bull trout incidentally encountered in the Wells Hatchery volunteer trap are immediately returned to the Columbia River below Wells Dam and are not anesthetized or sampled.

The Wells Hatchery activities described above are expected to continue annually throughout the term of the license. All three of these activities have the potential to incidentally re-direct upstream migrating adult bull trout resulting in lethal or non-lethal incidental take.

Any bull trout encountered during trapping in the ladders at Wells Dam for either the Wells or Methow Hatchery brood collection activities will be anesthetized using MS-222, measured, general condition recorded, a tissue sample will be taken for genetic analysis, and given a Passive Integrated Transponder (PIT) tag. If a PIT tag exists, the PIT tag identification code will be recorded and the information will be uploaded to PTAGIS. After processing, all bull trout will be placed in an aerated, dark-colored container until recovery from anesthesia is achieved. On the east ladder, sampled fish will be placed in a semi-volitional recovery trough with fresh flow. Bull trout captured at the west ladder facility will be handled using the same protocols and released in the forebay of Wells Dam (Starr boat launch). All handling and release protocols will be consistent with USFWS guidance (2012b). Douglas PUD will notify the USFWS of any...
lethal take of bull trout during the described sampling (over the last decade of hatchery actions no lethal take has been observed). Any mortality will have a tissue sample taken (for genetic analysis in support of BTMP section 4.5.2), be placed in a zip lock bag and refrigerated as soon as possible. All mortalities will be provided to the USFWS.

License Article 402 states requirements for incidental monitoring activities at the Wells Hatchery however, section 4.6.1 of the BTMP explicitly states that such activities will be implemented for all facilities including the Wells Hatchery, the Methow Hatchery, and any future facilities directly funded by Douglas PUD. Currently, hatchery activities in addition to the three sites described above include operation of the Twisp weir (Methow Hatchery), Methow Hatchery outfall trap, Methow and Twisp river rotary screw trap operations, and Hatchery Genetic Management Plan implementation activities. For all of these hatchery activities, handling, anesthetic and sampling methods as described above will be employed. All handling and release protocols will be consistent with USFWS guidance (2012b). Douglas PUD will notify the USFWS of any lethal take of bull trout during the described sampling (over the last decade of hatchery actions no lethal take has been observed). Any mortality will have a tissue sample taken (for genetic analysis in support of BTMP section 4.5.2), be placed in a zip lock bag and refrigerated as soon as possible. All mortalities will be provided to the USFWS.

During the course of the Wells Operating License, new hatchery related activities may be developed that are currently unforeseen. New hatchery actions that are implemented during HGMP activities may have the potential to encounter bull trout. In this event of new HGMP actions (e.g. development and operation of a new weir or trapping facility) Douglas PUD, along with the ASWG may elect to adopt similar measures for bull trout monitoring as explained above.

5.0 REPORTING

Douglas PUD will provide the annual results of the Bull Trout Evaluations Study Plan activities as a part of the annual Bull Trout Incidental Take Report filed with the USFWS on April 15th of each year (see BO) and Douglas PUD will incorporate that same information into the annual Bull Trout Management Plan report that is developed by, and then approved by, the Aquatic SWG each year following a 30 day review. Starting in 2014, the annual Bull Trout Management Plan Report will be incorporated into the comprehensive Aquatic Settlement Agreement annual report, which is required to be filed with the FERC by May 30th of each year. As part of reporting, a PIT tag summary (primarily associated with activities in Section 4.3) will be provided at the request of the Aquatic SWG. If significant bull trout activities were not conducted in a given year, Douglas retains the option to instead prepare a technical memorandum providing an overview of all bull trout related sampling activities and an explanation of the circumstances in lieu of the annual report.
6.0 REFERENCES


Exhibit B

Pre-filing consultation record for Bull Trout Stranding, Entrapment and Take Study Plan
EMAIL TO THE AQUATIC SWG AND THE NMFS PROVIDING A REVIEW AND COMMENT PERIOD FOR THE BULL TROUT STRANDING, ENTRAPMENT AND TAKE STUDY PLAN
Hi Aquatic SWG: please see the email below from Andrew and the attached draft Bull Trout Stranding and Take Study Plan. This draft plan is out for a 30-day review period with comments due to Andrew no later than Wednesday, August 28, 2013. Please note Andrew’s additional comments below regarding review and approval of the attached plan.

Thanks!
Kristi 😊

---

Andrew Gingerich

From: Kristi Geris <kgeris@anchorqea.com>
Sent: Monday, July 29, 2013 1:56 PM
To: Andrew Gingerich; Bao Le; Beau Patterson; Bill Towey; Bob Jateff; Bob Rose; ‘Brad James’; ‘Bret Nine’; ‘Chad Jackson’; Charlie McKinney; Chas Kyger; Chris Sheridan; ‘Donella Miller’; Jason McLellan; Jeff Korth; ‘Jessi Gonzales’; ‘Joe Peone’; ‘Jeff Korth’; ‘Keith Kirkendall’; ‘Kristi Geris’; ‘Mary Mayo’; ‘Mike Schiewe’; ‘Pat Irle’; ‘Patrick Luke’; ‘Patrick Verhey’; ‘Paul Ward’; ‘Shane Bickford’; ‘Steve Lewis’; ‘Steve Parker’; ‘Steve Rainey’
Subject: FW: Bull Trout Stranding and Take Study Plan License Article 402 (7-29-13)

---

Andrew Gingerich

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Monday, July 29, 2013 1:43 PM
To: Kristi Geris
Cc: Chas Kyger
Subject: Bull Trout Stranding and Take Study Plan License Article 402 (7-29-13)

Kristi,

Please distribute the attached Bull Trout Stranding and Take Study Plan to the ASWG. This Plan was developed to specifically address License Article 402 in the new Well Operating License. The Plan describes the proposed methods, schedule and reporting that will be used to address requirements in the Bull Trout Management Plan (BTMP). Here are the specific areas in the BTMP that are addressed:

(a) the bull trout stranding evaluations described in section 4.4 of the Aquatic Settlement Agreement’s BTMP;

(b) the bull trout incidental take monitoring studies described in section 4.5.1 of the Aquatic Settlement Agreement’s BTMP; and

(c) the bull trout incidental take monitoring studies to be implemented at the Wells Hatchery as described in section 4.6.1 of the Aquatic Settlement Agreement’s BTMP.
Douglas PUD is asking the Aquatic SWG for a 30 day review, with all comments to be submitted to Douglas PUD by August 28th. At the September 11th conference call Douglas PUD will ask for formal approval from the ASWG, once any revisions have been made. For those signatories unable to make the call in September, please submit your approval to Mike prior to the meeting.

Please let me know if you have questions and submit edits or comments to me.

Thanks
Andrew

Andrew Gingerich
Sr. Aquatic Resource Biologist
Douglas County Public Utility District
1151 Valley Mall Parkway, East Wenatchee, WA 98802
Office Phone: (509) 881-2323
Email: andrewg@dcpud.org
EMAIL TO BIA PROVIDING A REVIEW AND COMMENT PERIOD FOR THE BULL TROUT STRANDING, ENTRAPMENT AND TAKE STUDY PLAN
Hi Keith,

Please see the emails below regarding review of the attached Bull Trout Stranding and Take Study Plan. Thanks! –kristi

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
T 509.491.3151 x104
C 360.220.3988

From: Kristi Geris
Sent: Monday, July 29, 2013 1:56 PM
To: Andrew Gingerich (andrewg@dcpud.org); Bao Le; Beau Patterson (bpatterson@dcpud.org); Bill Towey (bill.towey@colvilletribes.com); Bob Jateff (jatefrij@dfw.wa.gov); Bob Rose; 'Brad James'; 'Bret Nine'; 'Chad Jackson'; Charlie McKinney (cmck461@ecy.wa.gov); Chas Kyger; Chris Sheridan; 'Donella Miller'; Jason McLellan; Jeff Korth (korthjkw@dfw.wa.gov); 'Jessi Gonzales'; Joe Peone (joe.peone@colvilletribes.com); Keith Kirkendall (Keith.Kirkendall@noaa.gov); kirk.truscott@colvilletribes.com; Kristi Geris; 'Mary Mayo'; Mike Schiewe; Pat Irle (pirl461@ecy.wa.gov); 'Patrick Luke'; Patrick Verhey (Patrick.Verhey@dfw.wa.gov); Paul Ward (ward@yakama.com); Shane Bickford (sbickford@dcpud.org); 'Steve Lewis'; 'Steve Parker (parker@yakama.com)'; Steve Rainey
Subject: FW: Bull Trout Stranding and Take Study Plan License Article 402 (7-29-13)

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Thanks!

Kristi

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
T 509.491.3151 x104
C 360.220.3988

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Sent: Monday, July 29, 2013 1:43 PM
To: Kristi Geris  
Cc: Chas Kyger  
Subject: Bull Trout Stranding and Take Study Plan License Article 402 (7-29-13)

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(a) the bull trout stranding evaluations described in section 4.4 of the Aquatic Settlement Agreement’s BTMP;

(b) the bull trout incidental take monitoring studies described in section 4.5.1 of the Aquatic Settlement Agreement’s BTMP; and

(c) the bull trout incidental take monitoring studies to be implemented at the Wells Hatchery as described in section 4.6.1 of the Aquatic Settlement Agreement’s BTMP.

Douglas PUD is asking the Aquatic SWG for a 30 day review, with all comments to be submitted to Douglas PUD by August 28th. At the September 11th conference call Douglas PUD will ask for formal approval from the ASWG, once any revisions have been made. For those signatories unable to make the call in September, please submit your approval to Mike prior to the meeting.

Please let me know if you have questions and submit edits or comments to me.

Thanks
Andrew

Andrew Gingerich  
Sr. Aquatic Resource Biologist  
Douglas County Public Utility District  
1151 Valley Mall Parkway, East Wenatchee, WA 98802  
Office Phone: (509) 881-2323  
Email: andrewg@dcpud.org
REMINDER TO THE ASWG TO REVIEW AND COMMENT ON THE BULL TROUT STRANDING, ENTRAPMENT AND TAKE STUDY PLAN
Hi Aquatic SWG: please remember to submit comments on the attached draft Bull Trout Stranding and Take Study Plan to Andrew no later than EOD TOMORROW.

Thanks! -kristi :)

Sent from my Verizon Wireless 4G LTE smartphone
USFWS COMMENTS ON THE BULL TROUT STRANDING, ENTRAPMENT AND TAKE STUDY PLAN
Hi Andrew-

Thanks for the opportunity to review this document. In general the document looks pretty good, but I offer some helpful suggestions for your consideration:

1.) The word "stranding" doesn't necessarily encapsulate all the aspects of reservoir fluctuation effects. "Entrapment" into a specific area of the reservoir periphery is also important. I suggest incorporating this concept into the study plan as well and modifying the title accordingly. In instances where a documented "stranding" or "entrapment" event has occurred, please not the respective water temperature during those instances.

2.) Devine Tarbell & Associates 2006 (attached below) provides a good summary of effects resulting from potential reservoir fluctuations in the Wells Pool. I suggest inserting this reference into the document to strengthen the rationale for these actions contained in the study plan.

3.) I always think its important to multi-task during these types of studies to the extent possible and reasonable. So I suggest reporting any incidental aquatic species that might be surveyed during the implementation of this study.

4.) Bull Trout Monitoring During Hatchery Activities (page 10): Please insert a placeholder into this section which takes into account other unforeseen hatchery activities which may occur during the course of the new license. I think that's what you intended through the HGMP caveat, but further clarification would be useful.

5.) Figure 1 (page 7): This figure identifies six locations under consideration for these surveys. However, do you have a sense of how these sites will be prioritized once a reservoir fluctuation event has been identified. Based on the reservoir bathymetry, I'm sure some locations rise to the top in terms of importance? Clarification of this point in the document would be very useful.

Hopefully these suggestions help! Give me a call if you would like to discuss!

S-

---------- Forwarded message ----------
From: Kristi Geris <kgeris@anchorqea.com>
Date: Tue, Aug 27, 2013 at 6:12 PM
Stephen T. Lewis
Hydropower and Energy Coordinator
US FISH AND WILDLIFE SERVICE
CENTRAL WASHINGTON FIELD OFFICE
215 MELODY LANE STE 103
WENATCHEE, WA 98801-8122
phone: (509) 665-3508 Ext. 2002
e-mail: Stephen_Lewis@fws.gov

"If a road has no obstacles, it probably doesn't lead to anywhere." S. Lewis
EMAIL TO THE AQUATIC SETTLEMENT WORK GROUP WITH THE REVISED BULL TROUT STRANDING, ENTRAPMENT AND TAKE STUDY PLAN
Hi Aquatic SWG: please see the email below from Andrew and the attached revised Bull Trout Stranding and Take Study Plan that will be up for approval at this week’s Aquatic SWG conference call.

Thanks!
Kristi 😊

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
T 509.491.3151 x104
C 360.220.3988

The comment period for the Bull Trout Stranding and Take Study Plan closed 8/28/2013. Douglas PUD received comments from the USFWS on this plan. The comments were very good and helped improve the document. Douglas PUD’s responses to the comments are included below. In addition, I have attached the revised document with the changes that were made in response to the USFWS’ comments (I kept the changes in track changes for ease of review). Once the document is approved by the ASWG we will turn off track changes and circulate a final version.

The revised plan, with tracked changes, is up for approval this Wed. Sept. 11 during our ASWG call.

Thanks
Andrew
509-881-2323
Hi Andrew-

Thanks for the opportunity to review this document. In general the document looks pretty good, but I offer some helpful suggestions for your consideration:

1.) The word "stranding" doesn't necessarily encapsulate all the aspects of reservoir fluctuation effects. "Entrapment" into a specific area of the reservoir periphery is also important. I suggest incorporating this concept into the study plan as well and modifying the title accordingly. In instances where a documented "stranding" or "entrapment" event has occurred, please note the respective water temperature during those instances.

I have updated the title to be, “Bull Trout Stranding, Entrapment and Take Study Plan” and added a section to note water temperature in the entrapment and stranding survey section that reads, “Finally, water temperatures will be taken in each pool when fish of any species are present.”

2.) Devine Tarbell & Associates 2006 (attached below) provides a good summary of effects resulting from potential reservoir fluctuations in the Wells Pool. I suggest inserting this reference into the document to strengthen the rationale for these actions contained in the study plan.

Agree. As such, I have added to the stranding justification section and added the reference to the reference list at the end of the document, “Infrequent reservoir operations necessitated by unusual circumstances, such as extreme runoff from the Methow or Okanogan rivers can result in reservoir elevation of 773-771 (Devine Tarbell & Associates 2006).”

3.) I always think it's important to multi-task during these types of studies to the extent possible and reasonable. So I suggest reporting any incidental aquatic species that might be surveyed during the implementation of this study.

Sounds good. I added this to the pool surveys, “Incidentally captured species will be identified to species and enumerated up to the first 25 of each species. Additional counts beyond 25 will be estimated (e.g. approximately 100 stickle back). Non-target taxa will also be identified as adult or subadult.”

4.) Bull Trout Monitoring During Hatchery Activities (page 10): Please insert a placeholder into this section which takes into account other unforeseen hatchery activities which may occur during the course of the new license. I think that's what you intended through the HGMP caveat, but further clarification would be useful.

Good point. I added this to the section, “During the course of the Wells Operating License, new hatchery related activities may be developed that are currently unforeseen. New hatchery actions that are implemented during HGMP activities may have the potential to encounter bull trout. In the event of new HGMP actions (e.g. development and operation of a new weir or trapping facility) Douglas PUD, along with the ASWG may elect to adopt similar measures for bull trout monitoring as explained above.”

5.) Figure 1 (page 7): This figure identifies six locations under consideration for these surveys. However, do you have a sense of how these sites will be prioritized once a reservoir fluctuation event has been identified? Based on the reservoir bathymetry, I'm sure some locations rise to the top in terms of importance? Clarification of this point in the document would be very useful.

Yes. Good point the upper area of the Project has the potential to have more smaller and more numerous stranding locations. As such, I added, “Surveys will be conducted by boat and/or foot, as appropriate, at each of
the six sites identified above in the following order 3, 4, 6, 2, 1, and 5 (prioritized based on expected size and depth of stranding pools)."

Hopefully these suggestions help! Give me a call if you would like to discuss!

S-

-------- Forwarded message --------
From: Kristi Geris <kgeris@anchorqea.com>
Date: Tue, Aug 27, 2013 at 6:12 PM
Subject: FW: Bull Trout Stranding and Take Study Plan License Article 402 (7-29-13)
To: "Steve Parker (parker@yakama.com)" <parker@yakama.com>, Chris Sheridan <csherida@blm.gov>, "Paul Ward (ward@yakama.com)" <ward@yakama.com>, "Bob Jateff (jatefrij@dfw.wa.gov)" <jatefrij@dfw.wa.gov>, "Shane Bickford (sbickford@dc pud.org)" <sbickford@dc pud.org>, Jessi Gonzales <jessica_gonzales@fws.gov>, "Pat Irle (pirl461@ecy.wa.gov)" <pirl461@ecy.wa.gov>, "Bill Towey (bill.towey@colvilletribes.com)" <bill.towey@colvilletribes.com>, Mike Schieve <mschieve@anchorqea.com>, "Beau Patterson (bpatterson@dc pud.org)" <bpatterson@dc pud.org>, Donella Miller <donella@yakama.com>, "Charlie McKinney (cmck461@ecy.wa.gov)" <cmck461@ecy.wa.gov>, Steve Lewis <stephen_lewis@fws.gov>, "kirk.truscott@colvilletribes.com" <kirk.truscott@colvilletribes.com>, "korthjwk@dfw.wa.gov" <korthjwk@dfw.wa.gov>, Chad Jackson <chad.jackson@dfw.wa.gov>, Mary Mayo <marym@dc pud.org>, Bob Rose <rosb@yakamafish-nsn.gov>, Bret Nine <bret.nine@colvilletribes.com>, "Andrew Gingerich (andrewg@dc pud.org)" <andrewg@dc pud.org>, "Bryan Nordlund (bryan.nordlund@noaa.gov)" <bryan.nordlund@noaa.gov>, Bao Le <Bao.Le@hdrinc.com>, Patrick Luke <pluke@ykfp.org>, Brad James <jamesbwj@dfw.wa.gov>, "Keith Hatch (Keith.Hatch@bia.gov)" <Keith.Hatch@bia.gov>

Hi Aquatic SWG: please remember to submit comments on the attached draft Bull Trout Stranding and Take Study Plan to Andrew no later than EOD TOMORROW.

Thanks! -kristi :)

Sent from my Verizon Wireless 4G LTE smartphone

------- Original message -------
From: Kristi Geris <kgeris@anchorqea.com>
Date: 07/29/2013 1:56 PM (GMT-08:00)
To: "Andrey Gergich (andrewg@dc pud.org)" <andrewg@dc pud.org>,Bao Le <Bao.Le@hdrinc.com>,"Beau Patterson (bpatterson@dc pud.org)" <bpatterson@dc pud.org>,”Bill Towey (bill.towey@colvilletribes.com)" <bill.towey@colvilletribes.com>,"Bob Jateff (jatefrij@dfw.wa.gov)" <jatefrij@dfw.wa.gov>,Bob Rose <rosb@yakamafish-nsn.gov>,"Chad Jackson' <chad.jackson@dfw.wa.gov>,'Bret Nine'
<bret.nine@colvilletribes.com>,"Chad Jackson' <chad.jackson@dfw.wa.gov>,"Charlie McKinney (cmck461@ecy.wa.gov)" <cmck461@ecy.wa.gov>,Chas Kyger <chask@dc pud.org>,Chris Sheridan <csherida@blm.gov>,"Donella Miller' <donella@yakama.com>,Jason McLeLLan <Jason.McLeLLan@colvilletribes.com>,"Jeff Korth (korthjwk@dfw.wa.gov)" <korthjwk@dfw.wa.gov>,"Jessi Gonzales' <jessica_gonzales@fws.gov>,"Joe Peone (joe.peone@colvilletribes.com)"
APPROVAL BY THE AQUATIC SETTLEMENT WORK GROUP OF THE BULL TROUT STRANDING, ENTRAPMENT AND TAKE STUDY PLAN
Final Conference Call
Action Items

Aquatic Settlement Work Group

To: Aquatic SWG Parties
From: Michael Schiewe, Chair (Anchor QEA, LLC)
Re: Final Action Items of the September 11, 2013, Aquatic SWG Conference Call

Date: September 16, 2013

Below is a summary of Action Items from the Aquatic SWG meeting held by conference call from 10:00 am to 11:30 am on Wednesday, September 11, 2013. These action items include the following:

I. Summary of Action Items

1. Douglas PUD will finalize the revised draft Bull Trout Stranding and Take Study Plan, and will provide a final version of the plan to Kristi Geris for distribution to the Aquatic SWG (Item VI-2).

2. Douglas PUD will incorporate Section 2.6 – Regional Coordination of the Pacific Lamprey Management Plan (PLMP) into the draft Lamprey Entrance Efficiency and Operations Study Plan, per U.S. Fish and Wildlife’s (USFWS’s) request. Upon USFWS’s approval of the revisions, Kristi Geris will distribute the final version of the plan to the Aquatic SWG (Item VI-3). (Note: Steve Lewis provided USFWS’s approval of the revised plan via email on September 11, 2013, and the final plan was distributed to the Aquatic SWG by Geris on September 12, 2013.)

3. Douglas PUD will provide a revised draft Water Quality Attainment Plan (WQAP) to Kristi Geris for distribution to the Aquatic SWG. Aquatic SWG members will submit edits and comments on the revised draft WQAP to Andrew Gingerich no later than Tuesday, October 1, 2013 (Item VI-4).

4. Aquatic SWG members will submit edits and comments on the draft Spill Prevention Control and Countermeasures (SPCC) Plan to Andrew Gingerich no later than Tuesday, October 1, 2013 (Item VI-5).

5. Jason McLellan will present his Mid-Columbia Regional Sturgeon Workshop materials at the Aquatic SWG in-person meeting on October 9, 2013 (Item VI-6).

6. Douglas PUD will provide a demonstration of the Aquatic SWG Extranet site at the Aquatic SWG in-person meeting on October 9, 2013 (Item VI-8).
7. The Aquatic SWG meeting on October 9, 2013, will be held in person at 9:00 am at Douglas PUD Headquarters in East Wenatchee, Washington. If time permits, there will also be a Wells Dam site visit following the meeting (Item VII-1).

II. Summary of Decisions
1. There were no Statements of Agreement (SOAs) approved at today’s meeting.

III. Agreements
1. The Aquatic SWG members present approved the draft Bull Trout Stranding and Take Study Plan, as revised (Item VI-2).
2. The Aquatic SWG members present conditionally approved the draft Lamprey Entrance Efficiency and Operations Study Plan, pending USFWS’s email approval of the revised draft plan (Item VI-3). *(Note: Steve Lewis provided USFWS’s approval of the revised plan via email on September 11, 2013, as distributed to the Aquatic SWG by Kristi Geris that same day.)*
3. The Aquatic SWG members present agreed to continue discussions on the Conflict of Interest Policy at the Aquatic SWG in-person meeting on October 9, 2013 (Item VI-9).
4. The Aquatic SWG members present agreed to hold the Aquatic SWG meeting on October 9, 2013, at an earlier than usual start time of 9:00 am. The meeting will be held in person at Douglas PUD Headquarters in East Wenatchee, Washington. If time permits, Aquatic SWG members also agreed to a Wells Dam site visit following the meeting (Item VII-1).

IV. Review Items
1. Kristi Geris sent an email to the Aquatic SWG on August 26, 2013, notifying them that the draft SPCC Plan is available for review, with comments due to Andrew Gingerich no later than Tuesday, October 1, 2013.
2. Kristi Geris sent an email to the Aquatic SWG on August 27, 2013, notifying them that the draft Conflict of Interest Policy is available for review. The draft policy will be up for approval at the Aquatic SWG meeting on October 9, 2013.
3. Kristi Geris sent an email to the Aquatic SWG on August 27, 2013, notifying them that the draft WQAP is available for review, with comments due to Andrew Gingerich no later than Tuesday, October 1, 2013.

V. Reports Finalized
1. The final Lamprey Entrance Efficiency and Operations Study Plan was approved by the Aquatic SWG on September 11, 2013, and was distributed to the Aquatic SWG by Kristi Geris on September 12, 2013.
Via Electronic Filing

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 1st Street N.E.
Washington, D.C. 20426

Subject: Wells Hydroelectric Project – FERC Project No. 2149
Extension of Time Request - Bull Trout Passage Evaluations Study

Dear Secretary Bose:

Public Utility District No. 1 of Douglas County, Washington (Douglas PUD), licensee for the Wells Hydroelectric Project No. 2149, respectfully request that the FERC approve an extension of time to conduct the adult bull trout passage evaluation study at off-project hatchery collection facilities (Twisp Weir Bull Trout Study). This extension of time is being jointly requested by all of the parties to the Aquatic Settlement Agreement including the United States Fish and Wildlife Service (USFWS), Washington State Department of Ecology (Ecology), and Douglas PUD.¹

The FERC license for the Wells Project requires Douglas PUD to implement the Twisp Weir Bull Trout Study within one year of issuance of the new license. The requirement to conduct this study can be found in various locations throughout the license including: 1) section 6.5 of the Washington State Department of Ecology’s Clean Water Act Section 401(a)(1) Water Quality Certification for the Wells Project (Appendix A of the license); 2) section 4.7 of the USFWS’s Federal Power Act section 18 Fishway Prescription (Appendix B of the license); and 3) Term and Condition No. 11 in the USFWS’s Endangered Species Act section 7 consultation for bull trout (Appendix E of the license).

¹ The parties to the Aquatic Settlement Agreement include the USFWS, U.S. Bureau of Land Management (BLM), Washington State Department of Fish and Wildlife (WDFW), Ecology, the Confederated Tribes of the Colville Reservation (CCT), the Confederated Tribes and the Bands of the Yakama Nation (YN), and Douglas PUD.
The goals and objectives of the Twisp Weir Bull Trout Study, referenced by all three of the mandatory conditions cited above, can be found in section 4.2.2 of the Aquatic Settlement Agreement’s Bull Trout Management Plan (BTMP). The proposed Bull Trout Study, as described in the BTMP, was originally intended to consist of a radio telemetry study at Douglas PUD’s only off-project hatchery collection facility, the Twisp River Weir. The study is intended to assess adult bull trout behavior and passage success in relation to the operation of this regionally important hatchery and stock assessment facility.²

Per the requirements of the license, the bull trout study was originally scheduled to be completed in year one of the new license. However, during the development of the study plan the USFWS requested that Douglas PUD postpone the study from year one to year five of the license. In support of the USFWS’s request, representatives from the USFWS and Douglas PUD jointly submitted a study deferral request to all of the signatory parties to the Wells Aquatic Settlement Agreement (Exhibit A). The parties to the agreement approved this request as detailed in Exhibit B. In support of this decision, the USFWS submitted a letter to the FERC on June 27, 2013 requesting that the FERC postpone the Twisp Weir Bull Trout Study until year 5 of the license (Exhibit C).

The deferral of this study is intended to combine the Twisp Weir Bull Trout Study with a bull trout passage study scheduled to take place at Wells Dam in year five of the license. During past studies at Wells Dam, many of the fish tagged at the dam migrated into the Twisp River and over the Twisp Weir. The USFWS is a major proponent of the deferral and consolidation of these two studies because it will reduce the total number of bull trout tagged and because it will provide a more cumulative assessment of bull trout passage in the Upper Columbia Region.

At the request of the USFWS and following approval by all of the signatory parties to the Aquatic Settlement Agreement, Douglas respectfully requests that the FERC grant an extension of time in order to combine the Twisp Weir Bull Trout Study with the passage assessment at Wells Dam in year five of the license.

If you have any questions or require further information, please feel free to contact me at (509) 881-2208 or sbickford@dcpud.org.

Sincerely,

Shane Bickford
Natural Resources Supervisor

² The Twisp Weir is an off-Project salmon and steelhead broodstock collection, adult management, reproductive success, and stock assessment facility of regional importance. It is used to monitor, protect and restore ESA listed salmon and steelhead and to monitor bull trout populations within the Twisp River. The facility is owned by Douglas PUD and operated by WDFW. Funding for the actions taking place at the Twisp Weir are provided by the Bonneville Power Administration, Public Utility District No. 2 of Grant County, WDFW, and Douglas PUD.
Enclosure:

1) Exhibit A – Request to the Aquatic Settlement Work Group to postpone the Bull Trout Study.
2) Exhibit B – Aquatic Settlement Work Group Meeting minutes approving and recommending postponement of the Bull Trout Study.
3) Exhibit C – Letter from USFWS to the FERC requesting that the Bull Trout Study at the Twisp Weir be postponed until year five of the license.

Cc: Mr. Douglas Johnson – FERC, Portland
    Mr. Erich Gaedeke – FERC, Portland
    Wells Aquatic Settlement Work Group
    Mr. Andrew Gingerich – Douglas PUD
Exhibit A

Request to the Aquatic Settlement Work Group to postpone the Bull Trout Study
Hi Emily, Inc.

Per our conference call on 5/8/2013, please feel free to provide your comments on the attached letter concerning the Twisp Weir and pending assessment of bull trout at this facility. For convenience and clarity, I would suggest using the "Final Mark-Up" and "Draft" options on your tool-bar in Word to see the "clean" document without the track changes. Feel free to give me a call if you have questions!

S

On Thu, May 9, 2013 at 2:03 PM, Emily Pizzichemi <epizzichemi@anchorqea.com> wrote:

Hi Aquatic SWG: Attached are the final Action Items from yesterday’s conference call. Thanks!

Emily Pizzichemi 😊

ANCHOR QEA, LLC
epizzichemi@anchorqea.com
720 Olive Way, Suite 1900

Seattle, Washington 98101
T 206.287.9130
D 206.903.3313
F 206.287.9131

ANCHOR QEA, LLC
www.anchorqea.com
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************************************************
Stephen T. Lewis
Hydropower and Energy Coordinator
US FISH AND WILDLIFE SERVICE
CENTRAL WASHINGTON FIELD OFFICE
215 MELODY LANE STE 103
WENATCHEE, WA 98801-8122
phone:  (509) 665-3508 Ext. 2002
e-mail:  Stephen_Lewis@fws.gov

"If a road has no obstacles, it probably doesn't lead to anywhere." S. Lewis
Exhibit B

Aquatic Settlement Work Group Meeting minutes approving and recommending postponement of the Bull Trout Study
The Aquatic Settlement Work Group (SWG) met by conference call on Wednesday, June 12, 2013, from 10:00 a.m. to 12:00 p.m. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items
   1. Steve Lewis will distribute the final revised letter requesting deferral of the Bull Trout Radio Telemetry Study at the Twisp Weir, as approved at today’s conference call, to the Aquatic SWG prior to the Aquatic SWG conference call on July 10, 2013 (Item V-2).
   2. Andrew Gingerich will confirm the acreage to be treated during Douglas PUD’s 2013 aquatic herbicide application, and will provide this information to the Aquatic SWG (Item V-3).
   3. Andrew Gingerich will contact the Chelan County Noxious Weed Control Board to discuss their 2013 aquatic herbicide application, and to also compare methods with Douglas PUD’s planned application. Gingerich will provide a summary of the discussions to the Aquatic SWG (Item V-3).
   4. Douglas PUD will review the Joint Fisheries Parties’ (JFP’s) Lamprey Proposal for the Upper Columbia prior to the Aquatic SWG conference call on July 10, 2013 (Item V-8).

II. Summary of Decisions
   1. There were no Statements of Agreement (SOAs) approved at today’s meeting.

III. Agreements
IV. Reports Finalized

1. The Douglas PUD Aquatic Settlement Work Group 2012 Annual Report that was approved by the Aquatic SWG on May 9, 2013, was submitted to FERC on May 31, 2013.

V. Summary of Discussions

1. Welcome, Agenda Review, and Meeting Minutes Review (Kristi Geris): Kristi Geris welcomed the Aquatic SWG members (attendees are listed in Attachment A) and opened the meeting. Geris reviewed the agenda and asked for additions or other changes to the agenda. Bob Rose added a discussion on a Lamprey Proposal for the Upper Columbia.

Emily Pizzichemi reported that all comments and revisions received on the draft May 8, 2013 meeting minutes had been incorporated. The Aquatic SWG members present approved the May 8, 2013 meeting minutes, as revised. Bob Rose approved the draft May 8, 2013 meeting minutes via telephone directly following the meeting, and Jason McClellan approved the minutes via email on June 13, 2013.

2. DECISION: Bull Trout Letter Deferring Twisp Weir Study (Andrew Gingerich): Andrew Gingerich asked if the Aquatic SWG had additional input on Douglas PUD’s letter to FERC requesting deferment of the Bull Trout Radio Telemetry Study at the Twisp Weir. The draft letter was distributed to the Aquatic SWG in an email from Steve Lewis on May 10, 2013, with comments due to Gingerich and Lewis prior to today’s Aquatic SWG meeting. Patrick Verhey asked when the final deadline is for a deferral request from FERC and Gingerich replied that everything needs to be submitted to FERC by the end of October 2013. Aquatic SWG representatives present approved Douglas PUD’s letter to FERC requesting rescheduling the Bull Trout Radio Telemetry Study at the Twisp Weir to occur in 2016. Lewis will distribute the final revised letter, as approved at today’s conference call, to the Aquatic SWG prior to the Aquatic SWG conference call on July 10, 2013.

3. Aquatic Herbicide Application Methods (Andrew Gingerich): Andrew Gingerich met with Scott Kreiter (Douglas PUD Lands Department) to discuss details regarding Douglas PUD’s 2013 aquatic herbicide application in public swimming areas. Gingerich said that Douglas PUD hired Woodland Resource Services from Ellensburg, Washington, to perform the application. The herbicidal chemical is diquat dibromide, applied in liquid form. The contractors use a boat with a submerged trail bar with multiple weighted hoses for direct herbicidal application to plant. This method of application broadcasts the chemical less than other methods and does not require people applying the herbicide to be in the water. Patrick Verhey asked how many acres Douglas PUD plans to treat during 2013 and Gingerich said that he would confirm the exact acreage and provide the information to the Aquatic SWG at the meeting on July 10, 2013. Gingerich said that Douglas PUD plans to treat three swimming areas within city parks with water
access recreation areas—one each in Pateros, Brewster, and Bridgeport, Washington.
Verhey asked if Douglas PUD considered using the same herbicide that Chelan PUD used near the Entiat River and suggested that Douglas PUD compare the two chemicals and application methods. Pat Irle said that, according to an herbicide application plan produced by the Chelan County Noxious Weed Control Board, Chelan County is using a chemical called Triclopyr because it is the most cost-effective herbicide with minimal impacts on local listed fish species. Gingerich said that he will contact the Chelan County Noxious Weed Control Board to discuss their 2013 aquatic herbicide application process and compare methods with Douglas PUD’s planned application; and then he will provide a summary of the discussions to the Aquatic SWG. Gingerich said that the first application is scheduled for just after July 15, 2013, which will account for bull trout movement in the area.

4. **Lamprey Entrance Efficiency Plan** (Andrew Gingerich): Andrew Gingerich said that, as required by conditions in their FERC license, Douglas PUD is developing a Lamprey Entrance Efficiency Plan (LEE Plan). This plan is being developed in coordination with Bao Le from HDR Engineering, Inc., and will be presented to the Aquatic SWG for comments and approval. Gingerich said that even though it is not explicitly stated in a FERC license article, Douglas PUD is also required to construct an operations study plan to assess potential changes in fish-way operations to improve overall passage if and when problems are identified. He said that the 2013 Adult Lamprey Passage and Enumeration Study Plan already includes this type of information and also contains potential improvement options. However, Douglas PUD would try and combine the LEE Plan and the Operations Plan into one document or plan. Pat Irle asked when Douglas PUD expects to have the draft document available for review, and Chas Kyger replied that they hope to distribute the plan to the Aquatic SWG before the Aquatic SWG conference call on July 10, 2013. Gingerich added that he is targeting August 2013, or at the latest, September 2013 as the approval deadline for the Aquatic SWG in order to meet the FERC submittal deadline of October 2013. Gingerich noted that Douglas PUD needs time after the completion of the approval process to develop the consultation record for the approved plan; which gets filed with FERC along with the approved plan.

Bob Rose asked what data Douglas PUD plans to evaluate, and Kyger responded that they will rely heavily on the 2013 Adult Lamprey Passage and Enumeration Study Plan and will also consult outside study data. Rose said that he hopes Douglas PUD coordinates with the U.S. Army Corps of Engineers (Corps) to discuss the potential use of acoustic tags for gathering three-dimensional baseline data. Gingerich noted that acoustic data have some pros and cons and that one of the difficulties with developing this plan is that there is currently no standard entrance efficiency for lamprey or passage standards and much of the baseline information is missing. Rose said, for example, that if there were data on lamprey approaching the entrance of the dam but not fully entering the fish passage, assumptions could be made regarding causes for fish
rejecting the fish passage. However, since those data have not been documented, assumptions cannot be developed. Rose said that this is fundamental information about the interaction between lamprey and dams that should be addressed in study objectives. Le explained that the plan will be sufficiently robust in utilizing currently available data tools, and that the analyses will be as conservative as possible. Rose acknowledged that this plan is just a starting point and it will take several years to determine the best plan for maximizing lamprey entrance efficiency. Irle asked if the past Dual-Frequency Identification Sonar (DIDSON) lamprey passage studies are being used to guide Douglas PUD’s plan, and Le replied that, due to small sample sizes and the subsequent lack of statistical significance, those studies did not contribute much useful data to the 2013 study plan; however, results of those studies have informed current operations in Wells fishways to lower entrance velocities to support lamprey migration at appropriate times of the year. Le also said that the lack of information about lamprey should be kept in mind and that the mistake of comparing lamprey to salmonids should be avoided. He said that the implication dams have for the population dynamics and ecology of the species is not yet fully understood. Rose said that he thinks lamprey and salmon are not so fundamentally different as to write off the possibility that no passage means rejections, as it does in salmonids. Rose asked if salmon are being considered in the formulation of the efficiency plan, and Gingerich confirmed that the document will also address impacts to salmonids. Gingerich noted that changes to the fishway for the benefit of lamprey need HCP approval because impacts to passage of Endangered Species Act (ESA) listed salmonids must be considered.

5. **2013 Lamprey Study: Release Location below Wells Dam** (Chas Kyger): Chas Kyger said that, as the Aquatic SWG approved in the 2013 Adult Lamprey Passage and Enumeration Study Plan, lamprey will be released 1.5 miles below Wells Dam and a subset of each release group will be placed directly into the fish ladder. Kyger asked for further thoughts or comments, and Bob Rose reminded the Aquatic SWG of his previous recommendation of releasing some fish further downstream near the Entiat River. He recalled that the lamprey for this study are being transported from Bonneville Dam, and that, typically, it takes lamprey 3 to 6 weeks to travel from Bonneville Dam to Wells Dam. Rose said that drastically reducing this natural timeline could bias the data. Gingerich said that the shortened timeline may be considered a positive bias; however, carrying a radio tag may be considered a negative bias since asking a fish to behave normally while carrying the burden of a tag and the stress associated with the transport and tagging experience is unqualified, but undoubtedly negative. So ultimately, each scientific study is with some bias and assumptions. Gingerich noted that the study has been designed to address the objectives, and that it is up to the Aquatic SWG to be aware of the assumptions and biases and discuss the results of the study within this context.
Kyger said that he had previously discussed with Rose releasing PIT-tagged lamprey at different locations downstream from Wells Dam to gather data about movement patterns. These PIT-tagged lamprey would be in addition to the 125 individuals already planned for the study. Aquatic SWG representatives present agreed that releasing additional PIT-tagged lamprey in various locations would be beneficial. Kyger added that the extra lamprey can either be bulk-released in one location or spread over several locations, and would only be released if the Yakama Nation (YN) could provide the additional fish. Kyger also noted that since the release location would be in the Rocky Reach reservoir that Douglas PUD would need to consult Chelan PUD. Gingerich said that the 25 additional lamprey will only carry PIT-tags while the other 125 study fish will carry both PIT-tags and acoustic tags. Gingerich said that he suggested using full duplex (FD) array tags on the additional 25 lamprey, since tributary arrays are wired for FD detection. Bao Le agreed that FD array tags are best for data collection purposes. Pat Irle asked if Douglas PUD would be interested in lamprey interaction with the Methow River instead of the Entiat River, and Gingerich replied that the objective of the study is to evaluate how fish interact with Wells Dam, and releasing fish into the Methow River would compromise that objective. He added, however, that fish traveling through Wells and into the Methow River would have a good chance of being detected on PIT tag arrays currently installed in that tributary, provided flows were reasonable; since, detection efficiency of those arrays is dependent on flow. Rose asked if aerial antenna arrays were still planned to be deployed at the entrances to the Methow and Okanogan rivers, and Kyger replied that these elements are still in the 2013 study plan.

6. **White Sturgeon Egg Arrival Update** (Andrew Gingerich): Andrew Gingerich said that Douglas PUD was able to bring white sturgeon eggs to the Wells Hatchery Facility thanks largely due to efforts by Chelan PUD collecting broodstock and spawning efforts by the YN. Gingerich said that delivered eggs were a result of a three-by-three (3x3) matrix, consisting of three females and three males, and is hoping to bring in additional fish in the near future since additional broodstock may be available as a result of Grant PUD and the YN collection efforts. Gingerich said that the egg program has been successful so far and that one of the maternal families in the hatchery hatched a few days ago. Pat Irle asked if Douglas PUD is keeping adults on site at Wells Hatchery, and Gingerich replied that they are not and stated that Douglas PUD has a larvae program and a broodstock program, and that spawning takes place at Marion Drain. He said that the eggs from one female are incubated together as a lot, regardless of paternity (i.e., families are grouped by maternal family unit). Jason McLellan suggested that, in the future, eggs be kept separate based on both maternity and paternity until they begin to feed. He explained that there can be differential success during incubation and that over-representation of one genetic cross over another could occur if the eggs are combined too early. Gingerich said that next year they will keep the different genetic crosses in separate jars to mitigate for this concern. Rose said that it is important that
additional discussions occur within the next few weeks regarding future needs and expectations for the programs.

7. **Wells Dam Water Quality Update** (Andrew Gingerich): A Total Dissolved Gas (TDG) Update for Wells Dam (Attachment B) was distributed to the Aquatic SWG by Kristi Geris on June 12, 2013 [today], prior to the start of the meeting. Andrew Gingerich explained that there were two 125 percent exceedences at Wells Dam in early April 2013 due to a coordination issue between Douglas PUD operators and the Central Control at Grant PUD. He noted that they have not seen 7Q10 flows this season and explained that a 7Q10 flow is the probability of a certain extreme flow lasting 7 days and occurring every 10 years. The 7Q10 flow at Wells Dam is 246,000 cubic feet per second (246 kcfs) and the mean hourly flow this month has been approximately 155 kcfs. He added that there was also one 115 percent exceedence at the Rocky Reach forebay. Gingerich encouraged the Aquatic SWG to read the document more thoroughly and contact him with any questions or concerns. Pat Irle asked about the 115 percent 12-C high exceedance in the Rocky Reach forebay. Gingerich explained that on the day before the exceedance, there was a short, intense flow as a result of poor hourly coordination communication with Central at Grant PUD, which resulted in the Rocky Reach Forebay exceedance.

Irle asked if the Corps has accepted the fact that their responsibility is 110 percent. Gingerich replied that they should, based on State water quality regulations; however, he said that he did not think they have formally adopted this standard. Gingerich added, however, that they have been running above the 110 percent standard since June 1, 2013, based on measurements in the Wells Forebay.

8. **Lamprey Proposal for Upper Columbia** (Bob Rose): The Lamprey Proposal for the Upper Columbia (Attachment C) was distributed to the Aquatic SWG by Kristi Geris on June 12, 2013 [today], prior to the meeting. Bob Rose said that the proposal has been in development for some time and that the Joint Fisheries Parties (JFP) are now bringing it to the work group forum for comments. Rose said that he will refrain from using the term No Net Impact (NNI) because Douglas PUD does not have a NNI clause in its documents. Rose went on to say that the JFP is only looking at primary objectives to set the stage for collecting more long-term status and trend data. They want to develop critical research questions for a large-scale Columbia lamprey study and then proceed to obtain tools, experts and professionals, and other data collection needs. Rose said that this discussion is meant to provide an overview of objectives and data gaps and that this conversation will guide the development of a cleaner document with more specific goals and methods for the study. Rose said that he hopes the JFP have clearer resolution on the issue by October or November 2013. He said that the primary objective is to maximize the value of every fish put into the river by obtaining as much data as possible in just 2 to 3 years. After this time period, he thinks that the data will indicate whether
or not lamprey are viable candidates for movement tracking studies. Rose proposed using radio telemetry tags to track movements more carefully. He further explained that if the JFP are considering translocation as a possible tool for repopulation, it needs to be known if translocated fish produce viable offspring. Rose said that once tagged adults spawn, he hopes that biologists can observe where the tags end up and draw conclusions from there. From the spawning grounds, biologists can move downstream and pinpoint index sites with potential spawning and rearing habitat. Rose suggested that, based on these data, it may be feasible to make connections between juveniles and their parents to determine if offspring are coming from tagged or untagged adults. Rose said this proposal is a good approach to figuring out what is going on with lamprey in the Mid- to Upper Columbia River in a relatively short period of time with low expenses, so they can more quickly develop management plans for the species.

Andrew Gingerich requested additional time to review the document prior to discussing it. He added that Douglas PUD will review the proposal prior to the Aquatic SWG conference call on July 10, 2013. Rose said that the JFP agrees that the document is not perfect and needs refinement. Pat Irle asked about the release location of half-duplex PIT-tagged individuals as depicted on a diagram on page 18 of the proposal (Attachment C), and Rose clarified that the fish would be released in the general vicinity, up to a few miles away. Gingerich said that Douglas PUD is committed to studying lamprey in a way that is consistent with the existing Douglas PUD Pacific Lamprey Management Plan (PLMP) and the Aquatic Settlement Agreement (ASA).

Lastly, Rose provided a brief overview of the objectives for juveniles. He said that juvenile lamprey are vulnerable and highly susceptible to predation at dams. He suggested taking actions to reduce piscivorous fish around dams to increase juvenile survival. He said that irrigation diversions are another concern for juvenile survival. He wondered if juveniles could get entrained in these irrigation features in rivers such as the Wenatchee where they are common. Rose said that much can be learned about life history from propagating juveniles of a known size, age, and location, and that this could be a cost-effective way to supplement populations in the Upper Columbia.

VI. Next Meetings
1. Upcoming meetings: July 10, 2013 (conference call); August 14, 2013 (conference call); September 11, 2013 (conference call)

List of Attachments
Attachment A – List of Attendees
Attachment B – TDG Compliance Update for Wells Dam
Attachment C – Lamprey Proposal for the Upper Columbia
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<tr>
<th>Name</th>
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<tr>
<td>Kristi Geris</td>
<td>Administration/Technical Support</td>
<td>Anchor QEA, LLC</td>
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<td>Emily Pizzichemi</td>
<td>Administration/Technical Support</td>
<td>Anchor QEA, LLC</td>
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<td>Andrew Gingerich</td>
<td>SWG Technical Representative</td>
<td>Douglas PUD</td>
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<td>Chas Kyger</td>
<td>Technical Support</td>
<td>Douglas PUD</td>
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<td>Pat Irle</td>
<td>SWG Technical Representative</td>
<td>Washington State Department of Ecology</td>
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<td>Steve Lewis</td>
<td>SWG Technical Representative</td>
<td>U.S. Fish and Wildlife Service</td>
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<td>Patrick Verhey</td>
<td>SWG Technical Representative</td>
<td>Washington Department of Fish and Wildlife</td>
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<td>Chad Jackson</td>
<td>Technical Support</td>
<td>Washington Department of Fish and Wildlife</td>
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<td>Bob Rose</td>
<td>SWG Technical Representative</td>
<td>Yakama Nation</td>
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<td>Jason McLellan</td>
<td>SWG Technical Representative</td>
<td>Colville Confederated Tribes</td>
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<td>Bao Le</td>
<td>Technical Support</td>
<td>HDR Engineering, Inc.</td>
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Exhibit C

Letter from USFWS to the FERC requesting that the Bull Trout Study at the Twisp Weir be postponed until year five of the license
IN REPLY REFER TO:  
USFWS Reference: 13410-2013-CPA-0006  
Hydrologic Unit Code: 17-02-00-08-05  
Re: Off-Project Hatchery Collection Facilities Adult Bull Trout Upstream Passage Assessment (Wells Hydroelectric Project – FERC Project No. 2149)

June 27, 2013

Honorable Kimberly D. Bose, Secretary  
Federal Energy Regulatory Commission  
888 First St., NE  
Washington, DC 20426

Dear Secretary Bose:

The Federal Energy Regulatory Commission (Commission) issued a new license for the Wells Hydroelectric Project (FERC No. 2149) on November 11, 2012. As part of this effort, the U.S. Fish and Wildlife Service (Service) filed its Prescription for Fishways with the Commission in July 2010, which included provisions for the safe and timely passage of bull trout at the Project’s facilities. On March 16, 2012, the Service also issued its Biological Opinion for the Proposed Relicensing of the Wells Hydroelectric Project to the Commission. This biological opinion stipulates that the Commission shall require the Public Utility District No. 1 of Douglas County (Douglas PUD) to implement an adult bull trout passage evaluation at off-project hatchery collection facilities such as Douglas PUD’s Twisp River Weir in year one of the new license. This requirement is found in Term and Condition No. 11 of the Service’s biological opinion, and item 4.7 in the Service’s Prescription for Fishways. This mandated study requirement is also consistent with the Bull Trout Management Plan (section 4.2.2) found within the Wells Aquatic Settlement Agreement filed with the Commission on May 27, 2010, and within the Washington State Department of Ecology (Ecology) Chelan Water Act section 401 water quality certification (401 Certification) for the Project.

The Service has determined, in collaboration with all signatories to the Wells Aquatic Settlement Agreement, to defer the mandated year one passage study in favor of a study in year five of the new Wells license, when an ‘at project evaluation’ is scheduled to take place. The rationale for this deferral rests on the premise that combining these evaluations will provide a more comprehensive analysis of project impacts and will also require the use of fewer study fish than two independent evaluations, thus reducing handling impacts on bull trout which are listed under the Endangered Species Act.

This deferral has been discussed extensively within the confines of the Wells Aquatic Settlement Work Group. As such, all signatories approve of the Service’s deferral of this evaluation. In light of these considerations, it is the Service’s position that the year one bull trout passage study at hatchery brood collection traps (i.e., Twisp Weir) be deferred to year five of the license rather...
than conducted during year one of the license. If you have any questions, please do not hesitate to contact me at (509) 665-3508 ext. 2002.

Sincerely,

[Signature]

Ken S. Berg, Manager
Washington Fish and Wildlife Office

CC:
Patrick Verhey - Washington Department of Fish and Wildlife
Pat Irle - Washington Department of Ecology
Bob Rose - Yakama Nations
Jason McLellan - Colville Confederated Tribes
Chris Sheridan – Bureau of Land Management
Shane Bickford - Douglas County PUD
Brad Hawkins – Douglas County PUD
Scott Kreiter - Douglas County PUD
APPENDIX J
2013 GAS ABATEMENT PLAN AND
BYPASS OPERATING PLAN
Via Electronic Filing

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 1st Street N.E.
Washington, D.C. 20426

Subject: Wells Hydroelectric Project No. 2149
Gas Abatement Plan and Bypass Operating Plan – License Article 401 (a)

Dear Secretary Bose:

Pursuant to Article 401(a) of the new license for the Wells Hydroelectric Project, the Public Utility District No. 1 of Douglas County (Douglas PUD) hereby submits for approval the 2013 Total Dissolved Gas Abatement Plan (GAP) and the 2013 Bypass Operating Plan (BOP) for the Project.

Article 401(a) requires Douglas PUD to file a GAP approved by the Washington State Department of Ecology (Ecology) by February 28th during each year of the license. The final GAP is attached as Appendix A to this letter and was reviewed and approved by all of the parties to the Aquatic Settlement Agreement (ASA) and Habitat Conservation Plan (HCP) including Ecology, the National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), U.S. Bureau of Land Management (BLM), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (CCT) and the Confederated Tribes and the Bands of the Yakama Nation (YN). The Bureau of Indian Affairs (BIA) was also provided an opportunity to review and comment on the GAP during the 30-day ASA comment period. The BIA is currently a non-voting observer within the ASA process.

The enclosed GAP is consistent with (1) the Water Quality Management Plan that is contained within the ASA and Condition 6.7(2)(a) of Ecology’s Clean Water Act section 401 Water Quality Certification (401 Certification) and (2) the NMFS Endangered Species Act Incidental Take Statement (ITS) Reasonable and Prudent Measure No. 2 for the Wells Project. The pre-filing consultation record supporting the review and approval of the GAP is attached as Appendix B to this letter.

Douglas PUD respectfully requests that the FERC approve the enclosed GAP for the Wells Project prior to the start of the fish spill season that begins on April 1, 2013.
Article 401 (a) also requires Douglas PUD to file a BOP that has been approved by the NMFS within year one of the new license. The Wells HCP requires Douglas PUD to annually submit the BOP to the HCP Coordinating Committee for review and approval. Section 6.7(2)(d) of the 401 Certification requires Douglas PUD to closely coordinate the content and review processes for the GAP and BOP within year one of license issuance.

The final BOP is attached as Appendix C to this letter and was reviewed by all of the agencies and tribes participating in the HCP process, including the NMFS. The 2013 BOP was approved by the HCP Coordinating Committee, including the NMFS, at the January 22, 2013 meeting. On January 28, 2013, the NMFS also provided Douglas PUD with independent correspondence reaffirming its approval of the BOP.

A draft copy of the BOP was provided to the Aquatic Settlement Work Group on December 28, 2012 to coordinate the BOP with the GAP. No comments on the BOP were received by the end of the 30-day comment deadline. On February 12, 2013, Ecology provided Douglas PUD with a letter reaffirming its approval of the GAP and indicating that Douglas PUD has appropriately coordinated the GAP and BOP in accordance with the requirements of the 401 Certification, section 6.7 (2)(d). The consultation record supporting the review and approval of the BOP can be found in Appendix D to this letter.

Douglas PUD respectfully requests that the FERC approve the BOP for the Wells Project prior to the start of fish bypass operations that begins on April 9, 2013.

If you have any questions or require further information regarding the enclosed plans or the consultation record supporting the approval and coordination of these plans, please feel free to contact Andrew Gingerich at (509) 881-2323, andrewg@dcpud.org or Tom Kahler at (509) 881-2322, tomk@dcpud.org.

Sincerely,

Shane Bickford
Natural Resources Supervisor

Enclosure: 1) Appendix A – 2013 Total Dissolved Gas Abatement Plan – Wells Project
2) Appendix B – Pre-filing consultation record for the 2013 Gas Abatement Plan
3) Appendix C – 2013 Bypass Operating Plan – Wells Project
4) Appendix D – Pre-filing consultation record for the 2013 Bypass Operating Plan

Cc: Mr. Douglas Johnson – FERC, Portland
Mr. James Hastreiter – FERC, Portland
Mr. Erich Gaedeke – FERC, Portland
Wells HCP Coordinating Committee
Wells Aquatic Settlement Work Group
Mr. Tom Kahler – Douglas PUD
Mr. Andrew Gingerich – Douglas PUD
Appendix A - 2013 Total Dissolved Gas Abatement Plan – Wells Project
TOTAL DISSOLVED GAS ABATEMENT PLAN

WELLS HYDROELECTRIC PROJECT

(FERC Project No. 2149)

Prepared by:

Public Utility District No. 1 of Douglas County
East Wenatchee, Washington

February 1, 2013
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Executive Summary

Washington State Water Quality Standards (WQS) are defined in Washington Administrative Code (WAC) Chapter 173-201A, and are administered by the Washington Department of Ecology. Compliance with the total dissolved gas (TDG) standard requires that TDG not exceed 110 percent at any point of measurement in any state water body. A dam operator is not held to the TDG standards when the river flow exceeds the seven-day, 10-year frequency flood (7Q-10). In addition to allowances for natural flood flows, the TDG criteria may be adjusted to aid fish passage over hydroelectric dams when consistent with an Ecology-approved gas abatement plan. On a per-application basis, Ecology has approved a TDG adjustment to allow spill for juvenile fish passage past Columbia and Snake River dams (WAC 173-201A-200(1)(f)(ii)).

On the Columbia and Snake rivers there are three separate standards for the fish passage TDG adjustment: 1) TDG shall not exceed 125 percent in the tailrace of a dam, as measured in any one-hour period, 2) TDG shall not exceed 120 percent in the tailrace of a dam and 3) shall not exceed 115 percent in the forebay of the next dam downstream. Compliance with the latter two standards is determined using an average of the 12 highest consecutive hourly readings in any 24-hour period. The increased levels of spill, resulting in elevated TDG levels, are intended to allow increased fish passage with less harm to fish populations than what would be caused by turbine fish passage. This TDG adjustment provided by Ecology is based on a risk analysis study conducted by the National Marine Fisheries Service (NMFS) (NMFS 2000).

The goal of the Wells Total Dissolved Gas Abatement Plan (GAP) is to implement a long-term strategy to achieve compliance with the Washington State WQS criteria for TDG in the Columbia River at the Wells Hydroelectric Project (Wells Project) while continuing to provide safe passage for downstream migrating juvenile salmonids. Public Utility District No. 1 of Douglas County (Douglas PUD), which owns and operates the Wells Project, is submitting this GAP to Ecology as required for receipt of a TDG adjustment to aid fish passage at Wells Dam.
1.0 Introduction and Background

The Wells Hydroelectric Project Gas Abatement Plan (GAP) provides details on operational and structural measures to be implemented by Public Utility District No. 1 of Douglas County, Washington (Douglas PUD) at Wells Dam under the Federal Energy Regulatory Commission (FERC) license for Project No. 2149. These measures are intended to result in compliance with the modified Washington State water quality standards (WQS) for total dissolved gas (TDG) allowed under the TDG adjustment, provided incoming water to the Project is in compliance and flows are below the seven-day, 10-year frequency flood levels (7Q-10: 246 kcfs).

The goal of the GAP is to implement a long-term strategy to achieve compliance with the Washington State WQS for TDG in the Columbia River at the Wells Hydroelectric Project (Wells Project or Project), while continuing to provide safe passage for downstream migrating juvenile salmonids via the Juvenile Bypass System (JBS). Douglas PUD is the owner and operator of the Wells Project and is submitting this GAP to the Washington Department of Ecology (Ecology) for approval as required for receipt of a TDG adjustment for fish passage.

Since 2003, Ecology has approved GAPs and issued a TDG adjustment for the Wells Project. The most recent GAP was approved by Ecology in 2012.

This GAP contains three sets of information. Section 1.0 summarizes the background information related to regulatory and project-specific TDG information at the Wells Project. Proposed Wells Project operations and activities related to TDG management are contained in Sections 2.0 and 3.0. Section 4.0 provides a summary of compliance and physical monitoring plans, quality assurance and quality control procedures, and reporting.

1.1 Project Description

The Wells Project is located at river mile (RM) 515.6 on the Columbia River in the State of Washington (Figure 1). Wells Dam is located approximately 30 river miles downstream from the Chief Joseph Hydroelectric Project, owned and operated by the United States Army Corps of Engineers (USACE); and 42 miles upstream from the Rocky Reach Hydroelectric Project owned and operated by Public Utility District No. 1 of Chelan County (Chelan PUD). The nearest town is Pateros, Washington, which is located approximately 8 miles upstream from the Wells Dam.

The Wells Project is the chief generating resource for Douglas PUD. It includes ten generating units with a nameplate rating of 774,300 kW and a peaking capacity of approximately 840,000 kW. The spillway consists of eleven spill gates that are capable of spilling a total of 1,180 thousand cubic feet per second (kcfs). The crest of the spillway is approximately five and a half feet above normal tailwater elevation and two feet below tailwater elevation when plant discharge is 219 kcfs. The design of the Wells Project is unique in that the generating units, spillways, switchyard, and fish passage facilities were combined into a single structure referred to as the hydrocombine. Fish passage facilities reside on both sides of the hydrocombine, which is 1,130 feet long, 168 feet wide, with a dam top elevation of 795 feet above mean sea level (msl). The Juvenile Bypass System (JBS) was developed by Douglas PUD and uses a
barrier system to modify the intake velocities on all even numbered spillways (2, 4, 6, 8 and 10). The Wells Project is considered a “run-of-the-river” project due to its relatively limited storage capacity.

Figure 1. Map of the Wells Hydroelectric Project in Central Washington.

The Wells Reservoir is approximately 30 miles long. The Methow and Okanogan rivers are tributaries of the Columbia River within the Wells Reservoir. The Wells Project boundary extends approximately 1.5
miles up the Methow River and approximately 15.5 miles up the Okanogan River. The surface area of the reservoir is 9,740 acres with a gross storage capacity of 331,200 acre-feet and usable storage of 97,985 acre-feet at the normal maximum water surface elevation of 781 feet.

1.2 Regulatory Framework

Article 401(a) of the FERC license for the Wells Project requires that the GAP be developed in consultation with the National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), Washington State Department of Fish and Wildlife, Washington State Department of Ecology (Ecology), Confederated Tribes of the Colville Reservation, Confederated Tribes and Bands of the Yakama Nation, United States Bureau of Land Management, and United States Bureau of Indian Affairs. The GAP must then be approved by NMFS and Interior before being submitted to Ecology and the Aquatic Settlement Work Group for approval. Once approved by the Aquatic Settlement Work Group and in particular Ecology, then the GAP is to be filed with the FERC for approval.

WAC Chapter 173-201A defines standards for the surface waters of Washington State. Section 200(1)(f) defines the WQS for TDG, and subsection ii defines the TDG criteria adjustment for fish passage.

Under the WQS, TDG shall not exceed 110 percent at any point of measurement in any state water body. However, the standards exempt dam operators from this TDG standard when the river flow exceeds the 7Q-10 flow. The 7Q-10 flow is the highest calculated flow of a running seven consecutive day average, using the daily average flows that may be seen in a 10-year period. The 7Q-10 total river flow for the Wells Project was computed using the hydrologic record from 1974 through 1998, coupled with a statistical analysis to develop the number from 1930 through 1998. These methods follow the United States Geological Survey (USGS) Bulletin 17B, “Guidelines for Determining Flood Flow Frequency” and determined that the 7Q-10 flow at Wells Dam is 246,000 cfs (Ecology et. al. 2004).

In addition to allowances for natural flood flows, the TDG criteria may be adjusted to aid fish passage over hydroelectric dams when consistent with an Ecology-approved gas abatement plan. This plan must be accompanied by fisheries management and physical and biological monitoring plans. Ecology may approve, on a per application basis, an interim adjustment to the TDG standard (110 percent) to allow spill for juvenile fish passage past dams on the Columbia and Snake rivers. Ecology-approved fish-passage adjustments comprise three separate standards to be met by dam operators: 1)TDG shall not exceed 125 percent in any one-hour period in the tailrace of a dam, 2) TDG shall not exceed 120 percent in the tailrace of a dam and 3) shall not exceed 115 percent in the forebay of the next dam downstream, with compliance criteria 2 and 3 measured as an average of the 12 highest consecutive hourly readings in any 24-hour period (12C High). The increased levels of spill resulting in elevated TDG levels are authorized by Ecology to allow salmonid smolts a non-turbine downstream passage route that is less harmful to fish populations than turbine fish passage. This TDG adjustment provided by Ecology is based on a risk analysis study conducted by the National Marine Fisheries Service (NMFS) (NMFS 2000).

A significant portion of the Wells Reservoir occupies lands within the boundaries of the Colville Indian Reservation. Wells Project operations do not affect TDG levels in tribal waters, where the Colville Tribes’ TDG standard is a maximum of 110 percent, year-round, at all locations. This TDG standard is also the
U.S. Environmental Protection Agency’s (EPA) standard for all tribal waters on the Columbia River, from the Canadian border to the Snake River confluence. TDG levels on the Colville Reservation portion of the mainstem Columbia River within Wells Reservoir result from the operations of upstream federal dams but in particular, the USACE’s Chief Joseph Dam (located immediately upstream of Wells Dam) and the US Bureau of Reclamation’s Grand Coulee Dam (located immediately upstream of Chief Joseph Dam).

### 1.2.1 7Q-10 Flood Flows
The 7Q-10 flood flow at the Wells Project is 246.0 kcfs. The Project is not required to comply with state WQS for TDG when project flows exceed this value.

### 1.2.2 Fish Spill Season
Although not defined in state regulations, the fish spill season at Wells Dam is determined by the Habitat Conservation Plan (HCP) Coordinating Committee and is intended to aid downstream juvenile salmonid fish passage over Wells Dam as an alternative to passage through the Project turbines. The fish spill season is generally April to end of August, but may vary from year to year. During non-fish spill, Douglas PUD will make every effort to remain in compliance with the 110 percent standard. During the fish spill season, Douglas PUD will make every effort not to exceed an average of 120 percent as measured in the tailrace of the dam. TDG at the Wells Project also must not exceed an average of 115 percent as measured in the forebay of the next downstream dam (Rocky Reach). These averages are calculated using the twelve (12) highest consecutive hourly readings in any 24-hour period. In addition, there is a maximum one-hour average of 125 percent, relative to atmospheric pressure, during fish spill season. Nothing in these special conditions allows an impact to existing and characteristic uses.

### 1.2.3 Incoming TDG Levels
During the fish spill season, TDG concentrations in the Wells Project forebay are primarily determined by the USACE’s upstream water management activities at Chief Joseph Dam and the Bureau of Reclamation’s activities at Grand Coulee Dam.

Since the completion of spill deflectors at Chief Joseph Dam in 2008, there has been a significant increase in the amount of spill at the Chief Joseph Project resulting from Federal Columbia River Power System (FCRPS)-wide operations. Recent increases in the amount of spill at Chief Joseph Dam have resulted in a dramatic rise in the volume of supersaturated water entering the Wells Project. For example, in 2012 Wells Dam received non-compliant water (>110%) on 125 days of the 133 days fish spill season. This mass influx of supersaturated water has resulted in significantly higher TDG concentrations observed in the forebay of Wells Dam that often exceeds TDG values of 115%.

Despite the absence of fish passage at Chief Joseph Dam, the USACE has operated under the assumption that the fish passage TDG adjustment approved by Ecology applies to all FCRPS dams, rather than the eight dams with fish passage in the lower Snake and Columbia rivers. Chief Joseph and Grand Coulee dams do not currently have upstream or downstream fish passage and subsequently do not have Ecology approved fish passage adjustment for spilling water above the 110% statewide uniform TDG
standard. As a result, both the USACE and the Bureau of Reclamation are out of compliance with Washington State WQS, as well as the EPA TDG standard and the Colville Tribe’s TDG standard, whenever TDG in the Chief Joseph dam or Grand Coulee dam tailraces exceeds 110 percent.

In 2012 the USACE revamped their proposed spill priority list for the FCRPS in recognition of the 110 percent TDG standard for joint operations of Grand Coulee and Chief Joseph Dams. Douglas PUD strongly supported the USACE’s proposed 2012 spill priority as it was expected to reduce the future frequency and duration of non-compliant water entering the Wells Reservoir. Despite the spill priority modification in 2012, Douglas PUD consistently received non-compliant water from the upstream federal hydro-system above 110% on all but 8 days of the 133 day spill season. In addition Wells received water containing TDG over the 115% (12C-High) standard for more than 50% of the spill season days in 2012.

1.2.4 Total Maximum Daily Load

In June 2004, a total maximum daily load (TMDL) for TDG was jointly established for the Mid-Columbia River and Lake Roosevelt by Ecology, the Spokane Tribe of Indians, and EPA (Ecology et al. 2004). EPA’s issuance covers all waters above Grand Coulee Dam and all tribal waters; EPA’s TMDL covers all tribal waters of the Colville Confederated Tribes, including the right bank of the Columbia River from Chief Joseph Dam downstream to the Okanogan River confluence. Ecology’s issuance covers all state waters downstream from Grand Coulee Dam to the Snake River confluence.

A summary implementation strategy prepared by Ecology and the Spokane Tribe of Indians describes proposed measures that could be used to reduce TDG levels in the Columbia River. Short-term actions primarily focus on meeting Endangered Species Act (ESA) requirements, while long-term goals address both ESA and TMDL requirements (Ecology et. al., 2004). Many of the recommended TMDL actions are currently being addressed by Douglas PUD through the implementation of the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) for anadromous salmon, the Bull Trout Management Plan resulting from consultation with the U.S. Fish and Wildlife Service, and requirements described in current and past GAPs.

The Wells Project occupies waters both upstream and downstream of the Okanogan River. In waters upstream of the Okanogan River, the TMDL does not provide an exemption for fish passage spills (except as a temporary waiver or special condition as part of the short-term compliance period, as described in the Implementation Plan, Appendix A of the TMDL). Downstream of the Okanogan River, allocations are provided based on both the 110 percent criteria and the criteria established for fish passage in the Washington State WQS. Any adjustment for fish passage downstream of the Okanogan River requires an Ecology-approved Gas Abatement Plan or GAP (Ecology et al. 2004).

1.2.5 Additional 401 Certification Requirements

the Wells Project, as conditioned by its 401 Certification/Order No. 8981, would comply with all applicable provisions of 33 USC 1311, 1312, 1313, 1316, 1317 and appropriate requirements of Washington State law. The 401 Certification general conditions that are relevant to the GAP and the abatement of TDG under the TDG adjustment are as follows:

- Douglas PUD shall consult with Ecology before it undertakes any change to the Project or Project operations that might significantly and adversely affect compliance with any applicable water quality standard (including designated uses) or other appropriate requirement of state law.

- Copies of the Wells Project 401 Certification and associated permits, licenses, approvals and other documents shall be kept on site and made readily available for reference by Douglas PUD, its contractors and consultants, and by Ecology.

- Douglas PUD shall allow Ecology access to inspect the Project and Project records required under the 401 Certification for the purpose of monitoring compliance with conditions of the 401 Certification. Access will occur after reasonable notice, except in emergency circumstances.

- Douglas PUD shall, upon request by Ecology, fully respond to all reasonable requests for materials to assist Ecology in making determinations under the 401 Certification and any resulting rulemaking or other process.

- Douglas PUD shall operate the Wells Project in compliance with a GAP approved by Ecology. By February 28 of each year, Douglas PUD shall submit a GAP to Ecology for approval. Pending Ecology’s approval of each subsequent GAP, Douglas PUD shall continue to implement the activities identified within the previously approved plan.

- The GAP will include the Spill Operations Plan and will be accompanied by a fisheries management plan (section 2.2.1) and physical (section 4.1.1) and biological (section 2.2.2) monitoring plans. The GAP shall include information on any new or improved technologies to aid in the reduction in TDG.

- Commencing one year after issuance of a new FERC license, Douglas PUD shall monitor and report spills and TDG during non-fish spill season to determine TDG compliance with the 110 percent standard (see section 4.1.1). The non-fish spill season is defined as the times of the year that are not considered the fish spill season (generally April to end of August).

- If Douglas PUD, at any point, considers modifying any of the measures identified in the spill playbook, they will immediately develop proposed alternative(s) that will produce levels of TDG equal to or less than those estimated to be produced by the measures to be replaced. These measures should be implementable in a similar timeframe and must be submitted to Ecology for review and approval prior to implementation.

- The Project shall be deemed in compliance with the TMDL for TDG as long as it remains in compliance with the terms of the 401 Certification. The certification, including the GAPs and the
Water Quality Attainment Plan (section 2.2.4), is intended to serve as the Project’s portion of the Detailed Implementation Plan for the TDG TMDL.

The 401 Certification also contains specific conditions that are relevant to the GAP and the abatement of TDG under the TDG adjustment are as follows:

- Commencing one year after issuance of the new license, Douglas PUD shall monitor and report spills and TDG during non-fish spill season to determine compliance with the 110% standard.

- Douglas PUD shall maintain a TDG monitoring program at its Fixed Monitoring Locations in the forebay and tailrace of Wells Dam and/or at other locations as determined by Ecology, in order to monitor TDG and barometric pressure. Douglas PUD shall monitor TDG hourly throughout the year.

- The TDG monitoring program shall conform to the Ecology Quality Assurance Project Plan (QAPP) requirements per Section 6.7 (f) of the [license] order and the procedures shall be at least as stringent as the quality assurance/quality control calibration and monitoring procedures developed by the USGS for the Columbia River.

- Douglas PUD shall provide an annual TDG report to Ecology for review and approval by February 28th of each year.

- Within one year of issuance of the new license, Douglas PUD shall coordinate the annual HCP Project Fish Bypass/Spill Operations Plan with the GAP, using best available information to minimize the production of TDG. This coordination shall be accomplished in consultation with the Wells HCP Coordinating Committee and the aquatic SWG.

- Within one year of license issuance, Douglas PUD shall submit a Water Quality Attainment Plan for Ecology to review and approve. The plan shall include a compliance schedule to ensure compliance with the water quality criteria with 10 years.

- Douglas PUD shall manage spill toward meeting water quality criteria for TDG during all flows below 7Q10 by minimizing voluntary spill through operations, including scheduling maintenance based upon predicted flows, avoiding spill by coordinating operations with upstream dams to the extent that it reduces TDG, maximize power house discharge, especially during periods of high river flows, and manage voluntary spill in real time in an effort to continue to meet TDG numeric criteria consistent with the GAP.

1.2.6 Additional Requirements of the FERC Operating License

Article 401(a) of the FERC operating license for P-2149 requires that the Gas Abatement Plan be filed with the Commission for approval following the approval of the GAP by NMFS, USFWS and Ecology. Article 401(b) requires the TDG report be submitted to the Commission by February 28th of each year.
Article 401(c) requires Commission authorization of an application to amend the license, prior to the implementation of measures to address non-compliance with numeric water quality criteria.

1.3 History of Operations and Compliance

1.3.1 Historical Flows

Flow from the Columbia River originates in the headwaters of the Canadian Rockies and picks up snow melt from tributary streams as it travels over 1,243 miles before emptying into the Pacific Ocean. There are 85,300 square miles of drainage area above Wells Dam. The natural hydrograph had low flows in November through January with high flows in May through July. Storage dams on the Columbia River and its tributaries upstream of the Wells Project in the U.S. and Canada capture spring and summer high flows to hold for release in the fall and winter months. Table 1 presents information on Columbia River flow, as measured at Wells Dam from 2002 to 2012, and shows that the current hydrograph of the Columbia River is controlled by upstream, federally managed storage and release regimes. Juvenile anadromous salmonid migration occurs within a regime of reduced high flows during the spring migration period.

In general, the hydropower system and reservoir operations in the Columbia River are coordinated through a set of complex agreements and policies that are designed to optimize the benefits and minimize the adverse effects of project operations. The Wells Project operates within the constraints of the Pacific Northwest Coordination Agreement, Canadian Treaty, Canadian Entitlement Agreement, Hourly Coordination Agreement, the Hanford Reach Fall Chinook Protection Program and the FERC regulatory and license requirements.
Table 1. Average monthly flows (kcfs) at Wells Dam, by month (2002-2012).

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<td>86.2</td>
</tr>
<tr>
<td>2011</td>
<td>114.9</td>
<td>136.6</td>
<td>124.1</td>
<td>145.7</td>
<td>206</td>
<td>259</td>
<td>206.6</td>
<td>139.9</td>
<td>73.8</td>
<td>74.9</td>
<td>89.9</td>
<td>98.2</td>
</tr>
<tr>
<td>2012</td>
<td>93.4</td>
<td>83.5</td>
<td>118.4</td>
<td>174.1</td>
<td>217.2</td>
<td>232.9</td>
<td>253.8</td>
<td>158.6</td>
<td>79.5</td>
<td>64</td>
<td>88.4</td>
<td>NA</td>
</tr>
<tr>
<td>All</td>
<td>97.4</td>
<td>90.7</td>
<td>89.3</td>
<td>117.4</td>
<td>149.4</td>
<td>179.2</td>
<td>145.5</td>
<td>106.8</td>
<td>66.3</td>
<td>70.0</td>
<td>85.7</td>
<td>96.1</td>
</tr>
</tbody>
</table>

1.3.2 Spill Operations

1.3.2.1 General Operation

The Hourly Coordination Agreement is intended to integrate power operations for the seven dams from Grand Coulee to Priest Rapids. "Coordinated generation" is assigned to meet daily load requirements via Central Control in Ephrata, WA. Automatic control logic is used to maintain pre-set reservoir levels to meet load requirements and minimize involuntary spill. These pre-set reservoir levels are maintained at each project via management of a positive or negative "bias". Positive or negative bias assigns a project more or less generation based on its reservoir elevation at a given time and thus, maximizes system benefits and minimizes involuntary spill.

1.3.2.2 Spill for Fish

Wells Dam is a hydrocombine design where the spillway is situated directly above the generating units. Research at Wells Dam in the mid-1980s showed that a modest amount of spill effectively guided 92.0-96.2% of the spring and summer downstream migrating juvenile salmonids through the JBS (Skalski et al. 1996; Table 2). The operation of the Wells JBS utilizes the five even-numbered spillways. These spillways have been modified with constricting barriers to improve the attraction flow while using modest levels of water. These spillways are used to provide a non-turbine passage route for downstream migrating juvenile salmonids from April through August. Normal operation of the JBS uses 10 kcfs. During periods of extreme high flow, one or more of the JBS barriers will be removed to provide adequate spill capacity to respond to an emergency plant load rejection. Spill barriers may also be removed to minimize TDG production during high spill events, or when flood flows are forecast. Bypass gates are opened when adjacent turbines are operating.
Typically, the JBS will use approximately 6 to 8 percent of the total river flow for fish guidance. Between the years 1997 and 2004, the volume of water dedicated to JBS operations has ranged from 1.5 to 3.2 million acre-feet annually. The operation of the JBS adds a small amount of TDG (up to 2 percent) while meeting a very high level of fish guidance and protection. This high level of fish protection at Wells Dam has met the approval of the fisheries agencies and tribes and is vital to meeting the survival performance standards contained within the FERC-approved HCP. The Wells Project JBS is the most efficient bypass system on the mainstem Columbia River.

### Table 2. Wells Hydroelectric Project Juvenile Bypass System Efficiency.

<table>
<thead>
<tr>
<th>Species</th>
<th>% JBS Passage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearling (spring) Chinook</td>
<td>92.0</td>
</tr>
<tr>
<td>Steelhead</td>
<td>92.0</td>
</tr>
<tr>
<td>Sockeye</td>
<td>92.0</td>
</tr>
<tr>
<td>Subyearling (summer/fall) Chinook</td>
<td>96.2</td>
</tr>
</tbody>
</table>

The JBS is used to protect downstream migrating juvenile salmonids. Fish bypass operations at Wells Dam falls into two seasons, Spring Bypass and Summer Bypass. For 21 years, the status of the fish migration for both spring and summer periods was monitored by an array of hydroacoustic sensors placed in the forebay of Wells Dam. The operation period for the juvenile bypass begins in April and ends in August; actual start and stop dates are set by the HCP Coordinating Committee, and are based on long-term monitoring to bracket the run timing of greater than 95 percent of both the spring and summer migrants. Up to thirteen million juvenile salmonids migrate past Wells Dam each year.

#### 1.3.2.3 Flows in Excess of Hydraulic Capacity

The Wells Project is a “run-of-the-river” project with a relatively small storage capacity (~98,000 acre ft). By comparison, Grand Coulee Dam, two projects upstream of Wells Dam, has 58 times the storage capacity of the Wells Reservoir. River flows in excess of the ten-turbine hydraulic capacity (219 kcfs) at Wells Dam must be passed over the spillways.

The forebay elevation at Wells Dam is maintained between 781.0 and 771.0 msl. The Wells Project has a hydraulic generating capacity of 219 kcfs (ASL 2007) and a spillway capacity of 1,180 kcfs. In recent years however the Wells project has had less than 200 kcfs plant capacity due to ongoing generator and turbine rebuild and upgrade projects. Data for Columbia River flows for eighty-five years at Priest Rapids yielded a peak daily average discharge of 690 kcfs on June 12, 1948 (USGS web page for historical flows at Priest Rapids on the Columbia River, http://waterdata.usgs.gov/wa/nwis/dv/?site_no=12472800). Therefore, the hydraulic capacity of Wells Dam is well within the range of recorded flow data.

#### 1.3.2.4 Flow in Excess of Power Demand

Spill may occur at flows less than the Wells Project hydraulic capacity when the volume of water is greater than the amount required to meet electric power system loads. This may occur during temperate weather conditions and when power demand is low or when non-power constraints on river
control results in water being moved through the Mid-Columbia at a different time of day than the power is required (i.e. off-peak periods). Hourly coordination (Section 3.2) between hydroelectric projects on the river was established to maximize generation by minimizing spill. Spill in excess of power demand provides benefit to migration juvenile salmonids. Fish that pass through the spillway survive at a higher rate relative to passage through a turbine and the turbulence in the tailrace generated by spill in excess of power demand increases tailrace velocity and reduces tailrace egress times. The reductions in tailrace egress time and increases in water turbulence and velocity reduce predation in the Wells tailrace.

1.3.2.5 Gas Abatement Spill

Gas Abatement Spill is used to manage TDG levels throughout the Columbia River Basin. The Technical Management Team (including NMFS, USACE, and Bonneville Power Administration [BPA]) implements and manages this spill. Gas Abatement Spill is requested from dam operators at other projects in the Columbia and Snake Rivers where gas levels are high. A trade of power generation for spill is made between operators, providing power generation in the river with high TDG and trading an equivalent amount of spill from a project where TDG is lower. Historically, the Wells Project has accommodated requests to provide Gas Abatement Spill. However, in an effort to limit TDG generated at the Wells Project, Douglas PUD has adopted a policy of not accepting Gas Abatement Spill at Wells Dam.

1.3.2.6 Other Spill

Other spill includes spill as a result of maintenance or plant load rejection. A load rejection occurs when the generating plant is forced off-line by an electrical fault, which trips breakers and shuts off generation. At a run-of-the-river hydroelectric dam, if water cannot flow through operating turbines, then the river flow that was producing power has to be spilled until turbine operation can be restored. These events are extremely rare, and would account for approximately 10 minutes in every ten years.

Maintenance spill is utilized for any activity that requires spill to assess the routine operation of individual spillways and turbine units. These activities include checking gate operation, conducting index and generator load testing and all other maintenance activities that would require spill to pass water. The FERC requires that all spillway gates be operated once per year. To control TDG levels associated with maintenance spill, Douglas PUD limits, to the extent practical, maintenance spill during period of peak flow.

1.3.3 Compliance Activities in Previous Year

1.3.3.1 Operational

Since the Wells Project is a “run-of-the river” project with a relatively small storage capacity, river flows in excess of the ten-turbine hydraulic capacity must be passed over the spillways. Outside of system coordination and gas abatement spill (Douglas PUD has adopted a policy of not accepting the latter), minimization of involuntary spill has primarily focused on minimizing TDG production dynamics of water spilled based upon a reconfiguration of spillway operations. The 2009 Wells Project GAP (Le and Murauskas, 2009) introduced the latest numerical model developed by the University of Iowa’s IIHR-
Hydroscience and Engineering Hydraulic Research Laboratories. The two-phase flow computational fluid dynamics tool was used to predict hydrodynamics of TDG distribution within the Wells Dam tailrace and further identify operational configurations that would minimize TDG production at the Project. In an April 2009 report, the model demonstrated that Wells Dam can be operated to meet the TDG adjustment criteria during the passage season with flows up to 7Q-10 levels provided the forebay TDG levels are below 115 percent. Compliance was achieved through the use of a concentrated spill pattern through Spillbay No. 7 and surplus flow volume through adjacent odd numbered spillbays in a defined pattern and volume. These preferred operating conditions create surface-oriented flows by engaging submerged spillway lips below the ogee, thus increasing degasification at the tailrace surface, decreasing supersaturation at depth, and preventing high-TDG waters from bank attachment. These principles were the basis of the 2009 Wells Project Spill Playbook and were fully implemented for the first time during the 2009 fish passage (spill) season with success. Overall, no exceedances were observed in either the Wells Dam tailrace or the Rocky Reach forebay in 2009.

In 2010, the concepts from the 2009 Spill Playbook were integrated into the 2010 Wells Project Spill Playbook given their effectiveness in maintaining levels below TDG criteria during the previous year. High Columbia River flows in June, which exceeded the preceding 15-year average flow, resulted in several exceedances of the hourly (125 percent maximum) and 12C-High (120 percent) TDG limits in the Wells Dam tailrace, and Rocky Reach forebay (115 percent). In response, Douglas PUD implemented an in-season analysis of the 2010 Spill Playbook and determined that full implementation of the recommendations from IIHR Engineering Laboratory would require the removal of the juvenile fish bypass system flow barriers in one even numbered spillbay. Following the in-season analysis and consultation with the HCP Coordinating Committee, changes were made to the 2010 Spill Playbook that allowed for the removal of the juvenile fish bypass system barriers in spillbay 6. Specifically, the Spill Playbook was modified to state that when spill levels approach the 53 kcfs threshold, the JBS barriers in spillbay 6 would be removed in order to remain in compliance with the TDG criteria in the Wells Dam tailrace and Rocky Reach Dam forebay. When spill exceeded 53 kcfs, excess spill would be directed through spillbays 6 and 7 rather than through spillbays 5 and 7. This operational configuration resulted in a more compact spill pattern that reduced the air-water interface surface area between spillway flows and the subsequent potential for lateral mixing and air entrainment.

In February 2011, Douglas PUD conducted an additional technical analysis of the 2010 Spill Playbook (after in-season changes) and confirmed that continued implementation would be appropriate for 2011 with additional minor modifications. Following approval of the 2011 GAP by Ecology, the 2011 Spill Playbook was implemented. Only minor changes were made to the 2012 spill playbook as a result of high compliance during the 2011 spill season.

In December of 2012 the final GAP report was completed for the 2012 spill season. After analysis it was determined that the 2012 spill season had the 3rd highest average monthly flows since 1969 (April-August). In addition incoming flows were reliably above 115%. Despite these conditions Wells Dam demonstrated high compliance with all standards aside from the Rocky Reach 115% 12C-high forebay standard since incoming flows to Wells were above 115% greater than 50% of the spill season days.
Given these unique conditions, and high compliance performance in 2011 and 2012, no changes are suggested for the 2013 spill playbook.

1.3.3.2 Structural

No structural modifications were implemented (none were scheduled) during the 2012 monitoring season, other than the removal of the JBS barriers, if needed, to accommodate high spill volumes in accordance with the Spill playbook. No structural modifications are planned for the 2013 spill season.

1.3.3.3 Biological Monitoring

NMFS has shown that Gas Bubble Trauma (GBT) is low if the level of TDG can be managed to below 120 percent (NMFS 2000). They recommend that “the biological monitoring components will include smolt monitoring at selected smolt monitoring locations and daily data collection and reporting only when TDG exceeds 125 percent for an extended period of time.” The 2012 Wells Project GAP has included the NMFS recommendation to sample for GBT in juvenile salmon when TDG levels exceed 125 percent saturation (NMFS 2000). In 2012, the 125 percent standard was exceeded on numerous occasions, but almost always when flows at Wells Dam were above 7Q-10 flood flows (246.0 kcfs). Regardless of 7Q-10 conditions, Douglas PUD conducted GBT sampling of juvenile salmonids at the Rocky Reach juvenile fish bypass, and in addition, sampled adult salmon at the Wells fish ladder traps. Over 800 adult salmon were collected and sampled from Wells Dam fish ladders, with none showing signs of GBT expression in 2012. Juvenile biological monitoring was initiated on May 3 and continued on days subsequent to 125% exceedences, which require monitoring. Daily monitoring continued until June 29, 2012, after which a three day/week sampling schedule was implemented due to TDG levels being sustained above 125 percent. Douglas PUD continued to monitor TDG conditions and biological responses until July 25, 2012.

Biological sampling indicated that GBT expression in juvenile salmonids examined at Rocky Reach averaged 1.25% for all 24 days of sampling, with a maximum daily occurrence of <6% of the fish examined. In all cases, GBT expression was mild with only a few cases of moderate expression (score of 1 or 2 on the 1-4 expression score scale). GBT expression peaked in late June and early July when the highest TDG values were observed in the Wells and Rocky Reach forebays. GBT expression was confounded by species specific sensitivities to levels of TDG coupled with changes to the species run composition during the spill season. Juvenile salmonids expressed varied amount of GBT by species. Coho expressed the highest incidence of GBT with steelhead and yearling Chinook expressing intermediate GBT and sockeye and subyearling Chinook appearing to be the most resilient to high TDG concentrations. Throughout the season, adult spring Chinook sampled at Wells Dam appeared to have few symptoms of GBT, even when TDG was above 130 percent in the Wells tailrace.

1.3.4 Compliance Success in Previous Year (2012)

TDG river flows in 2012 were much higher than historic flows at the Wells Project (Table 3); 156 percent of the 42-year average for the entire spill season. Flows in 2012 were the third-highest on record since Wells Dam was constructed (1997 and 1972 were slightly higher). The maximum hourly flow observed during the spill season was 314 kcfs on June 25 and flows frequently exceeded the 7Q-10 value of 246.0
kcfs. The average monthly flow from mid-June to the end of July exceeded the 7Q-10 value for the Wells Project in 2012.

Table 3. Average monthly river flow volume (kcfs) during the TDG monitoring season at the Wells Project in 2012 compared to the previous 42-year average (1969-2011), by month.

<table>
<thead>
<tr>
<th>Month</th>
<th>1969-2011 Mean</th>
<th>2012 Mean</th>
<th>Percent Difference from 42-year Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>115.6</td>
<td>174.1</td>
<td>+151%</td>
</tr>
<tr>
<td>May</td>
<td>149.4</td>
<td>217.2</td>
<td>+145%</td>
</tr>
<tr>
<td>June</td>
<td>164.5</td>
<td>232.9</td>
<td>+142%</td>
</tr>
<tr>
<td>July</td>
<td>132.2</td>
<td>253.8</td>
<td>+192%</td>
</tr>
<tr>
<td>August</td>
<td>104.6</td>
<td>158.7</td>
<td>+152%</td>
</tr>
<tr>
<td>All</td>
<td>133.3</td>
<td>207.34</td>
<td>+156%</td>
</tr>
</tbody>
</table>

High flows and incoming water out of compliance with the TDG standards, resulted in elevated TDG. On June 29 forced spill reached 167.5 kcfs, the maximum hourly value for the 2012 season (total outflow was 312.8 during the same hour). These high spill events were attributed to both flow volumes in excess of the Project’s hydraulic capacity, and flows in excess of the power system needs and/or transmission system capacity. Spill volume across the April-August spill season was over 260 percent of the preceding 17-year average (Table 4).
Table 4. Average monthly spill (kcfs) during the TDG monitoring season at the Wells Project in 2012 compared to the 17-year average (1995-2011), by month.

<table>
<thead>
<tr>
<th>Month</th>
<th>1995-2011 Mean</th>
<th>1995-2011 Std Dev</th>
<th>2012 Mean</th>
<th>2012 Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>10.9</td>
<td>7.0</td>
<td>20.6</td>
<td>13.7</td>
</tr>
<tr>
<td>May</td>
<td>21.9</td>
<td>20.7</td>
<td>59.0</td>
<td>18.6</td>
</tr>
<tr>
<td>June</td>
<td>36.4</td>
<td>39.6</td>
<td>65.4</td>
<td>41.9</td>
</tr>
<tr>
<td>July</td>
<td>15.1</td>
<td>11.2</td>
<td>84.4</td>
<td>28.4</td>
</tr>
<tr>
<td>August</td>
<td>7.9</td>
<td>2.1</td>
<td>12.5</td>
<td>9.4</td>
</tr>
<tr>
<td>Spill Season</td>
<td>18.4</td>
<td>16.1</td>
<td>48.4</td>
<td>37.0</td>
</tr>
</tbody>
</table>

As a result of these high spill volumes and the reception of non-compliant upstream water from the federal hydro-system, TDG exceeded the fish passage exception levels in early May, through early August. Of the 133 days during the spill season, there were 56 days when one or more hours had flows at Wells Dam above the 7Q-10 value. During the 2012 monitoring season, the TDG criterion for the forebay of Wells Dam was exceeded on all but 8 days (94.0 % of the spill season). If days where the Wells forebay exceedances are not excluded from compliance analysis except when TDG levels in the Wells tailrace are equal to or less than incoming forebay TDG levels, compliance for all three standards range from 49-98%. The 2012 compliance summary is reported in table 5.

Table 5. 2012 compliance summary.

<table>
<thead>
<tr>
<th>Compliance</th>
<th>Days with 7Q-10 flows removed</th>
<th>Considering 7Q-10 flows</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wells Tailrace 125% hourly standard</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days out of compliance</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Spill/bypass season</td>
<td>77</td>
<td>133</td>
</tr>
<tr>
<td>DCPUD Percent compliance</td>
<td>97%</td>
<td>98%</td>
</tr>
<tr>
<td><strong>Wells Tailrace 120% 12C-High standard</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days out of compliance</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Spill/bypass season</td>
<td>77</td>
<td>133</td>
</tr>
<tr>
<td>DCPUD Percent compliance</td>
<td>82%</td>
<td>89%</td>
</tr>
<tr>
<td><strong>Rocky Reach Forebay 115% 12C-High standard</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days out of compliance</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td>Spill/bypass season</td>
<td>77</td>
<td>127*</td>
</tr>
<tr>
<td>DCPUD Percent compliance</td>
<td>49%</td>
<td>69%</td>
</tr>
</tbody>
</table>

* Six days where the Rocky Reach forebay sensor failed has been removed from the analysis.
Despite extended periods of high flows, incoming TDG and spill, unit 7 rebuild, the Wells Project attained a high percentage of compliance when periods of flows in excess of 7Q-10, and periods when incoming water to the Project exceeded TDG criteria, are removed from the analysis. These encouraging results support the continued implementation of the 2012 Spill Playbook in 2013 during the fish passage season.

2.0 Proposed Operations and Activities

2.1 Operational Spill

2.1.1 Minimizing Involuntary Spill

Based on the Wells Project’s improved TDG performance as a result of 2012 operations associated with implementation of the Wells Project Spill Playbook, similar operating principles will be implemented for the 2013 fish passage season.

As discussed in Section 1.3.3.1 above, high Columbia River flows in 2012 resulted from high flood flows and subsequent forced spill. Often, incoming water in the forebay was already above tailrace compliance levels. However, operations following the 2012 Spill Playbook, when forebay inflows were below 115 percent TDG adjustment criterion and below 7Q-10 flows, resulted in high rates of compliance. Similarly to 2012, the 2013 Spill Playbook is proposing to shift concentrated spill away from spillway 7 to spillway 5. Spillway 5 was selected because spill through this bay can be more reliably supported by discharge from adjacent turbine units. The turbine discharge from Units 4 and 5 are expected to further enhance the surface jet being spilled through spillway 5. The updated Spill Playbook for 2012 is attached as Appendix 1.

In addition to minimizing involuntary spill through the implementation of the Spill Playbook, Douglas PUD shall manage spill toward meeting water quality criteria for TDG during all flows below 7Q-10 as follows:

- Minimize voluntary spill through operations including to the extent practicable, by scheduling maintenance based on predicted flows;
- Avoid spill by continuing to coordinate operations with upstream dams, to the extent that it reduces TDG;
- Maximize powerhouse discharge, especially during periods of high river flows; and
- During fish passage season, manage voluntary spill levels in real time in an effort to continue to meet TDG numeric criteria.
2.2 **Implementation**

2.2.1 Fisheries Management Plans

Juvenile salmon and steelhead survival studies conducted at the Wells Project in accordance with the HCP have shown that the operation of the Wells Project, of which the JBS is an integral part, provides an effective means for outmigrating salmon and steelhead to pass through the Wells Project with a high rate of survival (Bickford et al. 2001, Bickford et al. 2011) (Table 6). The Wells JBS is the most efficient juvenile fish bypass system on the mainstem Columbia River (Skalski et al. 1996). The Wells Anadromous Fish Agreement and HCP (Douglas PUD 2002) is the Wells Project’s fisheries management plan for anadromous salmonids, and directs operations of the Wells JBS to achieve the No Net Impact (NNI) standard for HCP Plan Species. The Aquatic Resource Management Plans (for white sturgeon, bull trout, Pacific lamprey, resident fish, water quality, and aquatic nuisance species) in the Wells Project’s Aquatic Settlement Agreement (developed in support of the pending Wells Project operating license) are the fisheries management plans for all other aquatic life designated uses.

**Table 6. 1998 -2000, 2010 Wells Hydroelectric Project Juvenile Survival Study Results.**

<table>
<thead>
<tr>
<th>Species</th>
<th>% Project Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearling Chinook (2010)</td>
<td>96.4</td>
</tr>
<tr>
<td>Yearling Chinook and Steelhead (1998, 1999)</td>
<td>96.2</td>
</tr>
</tbody>
</table>

In spring 2010, Douglas PUD conducted a survival verification study with yearling Chinook salmon, a required 10-year follow-up study to confirm whether the Wells Project continues to achieve survival standards of the Wells Anadromous Fish Agreement and HCP. Approximately 80,000 Passive Integrated Transponder (PIT)-tagged yearling summer Chinook were released over a 30 day period in 15 replicates. The study determined that juvenile Chinook survival from the mouth of the Okanogan and Methow rivers averaged 96.4 percent over the 15 replicate releases of study fish (Table 6). This result confirms conclusions from the three previous years of study and documents that juvenile fish survival through the Wells Project continues to exceed the 93 percent Juvenile Project Survival Standard required by the HCP (Bickford et al. 2011).

The current phase designations (status of salmon and steelhead species reaching final survival determination) for the HCP Plan Species are summarized in Table 7. Specific details regarding survival study design, implementation, analysis, and reporting are available in annual summary reports prepared and approved by the Wells HCP Coordinating Committee.
### Table 7. Wells Hydroelectric Project Habitat Conservation Plan Species Phase Designations.

<table>
<thead>
<tr>
<th>Species</th>
<th>Phase Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearling (spring) Chinook</td>
<td>Phase III(^1) – Standards Achieved (22-Feb-05)</td>
</tr>
<tr>
<td>Steelhead</td>
<td>Phase III – Standards Achieved (22-Feb-05)</td>
</tr>
<tr>
<td>Sockeye</td>
<td>Phase III – Additional Juvenile Studies (22-Feb-05)</td>
</tr>
<tr>
<td>Subyearling (summer/fall) Chinook</td>
<td>Phase III – Additional Juvenile Studies (22-Feb-05)</td>
</tr>
<tr>
<td>Coho</td>
<td>Phase III – Additional Juvenile Studies (27-Dec-06)</td>
</tr>
</tbody>
</table>

In 2013, Douglas PUD shall continue to operate Wells Dam adult fishways and the JBS in accordance with HCP operations criteria to protect aquatic life designated uses. Furthermore, all fish collection (hatchery broodstock and/or evaluation activities) or assessment activities that occur at Wells Dam will require approval by Douglas PUD and the HCP Coordinating Committee to ensure that such activities protect aquatic life designated uses.

Douglas PUD shall continue to operate the Wells Project in a coordinated manner toward reducing forebay fluctuations and maintaining relatively stable reservoir conditions that are beneficial to multiple designated uses (aquatic life, recreation, and aesthetics). Coordinated operations reduce spill, thus reducing the potential for exceedances of the TDG numeric criteria and impacts to aquatic life associated with TDG.

#### 2.2.2 Biological Monitoring

As in past years, if hourly TDG levels exceed 125 percent in the tailrace of Wells Dam, Douglas PUD will conduct adult and juvenile salmonid GBT sampling. Douglas PUD will work with the Washington Department of Fish and Wildlife hatchery programs to monitor the occurrence of GBT on adult salmon collected in the Wells Dam and Wells Hatchery fishways. Upon collection of broodstock, hatchery staff will inoculate each fish, place a marking identification tag on them and look for any fin markings or unusual injuries. It is expected that adult broodstock sampled for GBT will consist of spring and summer Chinook and sockeye since they are the species migrating through the Wells Project during fish spill periods where high TDG is a concern, however all encountered salmonids including steelhead and bull trout will be examined.

The JBS at Wells Dam does not have facilities to allow for juvenile fish sampling and observation. To address GBT sampling for juvenile anadromous salmonids if hourly TDG levels exceed 125 percent in the tailrace of Wells Dam, Douglas PUD will request biological sampling of migrating juveniles for symptoms of GBT at the Rocky Reach juvenile bypass sampling facility on the day subsequent to the exceedence. Target species for juvenile GBT sampling will consist of coho, sockeye, and yearling and subyearling Chinook and steelhead. If flood flows above 7Q-10 persist for extended timeframes (more than one

\(^1\) Phase III = Dam survival >95 percent or project survival >93 percent or combined juvenile and adult survival >91 percent (Standard Achieved).
week), sampling effort will be reduced to 3 days per week. Proposed biological monitoring for 2013 is consistent with 2012 sampling measures.

2.2.3 Water Quality Forums

Douglas PUD is currently involved in the Water Quality Team meetings held in Portland, Oregon. The purpose of the Water Quality Team is to address regional water quality issues. This forum allows regional coordination for monitoring, measuring, and evaluating water quality in the Columbia River Basin. Douglas PUD will continue its involvement in the Water Quality Team meetings for further coordination with other regional members.

Douglas PUD is also currently involved in the Transboundary Gas Group that meets annually to coordinate and discuss cross border dissolved gas issues in Canada and the U.S. Douglas PUD will continue its involvement with the Transboundary Gas Group.

In 2012, Douglas PUD actively participated in regional water quality forums with Ecology, Washington Department of Fish and Wildlife, Tribal Agencies, the U.S. Fish and Wildlife Service, NMFS, the USACE, and other Mid-Columbia PUDs (i.e., Grant and Chelan counties). These meetings, ranging from the Transboundary Gas Group to meetings with the USACE to individual telephone and email information exchange, allow for regional coordination for monitoring, measuring, and evaluating water quality in the Columbia River Basin. Douglas PUD is proposing to continue its involvement in such forums to further improve coordination with other regional water quality managers.

2.2.4 Water Quality Attainment Plan and Quality Assurance Project Plans

In November 2012, Douglas PUD received a new operating license for Wells Dam from the FERC. By October 2013 Douglas PUD is required to submit a Water Quality Attainment Plan (WQAP) and Water Quality Assurance Project plans (QAPP) for temperature and total dissolved gas monitoring to Ecology for review and approval. After Ecology approval, Douglas PUD shall submit the WQAP and QAPP plans to FERC for approval prior to implementation.

The WQAP shall include a compliance schedule to ensure compliance with TDG criteria within 10 years. The WQAP will also allow time for the completion of the necessary studies or for the resolution of the issue of elevated incoming TDG from upstream projects through rule-making or other means. The WQAP shall be prepared in consultation with the Aquatic Settlement Work Group (Aquatic SWG) and the HCP Coordinating Committee and shall meet the requirements of WAC 173-201A-510(5). The WQAP shall:

- Identify all reasonable and feasible improvements that could be used to meet TDG criteria. Data on high TDG levels and flow coming into the Wells forebay and its effects on Project compliance shall be included;

- Contain the analytical methods that will be used to evaluate all reasonable and feasible improvements;
• Provide for any supplemental monitoring that is necessary to track compliance with the numeric WQS; and

• Include benchmarks and reporting sufficient for Ecology to track Douglas PUD’s progress toward implementing this plan and achieving compliance within ten years of Ecology’s approval of the plan.

If implementing the compliance schedule does not result in compliance with TDG criteria at the time the compliance schedule expires, Douglas PUD may explore other alternative approaches available in the water quality standards, including a second compliance schedule or alternatives provided in WAC 173-201A-510(5)(g).

3.0 Structural Activities

No structural modifications related to spill are scheduled to occur at the Wells Project in 2013. As in 2012, high flow volume and spill may require JBS barrier removal per this GAP (see Appendix 2: 2013 Spill Playbook). The removal of JBS barriers to reduce TDG production at Wells Dam has been integrated into the Juvenile Fish Bypass Operating Plan that is annually approved by the HCP Coordinating Committee.

4.0 Compliance and Physical Monitoring

4.1 Monitoring Locations

4.1.1 TDG

TDG monitoring has been implemented in the Wells Dam forebay since 1984. Douglas PUD began monitoring TDG levels in the Wells Dam tailrace in 1997 by collecting data from a boat and drifting through the tailrace at four points across the width of the river. During the transect monitoring, no TDG “hot spots” were detected; the river appeared completely mixed horizontally. A fixed TDG monitoring station was established in 1998. The placement of the fixed monitoring station was determined based upon the 1997 work and was further verified as collecting data representative of river conditions during a 2006 TDG assessment at Wells Dam (EES et. al. 2007). Results of the 2008-2009 TDG numerical modeling activities conducted by University of Iowa/IIHR also confirmed that the tailrace monitoring station is located at a site representative of the mixed river flow, particularly during higher flows. Furthermore, locations of both forebay and tailrace sensors had to be protected to avoid sensor/data loss and damage and for safe accessibility during extreme high flows. The current locations of both the forebay and tailrace monitors took these criteria into consideration.

TDG monitoring at the Wells Project typically commences on April 1 and continues until September 15 annually. This monitoring period encompasses the operation of the Wells JBS as well as when river flows are at their highest and when a majority of spill occurs. Throughout this period, data from both forebay and tailrace sensors are transmitted by radio transmitters to a master radio at Wells Dam. This system is checked at the beginning of the season for communication between the probes and...
transmitters by technicians at Wells Dam. TDG data are sent and logged at the Douglas PUD Headquarters’ building in 15-minute intervals. Information on barometric pressure, water temperature and river gas pressure is sent to the USACE on the hour over the Internet. The four data points (15 minute) within an hour are used in compiling hourly TDG values, the 24-hour TDG average and the 12C-High readings in a day (24-hour period).

In 2013, Douglas PUD intends to operate a redundant TDG sensor in the tailrace location. Should the primary sensor fail data gaps can be filled from the second sensor. Installation timeframe will be contingent upon regulatory agencies’ approvals for in-water work and modification of the shoreline within the ordinary high water mark. Hourly TDG data transmissions to the USACE of Wells forebay and tailrace station data will be expanded to cover the year-round monitoring requirement (starting April 1, 2013).

Starting in 2013, Douglas PUD is planning on installing and operating a new TDG sensor station in the Wells Reservoir located several miles downstream of Chief Joseph Dam. This new TDG sensor station will provide reliable mixed flow TDG readings from Chief Joseph Dam. The current system operated by the USACE below Chief Joseph Dam collects TDG values from the spillways at the dam and does not provide information on TDG passing through the turbines at Chief Joseph Dam originating from Grand Coulee Dam and does not provide an accurate reading of mixed flow TDG being directed at the Wells forebay.

4.2 Quality Assurance

The broad purpose of a well-designed Quality Assurance Project Plan (QAPP) is to attain data of the type and quality needed to make future decisions surrounding the need, or lack thereof, for changes to project operation and construction related to compliance with TDG and temperature standards.

4.2.1 TDG

Douglas PUD will develop a QAPP for TDG in early 2013 in coordination with the Department of Ecology. Briefly, as part of the Douglas PUD’s Quality Assurance/Quality Control (QA/QC) program, Douglas PUD’s water quality consultant will visit the TDG sensor sites monthly for maintenance and calibration of TDG instruments. Calibration follows criteria established by the USACE, with the exception of monthly rather than bi-weekly calibration of sensors. A spare probe will be available and field-ready in the event that a probe needs to be removed from the field for repairs.

The consultant will inspect instruments during the monthly site visits and TDG data will be monitored weekly by Douglas PUD personnel. If, upon inspection of instruments or data, it is deemed that repairs are needed, they will be promptly made. Occasionally during the monthly sensor calibration, an error may develop with the data communication. These problems are handled immediately by technicians located at Wells Dam. Generally, the radio transmitters at each fixed station will run the entire season without any problems.

Douglas PUD will collect TDG data year round beginning April 1, 2013 but spill season data (April 9 – August 19) will be reported separately in an annual GAP report submitted to the Department of Ecology.
and FERC. As part of the quality assurance process, data anomalies will be removed. This would include data within a 2-hour window of probe calibration and any recording errors that result from communication problems. Data errors will prompt a technician or water quality specialist or consultant site visit, to inspect the instrument and repair or replace, if necessary. Real time data will be made available to the public by November 2013.

### 4.3 Reporting

Upon approval of the Wells GAP and issuance of a Wells Project TDG adjustment, Douglas PUD will submit an annual report to Ecology no later than February 28 subsequent to each year that the TDG adjustment is approved. The annual report will summarize all GAP activities conducted for the prior year (i.e., annual report filed February 28, 2013 will be for all GAP activities conducted in 2012) as required by Ecology and the FERC. In addition to reporting on spill season compliance, the annual report will include TDG compliance outside the spill season (110%), per the 401 Certification Section 6.7 2) c) iii).

### 5.0 Conclusions

Pending approval by Ecology, implementation of the measures identified within the 2013 GAP are intended to serve as a long-term strategy to maintain compliance with the Washington State WQS for TDG in the Columbia River at the Wells Project while continuing to provide safe passage for downstream migrating juvenile salmonids.


6.0 Literature Cited


Wells Project Gas Abatement Plan
7.0 Appendices
I. No Forced Spill

The Wells Dam JBS should be operated continuously throughout the juvenile salmon outmigration (April 9 to August 19 for 2013). The standard Wells HCP operating criteria, as described in Section 4.3.1 of the Wells HCP, will apply to the 2013 operating season. The operating criteria includes requirements that at least one bypass bay be operated during the entire JBS season, requires that no turbine is operated without an adjacent bypass bay being open and requires that all five bypass bays be operated continuously for 24 hours when the Chief Joseph Dam uncoordinated discharge estimate for that day is 140 kcfs or greater. The Wells JBS is normally operated with 1.7 kcfs passed through S2 and S10, and 2.2 kcfs through S4, S6, and S8. Figure 1 (below) assumes that the Chief Joseph Dam uncoordinated discharge estimate is greater than 140 kcfs or sufficient turbines units are operating that all five bypass bays are open.

Figure 2. Operational configuration under no forced spill (JBS only).
I. **Total Spill ≤ 53.0 kcf, JBS barriers in place**

As forced spill increases, Project Operators should allocate all spill through S5 until the maximum capacity is reached through that spillbay (~43.0 kcf). Note that S5 spill requires support of generation flows from units 4 and 5 to minimize TDG production. This, along with the already established JBS spill (10.0 kcf) would equal 53.0 kcf (Figure 3). Over 90% of the spill events over the past decade could have been handled under this configuration.

![Figure 3](image.png)

**Figure 3.** Operational configuration under spill ≤ 53.0 kcf (including JBS).
II. JBS Barrier Removal Criteria

When either of the following occurs, remove the JBS barrier in S6:

Spill in S5 reaches 30 kcf and total spill is expected to exceed 40 kcf for more than 8 hours, or total spill is expected to exceed 53 kcf. After the JBS barrier is removed from S6 and when flow through S5 is at least 30 kcf, shift 15 kcf to S6 (Figure 3). It is best to have generating units 4, 5, and 6 operating to support this spill configuration. Once at least 15 kcf is being spilled through S6, spill can be allocated to S5 until 43.0 kcf is reached.

![Graph showing spill distribution across spill bays](image)

**Figure 3.** Operational configuration once spill reaches 30 kcf in S5 and is expected to be above 40 kcf for more than 8 hours (JBS removed).

Shift sufficient spill from S5 to maintain a minimum of 15 kcf spill at S6. Note that the 15.0 kcf includes the existing 2.2 kcf JBS flow.
III. Short duration decreases in Forced Spill (<53.0 kcfs) and JBS Barriers in S6 Removed

If after removal of JBS barrier in S6, total spill drops below 53 kcfs (between 10-53 kcfs), and is expected to stay in this range for only a short period (4 days or less), direct spill through S6 up to 15 kcfs (total spill < 22.9 kcfs). When total spill exceeds 22.8 kcfs, direct the remainder of spill through S5.

IV. Forced Spill (> 53.0 kcfs) and JBS Barriers in S6 Removed

After S5 reaches 43.0 kcfs, additional spill should be allocated to S6 (S6 is already spilling at least 15.0 kcfs need to fully engage the submerged spillway lip below the ogee). As flow increases, spill should continually increase through S6 until paired with S5 (e.g., 43.0 kcfs through S5 and 26.0 kcfs through S6) (Figure 4). Eventually, S6 will reach 43.0 kcfs (93.8 kcfs, Figure 4).

Figure 4. Operational configuration under forced spill > 53.0 kcfs (including JBS flow, with removal of JBS barriers in S6). In this instance spill has reached the 43.0 kcfs maximum in S5 and additional spill is being allocated to S6 (26.0 kcfs).
Figure 5. Operational configuration under forced spill > 53.0 kcf (including JBS). In this instance (93.8 kcf of spill), S6 has been fully allocated and 43.0 kcf is now allocated through both S5 and S6.

V. Forced Spill (> 93.8 kcf) and JBS Barriers in S6 Removed

After both S5 and S6 reach 43.0 kcf, spill can also be allocated to S7. Since a minimum of 15.0 kcf is needed to fully engage the submerged spillway lip below the ogee, spill through S6 should be relocated to S7 (Figure 6). As flow increases, spill can be continually increased through S7 until paired with S6 (30.0 kcf through S6 and S7, while S5 continues at 43.0 kcf). After this point, both S6 and S7 can be increased until all three spillbays have reached 43.0 kcf (136.8 kcf of spill, Figure 7).
Figure 6. Operational configuration under forced spill > 96.0 kcf. In this instance (96.8 kcf of total spill), spill from S6 is relocated to S7 to maintain concentrated flow with S5. A spill of 16.0 kcf is maintained in S7 as to engage the submerged spillway lip.
VI. Forced Spill (> 136.8 kcfs)

Forced spill exceeding 136.8 kcfs rarely occurs (less than 0.5%). If these conditions arise and total river flow exceeds 246.0 kcfs, then 7Q-10 conditions are occurring and Wells Dam is exempt from the TDG standards. Under this situation, Project Operators may perform any combination of operations to ensure that flood waters are safely passed. Also, at this point, JBS barriers will likely be removed allowing additional flexibility to spill up to 43 kcfs each through S2, S4, S6, and S8. Project Operators may pass spill through S3 in a similar fashion to operations mentioned above (starting at a minimum of 15.0 kcfs to ensure that spillway lips are engaged).

VII. JBS Re-Installment Criteria

Once spills of less than 40.0 kcfs are predicted for at least four days, JBS barriers should be re-installed in S6.
### II. Spill Lookup Table

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<th>Operation</th>
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<td>IV. Spill (&gt; 93.8 kcfs, S6 JBS out), min.</td>
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<td>V. Spill (&gt;137.0 kcfs), min.</td>
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<td>V. Total Flow (&gt;246 kcfs), max.</td>
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**Spillbay Number**

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Notes: (1) No spill through S1 and S11 as to minimize interference with fish ladders. (2) Even-numbered spillbays are designated as the Juvenile Bypass System (JBS). (3) Primary spillbays for forced spill are S5, S6, S7, S3, and S9 (in that order).
Appendix B – Pre-filing consultation record for the 2013 Gas Abatement Plan
Hi Aquatic SWG: please see the email below from Andrew and the attached proposed 2013 Wells Dam Gas Abatement Plan and 2013 Bypass Operating Plan.

Thanks!
Kristi ☺

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com

This electronic message transmission contains information that may be confidential and/or privileged work product prepared in anticipation of litigation. The information is intended for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying distribution or use of the contents of this information is prohibited. If you have received this electronic transmission in error, please notify us by telephone at (206) 287-9130.

Attached is the proposed 2013 Wells Dam Gas Abatement Plan. For some years now Douglas PUD has worked in collaboration with the Department of Ecology to obtain an adjustment to the 110% TDG water quality criteria during the fish spill season. The adjustment allows for higher TDG values in order to provide fish with higher bypass efficiency via spill routes past virtually all main-stem Columbia and Snake River Projects. In summary, although this may appear to be a new process to some, we go through this process every year in preparation for the upcoming spill season.

This year we will, as always Douglas PUD will work with the WA Dept. of Ecology to obtain the TDG standard adjustment for out-migrating smolts, but also we are sharing it with the ASWG and the HCP Coordinating Committee to provide an opportunity to comment. The Gas Abatement Plan fits within the context Bypass Operating Plan that is prepared with the HCP-CC every year as well. As such, I have also attached the HCP bypass plan for 2013 to provide additional context related to Wells Dam fish spill and project operations in the spring/summer.

Aquatic SWG members will find that we have put these documents on the agenda for the Jan 9th ASWG meeting, but of course if people have specific questions prior to the meeting I would encourage them to ask away. In the meantime
please distribute this message and the document to the ASWG and the HCP CC. As is typical with our vetting process comments are welcome.

Thanks!
Andrew
509-881-2323
Hi HCP-CC, please see the email below from Andrew and the attached proposed 2013 Wells Dam Gas Abatement Plan.

Thanks!
Kristi ☺

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com

This electronic message transmission contains information that may be confidential and/or privileged work product prepared in anticipation of litigation. The information is intended for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying distribution or use of the contents of this information is prohibited. If you have received this electronic transmission in error, please notify us by telephone at (206) 287-9130.

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Friday, December 28, 2012 4:07 PM
To: Kristi Geris
Cc: Mike Schiewe; Shane Bickford; Chas Kyger; Tom Kahler
Subject: 2013 Wells Dam GAP 12-28-2012 clean

Kristi,

Attached is the proposed 2013 Wells Dam Gas Abatement Plan. For some years now Douglas PUD has worked in collaboration with the Department of Ecology to obtain an adjustment to the 110% TDG water quality criteria during the fish spill season. The adjustment allows for higher TDG values in order to provide fish with higher bypass efficiency via spill routes past virtually all main-stem Columbia and Snake River Projects. In summary, although this may appear to be a new process to some, we go through this process every year in preparation for the upcoming spill season.

This year we will, as always Douglas PUD will work with the WA Dept. of Ecology to obtain the TDG standard adjustment for out-migrating smolts, but also we are sharing it with the ASWG and the HCP Coordinating Committee to provide an opportunity to comment. The Gas Abatement Plan fits within the context Bypass Operating Plan that is prepared with the HCP-CC every year as well. *Note: the Bypass Operating Plan was distributed to the Coordinating Committees on Wednesday, December 26, 2012 –kristi ☺

Aquatic SWG members will find that we have put these documents on the agenda for the Jan 9th ASWG meeting, but of course if people have specific questions prior to the meeting I would encourage them to ask away. In the meantime please distribute this message and the document to the ASWG and the HCP CC. As is typical with our vetting process comments are welcome.
Intentionally Blank
Andrew Gingerich

From: Irle, Pat (ECY) <PIRL461@ECY.WA.GOV>
Sent: Wednesday, January 16, 2013 3:00 PM
To: Andrew Gingerich
Cc: Le, Bao (Bao.Le@hdrinc.com); McKinney, Charlie (ECY)
Subject: RE: 2013 GAP

Follow Up Flag: Follow up
Flag Status: Completed

Andrew:

Two small fixes, and then it looks good for approval:

In Section 4.2, Quality Assurance, the broad purpose of a well-designed QAPP is to attain data of the type and quality needed to make future decisions; in this case, the data will be used to evaluate the need for changes to project operation and construction related to compliance with TDG and temperature standards.

In Section 4.3, Reporting, the annual report should include TDG levels outside the spill season (as well as during the spill season), per the 401 Certification Section 6.7 2) c) iii), third sentence.

Please give me a call or email if you have any questions.

Sincerely,

Pat Irle
WA Dept of Ecology
Hydropower Projects Manager

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Thursday, January 10, 2013 11:36 AM
To: Irle, Pat (ECY)
Subject: RE: 2013 GAP

No apologies necessary. I had this on my to do list for today.

In the future I will try and send this to Ecology first...before sending it to the work group as we discussed yesterday. I know you wanted to see the QAPP too. I am busily working on it for the remainder of this week and likely next week as well.

Thanks Pat.

Andrew

From: Irle, Pat (ECY) [mailto:PIRL461@ECY.WA.GOV]
Sent: Thursday, January 10, 2013 10:49 AM
To: Andrew Gingerich
Subject: 2013 GAP

Hi, Andrew -

I think you said yesterday that you had already sent out a copy of the 2013 GAP? I know I’ve seen a copy of the 2012 GAP report, but I don’t remember this year’s GAP (plan). Could you send it again?
My apologies...

Pat Irle, MA, LG
Hydropower Projects Manager
Department of Ecology
Washington State
(509) 454-7864
Mary and Andrew,

NMFS approval of the BOP and GAP can be found in the e-mail below. Please add this to the agency approval correspondence.

Thanks,
Shane

Shane - After distribution of draft documents, at the December 2012 meeting of the Wells HCP Coordinating Committee, Douglas PUD presented the Total Dissolved Gas Abatement Plan and the 2013 Juvenile Fish Bypass Operating Plan for Wells Dam, followed by Committee discussion.

I have completed my review of these plans and find them consistent with NMFS expectations for Wells Dam operations in 2013. As such, please consider this email to construe NMFS approval of these plans.

Bryan Nordlund
January 28, 2013

Shane Bickford
Natural Resources Supervisor
Public Utility District No. 1 of Douglas County
1151 Valley Mall Parkway
East Wenatchee, Washington 98802-4497

Dear Mr. Bickford,

In December 2012 Douglas PUD submitted to the HCP Coordinating Committees coordinated plans for juvenile fish bypass operations and total dissolved gas abatement at the Wells Hydroelectric Project in 2013. I, as the U.S. Fish and Wildlife Service representative, reviewed those plans and along with the other agency and tribal Coordinating Committee representatives approved those plans. Specifically, the plans approved were: Total Dissolved Gas Abatement Plan, submitted for Coordinating Committee review on 28 December 2012, and the Wells Dam 2013 Juvenile Fish Bypass Operating Plan submitted for Coordinating Committee review on 26 December 2012.

I hope this letter assists Douglas PUD with their FERC submission. Feel free to contact me if you need anything further.

Sincerely,

Jim L Craig
Project Leader
Pat, attached is the final Gas Abatement Plan for 2013. Included in the document are Ecology’s suggested revisions and comments. No comments were received from the Aquatic Settlement Workgroup aside from those provided by Ecology. The HCP Coordinating Committee did provide two small editorial changes (‘JSB’ was changed to ‘JBS’ in appendix 1 and ‘complaint’ was changed to ‘compliance’ earlier in the document.) Both your comments and the HCP’s have been incorporated in the final version attached.

As we are required by the FERC, we would like to file this document along with the bypass operating plan (also attached) by Feb 28th.

If acceptable would you please return to me a letter from Ecology that we can file with the submission to the FERC. The letter would have the following similar statements:

1. Approval of a fish passage exemption for the 2013 spill season
2. Acknowledgement of the integration of the Bypass Operating Plan and the GAP towards meeting measure 6.7-2(d) in the 401 certification "Within one year of issuance of the new license, Douglas PUD shall coordinate the annual HCP project fish bypass spill operations plan with the GAP, using best available information to minimize the production of TDG during periods of spill. In consultation with the Wells HCP Coordinating Committee and ASWG, the spill operations plan will be reviewed and updates, as necessary." Recall that this year Tom Kahler and I (POC at DCPUD for the Bypass operating Plan) drafted these two documents in concert. Both documents were sent to the HCP and ASWG on Dec 28th, an approach designed to meet this requirement.

Let me know if the above sounds appropriate.
Thanks for the ongoing collaboration. As always give me a call if you’d like to discuss any of the info provided 509-881-2323.

Andrew

---

From: Irle, Pat (ECY) [mailto:PIRL461@ECY.WA.GOV]
Sent: Wednesday, January 16, 2013 3:00 PM
To: Andrew Gingerich
Cc: Le, Bao (Bao.Le@hdrinc.com); McKinney, Charlie (ECY)
Subject: RE: 2013 GAP

Andrew:

Two small fixes, and then it looks good for approval:

In Section 4.2, Quality Assurance, the broad purpose of a well-designed QAPP is to attain data of the type and quality needed to make future decisions; in this case, the data will be used to evaluate the need for changes to project operation and construction related to compliance with TDG and temperature standards.
In Section 4.3, Reporting, the annual report should include TDG levels outside the spill season (as well as during the spill season), per the 401 Certification Section 6.7 2) c) iii), third sentence.

Please give me a call or email if you have any questions.

Sincerely,
Pat Irle
WA Dept. of Ecology
Hydropower Projects Manager

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Thursday, January 10, 2013 11:36 AM
To: Irle, Pat (ECY)
Subject: RE: 2013 GAP

No apologies necessary. I had this on my to do list for today.

In the future I will try and send this to Ecology first...before sending it to the work group as we discussed yesterday. I know you wanted to see the QAPP too. I am busily working on it for the remainder of this week and likely next week as well.

Thanks Pat.
Andrew

From: Irle, Pat (ECY) [mailto:PIRL461@ECY.WA.GOV]
Sent: Thursday, January 10, 2013 10:49 AM
To: Andrew Gingerich
Subject: 2013 GAP

Hi, Andrew -

I think you said yesterday that you had already sent out a copy of the 2013 GAP? I know I’ve seen a copy of the 2012 GAP report, but I don’t remember this year’s GAP (plan). Could you send it again?

My apologies...

Pat Irle, MA, LG
Hydropower Projects Manager
Department of Ecology
Washington State
(509) 454-7864
Revised
Meeting Minutes

Aquatic Settlement Work Group

To: Aquatic SWG Parties

From: Michael Schiewe, Chair (Anchor QEA)

Re: Revised Minutes of the January 9, 2013 Aquatic SWG Meeting

The January Aquatic Settlement Work Group (SWG) met in person at the Wells Dam Hydroelectric Project on Wednesday, January 9, 2013, from 10:00 am to 4:00 pm. Attendees are listed in Attachment A of these meeting minutes.

I. Summary of Action Items
1. Steve Lewis will provide revisions to the draft December 13, 2012 Aquatic SWG conference call minutes to Kristi Geris for incorporation prior to finalizing and distributing to the Aquatic SWG (Item VI-2).
2. Chas Kyger will provide photos of the Wells Dam count window modifications to Kristi Geris for distribution to the Aquatic SWG (Item VI-3).
3. Andrew Gingerich will provide Douglas PUD’s draft 2012 Gas Abatement Plan (GAP) Report to Kristi Geris for distribution to the Aquatic SWG for review prior to filing the report with the Federal Energy Regulatory Commission (FERC) in February 2013 (Item VI-4).
4. The Aquatic SWG will submit comments on Douglas PUD’s draft 2013 Action Plan to Kristi Geris no later than Friday, January 18, 2013 (Item VI-4).
5. Andrew Gingerich will provide contact information for the new Aquatic SWG U.S. Bureau of Land Management (BLM) Technical and Policy Representative, Chris Sheridan, to Kristi Geris for distribution to the Aquatic SWG (Item VI-8).

II. Summary of Decisions
1. There were no Statements of Agreement (SOAs) approved at today’s meeting.

III. Agreements
1. There were no agreements discussed at today’s meeting.
IV. Review Items
1. The Douglas PUD draft 2013 Action Plan is available for review with comments due to Kristi Geris by Friday, January 18, 2013.
2. Kristi Geris sent an email to the Aquatic SWG on January 11, 2013, notifying them that the Douglas PUD 2012 GAP Report is available for a 30-day review period, with comments due to Andrew Gingerich by Monday, February 11, 2013.

V. Reports Finalized
1. No reports have been finalized since the last Aquatic SWG meeting.

VI. Summary of Discussions
1. Wells Dam Hydroelectric Project Tour – Part I: Power Production (Brian Hicks, Andrew Gingerich, Chas Kyger): Brian Hicks, the Wells Dam Hydroelectric Project Superintendent; Andrew Gingerich, and Chas Kyger led a tour of the power production facilities at the Wells Dam Hydroelectric Project. Hicks provided an overview of power production at the dam while touring several areas of the project, including the Operations Center.

2. Welcome, Agenda Review, and Meeting Minutes Review (Mike Schiewe): Mike Schiewe welcomed the Aquatic SWG members (attendees are listed in Attachment A) and introduced Jessi Gonzales, the Aquatic SWG Policy Representative for U.S. Fish and Wildlife Service (USFWS). Gonzales also introduced Doug Tangen, a new office assistant at USFWS. Tangen has a background in Environmental Sciences and came to USFWS from the U.S. Navy. Schiewe welcomed them both and reviewed the agenda. He asked for additional agenda items, and the following revisions were made to the agenda:

   - Andrew Gingerich requested two additions: 1) a brief announcement regarding the new Aquatic SWG Technical and Policy Representative for BLM; and 2) a discussion of the Pacific Lamprey count window modifications and head differential license amendment.

Kristi Geris reported that one additional revision was received on the draft December 13, 2012 conference call minutes from Patrick Verhey on January 2, 2013. Verhey requested a modification regarding Washington Department of Fish and Wildlife’s (WDFW’s) review of the new Wells Project FERC license. Steve Lewis requested a revision to the discussion regarding the installation of infrared (IR) cameras for improved lamprey enumeration. He said that he would like it noted that the Aquatic SWG did not conclude whether to use IR cameras in the future; and he added that he would like to see what angles the existing cameras are capable of viewing. Gingerich said that he had not intended to give the impression that the IR cameras are no longer being considered. He said that the Aquatic SWG did collectively decide to postpone
installation of the IR cameras to first investigate if fish can effectively be enumerated without installation of the IR cameras; Gingerich added that this question will be investigated this year. Lewis said that he will provide revisions to the draft December 13, 2012 Aquatic SWG conference call minutes to Geris for incorporation prior to finalizing and distributing these minutes to the Aquatic SWG.

3. **Pacific Lamprey Count Window Modifications and Head Differential License Amendment** (Chas Kyger): Chas Kyger said that the modifications to the count windows have been installed, and that the Aquatic SWG will have an opportunity to view the improvements during the tour of the Wells Dam east and west fish ladders. Kyger said that he will also take photos of the count window modifications and provide them to Kristi Geris for distribution to the Aquatic SWG.

Andrew Gingerich reminded the Aquatic SWG members that the new FERC license requires a license amendment for all permanent modifications to project facilities. He said that Douglas PUD is in the process of discussing the package of information to prepare for FERC that describes and shows that the Aquatic SWG has thoroughly reviewed and discussed the lamprey study and the related operational and structural modifications. Gingerich said that Douglas PUD should have a package ready for discussion for the Aquatic SWG February 13, 2013 meeting. Bao Le asked if Douglas PUD planned to state that the proposed head differential changes will occur each year, or just in 2013. Gingerich said that FERC is requesting a license amendment for these changes, so they must be viewing the changes as potentially permanent. He added that if FERC determines that the changes are a temporary measure, then an amendment will not be needed.

Kyger said that Douglas PUD is discussing logistics with the Yakama Nation (YN) to obtain adult lamprey from Bonneville Dam, and he also noted that Douglas PUD is coordinating with Grant PUD to obtain fish from Priest Rapids Dam, which Kyger said in total, covers all of the 125 study fish needed for the 2013 Pacific Lamprey radio telemetry study. Kyger said that arrangements should be finalized by spring. Steve Lewis asked if the U.S. Army Corps of Engineers (who operates Bonneville Dam) is requesting federal approval for securing the lamprey, and Kyger said that Douglas PUD is investigating whether that is a requirement. Kyger said that the YN would collect and transport the fish from Bonneville Dam to Wells Dam for tagging.

4. **2013 Aquatic SWG Action Plan** (Andrew Gingerich): Andrew Gingerich said that the Douglas PUD 2013 Aquatic SWG Action Plan was distributed to the Aquatic SWG by Kristi Geris on January 2, 2013. A PowerPoint presentation of the 2013 Aquatic SWG Action Plan (Attachment B) was also distributed to the Aquatic SWG on January 9, 2013.
Gingerich reviewed Aquatic SWG actions planned for 2013, by management plan. Actions included those associated to the Aquatic SWG Annual Report and webpage development, white sturgeon, bull trout, water quality, Pacific Lamprey, aquatic nuisance species (ANS), and resident fish. He reviewed planned activities and key dates associated with each respective management plan including planned studies, reports, and monitoring; regional coordination; and deadlines to FERC. Gingerich said that all 2013 activities will be incorporated into an Aquatic Settlement Agreement Annual Report and submitted to FERC. He noted that 2013 action dates were structured to comply with FERC deadlines.

Gingerich said that the new FERC license requires Douglas PUD to develop a webpage to post study plans, meeting minutes, and other relevant Aquatic SWG material. He said that the webpage will also include links to water quality data. Mike Schiewe asked if the webpage would be similar to a SharePoint site, and Gingerich replied that he was not yet certain what exactly the webpage will entail, but that an internal meeting is scheduled for this week to discuss these details. He said that Douglas PUD has a relicensing webpage, and that this new webpage may be similar to that. He also added that the Douglas PUD Information Technology (IT) staff is interested in including SharePoint as one of the options.

Steve Lewis asked about the status of Colville Confederated Tribe’s (CCT’s) and YN’s white sturgeon professional services contract development, and Gingerich said that they both are near finalization. Specifically, the CCT contract process is complete and Douglas PUD is waiting on insurance information from the YN to finalize that contract. Lewis asked about the areas of collection, and Gingerich indicated that they have not yet been finalized, and that before they are, he would like the Aquatic SWG to review and reach agreement on options.

Gingerich noted that for bull trout monitoring in 2013, Douglas PUD plans to employ a “greater than 10 per year” rule that would require additional monitoring activities for sub-adults at Wells Dam. Bao Le explained that if more than 10 bull trout are detected in a one-year period, additional protective measures will be triggered.

Gingerich said that there are several water quality reports and plans slated for 2013. He noted that Douglas PUD has already received and incorporated comments on the 2012 Gas Abatement Plan (GAP) Report from the Washington Department of Ecology (Pat Irle); however, he would like to also provide the Aquatic SWG an opportunity to provide comments prior to filing the report with FERC in late February 2013. He added that he will provide the draft report to Geris for distribution to the Aquatic SWG for review prior to filing the report with the FERC. Gingerich said that the 2013 GAP Report and 2013 Bypass Operating Memorandum were distributed to the Aquatic SWG on December 28, 2012; and he noted that in 2013, Douglas PUD will now look to meet the 110 percent
total dissolved gas (TDG) standard year-round, and not just monitor compliance during the spill season, which has different TDG guidelines. Lewis asked what the target species are for the TDG compliance and Gingerich said that incidental sampling will be performed on all juvenile salmonid species.

Gingerich also said that the Annual Water Temperature Report will not be available until 2014 because 2013 will be the year of infrastructure installation and the first year of data collection. He went on to say that reporting will increase with the new FERC license, which means there will be a lot more for the Aquatic SWG to review. Le noted that the Section 401 deadline for a Spill Prevention, Control and Countermeasures Plan (SPCC) is not until March 2014, as opposed to the September 2013 FERC deadline. He asked if Douglas PUD will be able to forego the FERC deadline due to the existing deadline. Pat Irle said that she could not speak to what FERC will require, but that Ecology will want to review the SPCC if it is updated in September 2013.

Gingerich clarified that “STT-WQ” means “Sovereign Technical Team – Water Quality,” and that this team is associated with the Columbia River Treaty. He said that participating in forums with the STT-WQ will help inform decisions in addressing the treaty in the future.

Gingerich noted that several Pacific lamprey actions are tentative and will be carried forward on an “as needed” basis (see third grouping of bullets in Attachment B). Shane Bickford added that, with the exception of the Lamprey Entrance Efficiency Plan, Douglas PUD has five years to complete these tentative items.

Gingerich said, in summary, that Douglas PUD has a lot planned for 2013 and he asked that the Aquatic SWG submit comments on Douglas PUD’s draft 2013 Action Plan to Geris no later than Friday, January 18, 2013. He added that he would like to request approval on the draft 2013 Action Plan at the Aquatic SWG February 13, 2013 meeting.

5. **FERC License** (Andrew Gingerich and Shane Bickford): Shane Bickford reviewed that in early December 2012, Douglas PUD submitted a request for rehearing. Bickford said that Douglas PUD had raised three overarching issues: 1) the new license term; 2) how encroachment of Wells Dam on Chief Joseph Dam is calculated; and 3) the inclusion of Article 204 to address Canadian Storage. Bickford explained that the proposed new license term of 40 years is based on the incorrect assumption that the Wells HCP would expire on the same date as the HCPs for the Rock Island and Rocky Reach Project in 2052. Bickford clarified that the Wells HCP does not expire until 2054. FERC’s intent is to synchronize the license terms for all of the mid-Columbia River dams; however, as noted by many state, federal and tribal stakeholders, a coordinated relicensing is not appealing due to work load. He also noted that the Rock Island Dam FERC license
expires in 2028, and therefore could not be synchronized with the FERC licenses for Rocky Reach and Priest Rapids.

Bickford said that Douglas PUD believes that the second issue was an error within the language in the license, in that the U.S. Corp Army of Engineers, Bonneville Power Administration, and Douglas PUD have all agreed to the terms of future encroachment calculations and payments, and that FERC simply incorrectly carried those terms into the license. He added that Douglas PUD is seeking to overturn the third issue as it is inconsistent with the license articles for the other PUD dams and represents an outdated characterization of the Columbia River Treaty. Bickford also added that there were other minor issues that Douglas PUD mentioned in the request for rehearing, including the correction of the Wells Project boundary and peak generating capacity.

Jessi Gonzales asked if the Canadian Storage language was about to change again, and Bickford replied that the Canadian Storage that is referred to in the request for rehearing will not change (it is already built). However, the terms of operation between the U.S. and Canada is expected to change (i.e., the Columbia River Treaty) and Douglas PUD would like to have the ability to change with it rather than be stuck in the past as the new license article 204 requires. Bickford said that it may take up to 7 to 8 months before Douglas PUD hears back from FERC, and he noted that the group that handles the rehearings is separate from the licensing group.

Andrew Gingerich said that Douglas PUD is now working to develop a FERC compliance matrix that includes all of the complex requirements of the new license including the requirements mandated within the CWA Section 401 water quality certification, the ESA consultations for bull trout, steelhead and spring Chinook, the Federal Power Act section 18 fishway prescriptions and the requirements imposed by FERC.

6. **Water Quality Management Plan/401 Certification Priorities** (Andrew Gingerich): This agenda item was covered in the draft 2013 Aquatic SWG Action Plan Update discussion.

7. **White Sturgeon** (Andrew Gingerich): This agenda item was covered in the draft 2013 Aquatic SWG Action Plan Update discussion.

8. **New Aquatic SWG U.S. Bureau of Land Management Technical and Policy Representative** (Andrew Gingerich): Andrew Gingerich announced that Chris Sheridan is now the new Aquatic SWG Policy and Technical Representative for BLM. Gingerich said that he will send Sheridan’s contact information to Kristi Geris for distribution to the Aquatic SWG.

9. **Wells Dam Hydroelectric Project Tour – Part II: East and West Fish ladders** (Shane Bickford, Andrew Gingerich, Tom Kahler and Chas Kyger): Shane Bickford, Andrew
Gingerich, Tom Kahler and Chas Kyger lead a tour of the east and west fish ladders at the Wells Dam Hydroelectric Project. Sites visited included the east and west fish ladders, the fish trap, the count station, the interpretive center, and the fish hatchery facilities. The 2012/2013 winter annual maintenance was underway; therefore, the east ladder was completely dewatered, which permitted access to view the recently installed count window modifications to improve lamprey enumeration. While discussing the modifications, Bickford and Kyger noted that in 2013, Douglas PUD also plans to install radio telemetry antennas in both Wells Dam fishways. They said that those arrays will help determine if the new wall diffuser screening and ramp perform as expected (i.e., if Pacific lamprey entry into the counting station is improved or if it is delayed, etc.).

VII. Next Meetings
1. Upcoming meetings: February 13, 2013 (conference call); March 13, 2013 (conference call); and April 10, 2013 (conference call).

List of Attachments
Attachment A – List of Attendees
Attachment B – Douglas PUD 2013 Aquatic SWG Action Plan Presentation
### List of Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mike Schiewe</td>
<td>SWG Chair</td>
<td>Anchor QEA, LLC</td>
</tr>
<tr>
<td>Kristi Geris</td>
<td>Administration/Technical Support</td>
<td>Anchor QEA, LLC</td>
</tr>
<tr>
<td>Andrew Gingerich</td>
<td>SWG Technical Representative</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Shane Bickford</td>
<td>SWG Policy Representative</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Tom Kahler</td>
<td>Technical Support</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Chas Kyger</td>
<td>Technical Support</td>
<td>Douglas PUD</td>
</tr>
<tr>
<td>Steve Lewis</td>
<td>SWG Technical Representative</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>Jessi Gonzales</td>
<td>SWG Policy Representative</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>Doug Tangen</td>
<td>Observer</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>Patrick Verhey</td>
<td>SWG Technical Representative</td>
<td>Washington Department of Fish and Wildlife</td>
</tr>
<tr>
<td>Pat Irle†</td>
<td>SWG Technical Representative</td>
<td>Washington State Department of Ecology</td>
</tr>
<tr>
<td>Bao Le†</td>
<td>Technical Support</td>
<td>HDR Engineering, Inc.</td>
</tr>
</tbody>
</table>

**Notes:**

† Joined by phone
Subject: Aquatic SWG: 2013 Gas Abatement Plan

ASWG members,

Douglas County PUD’s 2013 GAP (Gas Abatement Plan) was distributed to the group on Dec 28th, 2012 for comments. This document has be submitted annually to Ecology in order to obtain an adjustment to the 110% TDG standards for the purposes of passing salmonids during the fish spill season. In addition, this year and in subsequent years this plan will be filed with FERC for approval.

The HCP Coordinating Committee, specifically the USFWS, and NMFS reps within the HCP, have provided feedback and approval of the 2013 GAP. The WA department of Ecology (Pat Irle) has provided comments directly to Douglas PUD on the 2013 GAP and comments were received through the Aquatic SWG during the January 2013 work group meeting (refer to meeting minutes). As such, the comment period is closed and Douglas PUD will file the final GAP with Ecology and FERC on, or prior to, the Feb 28th deadline.

Please contact Andrew directly if you have questions about this document (andrewg@dcpud.org 509-881-2323). Thanks all.

Kristi Geris
Scientist

ANCHOR QEA, LLC
kgeris@anchorqea.com
1060 Jadwin Avenue, Suite 275
Richland, WA 99352
T 509.392.4548 x104
C 360.220.3988

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Ms. Pat Irle
Hydropower Projects Manager
Washington State Department of Ecology
15 West Yakima Avenue, Suite 200
Yakima, WA 98802-3452

Subject: 2013 Total Dissolved Gas Abatement Plan – Wells Hydroelectric Project

Dear Pat:

Pursuant to section 6.7 a) of the Clean Water Act 401 Water Quality Certification (401 Certification) for the Wells Project, please find enclosed for your review and approval a copy of the 2013 Total Dissolved Gas Abatement Plan (GAP). A draft copy of the GAP was provided to the Aquatic Settlement Work Group (Aquatic SWG) and the Habitat Conservation Plan Coordinating Committee (HCP CC) on December 28, 2012. The only comments received on the GAP were provided by Ecology. Ecology’s suggested revisions, received on January 16, 2013, have been incorporated into the enclosed version of the GAP. If the enclosed version of the GAP satisfies your requirements, please send us written notification that Douglas PUD’s request for a seasonal fish passage exemption to the 110 percent total dissolved gas standard has been approved. Please note that license Article 401 (a) requires Douglas PUD to file the Ecology approved GAP with the Federal Energy Regulatory Commission (FERC) for approval by February 28th.

Pursuant to section 6.7 d) of the 401 Certification, please also find enclosed a copy of the HCP CC approved Juvenile Fish Bypass Operating Plan (BOP) for the Wells Project. A draft copy of the BOP was provided to Ecology and the Aquatic Settlement Work Group (Aquatic SWG) on December 28, 2012. No comments on the BOP were received by the comment deadline. Per the requirements of the Habitat Conservation Plan, the HCP CC approved the BOP on January 22, 2013. License Article 401 (a) requires that the HCP CC approved BOP be filed with the FERC for approval within one year of license issuance.

Section 6.7 d) of the 401 Certification further requires Douglas PUD to coordinate the development and review of the GAP and BOP with both the Aquatic SWG and the HCP CC toward the minimization of total dissolved gas during periods of spill. Douglas PUD submits that the annual GAP and BOP coordination requirements found within the 401 Certification and within Article 401 (a) of the FERC license have been met through the multi-workgroup collaborative review and approval process described above.
If you have any questions or require further information regarding the enclosed plans, please feel free to contact Andrew Gingerich at (509) 881-2323, andrewg@dcpud.org.

Sincerely,

Shane Bickford
Natural Resources Supervisor

Enclosure

(1): 2013 Total Dissolved Gas Abatement Plan – Wells Hydroelectric Project
(2): 2013 Juvenile Fish Bypass Operating Plan – Wells Hydroelectric Project

Cc: Mr. Charlie McKinney, Ecology
    Mr. Andrew Gingerich, Douglas PUD
    Mr. Chas Kyger, Douglas PUD
Intentionally Blank
February 12, 2013

Andrew Gingerich
Douglas County Public Utility District No. 1
1151 Valley Mall Parkway
East Wenatchee, WA 98802

Re: Wells Hydroelectric Project No. 2149
2013 TDG Gas Abatement Plan

Dear Andrew Gingerich:

The Washington State Department of Ecology approves the 2013 Gas Abatement Plan (GAP) for the Wells Hydropower project, submitted in accordance with WAC 173-201A-200(1)(f)(ii) and the Clean Water Act (CWA) 401 certification Section 6.7(2)(a). Approval of this GAP allows higher TDG levels that occur during spill for downstream fish passage during spring and summer of 2013.

In addition, it appears that the GAP and the Bypass Operating Plan are appropriately coordinated, in accordance with the 401 Certification, Section 6.7(2)(d).

Thank you for the quality of your products. If you have any questions, please feel free to call me at (509) 454-7864.

Sincerely,

Patricia S. Irle
Hydropower Projects Manager

By Certified Mail 7006 0100 0002 8191 2315
Appendix C - 2013 Bypass Operating Plan – Wells Project
Memorandum

TO:    Wells HCP Coordinating Committee
FROM:  Tom Kahler, Shane Bickford, Douglas PUD
DATE:  December 26, 2012
SUBJECT: Wells Dam 2013 Juvenile Fish Bypass Operating Plan

Anticipated Juvenile Migrants during the 2013 Juvenile Fish Bypass Period

The 2013 spring and summer outmigration of naturally produced juvenile HCP Plan Species at Wells Dam will consist of offspring of adults that spawned above Wells Dam during brood years (BY) 2011 and 2012 (Table 1). The spring migration will include juvenile spring Chinook, coho, sockeye, and steelhead, and summer/fall Chinook sub-yearlings will migrate during both spring and summer bypass operations.

Table 1. Ladder counts at Wells Dam of HCP Plan Species whose progeny are anticipated to migrate through the Wells Project during the 2013 bypass period. Juvenile steelhead migrate predominantly as yearlings from the Okanogan River and as age-2 and age-3 fish from the Methow River; thus, 2009, 2010, and 2011 steelhead adult counts are included (BY 2010, 2011, and 2012, respectively).

<table>
<thead>
<tr>
<th>Species</th>
<th>Adult Migration Year</th>
<th>Ladder Count</th>
<th>Juvenile Migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Chinook</td>
<td>2011</td>
<td>8,122</td>
<td>Spring</td>
</tr>
<tr>
<td>Summer/Fall Chinook</td>
<td>2012</td>
<td>46,835</td>
<td>Summer</td>
</tr>
<tr>
<td>Coho</td>
<td>2011</td>
<td>5,796</td>
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<tr>
<td>Sockeye</td>
<td>2011</td>
<td>111,508</td>
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<tr>
<td>Summer Steelhead</td>
<td>2009</td>
<td>25,422</td>
<td>Spring</td>
</tr>
<tr>
<td>Summer Steelhead</td>
<td>2010</td>
<td>12,929</td>
<td>Spring</td>
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<tr>
<td>Summer Steelhead</td>
<td>2011</td>
<td>12,069</td>
<td>Spring</td>
</tr>
</tbody>
</table>

Scheduled hatchery releases above Wells Dam in 2013 include yearling spring Chinook from the Methow Fish Hatchery (495,000) and the Winthrop National Fish Hatchery (WNFH; 375,000). The WNFH also will release approximately 300,000 coho. Summer Chinook yearlings will be released from the Carlton (420,000) and Similkameen (620,000) acclimation ponds. Hatchery steelhead scheduled for release above Wells Dam include approximately 150,000 fish to the Methow Basin and 100,000 to the Okanogan Basin from Wells Hatchery, and 114,000 to the Methow Basin from WNFH. In general, the hatchery yearling Chinook, coho and steelhead are
scheduled for release after April 15th with Winthrop coho and Wells steelhead scheduled for release after April 20th. By mid-May, all of the yearling Chinook and coho will have been released. The steelhead releases have historically continued into late May.

**2013 Juvenile Fish Bypass Operations**

Operation of the bypass system throughout the 2013 season will follow the criteria contained within the Wells Dam Juvenile Dam Passage Survival Plan (Wells Juvenile Bypass Plan) found in Section 4.3 of the Wells HCP. One of the main goals of the Wells Juvenile Bypass Plan is to provide bypass operations for at least 95% of both the spring and summer migration of juvenile plan species.

From 2004 through 2011, the timing of the implementation of bypass operations was based upon an analysis of 21 years of hydroacoustic and 14 years of species composition information collected on juvenile run patterns at Wells Dam. From the data available to the Wells HCP Coordinating Committee in February 2004, they agreed that initiation of the Wells bypass system on April 12th and termination on August 26th would conservatively provide bypass operations for more than 95% of both the spring and summer migrations of juvenile Plan Species.

In 2011, Columbia Basin Research performed an analysis using seven years of passage data obtained from daily sampling at the Juvenile Sampling Facility of the Rocky Reach Juvenile Fish Bypass System to more accurately estimate the contemporary percentage of the migration of spring and summer migrants that passed during bypass operations at Wells Dam. From that analysis, the Wells HCP Coordinating Committee adjusted the starting and ending dates for bypass operations at Wells Dam, moving the starting date three days earlier to April 9 to cover early-migrating natural origin spring Chinook, and moving the ending date seven days earlier to August 19 to more accurately reflect the contemporary passage timing of the sub-yearling Chinook outmigration. Thus, for 2012, bypass operations at Wells Dam commenced at 00:00 on April 9 and ended at 24:00 hours on August 19. For accounting purposes, the end of the 2012 spring bypass season was June 13th at 24:00 hours and the beginning of the summer bypass season was June 14th at 00:00 hours.

Upon completion of the 2012 bypass season, Columbia Basin Research updated the original analysis that supported the decision by the Wells Coordinating Committee to adjust the dates of bypass operations. The updated analysis determined that the adjusted dates of bypass operations at Wells Dam in 2012 provided bypass passage for 99.96 percent of yearling Chinook, 99.86 percent of steelhead, 100 percent of sockeye, and 99.30 percent of subyearling Chinook. Based upon this high level of compliance with the HCP bypass operating criteria (exceeding the 95% bypass-passage criteria for all species), Douglas PUD proposes to commence operation of the bypass system starting at 00:00 on April 9 and to end operations at 24:00 hours on August 19. For accounting purposes, the 2013 spring bypass season will end on June 13th at 24:00 hours and the summer bypass season will begin on June 14th at 00:00 hours.

Dam safety emergency action planning, as required by the Federal Energy Regulatory Commission (FERC), calls for Douglas PUD to operate Wells Dam with sufficient automatic-gate-opening capacity in the spillways to pass the flow from a plant load rejection of up to 200 thousand cubic feet per second (kcfs), in addition to any concurrent initial spillway discharge.
Of the 11 spillways at Wells Dam, only spillways 3 through 9 have automated gate hoists. Thus, the seasonal installation of bypass barriers in spillways 2, 4, 6, 8 and 10, substantially reduces the automatic-gate-opening capacity of Wells Dam by reducing the capacity of each bypass spillway to 8.6 kcfs. Consequently, Douglas PUD must remove bypass barriers systematically when discharge estimates exceed certain flow thresholds, as per Table 2, sufficient to provide the necessary automatic-gate-opening flow capacity as described in the FERC-required Emergency Action Plan for the Wells Project (EAP, Appendix I). Decisions to remove bypass barriers for dam safety considerations will be made each Monday (or at other times as necessary) during the bypass period and will be based on weekly forecasts of combined discharge from Chief Joseph Dam and side-flows from the Okanogan and Methow rivers (from the National Weather Service Northwest River Forecast Center [NWRFC]; http://www.nwrfc.noaa.gov/stp/stp.cgi).

Table 2. Schedule for removal of spillway flow-barriers (bypass barriers) to accommodate flood flows and load rejections.

<table>
<thead>
<tr>
<th>Inflow Forecast (kcfs)</th>
<th>Bypass Barriers Removed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 200</td>
<td>None</td>
</tr>
<tr>
<td>200 – 240</td>
<td>Spillway 6</td>
</tr>
<tr>
<td>240 – 275</td>
<td>Spillways 6, 8</td>
</tr>
<tr>
<td>275 – 310</td>
<td>Spillways 4, 6, 8</td>
</tr>
<tr>
<td>310 – 350</td>
<td>Spillways 4, 6, 8, 10, &amp; preset gates 10, 11 to spill excess of 312 kcfs</td>
</tr>
<tr>
<td>350 – 400</td>
<td>Spillways 4, 6, 8, 10, &amp; preset gates 1, 10, 11 to spill excess of 312 kcfs</td>
</tr>
<tr>
<td>400 – 450</td>
<td>All spillways (2, 4, 6, 8, 10)</td>
</tr>
</tbody>
</table>

Juvenile Fish Bypass Operations and Clean Water Act TDG Compliance

Seasonal bypass operations generally coincide with the spring freshet, an event during which operators of hydroelectric projects must cope with flows that often exceed the hydraulic capacity of their powerhouses. When flows exceed the hydraulic capacity of the generating units, water must be passed via the spillway in what is termed “involuntary spill.” Involuntary spill increases the concentration of atmospheric gases in the water below hydroelectric projects, and can result in excessive levels of total dissolved gas (TDG) that may injure fish. To minimize the potential for fish injury, the Washington Department of Ecology (WDOE) imposes TDG standards on operators of hydroelectric projects.

Extensive study of spill operations at Wells Dam and modeling exercises at the University of Iowa provide the basis for the development of annual spill “playbooks” for operations at Wells Dam aimed at achieving the WDOE standards for TDG in the Wells tailrace. From modeling and physical-spill studies over the past several years, Douglas PUD has determined that concentrating spill through the middle of the spillway and supporting that concentrated spill with turbine discharge results in the most effective minimization of TDG in the Wells tailrace. Specifically, the best TDG performance is achieved when concentrating involuntary spill through Spillway 5, and allocating additional spill, beyond the capacity of Spillway 5, to Bypass Bay 6 and then to Spillway 7, up to a maximum of 43 kcfs per spillway.

To accomplish this TDG-minimizing pattern of concentrated spill requires the removal of the bypass barriers from at least one spillway during periods with excessive involuntary spill. The removal of the bypass barriers from one bypass bay takes approximately eight hours and requires...
the use of a four-man mechanical crew and the powerhouse gantry cranes. To comply with the TDG standards below Wells, the bypass barriers must be removed from at least one spillway whenever involuntary spill exceeds 30 kcfs and one or both of the following conditions applies: 1) prolonged (> 8 hours) involuntary spill in excess of 40 kcfs is predicted (based on forecasted tributary inflows from the NWRFC and estimated discharge from Chief Joseph Dam provided by the US Army Corps of Engineers); or 2) total spill is predicted to exceed 53 kcfs, regardless of duration. Once involuntary spill of less than 40 kcfs, for a period of at least four days is predicted, the respective bypass barriers would be reinstalled. At river flows greater than 240 kcfs, bypass barriers would be removed from additional bypass bays as described above (see Table 2) and reinstalled sequentially as appropriate.

**Juvenile Fish Bypass Contingency Plan**

The failure of a gate-hoist cable in a bypass spillway at Wells Dam in late August 2010 provided the impetus for the development of a contingency plan for bypass operations during similar events that could occur in the future. Under the 2010 Juvenile Fish Bypass Contingency Plan (Bypass Contingency Plan), in the event of a failure of a bypass gate or other such accident or unanticipated mechanical failure that rendered impossible normal bypass operations, Douglas PUD’s initial response would follow the Wells Juvenile Bypass Plan, shutting down associated turbine units as prescribed in Section 4.3 of the Wells HCP. However, high river discharge in 2011 and 2012 highlighted the need to incorporate the consideration of TDG into the Bypass Contingency Plan, and we have modified the plan accordingly.

During periods of high river discharge, mid-Columbia hydroprojects maximize powerhouse discharge to minimize spill and associated increases in TDG. Shutting down a turbine at Wells Dam when all other turbines are loaded would increase spill by 20 kcfs, which would also increase TDG. However, losing function of one bypass unit at Wells Dam affects two turbine units; thus, shutting down both turbine units associated with the malfunctioning bypass spillway would increase spill by 40 kcfs. Therefore, Douglas PUD has modified the Bypass Contingency Plan to avert unnecessary increases in TDG from shutting turbine-units due to a mechanical failure of the bypass system.

Section 4.3 of the Wells HCP directs Douglas PUD to shut down the turbine units adjacent to the bypass spillway that is not operating due to either a lack of water or an inability to operate the bypass spillway. Under the 2010 Bypass Contingency Plan, the associated turbine units would have remained inactive until personnel at Wells Dam could determine the cause of the bypass failure and the nature of and time required for the necessary repair. Under the new Bypass Contingency Plan, if shutting down the turbines would not threaten compliance with TDG standards, Douglas PUD would shut down the associated turbine units. However, if doing so would threaten compliance with TDG standards, Douglas PUD would not shut down the associated turbines but would instead direct spill through spillways adjacent to the affected turbine units in a manner that provides bulk flow for fish passage while minimizing TDG (Figure 1, Option 1). Douglas PUD would consult the Spill Playbook (see above) to select such spill configurations, and would spill at least 10 kcfs through selected spillways to engage the submerged flip-lip as a TDG minimization measure and to provide bulk flow for fish attraction to the surface passage route. In circumstances where turbine shutdown would not jeopardize TDG compliance, Douglas PUD would shut down the associated turbine units to evaluate and
repair the malfunction, but may then elect to move the bypass barriers from the inoperable bypass spillway to an adjacent, non-bypass spillway to obtain the use of an additional turbine unit (see Figure 1, options 2 and 3). The gate for that substitute bypass spillway would then be set at the standard 1-foot opening for bypass spillways and the adjacent turbine unit could be operated without constraints. This configuration would meet the intent of HCP Section 4.3 by providing bypass spill immediately adjacent to every operating turbine unit and would comply with the goal of the Total Dissolved Gas Abatement Plan.

During the repair of a bypass malfunction, Douglas PUD would daily reevaluate forecasts of Chief Joseph Dam discharge, tributary inflows, and TDG conditions, as well as repair progress, and determine which bypass option to implement.

**Figure 1.** Evaluation flow chart for daily decisions regarding bypass, spill, and turbine operations during a bypass malfunction.
Appendix D – Pre-filing consultation record for the 2013 Bypass Operating Plan
Hi HCP-CC: please see the email below from Tom and the attached Douglas PUD draft 2013 Bypass Operating Plan Memo for discussion, and perhaps approval, at the Coordinating Committees January 22, 2013 meeting.

Hope your holidays are going well!
Kristi ☺

Hi Kristi,

I hope your Christmas isn’t over. My recycle bin hopes mine is.

As promised (though a week late), attached is the draft of our 2013 bypass operations report for the CC. Because we now have a FERC-review step with a deadline, I’m hoping for a CC decision on this at the January meeting. Please pass this on to the CC for their review in preparation for a discussion and (we hope) a decision at the January meeting. I’ll send out our Gas (TDG) Abatement Plan later this week or next in case the CC has any questions regarding the relationship between the two documents (no one panic—the GAP isn’t a review document for the CC!).

Helpful hint—don’t burn all that wrapping paper at the same time!

Thanks,
Tom
Hi Aquatic SWG: please see the email below from Andrew and the attached proposed 2013 Wells Dam Gas Abatement Plan and 2013 Bypass Operating Plan.

Thanks!
Kristi 😊

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com

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From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Friday, December 28, 2012 4:07 PM
To: Kristi Geris
Cc: Mike Schiewe; Shane Bickford; Chas Kyger; Tom Kahler
Subject: 2013 Wells Dam GAP 12-28-2012 clean

Kristi,

Attached is the proposed 2013 Wells Dam Gas Abatement Plan. For some years now Douglas PUD has worked in collaboration with the Department of Ecology to obtain an adjustment to the 110% TDG water quality criteria during the fish spill season. The adjustment allows for higher TDG values in order to provide fish with higher bypass efficiency via spill routes past virtually all main-stem Columbia and Snake River Projects. In summary, although this may appear to be a new process to some, we go through this process every year in preparation for the upcoming spill season.

This year we will, as always Douglas PUD will work with the WA Dept. of Ecology to obtain the TDG standard adjustment for out-migrating smolts, but also we are sharing it with the ASWG and the HCP Coordinating Committee to provide an opportunity to comment. The Gas Abatement Plan fits within the context Bypass Operating Plan that is prepared with the HCP-CC every year as well. As such, I have also attached the HCP bypass plan for 2013 to provide additional context related to Wells Dam fish spill and project operations in the spring/summer.

Aquatic SWG members will find that we have put these documents on the agenda for the Jan 9th ASWG meeting, but of course if people have specific questions prior to the meeting I would encourage them to ask away. In the meantime
please distribute this message and the document to the ASWG and the HCP CC. As is typical with our vetting process comments are welcome.

Thanks!
Andrew
509-881-2323
MEMORANDUM

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

From: Michael Schiewe, Chair

Cc: Kristi Geris

Re: Action Items and Agreement Summary from January 22, 2013, HCP-CC Meeting

This memorandum provides a summary of Action Items, decisions, and documents out for review as agreed on at the Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCP) Coordinating Committees (CC) meeting that met at the Radisson Hotel in SeaTac, Washington on Tuesday, January 22, 2013, from 9:30 am to 1:00 pm. These action items include the following:

ACTION ITEM SUMMARY

- Tom Kahler will send Kristi Geris the Douglas PUD Final 2013 HCP Action Plan for distribution to the Coordinating Committees (Item II-A).
- Bryan Nordlund will send Shane Bickford a letter or email documenting National Marine Fisheries Service (NMFS) approval of the Douglas PUD Final 2013 Bypass Operations Plan, no later than Friday, February 1, 2013 (Item II-B).
- Jim Craig will send Shane Bickford a letter or email documenting United States Fish and Wildlife Service (USFWS) approval of the Douglas PUD Final 2013 Bypass Operations Plan, no later than Friday, February 1, 2013 (Item II-B).
- Bryan Nordlund will review the Douglas PUD Draft 2013 Gas Abatement Plan, and upon approval, will send Shane Bickford a letter or email documenting NMFS approval of the plan, no later than Friday, February 1, 2013 (Item II-C).
- Jim Craig will review the Douglas PUD Draft 2013 Gas Abatement Plan, and upon approval, will send Shane Bickford a letter or email documenting USFWS approval of the plan, no later than Friday, February 1, 2013 (Item II-C).
- Coordinating Committees representatives will review the Douglas PUD Draft 2013 Gas Abatement Plan and provide comments to Tom Kahler and Kristi Geris no later than Friday, February 1, 2013 (Item II-C).
- Coordinating Committees representatives will review the Douglas PUD Draft 2013 10-year No Net Impact (NNI) Comprehensive Check-in Report and provide comments to Tom Kahler no later than Monday, February 11, 2013 (Item II-D).

- Coordinating Committees representatives will review the Douglas PUD Draft 2012 Wells Post-Season Bypass Report and provide comments to Tom Kahler no later than Friday, February 15, 2013 (Item II-E).

- Steve Hemstrom will add information on juvenile survival estimates (dates tested and results) to the Statement of Agreement (SOA) to Re-approve Phase III Standards Achieved for Combined Adult and Juvenile Survival at Rocky Reach and Rock Island, and will provide the revised SOA to Kristi Geris for distribution to the Coordinating Committees (Item IV-C).

- Chelan PUD will incorporate the latest revisions to the Chelan PUD Draft 2013 NNI Report and redistribute the revised report to the Coordinating Committees; the report will be considered for approval at the Coordinating Committees February 26, 2013 meeting (Item IV-D).

- Chelan PUD and Douglas PUD will explore options for developing a shared HCP filing system and will report back to the Coordinating Committees for further discussion (Item VI-A).

**DECISION SUMMARY**

- No SOAs were approved at this meeting.

**AGREEMENTS**

- Coordinating Committees representatives present approved the Douglas PUD 2013 HCP Action Plan, as revised (Item II-A).

- **Coordinating Committees representatives present approved the Douglas PUD 2013 Bypass Operations Plan (Item II-B).**

- Coordinating Committees representatives present agreed to include in the Douglas PUD Draft 2013 10-year NNI Comprehensive Check-in Report the Executive Summary of the Fish and Water Management Tool (FWMT) Report from Dr. Kim Hyatt, Department of Fisheries and Oceans Canada (DFO) in lieu of the full report, with the expectation that the full report will be appended when available about August 2013 (Item II-D).
Coordinating Committees representatives present approved the Rocky Reach Juvenile Bypass Final Operating Plan for April 2013 (Item IV-A).

REVIEW ITEMS

- The Douglas PUD Draft 2013 Gas Abatement Plan is available for review, with comments due to Tom Kahler and Kristi Geris no later than Friday, February 1, 2013.
- Kristi Geris sent an email to the Coordinating Committees on December 11, 2012, notifying them that the Douglas PUD Sub-yearling Report is available for a 60-day review period, with comments due to Tom Kahler and Andrew Gingerich no later than Monday, February 11, 2013.
- Kristi Geris sent an email to the Coordinating Committees on December 27, 2012, notifying them that the Douglas PUD Draft 2013 10-year NNI Comprehensive Check-in Report is available for review. Comments are due to Tom Kahler no later than Monday, February 11, 2013.
- Kristi Geris sent an email to the Coordinating Committees on January 17, 2013, notifying them that the Douglas PUD Draft 2012 Wells Post-Season Bypass Report is available for a 30-day review period, with comments due to Tom Kahler no later than Friday, February 15, 2013.

REPORTS FINALIZED

- There are no reports that have been recently finalized.
Shane Bickford  
Natural Resources Supervisor  
Public Utility District No. 1 of Douglas County  
1151 Valley Mall Parkway  
East Wenatchee, Washington 98802-4497  

Dear Mr. Bickford,  

In December 2012 Douglas PUD submitted to the HCP Coordinating Committees coordinated plans for juvenile fish bypass operations and total dissolved gas abatement at the Wells Hydroelectric Project in 2013. I, as the U.S. Fish and Wildlife Service representative, reviewed those plans and along with the other agency and tribal Coordinating Committee representatives approved those plans. Specifically, the plans approved were: Total Dissolved Gas Abatement Plan, submitted for Coordinating Committee review on 28 December 2012, and the Wells Dam 2013 Juvenile Fish Bypass Operating Plan submitted for Coordinating Committee review on 26 December 2012.  

I hope this letter assists Douglas PUD with their FERC submission. Feel free to contact me if you need anything further.  

Sincerely,  

Jim L Craig  
Project Leader
Intentionally Blank
Andrew Gingerich

Mary and Andrew,

NMFS approval of the BOP and GAP can be found in the e-mail below. Please add this to the agency approval correspondence.

Thanks,

Shane

From: Bryan Nordlund - NOAA Federal [mailto:bryan.nordlund@noaa.gov]
Sent: Monday, January 28, 2013 10:23 AM
To: Shane Bickford
Cc: Tom Kahler
Subject: 2013 Wells Dam operations

Shane - After distribution of draft documents, at the December 2012 meeting of the Wells HCP Coordinating Committee, Douglas PUD presented the Total Dissolved Gas Abatement Plan and the 2013 Juvenile Fish Bypass Operating Plan for Wells Dam, followed by Committee discussion.

I have completed my review of these plans and find them consistent with NMFS expectations for Wells Dam operations in 2013. As such, please consider this email to construe NMFS approval of these plans.

Bryan Nordlund

--
Bryan Nordlund, P.E.
360-534-9338
National Marine Fisheries Service
510 Desmond Drive, Suite 103
Lacey, WA 98503
February 12, 2013

Andrew Gingerich  
Douglas County Public Utility District No. 1  
1151 Valley Mall Parkway  
East Wenatchee, WA 98802  

Re: Wells Hydroelectric Project No. 2149  
2013 TDG Gas Abatement Plan

Dear Andrew Gingerich:

The Washington State Department of Ecology approves the 2013 Gas Abatement Plan (GAP) for the Wells Hydropower project, submitted in accordance with WAC 173-201A-200(1)(f)(ii) and the Clean Water Act (CWA) 401 certification Section 6.7(2)(a). Approval of this GAP allows higher TDG levels that occur during spill for downstream fish passage during spring and summer of 2013.

In addition, it appears that the GAP and the Bypass Operating Plan are appropriately coordinated, in accordance with the 401 Certification, Section 6.7(2)(d).

Thank you for the quality of your products. If you have any questions, please feel free to call me at (509) 454-7864.

Sincerely,

Patricia S. Irle  
Hydropower Projects Manager

By Certified Mail 7006 0100 0002 8191 2315
APPENDIX K
2013 QUALITY ASSURANCE PROJECT PLAN FOR WATER TEMPERATURE AND TOTAL DISSOLVED GAS MONITORING
Via Electronic Filing

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 1st Street N.E.
Washington, D.C. 20426

June 21, 2013

Subject: Wells Hydroelectric Project – FERC Project No. 2149
Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas – License Article 401 (a)

Dear Secretary Bose:

Public Utility District No. 1 of Douglas County, Washington (Douglas PUD), licensee for the Wells Hydroelectric Project No. 2149, respectfully submits for approval the Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas (QAPP) for the Wells Project.

Article 401(a) of the license requires Douglas PUD to file all QAPPs with the FERC for approval. The final QAPP for water temperature and total dissolved gas (TDG) monitoring is attached as Appendix A to this letter and was reviewed and approved by all of the parties to the Aquatic Settlement Agreement (ASA) including Ecology, the National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), U.S. Bureau of Land Management (BLM), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (CCT) and the Confederated Tribes and the Bands of the Yakama Nation (YN). The Bureau of Indian Affairs (BIA) was also provided an opportunity to review and comment on the QAPP during the ASA comment period. The BIA is currently a non-voting observer within the ASA process.

The enclosed QAPP is consistent with (1) Article 401(a) of the license issued by the FERC; (2) the Water Quality Management Plan that is contained within the ASA and Condition 6.7(7)(a) of Ecology’s Clean Water Act section 401 Water Quality Certification (401 Certification) and (3) the NMFS Endangered Species Act Incidental Take Statement (ITS) Reasonable and Prudent Measure No. 2 for the Wells Project. The pre-filing consultation record supporting the review and approval of the QAPP is attached as Appendix B to this letter.
If you have any questions or require further information regarding the enclosed QAPP or the consultation record supporting the approval and coordination of these plans, please feel free to contact Andrew Gingerich at (509) 881-2323, andrewg@dcpud.org.

Sincerely,

Shane Bickford
Natural Resources Supervisor

Enclosure: 1) Appendix A – Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas for the Wells Hydroelectric Project
2) Appendix B – Pre-filing consultation record for the Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas

Cc: Mr. Douglas Johnson – FERC, Portland
Mr. Erich Gaedeke – FERC, Portland
Wells Aquatic Settlement Work Group
Mr. Andrew Gingerich – Douglas PUD
APPENDIX A

QUALITY ASSURANCE PROJECT PLAN FOR WATER TEMPERATURE AND TOTAL DISSOVED GAS FOR THE WELLS HYDROELECTRIC PROJECT
QUALITY ASSURANCE PROJECT PLAN FOR WATER TEMPERATURE AND TOTAL DISSOLVED GAS

WELLS HYDROELECTRIC PROJECT

FERC NO. 2149

February 2013

Prepared by:
Andrew Gingerich
Public Utility District No. 1 of Douglas County
East Wenatchee, WA

Prepared for:
Washington Department of Ecology
Yakama, WA
For copies of this plan, contact:

Public Utility District No. 1 of Douglas County
Attention: Natural Resources
1151 Valley Mall Parkway
East Wenatchee, WA 98802-4497
Phone: (509) 884-7191
E-Mail: andrewg@dcpud.org
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TERMS AND ABBREVIATIONS

401 Certification
Wells Dam 401 Certification issued by the Washington Department of Ecology as part of the Federal Power Act requirement

7-DADMax
7-day average of the daily maximum temperatures

7Q-10 Flow
highest calculated flow of a running seven consecutive day average, using the daily average flows that may be seen in a 10-year period

12C-High
average of the 12 highest consecutive hourly readings in any 24-hour period

ASA
Aquatic Settlement Agreement

Aquatic SWG
Aquatic Settlement Work Group

BP
barometric pressure

cfs
cubic feet per second

CROHmS
Columbia River Operational Hydromet System

CWA
Clean Water Act

DART
Data Access in Real Time

DO
dissolved oxygen

Douglas PUD
Public Utility District No. 1 of Douglas County

DQO
decision quality objectives

Ecology
Washington State Department of Ecology

EPA
Environmental Protection Agency

FERC
Federal Energy Regulatory Commission

FSU
field services unit

GAP
Gas Abatement Plan

GBT
gas bubble trauma

HCP
Wells Anadromous Fish Agreement and Habitat Conservation Plan

kcfs
thousand cubic feet per second

mg/L
milligrams per liter

mmHg
millimeters of mercury

MSL
mean sea level

MQO
measurement quality objectives

MS
Microsoft

MW
megawatt

N/A
not applicable

NEMA
National Electrical Manufacturers Association

NIST
National Institute of Standards and Technology

NMFS
National Marine Fisheries Service

Project
Wells Hydroelectric Project

QA
quality assurance

QA/QC
quality assurance/quality control

QAPP
Quality Assurance Project Plan

QC
quality control
RM  river mile
TDG  total dissolved gas
TMDL total maximum daily load
USACE U.S. Army Corps of Engineers
USFWS U.S. Fish and Wildlife Service
USGS U.S. Geological Survey
WAC  Washington Administrative Code
WDFW Washington Department of Fish and Wildlife
WDOE Washington Department of Ecology
WQMP Water Quality Management Plan
WQS  Water Quality Standards
EXECUTIVE SUMMARY

The Wells Hydroelectric Project (Wells Project) 401 Water Quality Certification (401 Certification) issued by the Washington Department of Ecology (Ecology) requires that Public Utility District No. 1 of Douglas County (Douglas PUD) develop a Quality Assurance Project Plan (QAPP) to support the implementation of a water quality monitoring program (for temperature and TDG). This QAPP describes a systematic approach for collecting high quality and reliable data that may be used to determine compliance of these parameters with the State of Washington’s Water Quality Standards (WQS) for the Wells Project. Information provided in this QAPP includes the following:

1. Background
2. Project Description
3. Organization and Schedule
4. Quality Objectives
5. Sampling Process Design (Experimental Design)
6. Measurement Procedures
7. Quality Control
8. Data Management Procedures
9. Audits and Reports
10. References

Adaptive management, as defined by the Aquatic Settlement Agreement (ASA), will be employed when updating this QAPP. Any required updates will be vetted with those parties as required by the 401 Certification and the FERC License.
1.0 BACKGROUND

1.1 Relicensing and 401 Certification

As part of the relicensing process for the Wells Hydroelectric Project (Wells Project or Project), Public Utility District No. 1 of Douglas County (Douglas PUD) obtained a 401 Water Quality Certification (401 Certification) from the Washington Department of Ecology (Ecology). On September 30, 2010, Douglas PUD submitted to Ecology an application for a 401 Certification pursuant to the provisions of 33 USC §1341 (§401 of the Clean Water Act). On September 12, 2011, Douglas PUD withdrew its request and reapplied. On February 27, 2012, Ecology concluded that the Wells Project, as conditioned by its 401 Certification/Order No. 8981, complied with all applicable provisions of 33 USC 1311, 1312, 1313, 1316, 1317 and appropriate requirements of Washington State law.

According to the Wells Project 401 Certification section 7(a), Douglas PUD is required to prepare a Quality Assurance Project Plan (QAPP) for water quality measures:

i) Douglas PUD shall prepare study plans that include a quality assurance project plan (QAPP) for each water quality parameter to be monitored in each plan. The QAPPs shall follow the Guidelines for Preparing Quality Assurance Plans for Environmental Studies (July 2004 Ecology Publication Number 04-03-030) or its successor. The QAPPs shall contain, at a minimum, a list of parameter(s) to be monitored, a map of sampling locations, and descriptions of the purpose of the monitoring, sampling frequency, sampling procedures and equipment, analytical methods, quality control procedures, data handling and data assessment procedures and reporting protocols.

ii) Douglas PUD shall review and update the QAPPs annually based on a yearly review of data and data quality. Ecology may also require future revisions to the QAPP based on monitoring results, regulatory changes, changes in Project operations, and/or the requirements of TMDLs. The initial QAPPs and any changes shall be submitted to the ASWG for review and are subject to approval by Ecology. Implementation of the monitoring program shall begin upon Ecology's written approval of the QAPP, unless otherwise provided by Ecology.

On November 9, 2012 the Federal Energy Regulatory Commission (FERC) issued a new operating license for the Wells Project. All 401 Certification requirements were adopted in the License Order, including those pertaining to the QAPP (License Article 401(a)).
1.2 Total Dissolved Gas Regulatory Framework

Washington Administrative Code (WAC) Chapter 173-201A defines standards for the surface waters of Washington State. Section 200(1)(f) defines the water quality standards (WQS) for total dissolved gas (TDG), and subsection (ii) defines the TDG criteria adjustment for fish passage (Ecology 2011).

Under the WQS, TDG shall not exceed 110 percent at any point of measurement in any state water body. However, the standards exempt dam operators from this TDG standard when the river flow exceeds the highest calculated flow of a running seven consecutive day average, using the daily average flows that may be seen in a 10-year period (7Q-10 flow). The 7Q-10 total river flow for the Wells Project was computed using the hydrologic record from 1974 through 1998, coupled with a statistical analysis utilizing data from 1930 through 1998. These methods are consistent with the United States Geological Survey (USGS) Bulletin 17B, “Guidelines for Determining Flood Flow Frequency” and determined that the 7Q-10 flow value at Wells Dam is 246,000 cubic feet per second (cfs; Lombard and Kirchmer 2004).

In addition to allowances for natural flood flows, Ecology may approve, on a per application basis, an interim adjustment to the TDG standard (110 percent) to allow spill for juvenile fish passage past dams on the Columbia and Snake rivers. Such an adjustment requires the development of an Ecology-approved Gas Abatement Plan (GAP). This plan must be accompanied by fisheries management and physical and biological monitoring plans and is required annually or as otherwise determined by Ecology. The increased levels of spill resulting in elevated TDG levels are authorized by Ecology to allow salmonid smolts a non-turbine downstream passage route that is less harmful to fish populations than turbine fish passage. This TDG adjustment provided by Ecology is based on a risk analysis study conducted by the National Marine Fisheries Service (NMFS; NMFS 2000). Ecology-approved fish-passage adjustments comprise three separate standards to be met by dam operators:

1) TDG shall not exceed 125 percent in any one-hour period in the tailrace of a dam;
2) TDG shall not exceed 120 percent in the tailrace of a dam; and
3) TDG shall not exceed 115 percent in the forebay of the next dam downstream.

Compliance criteria 2 and 3 are measured as an average of the 12 highest consecutive hourly readings in any 24-hour period (12C-High).

A significant portion of the Wells Reservoir occupies lands within the boundaries of the Colville Reservation. Wells Project operations do not affect TDG levels in tribal waters, where the Colville Tribes’ TDG standard is a maximum of 110 percent, year-round, at all locations. This TDG standard is also the U.S. Environmental Protection Agency’s (EPA) standard for all tribal waters on the Columbia River, from the Canadian border to the Snake River confluence. TDG levels on the Colville Reservation portion of the mainstem Columbia River within Wells Reservoir are determined by the operations of upstream federal dams but in particular, the U.S. Army Corps of Engineer’s (USACE) Chief Joseph Dam (located approximately 30 miles upstream of Wells Dam) and the U.S. Bureau of Reclamation’s Grand Coulee Dam (located approximately 51 miles upstream of Chief Joseph Dam).
### 1.2.1 Fish Spill and Non-Fish Spill Season

Although not defined in state regulations, the fish spill season at Wells Dam is determined by the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) Coordinating Committee and is intended to aid downstream juvenile salmonid fish passage via Wells Dam spill as an alternative to passage through the turbines. The fish spill season is generally early April to late August, but may vary from year to year. Each year during the fish spill season, Douglas PUD operates the Wells Project in accordance with an Ecology-approved GAP. During the fish spill season, Douglas PUD will make every effort not to exceed 125 percent in any one-hour period or a 12C-High of 120 percent as measured in the Wells Project tailrace and a 12C-High of 115 percent as measured in the forebay of the next downstream dam (Rocky Reach). Nothing in these special conditions allows an impact to existing and characteristic uses.

During non-fish spill (i.e., approximately September through March), the Wells Project is subject to the 110 percent TDG WQS. Douglas PUD will make every effort to remain in compliance with the 110 percent standard.

Douglas PUD will report Wells Project TDG monitoring data for both the spill and non-fish spill season from the previous year by February 28th of every year in an annual TDG report (previously called a GAP report). This report will be reviewed and approved by Ecology and the Aquatic Settlement Work Group (Aquatic SWG). The final report will be filed annually with the FERC by the February 28th deadline. The report will also be filed with the NMFS as required in the terms and conditions contained within their 2012 Wells Project Biological Opinion (BO).

### 1.3 Water Temperature Regulatory Framework

Under the WQS Chapter 173-201A-602 of the WAC, Ecology designates the section of the Columbia River within the Wells Project as a “salmonid spawning, rearing, and migration” water body and therefore, requires that water temperature must remain below 17.5°C, as measured by the 7-day average of the daily maximum temperatures (7-DADMax). When a water body's temperature is warmer than the criteria (or within 0.3°C of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C. In addition, the standard for the lower Okanogan and Methow rivers (both have lower reaches of the river within the Wells Project) is identical to the Columbia River temperature criteria, except that in the Methow River, the criterion is 13°C from October 1 to June 15 to support spawning and incubation protection for native char, salmon and trout (Ecology 2006). Portions of the Columbia River within the Wells Project boundary are currently classified as impaired for temperature under Section 303(d) of the Clean Water Act. A Total Maximum Daily Load (TMDL) for temperature is expected to be developed by EPA in the future that will establish a load allocation for all of the Columbia River dams including the Wells Project.

Douglas PUD will report Wells Project water temperature monitoring data by April 30th of every year (for prior year’s monitoring activities). This report will be reviewed and approved by Ecology and the Aquatic SWG. The final report will be filed annually with the FERC by the April 30th deadline.
2.0 PROJECT DESCRIPTION

2.1 Purpose and Objectives

The purpose of this QAPP is to outline the methods of collecting water temperature and TDG data within the Wells Project. This QAPP is designed to attain data of the type and quality necessary to inform future decisions; in this case, the data will be used to evaluate temperature and TDG compliance of the Wells Project with the state WQS and whether additional measures may be necessary to achieve compliance.

Specific objectives of this QAPP include:

1. Documenting year-round physical values for TDG and seasonal values of temperature in the Wells Project in a systematic, reliable, and robust manner.
2. Making the data publically available via a license implementation webpage.
3. Managing a complete and expanding dataset.
4. Using monitoring data to support the development of plans and reports (e.g., GAP, TDG Report, Water Temperature Report, Aquatic SWG Report, the Wells Project Water Quality Attainment Plan [WQAP], etc.).
5. Using adaptive management, as defined in the Aquatic Settlement Agreement (ASA), to strengthen the quality and reliability of the data collected and to support the goals and objectives of the water quality monitoring program.

2.2 Wells Hydroelectric Project

The Wells Project is located at river mile (RM) 515.8 on the Columbia River in the State of Washington. Wells Dam is located approximately 30 river miles downstream from the Chief Joseph Dam, owned and operated by the USACE, and 42 miles upstream from the Rocky Reach Dam, owned and operated by Public Utility District No. 1 of Chelan County. The nearest town is Pateros, Washington, which is located approximately 8 miles upstream from the Wells Dam.

The Wells Project is the chief generating resource for Douglas PUD. It includes ten generating units with a nameplate rating of 774.3 MW and a peaking capacity of approximately 840 MW. The design of the Wells Project is unique in that the generating units, spillways, switchyard, and fish passage facilities were combined into a single structure referred to as the hydrocombine. Fish passage facilities reside on both sides the hydrocombine, which is 1,130 feet long, 168 feet wide, with a crest elevation of 795 feet in height. The juvenile fish bypass (JBS) system was developed by Douglas PUD and uses a barrier system to modify the intake velocities on all even numbered spillways (2, 4, 6, 8 and 10).

The Wells Reservoir is approximately 30 miles long. The Methow and Okanogan rivers are tributaries of the Columbia River within the Wells Reservoir. The Wells Project boundary extends approximately 1.5 miles up the Methow River and approximately 15.5 miles up the Okanogan River. The normal maximum surface area of the reservoir is 9,740 acres with a gross storage capacity of 331,200 acre-feet and usable storage of 97,985 acre-feet at elevation of 781 feet above mean sea level (msl). The normal maximum water surface elevation of the reservoir is 781 feet (Figure 1).
Figure 1. Location Map of the Wells Project.
2.3 TDG and Water Temperature Evaluations at Wells Dam

2.3.1 TDG

TDG levels associated with the operation of the Wells Project have occasionally been measured above the numeric criteria and are more likely to occur during April through August as a result of high flows, high TDG levels entering the Project from the operations of upstream projects, unit outages, or a combination of the above. Similar to other Columbia River hydroelectric facilities, probabilities for TDG exceedances are highest during late spring periods of high flow and low electrical demand, coupled with the Project’s run-of-the-river nature and relatively limited storage capacity.

During the relicensing of the Wells Project, three studies were performed to evaluate the ability of the Project to meet the TDG numeric criteria. The first two were field studies where physical TDG data was collected above and below Wells Dam under different operational scenarios (Columbia Basin Environmental 2006, EES Consulting Inc. et al. 2007) and the third study was the development of an unsteady-state three-dimensional two-phase numerical model (Politano et al. 2009). The model was developed to observe the predicted movement of water through the Project and how gas bubbles interacted with Project flows to produce TDG under various operating scenarios. Model results allowed Douglas PUD to identify specific Project operations that produce less TDG in both the near and far field under different flow conditions. According to the model output, concentrated spill operations of sufficient flows coupled with the appropriate configuration of unit generation (i.e., below operating spillways) across the Project reduced TDG production and increased the degasification of Project outflows at the free surface (i.e., reduced plunging spillway flows and air entrainment). Notably, reduced load, especially when flows are at or near 246 thousand cubic feet per second (kcfs), reduces TDG performance at Wells since spill over generation at Wells Dam enhances the surface jet of spilled water thereby maximizing air water interaction and increasing degasification. The model was tested using an available 9 out of 10 units and each unit passing 20 kcfs. Under these conditions Wells Dam was able to meet WAC WQS standard for TDG when incoming water from upstream was in compliance.

Based upon the modeling results, Douglas PUD developed a “Playbook” identifying a specific Project operational work flow process using a combination of spill gate and generating unit settings that would minimize TDG production and thereby meet TDG numeric criteria. Each year, the Playbook is updated, as needed, based upon the Project’s TDG performance in the preceding year. An updated Playbook is included as part of the annual GAP filing in support of the Ecology-approved fish-passage adjustments for TDG at the Wells Project.

In 2011 and 2012, Columbia River flows at Wells Dam were the fourth- and third-highest, respectively, on record during the months of April through August. During the month of July 2012, Wells Dam received almost twice as much water than the monthly average since the Project was commissioned in the late 1960’s. In addition, the total rebuild of unit 7 reduced the plant capacity at Wells Dam for both of these years by more than 20 kcfs. Despite these unusual factors, Wells Dam showed high compliance with all three TDG adjustment criteria when flows were below the 7Q-10 value (246 kcfs).
### 2.3.2 Water Temperature

#### 2.3.2.1 Reservoir and tributaries

The 7-DADMax temperature data recorded since 2001 indicate that the portion of the Columbia River upstream of and within the Project generally warms to above 17.5°C (see WQS numeric criteria) in mid-July and drops below the numeric criterion by early October. Temperatures in the Methow River upstream of the Project warm to above 17.5°C in mid-July and drop below the numeric criteria by September, while trends in the Okanogan River upstream of the Project indicate warming above 17.5°C from early June with cooling by late September.

To assess compliance with the state WQS for temperature (during the Wells Project FERC relicensing process), two 2-dimensional laterally-averaged temperature models (using CEQUAL-W2) were developed that represented existing (or “with Project”) conditions and “without Project” conditions of the Wells Project, including the Columbia River from the Chief Joseph Dam tailrace to Wells Dam, the lowest 15.5 miles of the Okanogan River, and the lowest 1.5 miles of the Methow River. The results were processed to develop daily values of the 7-DADMax, and then compared for the two conditions.

The model analyses demonstrated that “with Project” temperatures in the Columbia, Okanogan and Methow rivers do not increase more than 0.3°C compared to ambient (“without Project”) conditions anywhere in the reservoir, and that the Project complies with the state WQS for temperature (West Consultants Inc. 2008). However, a full evaluation of potential temperature impacts of hydroelectric power generation on the Columbia River will most likely require analysis of hydraulic and temperature conditions on a system-wide basis. Hydraulic and temperature influences from upstream dams complicate the evaluation of Project-related impacts. The only way to properly understand these impacts is to examine the river water temperatures more comprehensively through a system-wide TMDL study such as that which is under consideration for development by EPA. Currently, Douglas PUD is participating in the Sovereign Technical Team Water Quality Workgroup which is developing a temperature model that will inform Columbia River Treaty negotiations with the Canadian Government.

#### 2.3.2.2 Fish Ladders

According to the HCP BO issued by NMFS, all entities that use the fish trapping facilities at Wells Dam are required to monitor the ladders every two hours May 1 to November 15 and discontinue trapping operations when fish ladder water temperatures exceed 68.0°F (20.6°C). In 2001 and 2003, Douglas PUD added supplemental temperature recording equipment at Pool 39 near the broodstock collection facilities in the east fishway at Wells Dam to ensure compliance with requirements in the NMFS HCP BO. In 2001, hourly data indicated that water temperatures at this location in the east fish ladder did not exceed 68.0°F (20.6°C) at any time during the monitoring period, which ran from late July to early December. In 2003, data were recorded every two hours and exceedances of greater than 68.0°F (20.6°C) were observed on only three hourly occasions.
3.0 ORGANIZATION AND SCHEDULE

3.1.1 Personnel

This water quality monitoring project is to be conducted primarily by Douglas PUD personnel and experienced contractors hired by Douglas PUD. All personnel conducting work have experience working with or collecting water quality data in addition to having a background in aquatic ecology. Douglas PUD will provide implementation and contractor oversight of equipment installation, data collection and report writing. Regulatory oversight and approval of the QAPP will be provided by Ecology. The Aquatic SWG members will provide peer review on the study design and any reports. Key personnel include:

**Andrew Gingerich**, Douglas PUD. Oversees the implementation of all water quality measures found within the 401 Certification, Wells Project License Order and Water Quality Management Plan (WQMP) contained within the ASA.

**Chas Kyger**, Douglas PUD. Serves as an alternate technical lead for water quality resources. Also provides contractor oversight, report development and technical editing support.

**Shane Bickford**, Douglas PUD. Natural Resources Supervisor responsible for the implementation of all aquatic and terrestrial resource measures.

**Beau Patterson**, Douglas PUD. Provides land use oversight and serves as Douglas PUD’s land owner liaison.

**Mary Mayo**, Douglas PUD. Provides support for administrative activities including contract invoice accounting and technical editing and review.

**Dan Stolp**, Douglas PUD. Serves as the communications lead for the wireless transmission of data.

**Rich Klein**, Douglas PUD. Serves as the database lead for all water quality data received by Douglas PUD.

**Bao Le**, HDR Engineering, Inc. Supports water quality resources including technical editing and report development. Also provides technical and regulatory assistance on all water quality program objectives.

**John Lemons**, Columbia Basin Environmental. Serves as the TDG lead technician which includes station maintenance, calibration, and quality assurance/quality control (QA/QC) activities of TDG monitoring equipment.


**Patrick Miller**, USGS. Spokane District lead technician for the stream monitoring field program. Serves as the temperature monitoring station technician responsible for calibration, station maintenance and QA/QC activities.

Patricia Irle, Ecology. Hydropower Projects Manager, CRO. Ecology’s lead responsible for tracking compliance with terms of the Wells Project 401 Certification and Aquatic Settlement Agreement.

3.1.2 Schedule

The schedules below will be managed to meet the implementation and reporting requirements of the Wells Project 401 Certification and FERC License Order. An estimated schedule for setup and annual reporting is provided below:

3.1.2.1 QAPP Development and Monitoring Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 15 2013</td>
<td>Send Draft QAPP to Ecology</td>
</tr>
<tr>
<td>March 15 2013</td>
<td>QAPP comments received from Ecology</td>
</tr>
<tr>
<td>March 20 2013</td>
<td>Secure professional services agreement with USGS</td>
</tr>
<tr>
<td>March 20 2013</td>
<td>Install TDG stations</td>
</tr>
<tr>
<td>March 30 2013</td>
<td>Distribute revised QAPP (per Ecology comments) to Aquatic SWG</td>
</tr>
<tr>
<td>April 1 2013</td>
<td>Forebay and tailrace TDG stations operational</td>
</tr>
<tr>
<td>April 30 2013</td>
<td>QAPP comments received from Aquatic SWG</td>
</tr>
<tr>
<td>June 30 2013</td>
<td>Install temperature stations</td>
</tr>
<tr>
<td>July 30 2013</td>
<td>Temperature stations operational</td>
</tr>
<tr>
<td>June 30 2013</td>
<td>File Final QAPP with the FERC</td>
</tr>
</tbody>
</table>

3.1.2.2 Annual Reporting Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-Jan</td>
<td>Draft TDG Report to Ecology and Aquatic SWG</td>
</tr>
<tr>
<td>15-Feb</td>
<td>Receive comments from Ecology and Aquatic SWG</td>
</tr>
<tr>
<td>28-Feb</td>
<td>File Final TDG Report with Ecology and the FERC</td>
</tr>
<tr>
<td>30-Jan</td>
<td>Draft GAP to Ecology, HCP and Aquatic SWG</td>
</tr>
<tr>
<td>15-Feb</td>
<td>Receive comments from Ecology, HCP and Aquatic SWG</td>
</tr>
<tr>
<td>28-Feb</td>
<td>File Final GAP with Ecology and the FERC</td>
</tr>
<tr>
<td>30-Jan</td>
<td>Draft Temperature Report to Ecology</td>
</tr>
<tr>
<td>28-Feb</td>
<td>Temperature Report comments from Ecology</td>
</tr>
<tr>
<td>30-Mar</td>
<td>Draft Temperature Report to Aquatic SWG</td>
</tr>
<tr>
<td>30-Apr</td>
<td>File Final Temperature Report with the FERC and Ecology</td>
</tr>
<tr>
<td>30-Mar</td>
<td>Incorporate water quality reporting in annual Aquatic SWG report</td>
</tr>
<tr>
<td>30-Apr</td>
<td>Receive comments from Aquatic SWG on annual water quality parameters</td>
</tr>
<tr>
<td>30-May</td>
<td>File Aquatic SWG Annual Report with the FERC</td>
</tr>
</tbody>
</table>
3.1.2.4 Schedule Limitation

Douglas PUD will work towards meeting the QAPP Development and Monitoring Schedule described above, however some factors exist that may limit the ability for implementation in accordance with the schedule. These factors include the permitting and regulatory review required for the installation of water quality instrumentation to support the monitoring program (i.e., review and processing of a Joint Aquatic Resources Permit Application and the potential need for implementation of the State Environmental Policy Act process or USACE section 10 and county shoreline permits). In addition, high flows, which typically occur during the spring run-off period, may preclude safe installation of water temperature stations as scheduled.

It is important to note that per the Wells Project 401 Certification, the development of the QAPP and installation of water quality monitoring stations are not required to be completed until the end of October of 2013 (by the end of the first year of the FERC license). However, Douglas PUD’s advanced schedule is proposed in consideration of the additional time required for the regulatory permitting and review process, as needed. In the event that environmental or permitting activities preclude Douglas PUD from meeting the above QAPP Development and Monitoring Schedule, and further, prevents Douglas PUD from meeting the within one year requirements for water quality monitoring, both Ecology and the FERC will be formally notified and Douglas PUD will submit a request for a modified schedule.

4.0 QUALITY OBJECTIVES

4.1 DECISION QUALITY OBJECTIVES (DQO) Process

The DQO Process is used when data are being used to select between two clear alternative conditions or to determine compliance with a standard. For this QAPP, a DQO Process will be implemented using the monitoring data (i.e., water temperature and TDG) for relevant parameters to determine compliance with the state WQS. Actions that could be taken if measurements indicate that state WQS numeric criteria are not met have already been defined in Douglas PUD’s WQMP and 401 Certification. These potential actions include:

1. Continued sampling to determine the accuracy and repeatability of a violation.
2. Employing adaptive management, as defined by the ASA to address non-compliance in water quality measures, if and when they occur. Examples include:

   a. Identifying reasonable and feasible actions that could be used to meet TDG and water temperature WQS numeric criteria.
   b. Exploring other alternative approaches available in the water quality standards provided in WAC 173-201A-510(5)(g).
4.1.2 Representativeness

Obtaining representative measurements or samples requires the use of properly operated and calibrated equipment and requires a good sampling design as well as good execution of that design. A result is representative of a population when it reflects accurately the desired characteristics of that population. A set of representative samples is said to be valid if it provides a true representation of the temporal and spatial variations of the population characteristic (Lombard and Kirchmer 2004). For the water temperature and TDG monitoring program, Douglas PUD proposes a spatial distribution of instrumentation and a temporal collection regime for water quality data that is representative of the quality of water entering and exiting the Wells Project and that is sufficient to evaluate Wells Project compliance with the state WQS numeric criteria for relevant parameters.

TDG sensors will be placed in the forebay (near unit six) and in the tailrace of Wells Dam. The placement of the sensors has been confirmed as representative of bulk flow prior to passing Wells Dam and leaving the tailrace (Columbia Basin Environmental 2006, EES Consulting Inc. et al. 2007). The forebay and tailrace sensors will provide a representative value of TDG production through Wells Dam and allow for the determination of Wells Dam’s ability to meet WAC standards.

During the summer of 2011, Wells Dam forebay values for TDG were often measured as higher than those determined in the Chief Joseph Dam tailrace. The USACE has determined that the placement of the TDG sensor maintained below Chief Joseph Dam causes inaccurate Chief Joseph Dam tailrace TDG values. The Chief Joseph Dam tailrace sensor is located below the spillway on river right and does not capture turbine outflow during certain operations. TDG in turbine outflow can be higher than spill flows when the spillway at Chief Joseph Dam is degassing supersaturated water in the forebay. Whereas, supersaturated water passing through the powerhouse is not stripped of gas (Pers. Comm. Mike Schneider, USACE). Given the unique hydrodynamics below Chief Joseph Dam and the lack of bulk flow representation, Douglas PUD is proposing to install an additional TDG station at Washburn Island (Washburn Island is downstream of Chief Joseph Dam, upstream from the Okanogan River and is being located at a site that contains mixed flow). The Washburn Island location will help Douglas PUD understand TDG degassing in the Wells Project and expected TDG saturation in the Wells Forebay. In addition it will help proof the Wells forebay TDG sensor since Washburn Island TDG values should predict Wells Forebay TDG values. Based on the comparison of the sensors at these two locations, technicians can service the sensors when data appears to be erroneous to ensure reliable data is being obtained. Finally, the Washburn Island location will more accurately assess TDG loading from the federal power system above Wells Dam, which may support improved management towards minimizing TDG production in the Columbia River.

The frequency of TDG data collection (15 minute intervals or more frequently year-round) is designed to provide a sufficient number of data points, which will represent real time TDG conditions in the Wells Project and allow Douglas PUD to evaluate TDG compliance in consideration of incoming water quality conditions in addition to TDG management activities occurring at Wells Dam throughout the year.
The proposed boundary locations for temperature sensors will provide a representation of water temperatures entering into and leaving the Wells Project. Boundary locations include the Chief Joseph Dam tailrace, the Okanogan River at RM 10.5 and the Methow River at RM 1.5. In addition, the temperature monitoring station in the Wells Dam forebay will collect a depth profile to allow Douglas PUD to continue to verify the lack of thermal stratification in the Wells Reservoir. Fishway thermistors will provide representative data to assist Douglas PUD in determining if trapping salmonids is allowable under NMFS BO temperature criteria for ESA listed fishes.

Together, proposed locations and depth of TDG and temperature sensors will provide the necessary information for a precise and accurate evaluation of the Wells Project’s ability to continue to meet WAC compliance criteria for TDG and water temperature. Finally, samples will be taken in a consistent manner for all measurement locations.

4.1.3 Comparability

In order to compare data collected under this QAPP with historic Wells Project water quality data, TDG and water temperature data will be collected using instrumentation and standardized procedures similar to the historic water quality program. Instrumentation will consist of Hydrolab® Minsonde sensors as has been utilized in the past for TDG and water temperature sensors used by the USGS at their existing stream gauge stations. Methodology for data collection and processing will be similar to or comparable to previous water quality monitoring activities in the Wells Project. The data resolution in this study is not only intended to be comparable to data collected at the Project in the past, but to support future TMDL development and any modeling that may be required to support Columbia River Treaty negotiations. In addition, the majority of TDG and water temperature data collected on the Columbia River is collected using identical equipment and nearly identical data collection protocols, as proposed in this QAPP.

4.1.4 Completeness

The sampling design is intended to provide, at a minimum, hourly data or 168 single location samples per week at each station. For TDG monitoring, data collection will occur year-round and thus provide over 8,736 data points per station each year. Redundant sampling in the design should reduce the probability of data gaps even when unforeseen events occur such as instrument failure or damage due to weather or environmental factors. In addition, the real-time recording and dissemination of the data allows for the prompt identification of a failed sensor and immediate equipment service or replacement; thereby minimizing data loss and improving data completeness.

4.2 MEASUREMENT QUALITY OBJECTIVES (MQO)

All water quality monitoring instrumentation will be calibrated per factory recommended specifications prior to deployment and serviced in the field on a monthly or more frequent schedule, as needed. If an instrument does not meet specifications it will not be deployed. In addition, if a sensor appears to be sending erroneous data, the site will be visited toward
recalibrating the instrumentation and an evaluation will be conducted to determine the quality and validity of the data associated with the event.

The repeatability and sensitivity of the equipment needs to be within the allowable deviations from water quality criteria in order to avoid reaching a false conclusion regarding whether or not criteria have been met. The MQOs for these parameters, based on water quality criteria allowances for human effects (smallest reference level for decision making) and instrument capabilities are presented in Table 1.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Smallest Reference Level for Decision Making</th>
<th>Range of Instrument</th>
<th>Accuracy</th>
<th>Sensitivity/Resolution</th>
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</thead>
<tbody>
<tr>
<td>TDG Station (MiniSonde/ Hydrolab)</td>
<td>Temperature 0.3°C</td>
<td>-5 to 50°C</td>
<td>± 0.1°C</td>
<td>0.01°C</td>
</tr>
<tr>
<td></td>
<td>TDG 1% Saturation</td>
<td>400 to 1400 mmHg</td>
<td>± 1.5 mmHg</td>
<td>1.0 mmHg (0.1% saturation)</td>
</tr>
<tr>
<td>Temperature Station (Waterlog H-377 sensor)</td>
<td>Temperature 0.3°C</td>
<td>-40 to 105°C</td>
<td>± 0.1°C</td>
<td>N/A</td>
</tr>
</tbody>
</table>

5.0 SAMPLING PROCESS DESIGN

Douglas PUD maintains two TDG stations during the spill season (April-August) but will be installing two additional TDG stations in 2013 and expanding its TDG program to year-round monitoring beginning in March of 2013. Similar to the past TDG program, all TDG instrumentation will also collect temperature data. In addition, Douglas PUD maintains redundant (2 per location) temperature Tidbit loggers at six locations upstream of the dam. In 2013, Douglas PUD plans on replacing the existing Tidbit temperature loggers with real time monitoring stations and making data available on a public website. In previous years, temperature data was shared with the public and agencies by request. Additional information on the proposed monitoring and sampling design is provided below.

5.1 TDG

Douglas PUD maintains two real time water quality monitors at the Wells Dam. These instruments record barometric pressure (BP), water temperature, and TDG every fifteen minutes. The forebay sensor is located on the upstream face of the dam near turbine unit six and the tailwater monitor is located approximately two miles downstream of the dam on the river left bank. Hourly data from these sites are transmitted to the Columbia River Operational Hydromet System (CROHmS) operated by the USACE–Northwest Division. An additional reservoir monitoring station at Washburn Island (RM 537.5) and a redundant tailwater probe will be added in 2013. The subsequent Wells Project TDG monitoring system will consist of the following stations:
1. Forebay station located on the upstream face of Wells Dam near unit 6, (WEL).
2. Tailwater station located approximately 2.5 miles downstream on the eastern shore, (WELW)
3. Redundant probe located at the tailwater site, (WEL2) and
4. Washburn Island station (WELWASH).

The location of TDG monitoring stations are illustrated in figures 2, 3, and 5.

5.2 Water Temperature

Douglas PUD will maintain water temperature sensors at six locations in the Wells Project. Loggers used in previous years were Tidbit thermistors (Onset), which are programmed to collect hourly data year-round and will be used until new remote stations can be installed. Previously, Douglas PUD downloaded the loggers two to four times a year based on river conditions and access. In 2013, upon approval of this QAPP, Douglas PUD plans on installing remote temperature monitoring stations at the following locations to meet 401 Certification requirements and monitor compliance with the state WQS temperature numeric criteria. Locations and duration of monitoring include:

April 1st to October 31st
   1. Methow River, RM 1.5 - Project Boundary
   2. Columbia River, RM 544.5 - Chief Joseph Dam Tailrace
   3. Okanogan River, RM 10.5 - Project Boundary
May 1st to November 15th
   4. Wells Dam Forebay (three depths)
   5. Wells Dam Fishways
   6. Wells Dam Auxiliary Water Supply

Temperature monitoring locations are illustrated in figures 2 through 6.
Figure 2. Proposed locations of TDG/temperature, temperature stations only and Washburn Island TDG station within the Wells Project boundary.
Figure 3. Proposed locations of forebay and tailrace TDG/temperature stations and temperature stations only. Sensors pictured include two redundant tailrace TDG stations and one forebay station above turbine unit six, one fishway temperature and auxiliary water supply station and one forebay water temperature profile sensor (surface, mid and deep depths) affixed to the debris boom.
Figure 4. Proposed Methow River boundary temperature sensor.
Figure 5. Proposed Okanogan River boundary temperature sensor and additional TDG station location off of Washburn Island.
Figure 6. Proposed Chief Joseph tailrace (Columbia RM 544.5) temperature sensor.
6.0 MEASUREMENT PROCEDURES

6.1 TDG equipment

Hydrolab® miniSonde multi-probes (sensors) will be used to monitor TDG in the Wells Project. Hydrolab® probes are used throughout the Columbia River Basin by other Columbia River dam operators (e.g. Chelan PUD 2007, and Corps 2008). Probes are deployed via PVC conduit with a perforated end cap. A sensor communication cable is connected to a communications box on the shoreline. The communication box is connected to a wireless modem that sends data via radio or cellular frequencies back to a server at Wells Dam. A 20 watt solar panel and a voltage regulator keep a 12 volt battery charged, which provides power to the communications box.

6.2 Water Temperature monitoring equipment

With the exception of a change in instrumentation and components, the same system (i.e., sensor connected to communications box with wireless modem to send data to Wells Dam and powered by solar panel) used to collect TDG data will be used for water temperature data collection. Changes in equipment include a Design Analysis H-377 temperature sensor, Sutron GOES radio/logger, GOES satellite antenna and cable, 20 watt solar panel, and voltage regulator. Onshore housing includes a National Electrical Manufacturers Association (NEMA) enclosure, 12 volt sealed lead-acid battery, galvanized pipe, flex conduit, fittings, and other hardware.

7.0 QUALITY CONTROL

Listed below are the general calibration and maintenance procedures to be conducted for TDG and temperature quality assurance methods. Calibration and Quality Assurance Protocols have been adopted and modified, as appropriate, from those used in the USGS stream monitoring protocols as is required by the Wells Project 401 Certification.

7.1 Calibration and Maintenance Protocol for TDG

Calibration and maintenance follows a modified standard procedure used by the USGS’s Guideline and Standard Procedures for Continuous Water-Quality Monitors: Station Operations, Record Computation, and Data Reporting (Wagner et al. 2006). Key elements of this procedure are provided below for both laboratory and field components:

7.1.1 Laboratory

1. Calibrate secondary standard field barometer to National Institute of Standards and Technology (NIST) traceable source.
2. Calibrate secondary standard multiprobe using known standards.
3. Perform integrity check of replacement membranes.
7.1.2 Field

1. Inspect fixed monitoring sites and document any problems monthly or as required.
2. Document pre-calibration water temperature and TDG measurements.
3. Remove sensor from housing, inspect for damage and document findings.
4. Remove TDG membrane, being careful to prevent moisture from entering TDG sensor.
   Visually inspect membrane and document findings.
5. Perform four-point calibration as follows:
   A. Attach pressure gauge to TDG sensor and release pressure.
   B. Check the zero by comparing TDG pressure from sensor to barometric pressure 
      reported by secondary standard. Document readings and adjust TDG sensor, if 
      necessary.
   C. Using the digital pressure gauge, gradually add sufficient pressure to the TDG sensor 
      to “bracket” the expected in situ pressures (~300 mmHg). The TDG sensor should 
      report pressures equivalent to the ambient BP (zero) plus the additional pressure, e.g. 
      at BP=760 mmHg with 300 mmHg added pressure, the sensor should report 1060 
      mmHg.
   D. Recheck the zero.
   E. Repeat if adjustments were required.
6. Install fresh TDG membrane. Monitor the TDG pressure as the membrane is attached. 
   Pressure should increase as the seal is formed and then gradually return to ambient BP.
7. Replace sensor guard, if so equipped.
8. Perform final membrane check by immersing entire sensor in carbonated water, i.e. 
   seltzer water. TDG pressure should increase rapidly and exceed ~1000 mmHg. Remove 
   sensor from seltzer water and ensure that the pressure gradually returns to atmospheric 
   levels. If pressures do not rise rapidly or if they instantly return to atmospheric levels, the 
   membrane may have been damaged. Repeat steps 6-8 with a new membrane (Note: It is 
   important that the sensor guard be replaced BEFORE performing the membrane integrity 
   check as it is possible to damage the membrane during this action).

After each eight week interval, the data are reviewed and analyzed. Data will be compared to 
expected values using incoming TDG values, spill volumes and Rocky Reach forebay values. 
Erroneous data will be noted and described in annual reporting. At the completion of the water 
year, the final TDG data will be reviewed by the Douglas PUD’s water quality technical lead.
7.2 Calibration and Maintenance Protocol for Temperature

Like TDG, temperature calibration and maintenance follows a modified standard procedure used by the USGS’s Guideline and Standard Procedures for Continuous Water-Quality Monitors: Station Operations, Record Computation, and Data Reporting (Wagner et al. 2006). Key elements of this procedure are provided below:

1. Water temperature sensors are verified in the lab before deployment.
2. At site visits, the sensor is checked against a digital thermistor which has been verified to be within USGS data-quality requirements with a NIST certified thermometer, as described by Wilde (2006).
3. A 5-point calibration is performed annually at the USGS Field Services Unit (FSU) in Tacoma, Washington, with additional 2-point calibrations performed twice annually.
4. Field sensors are verified and checked within +/-0.2°C accuracy, otherwise returned to vendor or discarded.
5. Temperature data will be collected in a cross-section adjacent to the sensor location, at different flow and temperature regimes, to check and possibly adjust for the collected data being representative of the river at the sampling point.

After each eight week interval, the data will be reviewed and analyzed, corrections will be applied if needed, and the database will be updated. At the completion of the water year, the final tables will be checked and reviewed by senior hydrographers.

8.0 DATA MANAGEMENT PROCEDURES

8.1.1 Data Access for TDG and water temperature

Data will be collected in a format that will include the location of collection, the time of day that each sample is taken, and the sample date. Data will be transferred to a Microsoft (MS) Access database since large volumes of data are anticipated, precluding the use of MS Excel. Data will be transmitted to Ecology or any other public agency by request. However, all final data will be published electronically at Douglas PUD’s Wells Project license implementation website.

TDG and temperature data will be stored internally but also made available in real-time via the Columbia River DART (Data Access in Real Time) website and Douglas PUD’s external website. TDG data will also be transmitted to the USACE’s Columbia Basin Water Management Division Webpage which serves as the information clearing house for all real-time hydroelectric project water quality data on the Snake and Columbia rivers. Wells Project water quality data will be publically available at:


A link to these pages will also be provided on Douglas PUD’s Wells Project license implementation website.
9.0 REPORTING

Monthly and bimonthly calibration reports for TDG and temperature monitoring locations, respectively, will be developed, reviewed and approved. All reports, including charts, diagrams, and data prepared by field personnel will be appended to annual reports. Key reports include:

1. Annual GAP
3. Annual Water Temperature Report
4. Annual Water Quality Management Plan Report or Memo
5. Revised version of the QAPP (if available)
6. Revised version of the WQAP (if available)
10.0 REFERENCES


APPENDIX B

PRE-FILING CONSULTATION RECORD FOR THE QUALITY ASSURANCE PROJECT PLAN FOR WATER TEMPERATURE AND TOTAL DISSOLVED GAS
LETTER SUBMITTING DRAFT QUALITY ASSURANCE PROJECT PLAN TO WASHINGTON DEPARTMENT OF ECOLOGY
Pat Irle
Department of Ecology
15 W. Yakima Avenue, Suite 200
Yakima, WA 98902

Subject: 2013 Quality Assurance Project Plan for monitoring select water quality measures within the Wells Project

March 4th, 2013

Dear Ms. Irle:

Please find enclosed Public Utility District No. 1 of Douglas County’s (Douglas PUD) Quality Assurance Project Plan (QAPP) for monitoring water temperature and total dissolved gas in the Wells Hydroelectric Project (Wells Project) Area. Consistent with requirements in the Wells Project 401 Water Quality Certification and Federal Energy Regulatory Commission (FERC) License Order, this QAPP describes the systematic process that will be implemented to collect useful environmental (water quality) data.

Article 401(a) of the Wells Project License Order requires that the final QAPP and the comments received on draft versions be prepared and submitted to the FERC for final approval.

If you have any questions or require further information regarding the enclosed plan, please feel free to contact Andrew Gingerich at (509) 881-2323 or andrewg@dcpud.org.

Sincerely,

Shane Bickford
Natural Resources Supervisor
EMAIL SUBMITTING DRAFT QUALITY ASSURANCE PROJECT PLAN TO ECOLOGY
Thanks!

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Monday, March 04, 2013 9:57 AM
To: Irle, Pat (ECY)
Cc: Shane Bickford; Le, Bao; Chas Kyger
Subject: Draft QAPP

Pat, please find attached Douglas PUD’s Quality Assurance Project Plan for TDG and water temperature monitoring. Although this document isn’t due to FERC until October, I think both Ecology and Douglas agree that it makes sense to finalize this document prior to April’s spill season (if we can). Once Ecology provides comments I will send it to the ASWG for review as well. Also, I am in the midst of working out the permitting details for water temperature recording stations. Having a final product will be helpful for the permitting processes.

I’ve elected to submit this as a word document to facilitate any editing or comments Ecology might have internally. As always, Please let me know if you have any questions.

Thanks for the ongoing support.

Andrew

Andrew Gingerich
Senior Aquatic Resource Biologist
Douglas County Public Utility District
andrewg@dcpud.org
509-881-2323 (work)
509-884-0553 (fax)
1151 Valley Mall Parkway
East Wenatchee, Washington 98802
COMMENTS BY ECOLOGY ON THE QAPP
Overall it is written well.

Section 4.1.2 – paragraph 3 states that the Corps determined that the location of the TDG sensor below Chief Joe causes inaccurate TDG values. It would be helpful if you cite the source of information (as you have other statements in the document). Does this information come from projects performed by Mike Schneider and Kent Easthouse?

Section 4.1.2 – You plan to add another TDG station at Washburn Island – it would be helpful to know how this data will be used in terms of compliance or improvement of TDG monitoring. Will these data be utilized in adjusting your playbook. Some further information would be helpful.
DOUGLAS PUD’S SUGGESTED CHANGES TO THE QAPP
Pat, thanks again for the comments on Douglas’ QAPP for water temperature and TDG. Here are my suggested changes to the QAPP based on the comments that you provided. Please see the bold text. I am going to share this document with the ASWG at this point. Through that process we can make additional revisions if we so choose. Thanks again for the support. Andrew.

“During the summer of 2011, Wells Dam forebay values for TDG were often measured as higher than those determined in the Chief Joseph Dam tailrace. The USACE has determined that the placement of the TDG sensor maintained below Chief Joseph Dam causes inaccurate Chief Joseph Dam tailrace TDG values. The Chief Joseph Dam tailrace sensor is located below the spillway on river right and does not capture turbine outflow during certain operations. TDG in turbine outflow can be higher than spill flows when the spillway at Chief Joseph Dam is de-gassing supersaturated water in the forebay. Whereas, supersaturated water passing through the powerhouse is not stripped of gas (Pers. Comm. Mike Schneider, USACE). Given the unique hydrodynamics below Chief Joseph Dam and the lack of bulk flow representation, Douglas PUD is proposing to install an additional TDG station at Washburn Island (Washburn Island is downstream of Chief Joseph Dam, upstream from the Okanogan River and is being located at a site that contains mixed flow). The Washburn Island location will help Douglas PUD understand TDG degassing in the Wells Project and expected TDG saturation in the Wells Forebay. In addition it will help proof the Wells forebay TDG sensor since Washburn Island TDG values should predict Wells Forebay TDG values. Based on the comparison of the sensors at these two locations, technicians can service the sensors when data appears to be erroneous to ensure reliable data is being obtained. Finally, the Washburn Island location will more accurately assess TDG loading from the federal power system above Wells Dam, which may support improved management towards minimizing TDG production in the Columbia River.”

Comments:

Overall it is written well.

Section 4.1.2 – paragraph 3 states that the Corps determined that the location of the TDG sensor below Chief Joe causes inaccurate TDG values. It would be helpful if you cite the source of information (as you have other statements in the document). Does this information come from projects performed by Mike Schneider and Kent Easthouse?

Section 4.1.2 – You plan to add another TDG station at Washburn Island – it would be helpful to know how this data will be used in terms of compliance or improvement of TDG monitoring. Will these data be utilized in adjusting your playbook. Some further information would be helpful.
EMAIL FROM ECOLOGY APPROVING THE QAPP
Hi, Andrew – This is an e-mail to formally approve the items listed in your e-mail below.

Thanks for all the good work!
Pat Irle
WA Dept of Ecology
Hydropower Projects Manager

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Thursday, May 09, 2013 3:25 PM
To: Irle, Pat (ECY)
Subject: Formal approval of various documents

Pat Anchor sent me your approval of the various documents discussed at the ASWG meeting yesterday. I think it would be helpful to have a direct email from you for the FERC filings for each of the documents we discussed and reviewed over the last few weeks.

Could you respond to me via a reply of this message to note that you formally approve these three items:

1. Aquatic Settlement Agreement Annual Report (distributed by Anchor QEA)
2. All six management plans annual reports
3. The QAPP for water temperature and TDG monitoring

Thanks!

Andrew Gingerich
Senior Aquatic Resource Biologist
Douglas County Public Utility District
andrewg@dcpud.org
509-881-2323 (work)
509-884-0553 (fax)
1151 Valley Mall Parkway
East Wenatchee, Washington 98802
EMAIL TO AQUATIC SETTLEMENT WORK GROUP FOR A REVIEW OF THE QAPP
Hi Aquatic SWG: please see the email below from Andrew and the attached draft Douglas PUD Quality Assurance Project Plan. This draft report is out for review with comments due to Andrew prior to the Aquatic SWG May 8, 2013 conference call. Douglas PUD will be asking for approval of this draft report at the May conference call.

Thanks! 
Kristi 😊

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com

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From: Andrew Gingerich [mailto:andrewg@dcpud.org]  
Sent: Tuesday, April 16, 2013 10:31 AM  
To: Kristi Geris  
Cc: Shane Bickford; Chas Kyger; Le, Bao  
Subject: DCPUD QAPP water temperature and total dissolved gas  

Kristi please send to the ASWG

Please find attached Douglas PUD’s Quality Assurance Project Plan (QAPP) for monitoring water temperature and total dissolved gas in the Wells Hydroelectric Project. Consistent with requirements in the Wells Project 401 Water Quality Certification and the FERC License Order, the QAPP describes the systematic process that will be implemented to collect useful water quality data. Article 401(a) of the Wells Project License Order requires that the final QAPP and the comments received on draft versions be prepared and submitted to the FERC for final approval. Douglas has worked closely with the Washington Department of Ecology to revise this document in order to meet this obligation. At this stage we would like to work towards review and approval from the Aquatic SWG.

Douglas is asking for a shortened review period towards approving this document at the May 8th conference call. Of course, if folks feel they need the full 30 day review we will provide that. However, folks will likely agree that approvals during conference calls work best compared to email votes and approval. We can assess peoples comfort with approving this plan during the May 8th call.
Please note that the attached QAPP describes how Douglas PUD will collect reliable water quality data towards meeting WA State water quality standards.

As always, let me know if you have questions.

Thanks!

Andrew

Andrew Gingerich
Senior Aquatic Resource Biologist
Douglas County Public Utility District
andrewg@dcpub.org
509-881-2323 (work)
509-884-0553 (fax)
1151 Valley Mall Parkway
East Wenatchee, Washington 98802
FINAL MEETING MINUTES FOR THE AQUATIC SETTLEMENT WORK GROUP
APPROVING THE QAPP
Final Conference Call Action Items

Aquatic Settlement Work Group

To: Aquatic SWG Parties                            Date: May 9, 2013
From: Michael Schiewe, Chair (Anchor QEA)
Re: Final Action Items of the May 8, 2013, Aquatic SWG Conference Call

Below is a summary of Action Items from the Aquatic SWG meeting held by conference call from 10:00 am to 11:30 am on Wednesday, May 8, 2013. These action items include the following:

I. Summary of Action Items

1. Pat Irle (Washington State Department of Ecology) will provide additional comments or approval of Aquatic Settlement Work Group 2012 Annual Report to Mike Schiewe via email (Approval was confirmed via email dated May 9, 2013) (Item II).
2. Irle will provide additional comments or approval of the Water Quality Management Plan 2013 Annual Report to Schiewe via email (Approval was confirmed via email dated May 9, 2013) (Item III).
3. Andrew Gingerich will talk with Scott Kreiter (Douglas PUD Lands Department) about method of application of aquatic herbicide in public swimming areas, and report back to Aquatic SWG representatives at the June 12, 2013 meeting (Item IX).
4. Steve Lewis will send the Twisp Weir Bull Trout Study deferral request letter to Emily Pizzichemi for distribution to the Aquatic SWG. Aquatic SWG representatives will submit comments and/or their formal approval to Gingerich no later than June 5, 2013 (Item IX).
5. Chas Kyger will provide additional details on the Lamprey Passage and Enumeration Study, including release locations, during the June 5, 2013 meeting (Item X).

II. Summary of Decisions

1. There were no Statements of Agreement (SOAs) approved at today’s meeting.
III. Agreements

1. Aquatic SWG representatives present approved Douglas PUD’s Aquatic Settlement Work Group 2012 Annual Report (Bob Rose and Pat Irle provided email confirmation of approval on May 9, 2013) (Item II).

2. Aquatic SWG representatives present approved Douglas PUD’s Aquatic Settlement Agreement Management Plan Annual Reports (six total) (Bob Rose and Pat Irle provided email confirmation of approval on May 9, 2013) (Item III). Approval required the inclusion of a reference to the Wells Aquatic Settlement Agreement White Sturgeon Collection Plan SOA (approved March 20, 2013) in the prioritization list on page 11, section 4.4.1 of the White Sturgeon Management Plan Report.

3. Aquatic SWG representatives present approved the 2013 Draft Quality Assurance Project Plan for Water Temperature and Total Dissolved Gas Monitoring (Bob Rose provided email confirmation of approval on May 9, 2013) (Item IX).

IV. Reports Finalized

1. No reports have been finalized since the last Aquatic SWG meeting.
EMAIL FROM YAKAMA NATION APPROVING THE QAPP
Hi Andrew, Mike,

I've reviewed each of the documents listed below and I do approve that the ASWG accept these as Final.

Thanks for the reminder.

My apologies for not being able to attend yesterday.

Best Regards,

B Rose

1. Approval of the 2012 Annual Report
2. Approval of the Settlement Agreement Management Plan Annual Reports
3. Approval of QAPP for Water Temperature and TDG Monitoring.

On Wed, May 8, 2013 at 8:15 AM, Mike Schiewe <mschiewe@anchorqea.com> wrote:

Bob – There are three decision items on the agenda

1. Approval of the 2012 Annual Report
2. Approval of the Settlement Agreement Management Plan Annual Reports
3. Approval of QAPP for Water Temperature and TDG Monitoring.

Do you have any comments, questions? Are you ready to approve?

Thanks, Mike
So, just looking at my schedule - I will need to be in Tacoma Wednesday with the Tacoma Power folks going over the Annual Review for that proceeding. So will not be in on the call.

However Mike - I'm going to go through the two decision documents asap and will get back to you with a vote for these two items. So hopefully I'll not hang up progress on those items.

I don't think I have much to add to the discussion, as I've visited recently with Andrew about a couple of these things. I am around via phone if I can help out with anything.

Best to both,

--
Bob Rose
Yakama Nation
Fisheries Resource Management Program
509-945-0141

--
Bob Rose
Yakama Nation
Fisheries Resource Management Program
509-945-0141
EMAIL FROM NATIONAL MARINE FISHERIES SERVICE APPROVING THE QAPP
Andrew - This morning, I read (actually, I think I re-read) the Water Temperature and TDG QAPP plan for Wells Dam. It wasn't checked off of my "tasks" list - possibly an error, since the text sounded familiar.

In any event, the 2013 QAPP for Wells Dam looks good to me. No comments and consider this NMFS approval (or added approval, if I had sent this approval previously).

Thanks,
Bryan

On Wed, Apr 17, 2013 at 2:56 PM, Andrew Gingerich <andrewg@dcpud.org> wrote:

Bryan, I left one out!

Here is item number seven that we need to show NMFS consultation. This is a plan on how we plan to collect TDG and water temperature data in the Wells Project in a robust manner that will help us determine Wells’ ability to meet the WA state water quality standards. This review actually falls under article 41 and page 48 of the new Wells License.

Let me know if you have time and we can chat briefly on the phone about all these plans and reports.

Thanks again.
Andrew

Andrew Gingerich
Senior Aquatic Resource Biologist
Douglas County Public Utility District
APPENDIX L
DOUGLAS PUD SPILL PREVENTION
CONTROL AND COUNTERMEASURES
PLAN
Via Electronic Filing

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington DC 20426

October 15, 2013

Subject: Wells Hydroelectric Project No. 2149 - Spill Prevention Control and Countermeasure Plan (SPCC) – License Article 401

Dear Secretary:

Pursuant to Article 401 of the new license for the Wells Hydroelectric Project (Wells Project), the Public Utility District No. 1 of Douglas County (Douglas PUD) hereby submits for approval the attached Spill Prevention Control and Countermeasures Plan (SPCC).

Article 401 requires Douglas PUD to file an updated SPCC with the Federal Energy Regulatory Commission (FERC) within one year of license issuance and following both approval by the Washington State Department of Ecology (Ecology) and consultation with the parties to the Aquatic Settlement Agreement (ASA), the National Marine Fisheries Service (NMFS) and the Bureau of Indian Affairs (BIA). The final SPCC is attached as Exhibit A to this letter and was developed in consultation with the parties to the ASA including the United States Fish and Wildlife Service (USFWS), U.S. Bureau of Land Management (BLM), Washington State Department of Fish and Wildlife (WDFW), Ecology, the Confederated Tribes of the Colville Reservation (CCT) and the Confederated Tribes and the Bands of the Yakama Nation (YN). The BIA and the NMFS were also provided an opportunity to review and comment on the SPCC during the 30-day ASA comment period.

No comments were received on the updated SPCC. Ecology acknowledged that the SPCC was recently updated in 2010 and that the current plan was satisfactory with no further review or modifications necessary. Following Ecology’s determination, the SPCC was approved by the Aquatic Settlement Work Group at the October 9, 2013 meeting. The pre-filing consultation record supporting the approval of the SPCC is attached as Exhibit B.
If you have any questions related to the SPCC, please feel free to contact Lori Morris at (509) 881-2243 or lorim@dcpwd.org.

Sincerely,

Shane Bickford
Supervisor of Natural Resources

Enclosure:

   Exhibit A – Spill Prevention Control and Countermeasure Plan.
   Exhibit B – Pre-filing consultation record for the Spill Prevention Control and Countermeasure Plan.

Copy:  Charlie McKinney, Ecology
       Pat Irle, Ecology
       Wells HCP Coordinating Committee – Members List
       Wells Aquatic Settlement Work Group – Members List
       Lori Morris, Douglas PUD
       Andrew Gingerich, Douglas PUD
       Brad Hawkins, Douglas PUD
Exhibit A

Spill Prevention Control and Countermeasure Plan
Spill Prevention Control and Countermeasure (SPCC) Plan

Wells Hydroelectric Project

prepared for

Public Utility District No. 1 of Douglas County, WA

August 2010
PUBLIC UTILITY DISTRICT NO. 1 OF DOUGLAS COUNTY
WELLS HYDROELECTRIC PROJECT

SPILL PREVENTION CONTROL AND COUNTERMEASURE (SPCC) PLAN

Date of initial operations: September 1967
Plan first implemented: March 1975
Last scheduled amendment: December 2006
Plan last amended: October 2009 - Amended in conjunction with relicensing process for Wells Hydroelectric Project
Current Plan amended: August 2010 - General revisions
Next scheduled plan review: August 2015

The Project Superintendent is the designated person accountable for oil spill prevention at this facility.

MANAGEMENT APPROVAL

This SPCC Plan will be implemented as herein described and will be amended as necessary due to modifications and improvements at the facility.

Signature: 
Name: William C. Dobbins
Title: General Manager
Public Utility District No. 1
of Douglas County

CERTIFICATION

This SPCC Plan was prepared using sound engineering practices. I have examined the facility and this Plan and find this Plan conforms to the guidelines and provisions of 40 CFR 112 (2006).

Engineer: Rolf G. Wielick, PE
JACOBS

Signature: 
License No.: 28939 State: WA
Date: August 17, 2010

STATE OF WASHINGTON
PROFESSIONAL ENGINEER
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## APPENDICES

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1.0 INTRODUCTION

This document is the Spill Prevention Control and Countermeasure (SPCC) Plan for the Wells Hydroelectric Project (Wells Project), owned by Public Utility District No. 1 of Douglas County, Washington (District). In accordance with regulations, this plan was initially implemented no later than the extension date of March 1975. It has been reviewed at 3-year intervals since that date and was reviewed and amended in March 2002. The Environmental Protection Agency (EPA) amended the 1973 Oil Pollution Prevention Regulations with revised rules that became effective August 16, 2002.

The 2002 rules require that an owner or operator review and evaluate his plan at least every 5 years. If the review identifies new field-proven technology that will significantly reduce the likelihood of harmful oil discharges from the facility, the plan must be amended within 6 months of the review. The plan must also be amended if there is a change in the facility design, construction, operation, or maintenance that materially affects its potential for the discharge of oil in quantities that may be harmful. Amendments must be implemented as soon as possible, but not later than 6 months following the preparation of any amendment.

In February 2006, EPA extended the dates by which facilities must prepare or amend SPPC Plans and implement those Plans. According to this extension rule, the Wells Project would have to make any necessary amendments to its SPCC Plan, and implement that Plan, on or before October 31, 2007.

In December 2006, EPA signed a final rule to amend the SPCC rule at 40 CFR Part 112. EPA amended the SPCC rule to address a number of issues raised by its 2002 final rule, including those pertaining to facilities with smaller oil storage capacities, qualified oil-filled operational equipment, and mobile refuelers. The plan was reviewed and amended in October 2007 to ensure conformance with the requirement of the 2006 regulations.

In November 2008, Washington State Department of Ecology (Ecology) provided comments on the 2007 Update of the SPCC Plan in conjunction with the District’s efforts to relicense the Wells Project.

This plan has been reviewed and amended to ensure conformance with Washington State Laws and Ecology requirements relating to the 401 Water Quality Certification and the District’s Water Quality Management Plan (WQMP). The next scheduled review of the SPCC Plan for the Wells Project will be before August 2015.

1.1 PURPOSE

The Purpose of this plan is to meet the requirements of the U.S. Environmental Protection Agency Regulations, as defined in Title 40 Code of Federal Regulations, Part 112 (as amended in December 2006), and entitled "Oil Pollution Prevention." Appendix D contains a SPCC Rule Cross-Reference that lists the page(s) of this plan that meet the requirements. Additionally this plan meets the requirements of the Revised Code of Washington (RCW) Chapters 90.56 and 90.48 (see Section 7.0).

The Spill Prevention Control and Countermeasure (SPCC) Plan contained herein is a comprehensive statement by facility management and is intended to be supported by the facility's Oil Spill Contingency Plan. The SPCC Plan along with the Oil Spill Contingency Plan establishes procedure, methods, equipment, and materials that shall be used to prevent, contain, and/or clean up an oil spill, thereby preventing it from impacting the navigable waters of the United States.
1.2  **POLICY**

It shall be the policy of Public Utility District No. 1 of Douglas County and all its contractors to recognize that oil contamination of the waters of the State of Washington is harmful to public health, welfare, and the environment. Therefore, it is required that the strongest emphasis be placed on oil spill prevention, and that the latest engineering and safety procedures be used at all times when dealing with oil and its associated equipment.

1.3  **DESCRIPTION OF FACILITY**

The Wells Project is located on the Columbia River at River Mile 515.6. The power plant has a rating of 840 MW with ten Kaplan units. Operation of the project first started on September 1, 1967.

1.4  **OWNER**

Public Utility District No. 1 of Douglas County  
1151 Valley Mall Parkway  
East Wenatchee, Washington  98802-4497

1.5  **PROJECT SUPERINTENDENT**

Mike Bruno  
Wells Hydroelectric Project  
28905 US Highway 97  
Pateros, Washington  98846-9602

1.6  **RESPONSIBLE PARTIES**

Bill Dobbins, General Manager  
Office (509) 881-2220  
Res. (509) 884-1191

Ken Pflueger, Assistant Manager/Chief Engineer  
Office (509) 881-2245  
Res. (509) 662-6316

Lori Morris, Safety Specialist  
Office (509) 881-2243  
Res. (509) 784-4012

Mike Bruno, Project Superintendent  
Office (509) 881-2490  
Res. (509) 923-9524

Dub Simmons, Operations Supervisor  
Office (509) 881-2465  
Res. (509) 923-2362

Meaghan Vibbert, Public Information Officer  
Office (509) 881-2221  
Res. (509) 886-5930

Wells Dam Control Room Operator  
Telephone: (509) 923-2224 or (509) 923-2150  
DCPUD Ext. 3471/3472  
Mobile Radio(s)
1.7 RELATED AGENCIES

The following is a list of agencies that the facility may need or want to contact regarding oil spill prevention and cleanup.

Federal

1. U.S. Coast Guard
   Sector Portland
   Portland, Oregon
   Telephone: (503) 240-9310
   (For spill incidents occurring in southern Washington and the Columbia River.)

2. U.S. Environmental Protection Agency
   Seattle, Washington
   24-Hour Hotline: (206) 553-1263
   Address: U.S. EPA, Region X
   1200 Sixth Avenue, ECL 116
   Seattle, Washington 98101
   (The EPA is the pre-designated federal On-Site Coordinator for inland spills under the National Contingency Plan.)

3. National Response Center
   Washington, D.C.
   Telephone: 1-800-424-8802
   (toll calls) (202) 267-2675

State

1. Washington State Department of Ecology (Ecology)
   24-hour Emergency Spill Response
   Central Regional Office, Yakima
   Emergency Telephone: (509) 575-2490 (24-hour phone number)
   Address: 15 West Yakima Avenue, Suite 200
   Yakima, Washington 98902-3452

2. Washington State Emergency Management Division (EMD)
   24-hour Emergency Spill Response
   Telephone: 1-800-258-5990
   (Toll calls) (253) 912-4901 or (253) 912-4904

1.8 ENVIRONMENTAL SERVICES

Trained in-house personnel will perform all oil spill containment and cleanup activities. Outside environmental services shall not be used unless deemed necessary by the Project Superintendent.
Figure 1: Physical Layout – Wells Dam
2.0 FACILITY ANALYSIS

2.1 PHYSICAL LAYOUT

The project is situated midway between Chief Joseph Dam and Rocky Reach Dam at River Mile 515.6 on the Columbia River in Washington State, and develops a gross head of 76 feet for hydroelectric operation. The right (west) bank development is comprised of a rockfill embankment approximately 40 feet in height and about 2,300 feet long and fish facilities containing spawning channels and rearing ponds. The left (east) bank development consists of a rockfill embankment, approximately 160 feet in height at its maximum section, and about 1,000 feet in length. Concrete structures are situated between the two embankment sections; one fish facility structure at each end separated by a 1,000-foot structure comprised of 11 spillway bays integrated with 10 generating units, known as a “hydrocombine”.

As shown in Figure 1, six operational main transformers are located on the top deck of the hydrocombine at Elevation 795. Two additional transformers (2000 kVA) are located just downstream of the main transformers inside the switchyard (scheduled for installation in 2010/2011). The oil delivery intake for the turbine/governor system is also located on the top deck. Gasoline, waste oil, and propane storage tanks are located near the warehouse on the western side of the project. Day tanks for two emergency diesel generators and a main diesel storage tank are also located in this area. Transformers located onshore on the West bank include: two transformers near the emergency generators; two transformers in the vicinity of the fish hatchery; two transformers on the West Embankment in the monument area upstream from Generator Rehab Buildings A and B; one transformer at the Carpenter Island pumping station; one transformer on the West Embankment at Generator Rehab Buildings A and B, one transformer near the main Shop Building, and the spare main transformer located just north of the emergency generators on the West Bank.

2.2 OIL SPILL HISTORY

The Wells Project has experienced no oil spill event discharging harmful quantities of oil into navigable waters.

A "harmful quantity" of oil discharge, as defined in 40 CFR 110, is a discharge which:

- violates applicable water quality standards, or
- causes a film or sheen upon or discoloration of the water or adjoining shorelines, or
- causes a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

2.3 POTENTIAL SPILL EVENTS

The probability of an oil spill at the Wells Project is low. A significant oil spill could conceivably occur if there is a major equipment failure or a rupture of an oil storage container. A more likely event would be a slow leak from a piece of equipment due to a failed gasket or seal, cracked bushing, or a leaking oil plug. Other potential events which could result in an oil spill include equipment or oil handling accidents and sabotage.

A listing of the individual oil storage containers and oil-bearing equipment, and their respective maximum spill potential (volume of oil), is listed in Section 2.4. The methods of spill prevention, containment, and countermeasure for oil storage containers and oil-bearing equipment, including physical barriers and procedures to be followed by facility personnel, are described in Section 2.5.
Most oil-containing items have secondary containment. In many instances, the spilled oil would drain to the station drainage sump. However, it is not feasible to install a secondary containment system for the oil in the turbine runner hubs. Thus, an oil spill contingency plan for the turbine runner hubs has been prepared as required by 40 CFR 112.7 (see Section 5).

### 2.4 INVENTORY OF OIL-CONTAINING EQUIPMENT AND TYPE OF OIL

The main oil-containing equipment maintained by personnel of the Wells Project is listed below. The transformer oil noted for the equipment is petroleum based transformer oil.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>CAPACITY (gallons each)</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inside facility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbine Guide Bearings (Shell Turbo-T-68)</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>Turbine Runner Hubs (Shell Turbo-T-68)</td>
<td>4,000</td>
<td>10</td>
</tr>
<tr>
<td>Turbine Governor Systems (Shell Turbo-T-68)</td>
<td>3,308</td>
<td>10</td>
</tr>
<tr>
<td>Generator Thrust Bearings (Shell Turbo-T-68)</td>
<td>3,450</td>
<td>10</td>
</tr>
<tr>
<td>Clean Oil/Dirty Oil Tanks (Shell Turbo-T-68)</td>
<td>Max. 9,700</td>
<td>2</td>
</tr>
<tr>
<td>Oil Storage Room (Turbine oil, greases, &amp; composites of oil)</td>
<td>Approx. 1,500</td>
<td>1</td>
</tr>
<tr>
<td>Grounding Transformers (Transformer oil)</td>
<td>30</td>
<td>11</td>
</tr>
<tr>
<td>Potential Transformers (Transformer oil)</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td><strong>On deck of facility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Transformers – T1 thru T5 (Shell Diala-AX)</td>
<td>14,400</td>
<td>5</td>
</tr>
<tr>
<td>230/115 Autotransformer – T6 (Shell Diala-AX)</td>
<td>9,000</td>
<td>1</td>
</tr>
<tr>
<td>Standby Generator (Diesel)</td>
<td>250</td>
<td>1</td>
</tr>
<tr>
<td>Potential Transformers (Transformer oil)</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>Potential Transformers (Transformer oil)</td>
<td>14,45</td>
<td>3</td>
</tr>
<tr>
<td>Current Transformers (Transformer oil)</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>Current Transformers (Transformer oil)</td>
<td>90</td>
<td>4</td>
</tr>
<tr>
<td>2000 kVA Transformers – T12 &amp; T13 (Transformer oil) *</td>
<td>735</td>
<td>2</td>
</tr>
<tr>
<td>Oil Delivery Truck (Shell Turbo)</td>
<td>Max. 7,000</td>
<td>1</td>
</tr>
<tr>
<td>Vickers Oil Pumps (Shell Turbo)</td>
<td>200</td>
<td>2</td>
</tr>
<tr>
<td><strong>Onshore</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spare Main Transformer near Shop Building (Shell Diala-AX)</td>
<td>15,230</td>
<td>1</td>
</tr>
<tr>
<td>Gas Tank (Gasoline)</td>
<td>4,000</td>
<td>1</td>
</tr>
<tr>
<td>Waste Oil Tank (Turbine oil)</td>
<td>1,000</td>
<td>1</td>
</tr>
<tr>
<td>Propane Storage Tank (40’ north of gas tank)</td>
<td>1,000</td>
<td>1</td>
</tr>
<tr>
<td>225 kVA Transformers near monument area – T8 (Transformer Oil)</td>
<td>200</td>
<td>1</td>
</tr>
<tr>
<td>225 kVA Transformer near monument area – T9 (Transformer Oil)</td>
<td>307</td>
<td>1</td>
</tr>
<tr>
<td>300 kVA Transformer at Carpenter Is. pump station – T10 (Transformer Oil)</td>
<td>99</td>
<td>1</td>
</tr>
<tr>
<td>300 kVA Transformer at buildings on West Bank – T17 (Transformer Oil)</td>
<td>177</td>
<td>1</td>
</tr>
<tr>
<td>1000 kVA Transformers near Fish Hatchery – T7 &amp; T11 (Transformer oil)</td>
<td>480</td>
<td>2</td>
</tr>
<tr>
<td>1000 kVA Transformer at Fab Shop – T16 (Transformer Oil)</td>
<td>428</td>
<td>1</td>
</tr>
<tr>
<td>3750 kVA Transformers near diesel generator – T14 &amp; T15 (Transformer oil)</td>
<td>1,058</td>
<td>2</td>
</tr>
<tr>
<td>Generator Day Tanks (diesel)</td>
<td>1,250</td>
<td>2</td>
</tr>
<tr>
<td>Bulk Storage Tank (diesel)</td>
<td>4,000</td>
<td>1</td>
</tr>
</tbody>
</table>

* Scheduled for Installation in 2010/11.
The six onshore tanks are above ground storage tanks. The gas tank is a double wall steel with a sounding well to detect leaks. The waste oil tank is welded steel and it has secondary containment. The diesel ‘day tanks’ are double-containment UL142 listed steel tanks located on the power modules. The bulk diesel storage tank is a double wall “FIREGUARD”-type tank. The propane tank is an ASME welded steel tank. Tanks are compatible with the contents that they hold.

An oil inventory list noting the locations of containers and oil-filled operating equipment holding less than 55-gallons of oil for the Project is maintained by the District and is updated on an annual basis. The inventory list is kept by the District’s Operations Supervisor on-site.

The District maintains records of the amounts of oil used on-site for all project equipment containing or using oil. These records are kept on site in the oil system transfer pump room.

2.5 OIL CLEAN-UP MATERIALS AND SYSTEMS

Best Management Practices or other control measures are to be utilized to prevent any oil-contaminated stormwater on the Project site from entering state waters. No emulsifiers or dispersants are to be used in state waters, including (a) water contained in sumps or (b) water contained in other areas that discharge to the sumps or discharge to the Columbia River.

2.5.1 OIL CLEAN-UP MATERIALS

The Wells Project has the following materials for use in cleaning up and containing spilled oil:

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber-Reinforced Rubber Bags:</td>
<td>Hydrocombine</td>
</tr>
<tr>
<td>- 1,000 Gallon Capacity</td>
<td>Hydrocombine</td>
</tr>
<tr>
<td>Floating Skimmer Pump</td>
<td>Hydrocombine</td>
</tr>
<tr>
<td>Two Portable Pumps</td>
<td>Hydrocombine</td>
</tr>
<tr>
<td>Oil-absorbent Material</td>
<td>Hydrocombine and Warehouse</td>
</tr>
<tr>
<td>Oil Spill Response Mobile Unit *</td>
<td>Mobile Response Trailer at Warehouse</td>
</tr>
<tr>
<td>- Boom (1000-foot)</td>
<td>Mobile Response Trailer at Warehouse</td>
</tr>
<tr>
<td>- Tool Box</td>
<td>Mobile Response Trailer at Warehouse</td>
</tr>
<tr>
<td>- PPE Bags</td>
<td>Mobile Response Trailer at Warehouse</td>
</tr>
<tr>
<td>- Decon Station</td>
<td>Mobile Response Trailer at Warehouse</td>
</tr>
<tr>
<td>- Absorbents</td>
<td>Mobile Response Trailer at Warehouse</td>
</tr>
<tr>
<td>- Miscellaneous Supplies</td>
<td>Mobile Response Trailer at Warehouse</td>
</tr>
</tbody>
</table>

* A complete inventory of the Oil Spill Response Mobile Unit (trailer) is contained in Appendix F

Fiber-Reinforced Rubber Bags & Portable Pumps

The fiber-reinforced rubber bags are suitable for oil disposal purposes. These bags, when used together, can hold the oil from all but the largest oil-containing item, the transformers. If a transformer fails and results in a large spill, the District will acquire the services of an oil tanker to transport the oil. Individual bags can be used for smaller spills. Two portable pumps are available for pumping spills from containment areas into the fiber-reinforced rubber bags or tanker. The District replaced the fiber reinforced bags in 2004. The replacement bags will be inspected at least every 5 years as part of the SPCC plan review and evaluation to determine if the bags should be replaced.
2.5.2 SYSTEMS

Hydrocombine Drainage System

The drainage system for the Wells Project is such that most of the floor drains would convey any oil spills and all other liquids to the station drainage sump. The floor drains in the Project have been identified and mapped. Any floor drains that are no longer needed have either been blocked or sealed. A map of the active floor drains is posted outside the Control Room for use by Operators and other personnel in the event of a spill. Maintenance personnel and/or response personnel (in the event of a spill) can safely reach the drainage sump through a 3’x3’ hatch covering opening; with several ladders and landings leading down to the sump area. Known sources of oily water are directed to an oil/water separator (see discussions below regarding the oil/water separator).

A rope type oil skimmer in the drainage sump operates continuously to collect and remove minor amounts of oil that may accumulate in the sump. These minor amounts of oil are automatically deposited in a reservoir. The oil within the reservoir is pumped to the oil/water separator on the right bank for treatment. From the sump, water level controls would automatically start one or more pumps to discharge the liquid into the river. A transducer/oil sensor has been installed in the sump to detect the presence of oil and announce a signal to the control room. The oil sensor alarm set-point for the monitor is set for an initial alarm at the 0.3 millimeter level.

At this signal, the pumps would be stopped immediately. The water and oil would be allowed to rise to a level so that the floating skimmer pump could be used to manually pump the floating oil into one of the fiber-reinforced rubber bags. The pumps would be controlled manually to keep the oil in the sump until the oil was removed. The volume of the sump is about 125,000 gallons and normal drainage inflow is minimal. If a spill were to occur during the night shift, the staff would execute all necessary measures to immediately respond to the spill and call additional staff, if required, for the cleanup operation. The oil-detection annunciator is tested routinely.

Oil/Water Separator

Two known sources of oily water in the Hydrocombine that formally discharged to the Hydrocombine drainage system include water draining into the turbine pits in Units 1 through 10 (approximately 200 gpm) and the Compressor Room Equipment drainage at Unit 5, Elevation 752 (approximately 20 gpm). Modifications to the turbine pit drain lines and the compressor room equipment drain lines in 2009 direct the oily water to an oil/water separator located on the West Bank for eventual release to the tailrace, instead of to the drainage sump. Any incidental oil that collects in the drainage sump (caused by accidental spills, etc.) is removed from the drainage sump by the rope skimmer and is likewise directed to the oil/water separator.

Intake Deck Transformer Drain System

A schematic of the drainage system for the transformers at the Intake Deck (Elevation 795) is shown in Figure 2. This figure reflects the transformer drain lines, containment vault and oil/water separator system. The drainage piping from each of the transformers conveys rainwater that falls within the transformer containment to a secondary containment vault on the West Bank or to a pump tank at Elevation 776 in the East Fish Facilities structure. Water in the pump tank is pumped to the drainage piping that connects to the secondary containment vault on the West Bank. In the event of an oil spill within the transformer containments, the oil would drain to the pump tank or secondary containment vault (similar to the rainwater). Rainwater that collects in the containment tank is pumped manually up to the oil/water separator. Oil that collects in the containment vault (from a leak in a transformer) is pumped to an oil-recovery truck for disposal offsite.
2.5.3 CLEAN-UP OPERATIONS AND DISPOSAL RECORDS

In the event of a discharge of oil, fuel or chemicals in state waters or onto land with a potential for entry into state waters released from project operation, maintenance activities or construction, effort will begin immediately to complete the containment, remove visible floating oils from the water, and clean-up the spilled materials, taking precedence over normal work. Clean-up shall include proper disposal of contaminated materials and oil, and used clean-up materials. New supplies will be restocked as soon as possible. No emulsifiers or dispersants will be utilized in the clean-up operations (whether liquid is contained in the sumps or other areas that discharge to the sumps or the Columbia River).

Copies of the disposal records of the contaminated materials and oil, and used clean-up materials are kept on file. In addition, the records of proper disposal are kept in the oil consumption records.

2.6 SPILL PREVENTION, CONTAINMENT, AND COUNTERMEASURE

2.6.1 EQUIPMENT AND EQUIPMENT COMPONENTS

The spill prevention, containment and countermeasure for specific equipment and components of the equipment are described below. Secondary containment capacity provided for oil-containing equipment is 110 percent of the largest volume of oil for any container or equipment.

TURBINES

Turbine Guide Bearings

If leakage occurs, the oil will drain to the packing box sumps and be pumped to the oil/water separator (see Section 2.5). The turbine/generators will shut down automatically with a low oil level alarm.
The best prevention of turbine bearing leakage is through observation by maintenance and operation personnel. Any noticeable drop in the bearings’ oil levels or any abnormal vibrations should be reported to the Project Superintendent.

**Turbine Runner Hubs**

The probability of spillage of runner hub oil is minimal if all valves, ports, etc., are checked out in accordance with the maintenance manual when the turbines are returned to service. If leakage does occur, the affected turbine would be immediately put out of service and the causes repaired. During normal maintenance, the surface of the hubs shall be inspected for damage caused by cavitation. If oil leakage is discovered through normal daily shift inspection, or while returning a turbine unit to service, the leak shall be reported immediately to the Project Superintendent.

If oil leakage is apparent, the affected turbine shall be immediately put out of service and the cause(s) of the leak repaired. Oil shall be cleaned up using sorbent materials and disposed of in properly labeled portable drums or disposable bags.

Oil leakage of the runner hubs creates potential for a spill directly into river waters. Careful observation and communication by facility personnel is essential in keeping this risk to a minimum. An oil level drop in the governor oil system indicates a possible spill to the river waters due to leakage from the turbine runner hubs, and personnel shall be prepared to administer the Oil Spill Contingency Plan. Any noticeable drop in the governor oil system level shall be reported to the Project Superintendent.

**Turbine Governor Systems**

One turbine governor system is located in each unit at Elevation 705. As presently arranged, if the sump tank or pressure tank bursts, the oil would drain into the station drainage sump to reduce fire hazard.

The oil is directed to the floor drains at Elevation 705 and in the elevator pits. This floor has a 6-inch curb all around except at the elevator door sill. In the event of a tank rupture, oil would be directed to the sump. Maintenance and operations personnel will react to abnormal governor pressure readings and pipe leakages by reporting them to the Project Superintendent.

**Generator Thrust Bearings**

If leakage occurs, the oil will drain to the packing box sumps (turbine pits) and be pumped to the oil/water separator (see Section 2.5). The turbine/generators will shut down automatically with a low oil level alarm. In the event of a bursting-type action of the bearing oil reservoir, the unit will shut down automatically. Some of the oil from the reservoir will collect in voids within the unit and can be pumped out and into the dirty oil tank or into fiber reinforced rubber bags stored at the project for cleaning up and containing spilled oil. Some of the oil will collect in the packing box sumps and be pumped to the station drainage sump where it will be contained and collected.

Any noticeable drop in the level of the thrust bearing reservoir or any abnormal vibration shall be reported to the Project Superintendent.
TRANSFORMERS

Grounding and Potential Transformers (inside facility)

There is one grounding transformer in each unit at Elevation 736. A spare grounding transformer is located in Unit 7, Elevation 764. Since the capacity of the grounding transformer is only 30 gallons, a spill from this piece of equipment is not likely to cause a release in harmful quantities. Small leaks would probably be detected before oil reaches the floor drains. Any operator noticing a leak shall notify the Project Superintendent and contain as much oil as possible using absorbent materials. Otherwise, oil spilled from the grounding transformers would drain through floor drains into the station drainage sump, where the spilled oil would be detected and cleaned up as described in Section 2.5. The cause of the leak shall be repaired or the unit shall be replaced as soon as possible.

There are three potential transformers in each unit at Elevation 720 holding approximately one gallon each. Leaks from these units would also reach the station drainage sump. They shall be handled similarly to the grounding transformers.

Main Transformers (T1 thru T5)

The transformers could possibly burst or be struck by an object that could cause leakage of oil onto the deck of the Hydrocombine.

Spilled oil is contained by barrier walls around each main transformer and the transformer drain system conveys the liquid to the West Bank secondary containment tank (see Figure 2 and Section 2.5).

Spare Main Transformer

The spare main transformer is stored in the vicinity of the Shop Building on the West Bank. The spare transformer has its own secondary containment area with no outlet. The containment area is monitored on a regular basis (see Section 3.0). Any oil or stormwater found in the containment area is pumped out and disposed of in properly labeled portable drums.

230/115 Autotransformer (T6)

The autotransformer could possibly burst or be struck by an object that could cause leakage of oil onto the deck.

Spilled oil is contained by barrier walls around the autotransformer, and the transformer drain system conveys the liquid to the West Bank secondary containment vault (see Figure 2 and Section 2.5).

Standby Generator

The standby generator is located on the Elevation 795 deck. The generator is enclosed in a metal building. There are drains in the low points of the floor which lead to the transformer drain system (see Section 2.5).

Potential Transformers (on the Elevation 795 Deck and in Warehouse)

There are six potential transformers with an oil capacity of 16 gallons each on the Elevation 795 deck and three potential transformers with an oil capacity of 14.45 gallons each. An added metal housing provides adequate secondary containment. Since the transformers are on poles
above the deck surface, a flexible hose connects the secondary containment to 2-inch drainage piping. A flexible hose is used instead of rigid piping, since a vehicle colliding with the hose would not rupture it. Hoses are inspected for any abnormalities such as leaks or damage during the weekly inspection of the transformers. If a problem is found then the inspection report notes the problem and necessary action is taken. See Section 3 for additional information regarding inspections/maintenance.

The draining system is connected to that of the main transformers (see Section 2.5, ‘Transformers Drain System’ for flow information and cleanup).

There is one spare potential transformer, with an oil capacity of 16 gallons, located in the warehouse.

**Current Transformers**

There are six current transformers on the Elevation 795 deck. Two of the transformers hold 35 gallons and the other four hold 90 gallons. Their secondary containment systems are the same as those used for potential transformers. A spare of each type of transformer is stored at Elevation 705 at Unit 10.

**2000 kVA Transformers – T12 and T13**

Two 2000 kVA transformers are located on the Elevation 795 deck; T-12 at the West End in the vicinity of Units 2 and 3; and T-13 in the vicinity of Units 6 and 7. Each of these transformers holds 735 gallons. Their secondary containment systems consist of an encircling wall able to contain 110 percent of the volume of oil. The drain for stormwater is tied into the drain systems from Transformers T1 and T3. Drainage flow is described under ‘Transformers Drain System’; see Section 2.5. (Installation of transformers is scheduled in 2010/2011.)

**West Bank Transformers – T7, T 8, T9, T10, T11, T14, T15, T16 and T17**

There are several transformers (with secondary containment systems) located on the West Bank, as shown in Figure 1. The capacity of each of these transformers is described in Section 2.4. The secondary containment system of each transformer contains 110 percent of the volume of oil.

**ELEVATION 745 – PUMPS**

**Vickers Oil Pumps**

The Vickers Oil Pumps are located on the east and west fish intake decks (Elevation 745) and control the gates that regulate the volume of water that flows out of the east and west fish attraction facilities. If the pumps leaked oil, it could flow into the tailbay of the east and west facilities and into the east fish attraction facilities, around a hatch cover in the deck.

The District has installed a metal barrier around the Vickers pumps to contain oil leaks. The pumps are located under an overhang and do not need a drainage valve for rainwater or snow melt.

**2.6.2 STORAGE CONTAINERS**

The spill prevention, containment and countermeasure for storage containers are described below. It should be noted that proper containment is provided around each storage containers or around a
combination of storage containers as appropriate. The containment capacity provided for the storage containers equals the volume of the largest container plus 10 percent.

ELEVATION 752 – TANKS & STORAGE ROOM

Clean Oil Tank and Dirty Oil Tank

The clean oil tank and the dirty oil tank are located in a separate oil storage room at Elevation 752 in Unit 4. There are no openings except a four-foot-wide doorway protected by a fire door. The doorway has a concrete curb six inches high and an aluminum plate that extends 31.5 inches above the floor of the room.

A float switch has been installed to detect the presence of oil within the storage room. In the event of a relatively slow leak, this would inform the operator in time to alert the Project Superintendent. A sudden rupture of a nearly full tank will be retained in the oil storage room by the aluminum plate barrier.

Oil Storage Room

The oil storage room is located at Unit 9, Elevation 752 and approximately 1,000 gallons of oil are stored in drums located in the room. The room is curbed and an oil spill will drain to the station drainage sump.

OTHER TANKS

Gas Tank

A gasoline storage tank was installed to the east of the warehouse in the Fall of 1991 and has secondary containment and a sounding well to detect leaks. The tank area is not fenced, but the tank is locked and the area is lighted.

Waste Oil Tank

The waste oil tank is relocated in a fenced and locked concrete pad to the north of the warehouse, and a metal barrier around the tank provides secondary containment. The waste oil tank has ¼-inch thick steel walls and is pressure rated to 85 psi. The tank is suitable for the storage of waste oil. A manually-operated, non-flapper type valve has been provided to periodically drain rainwater or snow melt from the containment area.

Diesel Tanks

The diesel ‘day tanks’ are double-containment UL142 listed steel tanks located on the power modules.

The bulk diesel storage tank is a double wall “FIREGUARD”-type tank located in the same area as the Gas Tank. The tank area is not fenced, but the tank is locked and the area is lighted.

2.6.3 OIL DELIVERY TRUCKS

The spill prevention, containment and countermeasure for oil delivery trucks are described as follows:

Any loose hose connection or accidental tank truck rupture will cause a spill on the Elevation 795 deck. The oil could enter the deck drains and be conveyed to the tailrace. District
personnel shall direct the delivery truck driver to place a seal over the deck drains so that a spill will be contained on the deck.

Special care shall be taken by operating personnel when connecting and disconnecting hoses from the oil delivery truck. Tank truck loading and unloading procedures shall meet requirements established by the Department of Transportation (see Appendix D and Section 5.4). To guard against the possibility of a runaway gantry colliding with the tank truck, the tank truck should not be parked in an area that allows this situation to occur.

2.6.4 OIL TRANSFER PROCEDURES

The District has developed written oil transfer procedures that cover communication, proper valve alignment, etc. All oil-handling personnel will be briefed on the procedures periodically. Best Management Practices and industry standards will be employed for protecting water quality and preventing and containing oil spills when performing oil transfers.

2.7 SECURITY

The facility is manned 24 hours a day and is monitored by video camera. Monitors are located in the office and the control room. The entrance has a gate which is normally closed. Once past this initial screening, a person intent on vandalism could access the equipment on the deck of the facility and could cause oil to be spilled. This person would probably be noticed, however, since employees are usually on the deck. It would be more difficult to go inside the facility unnoticed. Facility entrances at the El. 795 deck are secured by electronic key pads after normal working hours. Other facility entrances are secured by electronic key pads 24 hours a day. No incidents of vandalism have occurred in the history of this facility.

The adjacent onshore storage facilities are accessible by the public, but all facilities there are locked. The 4,000-gallon gasoline tank has locked valves and the area is illuminated. The 1,000-gallon waste oil tank is located in the fenced storage area to the north of the general warehouse, which has a locking gate and barbed wire. The tank has secondary containment consisting of a metal barrier constructed around the tank. The gate to this area will be locked when the area is unoccupied.

The shop building on the West Bank is accessible by the public, but all facilities there are locked. A security fence with a locking gate surrounds the diesel generators, also located on the West Bank.

3.0 MAINTENANCE AND INSPECTION PROCEDURES

3.1 INSPECTIONS – DAILY

Visual inspection of all oil-containing transformer equipment, transformer containment areas, turbine equipment, oil storage tanks, and oil-carrying pipelines shall be done on a daily work-shift basis. In addition, the inspection includes the following:

- Check all fuel and lubrication hoses, oil drums, oil or fuel transfer valves and fittings, etc. for drips and leaks. Three units will be inspected each day, rotating through all ten units approximately every 3 days.
- Inspect equipment containing oil and view oil-level gauges. Three units will be inspected each day, rotating through all ten units approximately every 3 days.
Whenever oil or grease is observed on the sorbent materials, the sorbent materials will be removed and properly disposed of, and new sorbent material will be placed.

During snowy or icy conditions, close (and at minimum daily) inspections will be conducted of the containment areas and any containment drains. Any observed stormwater pooling in containment areas will be removed.

Inspect oil/water separator and the secondary containment vault at the oil/water separator for proper operation.

Stormwater in transformer and oil-filled operating equipment containment areas on the intake deck (Elevation 795) will be monitored for the presence of oil. Contaminated (and non-contaminated) stormwater drains into the drainage piping which conveys the liquid to the secondary containment vault on the West Bank (see Figure 2). All liquid in the containment vault is inspected by operators before being manually pumped up to the oil/water separator prior to its release into the tailrace. If oil is present in other oil-filled equipment containment areas, the oil-contaminated stormwater shall not discharged to the ground or state waters but properly disposed of and recorded (as described in Section 7.6).

Crews shall be instructed to report any signs of oil leakage to the chief operator on duty as soon as possible. The chief operator will determine the course of action to be taken.

3.2 OTHER ROUTINE INSPECTIONS / MAINTENANCE

At least annually, thorough routine inspection of the oil-containing equipment, storage tanks, and related support systems shall take place. At minimum, this in-depth inspection shall include the following areas:

- Storage tank seams and pipe openings shall be observed for leakage, corrosion, or other questionable deterioration.
- The floating skimmer and portable sump pumps shall be cleaned and mechanically tested.
- Sump pumps shall be cleaned and mechanically tested.
- Secondary containment structures shall be inspected periodically and verified such that they are impervious (cracks shall be filled, and pipe penetrations shall be caulked, if required).
- All oil-carrying pipelines shall be subjected to examination and routine maintenance including flange joints, expansion joints, valve glands and bodies, catch pans, valve locking devices, and metal surfaces of any kind.
- Piping supports shall be observed for corrosion and abrasion, and for the proper expansion and contraction. Supports that have deteriorated or do not meet original design considerations shall be replaced or repaired.
- The facility security system shall be tested, and fencing and signs shall be inspected and repaired as needed.
- Governor oil pressure and sump level alarms and trip circuits shall be tested during biennial inspection and maintenance of each generating unit. Pressure vessels are also inspected by state inspectors every two years.
- The gasoline storage tank stilling well sounded with a dipstick to detect the presence of fluid.
- Test the float switch located in the oil storage room on Elevation 752 at Unit 4.
- Wash water containing oils, grease or other hazardous materials resulting from wash down of equipment or working areas shall be contained for proper disposal and shall not be discharged into state waters.

- When conducting in-place maintenance work on transformers, transporting transformers and transferring transformer oil, Best Management Practices or other control measures will be utilized and be in accordance with industry standards for protecting water quality, and preventing and containing oil spills.

- The District shall obtain prior approval from Ecology before breaching containment areas for reasons other than containment area maintenance.

- All oil-gauges (on oil-filled operating equipment and storage containers) have appropriate level markings (including sight-glass gauges) to ensure Project Operators and maintenance personnel can easily identify an unusual condition.

3.3 INSPECTION LOGS

All inspection activities shall be recorded in a log and signed by the appropriate supervisor and inspector. The inspection records shall be maintained for a minimum period of three years. Detailed written inspection and recording procedures are given in the Standard Operating Procedures Manual, which shall be kept with the SPCC Plan in the locations listed in Section 6.6 of the SPCC Plan.

These records are incorporated in this report by reference.

3.4 REMOVAL/DISPOSAL RECORDS

The District shall record the removal or discharge of stormwater (contaminated and non-contaminated) from containment areas. These removal records are kept on site and are available for inspection by Ecology. This includes pumping of water from the secondary containment vault at the oil/water separator.

Annually, hazardous materials (such as, batteries, light bulbs, etc.) are disposed of properly. Disposal records of contaminated cleanup supplies and proper disposal records of hazardous materials are kept in the Wells Project Office.

4.0 TRAINING OF PERSONNEL

The Project Superintendent shall be responsible for providing an annual training program for the Wells Project facility oil-handling personnel.

Training programs and periodic briefings shall review the SPCC Plan, the Oil Spill Contingency Plan, and the Standard Operating Procedures Manual, and shall describe actual experiences, recent spill events or failures, new or preventative control and cleanup measures, and use of the oil spill clean-up materials. Training shall also include review of all District forms and documentation procedures. Crews must understand the SPCC Plan, the Oil Spill Contingency Plan, and the Standard Operating Procedures Manual. As part of the training, staff will be acquainted with the floor drain system and the location of the posted floor drain maps, and on how to respond in the event of a spill.
5.0 OIL SPILL CONTINGENCY PLAN

The purpose of Sections 5.0 and 6.0 of this SPCC Plan is to meet the U.S. Environmental Protection Agency requirements for oil spill contingency planning as defined in 40 CFR 112. Sections 5.0 and 6.0 comprise the Oil Spill Contingency Plan for the Wells Hydroelectric Facility.

5.1 COMMITMENT TO CONTINGENCY PLAN

The District is committed to providing the manpower, equipment, and materials required to expeditiously control and remove any harmful quantity of oil discharged. This will include hiring an oil spill response contractor if needed.

5.2 NEED FOR CONTINGENCY PLAN

The Wells Project Hydrocombine is located over the Columbia River. Therefore, any uncontained spills that occur on or in the Hydrocombine could drain directly into the Columbia River. Of all of the oil-containing structures at the Wells Project, it is not feasible to provide complete secondary containment for the turbine runner hubs or an oil delivery truck during a delivery period.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>CAPACITY (gallons each)</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbine Runner Hubs</td>
<td>4,000</td>
<td>10</td>
</tr>
<tr>
<td>Oil Delivery Truck</td>
<td>Max. 7,000</td>
<td>1</td>
</tr>
</tbody>
</table>

Thus, a contingency plan is required under 40 CFR 112.7 (d).

5.3 TURBINE RUNNER HUBS

It is not feasible to prevent oil from the turbine runner hubs from reaching river waters in the case of a leak. As with any hydroelectric facility, large quantities of river water are rushing past and turning the turbine blades while the turbine is in operation. Thus, the turbine runner hubs are necessarily in contact with the water. Also, it is impossible to place an appropriate alarm (flowmeter or oil detector) in connected oil piping, since oil is circulating continuously between the turbine runners and the oil tanks.

In the case of a complete failure of the runner hub (which is highly unlikely), the pressure alarm in the oil storage tank would notify operators of the problem and contingency measures would start immediately. A slow leak in a turbine runner hub would not be noticed immediately. In such an event, it may be several weeks before the oil tank level has lowered noticeably, even though oil levels are carefully monitored.

Once a small or large leak is discovered, the turbine will be shut down, the gates to that turbine will be closed, and the cause of the leak repaired. If it is determined that water quality standards may have been exceeded due to the spill, then clean-up actions will be initiated as described in Section 5.5.
5.4 OIL DELIVERY TRUCK

At the Wells Project, oil is used for insulating and lubricating purposes only. Therefore, "consumption" consists only of replacing dirty oil with clean oil and is a rare occurrence. A 7,000-gallon oil delivery is needed approximately once every ten years.

Containment is not feasible due to the design of the drainage system and the need to keep the area accessible to large vehicles. Nearby drains lead directly to the river and cannot be connected to the other containment systems on the deck. The following control measures should prevent oil from reaching river waters.

The oil delivery truck shall be supervised while it is in the Wells Project area. The truck operators will be given the “Notice to Tank Truck Drivers” (Appendix D) and directed to the oil pumping station. Before oil transfer begins, the truck shall be visually inspected for obvious defects. A Wells Project employee or the delivery person shall plug up the drains closest to the pumping station to provide some secondary containment volume in the sloped areas on the deck of the hydrocombine. Minor leaks or spills will be contained within this volume. A portable pump and fiber-reinforced rubber bags shall be on hand. Unless the truck suddenly bursts, the portable pump should be able to handle the flow of oil from a major spill. After oil transfer is complete, the supervisor shall make sure that the truck is completely disconnected and connecting hoses properly stored before the truck will be allowed to leave the oil transfer area.

If, in spite of the above measures, oil is not contained, then the contingency measures described in Section 5.5 shall be followed.

5.5 CONTINGENCY PROCEDURES

The importance of oil spill prevention, containment, and clean-up shall be stressed during the annual safety training meetings. As discussed in Section 4.0, "Training of Personnel," all work crews will be familiar with the SPCC Plan and the Oil Spill Contingency Plan. As soon as an employee notices an oil spill of any kind, he or she will notify the Control Room at the dam. Notification of all interested parties shall then follow the notification procedures outlined in Section 6.0. If the spill is not contained within the facility, the oil spill discoverer shall recover as much oil as is feasible using the oil-containing equipment stored on site while waiting for further instruction.

Once notified, the Project Superintendent shall concurrently follow the notification plan described in Section 6.0 while organizing oil containment, recovery, and clean-up operations. For extended clean-up operations, the Control Room at the dam shall be the communication center.

Wells Project personnel shall provide the emergency containment and oil collection with the supplies on hand (see Section 2.4). When it is determined that a thorough clean-up of any oil spill in harmful amounts is beyond the capabilities of the on-site resources of the Wells Project, an oil spill response contractor shall be hired. The Department of Ecology’s “Hazmat Spill Contractor List”, updated in July 2009, is contained in Appendix B of this plan.

The most recent updated list can be obtained through the Department of Ecology’s web page (list is under the “When Spills Happen” section): http://www.ecy.wa.gov/programs/spills/spills.html

The Project Superintendent shall determine what is to be done with the discharged oil; whether it can be filtered and reused by the District or to be disposed of by an approved method. Any oil that reaches the
ground may require the removal and disposal of contaminated soils. A list of Regional Treatment Centers for Petroleum Contaminated Soils (January 2010) is contained in Appendix C of this plan.

5.6 COMPATIBILITY WITH STATE AND REGIONAL PLANS

The current state and regional oil spill contingency plans that are applicable to the Wells Project location have all been incorporated into the Northwest Area Contingency Plan and Geographic Response Plans.

The 2009 Northwest Area Contingency Plan and associated Geographic Response Plans (May 2004) are available on the Internet at [http://www.rrt10nwac.com](http://www.rrt10nwac.com). Wells Project personnel and any contractor hired by the District shall conform to the guidelines of the Northwest Area Contingency Plan. This includes following guidelines on oil dispersant use, in-situ burning, and oily waste treatment and disposal. Oil dispersants should not be used unless explicit permission is given by the Environmental Protection Agency, Region 10. In-situ burning is allowed with permission under certain circumstances outlined in the Northwest Area Contingency Plan.

Wells Project personnel and any contractor will cooperate completely with any on-site coordinator and spill response team provided by the state, regional, or federal government.

6.0 NOTIFICATION AND DOCUMENTATION REQUIREMENTS

6.1 IN-HOUSE NOTIFICATION

The discoverer of an oil spill at the Wells Project shall immediately notify the Hydrocombine Control Room. The control room shall notify the day-shift/chief operator. Figure A-1, The SPCC Notification Chart, shows the lines of communication to be followed in the event of an oil spill incident.

It is the responsibility of the day-shift supervisor or night-shift chief operator or designee to notify the appropriate clean-up crews, the Manager, Chief Engineer/Assistant Manager, Safety Specialist, and Project Superintendent.

Clean-up action shall be taken in accordance with Section 2.5 of the SPCC plan.

6.2 IMMEDIATE REPORTING REQUIREMENTS

The Safety Specialist shall be responsible for oil spill notification to the appropriate State and Federal officials. This shall be done as soon as possible after proper assessment and quantification of the oil spill occurrence.

Federal law requires that all spills of oil in harmful quantities into navigable waters or threat of release be immediately reported by the spiller to the National Response Center (NRC). In addition, Washington State law requires that all spills of oil into Washington State waters must be immediately reported to the Washington State Emergency Management Division (EMD). The Northwest Area Contingency Plan also requires the notification of the U.S. Environmental Protection Agency (EPA), Seattle for spills occurring in inland waters of Washington, Oregon, and Idaho. Spills into state waters and spills onto land with a potential for entry into state waters, or other significant water quality impacts, shall be reported immediately (within one hour) to the Washington State Department of Ecology (Ecology), Central Regional Office. Any oil detected in the sumps requires immediate cleanup and EMD and NRC notification.

The appropriate Federal and State contacts for the Wells Project are as follows:
REQUIRED NOTIFICATION OF OIL SPILLS:

1. National Response Center (NRC)  ....................................................   1-800-424-8802
   Toll Call: (202) 267-2675

2. Emergency Management Division  ...................................................   1-800-258-5990
   (Washington State EMD) Toll Call: (253) 912-4901
   (253) 912-4904

3. US Environmental Protection Agency (EPA) ..........24-Hour Hotline  (206) 553-1263
   Region X, Seattle............................................................................................................

   Central Regional Office, Yakima

When reporting a spill or release to the above agencies, it is important to collect as much information as possible. That information should include:

- Date and Time of call
- Caller Name, Address, & Phone Number
- Name of Person Taking the Report
- Facility information:
  - Name
  - Type of Facility
  - Location of incident
  - Date and Time the Incident occurred or was discovered
  - Description of spill (i.e. size, color, smell, etc.)
  - Type of Incident (Explosion, Collision, Grounding, etc.)
  - Materials released
  - Source of Materials released
  - Estimated Amount released
  - Total Potential quantity that could be released
  - Environmental media impacted or potentially impacted by spill (i.e. air, water, ground/soil)
  - Weather/Sea Conditions
  - Point of Contact (Responsible Party Name & Phone #)
  - Facility Agent(s) (Name & Phone)
  - Name and contact information of insurance carrier
  - Description of who is on-scene and what response activities are being done or have been completed
  - Have excavations occurred
  - Other Agencies notified
For liability purposes, the calls should be followed with a letter (including the Spill Incident Report) to be filed in the oil spill log and to be sent to the EPA and Ecology listing the information given and received during the notification phone calls. The Spill Incident Report to Ecology’s Central Regional Office will be provided within fifteen (15) days of the incident (spills into state waters, or onto land with a potential for discharge to state waters). There can be civil and criminal charges for not reporting discharges in a timely manner or for reporting false information. Thus, documentation of the notification call is important. The addresses are shown below:

U.S. EPA, Region X
1200 Sixth Ave., ECL 116
Seattle, Washington 98101

Washington State Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, Washington 98902-3452

6.3 NOTIFICATION TO OTHERS

The local fire department shall be notified by the day-shift chief operator or the night-shift chief operator or designee if there is a potential fire hazard concurrent with the oil spill occurrence.

The local police department shall be notified by the day-shift chief operator or night-shift chief operator or designee if there is evidence of sabotage, misconduct, or other wrongdoing.

The responsibility of contacting and/or responding to the news media shall be the exclusive responsibility of the Public Information Officer.

6.4 DOCUMENTATION OF SPILL EVENT

A Spill Incident Report (report) shall be kept of all oil spill events. The report shall contain the date and time of discovery, actions taken, telephone calls, and weather conditions. It shall be a complete account of the spill event through completion of clean-up and restoration. A copy of the report shall be sent to the Project Superintendent and Safety Specialist upon completion. The chief operator shall keep the report on file in the event of any future legal or government action that may result from the spill event.

The report shall be completed by the initial oil spill discoverer along with the operator who was on duty at the time of the spill. All reports of oil spill shall be kept on file for a minimum of three years and shall include the following information:

1. Date and time of the spill, and the location where it was first observed.
2. Type and quantity of the oil spill.
3. Cause of the spill.
4. Personnel and equipment involved.
5. Containment and clean-up action taken.
6. Sequence and time of events.
7. Evidence, such as witnesses, photographs, and samples.
8. Action taken to prevent similar occurrences.
9. Assessment of damage and steps required for restoration.
10. Samples taken and laboratories used.

6.5 OIL SPILL REPORT REQUIREMENTS

Whenever the Wells Project facility has discharged more than 1,000 gallons of oil into or upon navigable waters or adjoining shoreline in a single spill event, or discharged more than 42 gallons of oil upon navigable waters or adjoining shorelines in two spill events occurring within any twelve-month period, the District shall submit within sixty days a report of the spill(s) in accordance with 40 CFR 112.4. Any reports shall also be submitted to state agencies in charge of water pollution control activities.

6.6 SPCC PLAN LOCATIONS

At least one copy of the SPCC Plan and the Oil Spill Contingency Plan shall be kept in the following locations. All personnel shall be informed of these locations:

1. The Project Superintendent’s Office (and Residence)
2. The Control Room at the dam
3. The Chief Engineer/Assistant Manager's Office (and Residence)
4. The Safety Specialist's Office (and Residence)
5. The District’s Public Information Office (and Residence)

7.0 WASHINGTON STATE RULES, REGULATIONS AND GUIDELINES

7.1 WASHINGTON STATE LAWS

Discharge of any oil, fuel chemicals, and waste liquid water or solids to the waters of the state of Washington or onto land with a potential for entry into waters of the state is prohibited, Water Pollution Control Act (RCW 90.48) and Oil and Hazardous Substance Spill Prevention and Response (RCW 90.56).

7.2 COLUMBIA & SNAKE RIVER SPILL RESPONSE INITIATIVE

The Columbia and Snake River Spill Response Initiative (CSR-SRI) is a collaborative effort made up of local, state, and federal oil spill response community as well as members of industry. The initiative brings together a number of resources tailored for the area such as a notification list and contact of local responders, customized strategies for oil spill response, maps, locations of oil spill response equipment caches, and training opportunities.

The District is a member of the Upper Columbia Response Group. The location of equipment (listing can be found in Appendix F) at Wells Hydroelectric Plant is the upper warehouse area of Wells Dam.
Resources at Wells Dams include limited spill equipment and boats. Training opportunities include Incident Command System (ICS) training, and Boom Deployment training.

7.3 INCIDENT COMMAND SYSTEM

The District participates in the Incident Command System whenever a Unified Command is established in response to a spill incident that involves or potentially impacts one or more Projects.
8.0 Attachment C-II of 40 CFR 112
Certification of the Applicability of the Substantial Harm Criteria

Facility Name: Wells Hydroelectric Project

Facility Address: The Wells Hydroelectric Project is located on the Columbia River at River Mile 515.6. Correspondence can be addressed to Mike Bruno, Wells Hydroelectric Project, 28905 US Highway 97, Pateros, Washington 98846-9602.

1. Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons?
   Yes ______ No    ✔

2. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest above-ground oil storage tank plus sufficient freeboard to allow for precipitation within any aboveground oil storage tank area?
   Yes ______ No    ✔

3. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula in Attachment C-III to this appendix or a comparable formula) such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments, see Appendices I, II, and III to DOC/NOAA’s “Guidance for Facility and Vessel Response Plans: Fish and Wildlife and Sensitive Environments” (see Appendix E to this part, section 13, for availability) and the applicable Area Contingency Plan.
   Yes ______ No    ✔

4. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula in Attachment C-III to this appendix or a comparable formula) such that a discharge from the facility would shut down a public drinking water intake?
   Yes ______ No    ✔

5. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil discharge in an amount greater than or equal to 10,000 gallons within the last 5 years?
   Yes ______ No    ✔

Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate, and complete.

Signature
Ms. Lori Morris
Name (please type or print)
Safety Specialist
Title
Date 08/31/2010

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1 If a comparable formula is used, documentation of the reliability and analytical soundness of the comparable formula must be attached to this form.

2 For the purposes of 40 CFR part 112, public drinking water intakes are analogous to public water systems as described at 40 CFR 143.2(c).
APPENDIX A

SPCC NOTIFICATION CHART
SPCC Notification Chart

HAZARDOUS OIL SPILL DISCOVERER

HYDROCOMBINE CONTROL ROOM
Tele. (509) 923-2224 or (509) 923-2150

DAY-SHIFT / NIGHT-SHIFT CHIEF OPERATOR
Tele. (509) 923-2224

PROJECT SUPERINTENDENT
Mike Bruno, (509) 881-2490
Res. (509) 923-9524

CLEAN-UP CREW

ASSISTANCE
POLICE DEPARTMENT
FIRE DEPARTMENT

ASSISTANT MANAGER / CHIEF ENGINEER
Ken Pflueger, (509) 881-2245
Res. (509) 662-6316

SAFETY SPECIALIST
Lori Morris, (509) 881-2243
Res. (509) 784-4012

GENERAL MANAGER
Bill Dobbins, (509) 881-2220
Res. (509) 884-1191

PUBLIC INFORMATION OFFICER
Meaghan Vibbert, (509) 881-2221
Res. (509) 886-5930

NEWS MEDIA

NATIONAL RESPONSE CENTER
1 (800) 424-8802
1 (202) 267-2675

WA. STATE EMD
1 (800) 258-5990

U.S. EPA, REGION X
1 (206) 553-1263

WA. DEPT OF ECOLOGY
1 (509) 575-2490

See Section 6.0 for notification and documentation requirements.

See Section 1.6 for the list of responsible parties.

Figure A-1 Wells SPCC Notification Chart
APPENDIX B

HAZMAT SPILL CONTRACTOR LIST
# Hazmat Spill Contractor List

Ecology does not verify or endorse any of the contractors or information on this list. Information on this list is subject to change.


<table>
<thead>
<tr>
<th>COMPANY LOCATION</th>
<th>COMPANY NAME</th>
<th>SPILL NUMBER</th>
<th>OIL SPILL Small*</th>
<th>Large</th>
<th>Haz Mat</th>
<th>Organic**</th>
<th>Reactives Cylinders</th>
<th>Vac Truck</th>
<th>Vessel/Water</th>
<th>STATE COVERAGE</th>
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<td>Aberdeen</td>
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<td>(360) 532-3590</td>
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<td>Everett/Orting</td>
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<td>Seattle/Tacoma/Washougal</td>
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<td>Snouchim</td>
<td>Whiteside Inc</td>
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<td>Spokane</td>
<td>Able Clean-up Technologies</td>
<td>(509) 468-5255</td>
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<td>Tidewater Environmental</td>
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<td>Woodinville</td>
<td>CADRE</td>
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w = PRP: WAC 173-181 Approved Primary Response Contractor (oil) for facilities.

* Small = roadside, home tank, saddle tank, storm drains, 1 drum, etc.

Home Heating Oil Tanks - state of Washington - Pollution Liability Insurance Agency 1-800-822-3905 - Insurance Verification (M-F, 8-5)

Revised July 2009
APPENDIX C

REGIONAL TREATMENT CENTERS
FOR PETROLEUM CONTAMINATED SOILS
The Following is a List of Regional Treatment Centers for Petroleum Contaminated Soil:

<table>
<thead>
<tr>
<th>CRO</th>
<th>Roosevelt</th>
<th>Roosevelt Regional Landfill</th>
<th>1-800-275-5641</th>
<th>Disposal Only</th>
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<td>ERO</td>
<td>Spokane</td>
<td>Remtech, Inc.</td>
<td>(509) 624-0210</td>
<td>Thermal Desorption</td>
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<tr>
<td>NWRO</td>
<td>Everett</td>
<td>Rinker Materials</td>
<td>(425) 355-2111</td>
<td>Soil Remediation</td>
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<tr>
<td>NWRO</td>
<td>Seattle</td>
<td>Leforge Cement</td>
<td>(206) 937-8025</td>
<td>Cement Incorporation</td>
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<tr>
<td>SWRO</td>
<td>Tacoma</td>
<td>Petroleum Reclaiming Services</td>
<td>(253) 383-4175</td>
<td>Stabilization/Disposal</td>
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<tr>
<td>SWRO</td>
<td>Port Angeles</td>
<td>Fields Shotwell Corp.</td>
<td>(509) 457-1417</td>
<td>Thermal Treatment/Recycling</td>
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<td>SWRO</td>
<td>Portland OR</td>
<td>Waste Management</td>
<td>(800) 685-8001</td>
<td>Disposal Only</td>
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<td>SWRO</td>
<td>Fife</td>
<td>Fife Sand &amp; Gravel</td>
<td>(253) 922-7710</td>
<td>Bio-Remediation</td>
</tr>
</tbody>
</table>

**KEY:** CRO: Central Region  ERO: Eastern Region  NWRO: Northwest Region  SWRO: Southwest Region

---

**Washington State Department of Ecology Regional Office 24-Hour Oil Spill/Release Reporting Numbers**

**WHAT WE NEED TO KNOW**
- Reporting Party
- Contact Phone(s)
- Responsible Party
- Material Released
- Resource Damages (e.g. dead fish)
- Quantity
- Concentration
- Location
- Cleanup Status

![Map of Washington State with regions and phone numbers marked]

Or call the **Department of Emergency Management 24-hour Number:** 1-800-258-5990

For EPA and US Coast Guard reporting, call the National Response Center: 1-800-424-8802

- **Idaho:** Communications Center (208) 327-7442
- **Oregon:** Emergency Management (503) 378-6377
- **BC:** Provincial Emergency Program (800) 663-3456
- **EPA Region X, Seattle:** (206) 553-1263

January 2010 (revised)
APPENDIX D

NOTICE TO TANK TRUCK DRIVERS
NOTICE TO TANK TRUCK DRIVERS

To prevent the release of substances hazardous to the environment, tank truck drivers entering this site are to comply with the following rules:

1. Inspect tank, fitting, and liquid level indicator prior to filling.

2. Place drip pans under all pump hose fittings prior to loading/unloading.

3. Set the handbrake before starting to load/unload.

4. Plug the drains closest to the delivery truck.

5. Remain within 25 feet of the vehicle while loading/unloading.

6. Maintain an unobstructed view of the cargo tank and load/unload hose.

7. Drain loading/unloading line to storage tank when loading/unloading is complete.

8. Verify that all drain valves are closed before disconnecting loading/unloading lines.

9. Inspect vehicle before departure to be sure all loading/unloading lines have been disconnected and vent valves closed.

10. Unplug the drains closest to the delivery truck.

11. Immediately report any leakage or spillage to the Control Room:

    Extension 3471 or (509) 923-2224 or (509) 923-2150
APPENDIX E

SPCC RULE CROSS-REFERENCE
<table>
<thead>
<tr>
<th>Final SPCC Rule</th>
<th>1973 SPCC Rule</th>
<th>Description of Section</th>
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<tr>
<td>§ 112.7</td>
<td>§ 112.7</td>
<td>General requirements for SPCC plans for all facilities and all oil types.</td>
<td>§ 1 pgs. 1-3, § 2 pgs. 6-12, § 6 pgs. 17-20</td>
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<tr>
<td>§ 112.7(a)</td>
<td>§ 112.7</td>
<td>General requirements; discussion of facility’s conformance with rule requirements; deviations from Plan requirements; facility characteristics that must be described in the Plan; spill reporting information in the Plan; emergency procedures.</td>
<td>§ 2.6 pgs. 8-12</td>
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<tr>
<td>§ 112.7(b)</td>
<td>§ 112.7(b)</td>
<td>Fault analysis.</td>
<td>§ 2.6 pgs. 8-12</td>
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<td>§ 112.7(c)</td>
<td>§ 112.7(c)</td>
<td>Secondary containment.</td>
<td>§ 2.6 pgs. 8-12</td>
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<td>§ 112.7(d)</td>
<td>§ 112.7(d)</td>
<td>Contingency plans.</td>
<td>§ 5.0 pgs. 14-16</td>
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<td>§ 112.7(e)</td>
<td>§ 112.7(e)(8)</td>
<td>Inspections, tests, and records.</td>
<td>§ 3.0 pg. 13</td>
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<tr>
<td>§ 112.7(f)</td>
<td>§ 112.7(e)(10)</td>
<td>Personnel training and discharge prevention procedures.</td>
<td>§ 4.0 pg. 14</td>
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<td>§ 112.7(g)</td>
<td>§ 112.7(e)(9)</td>
<td>Security (excluding oil production facilities).</td>
<td>§ 2.7 pg. 13</td>
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<td>§ 112.7(h)</td>
<td>§ 112.7(e)(4)</td>
<td>Loading/unloading (excluding offshore facilities).</td>
<td>§ 5.4 pg. 15</td>
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<td>§ 112.7(i)</td>
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<td>Brittle fracture evaluation requirements.</td>
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<td>§ 112.7(j)</td>
<td>§ 112.7(e)</td>
<td>Conformance with State requirements.</td>
<td>§ 5.6 pg. 16</td>
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<td>§ 112.8</td>
<td>§ 112.7(e)(1)</td>
<td>Requirements for onshore facilities (excluding production facilities).</td>
<td>§ 1 pgs. 1-3, § 2 pgs. 6-12, § 6 pgs. 17-20</td>
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<td>§ 112.8(a)</td>
<td>§ 112.12(a)</td>
<td>General and specific requirements.</td>
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<td>Bulk storage containers.</td>
<td>Pgs. 8, 10-12</td>
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<td>Facility transfer operations, pumping, and facility process.</td>
<td>§ 3.0 pg. 13</td>
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<td>§ 112.9</td>
<td>§ 112.7(e)(5)</td>
<td>Requirements for onshore production facilities.</td>
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<td>§ 112.7(e)(7)</td>
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<td>1000 ft 4&quot;x 6&quot; Oil Spill Response Containment Boom</td>
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<td></td>
</tr>
<tr>
<td><strong>ANCHOR SYSTEM</strong></td>
<td>4 ea Anchor Systems (30 lb anchors, with 10 ft of chain, 150 ft rode &amp; with orange 15.5” buoy)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BOOM LIGHTS</strong></td>
<td>5 ea Navigational Lights, Self-floating, amber lens, 48” tall; to attach on or near boom (batteries in tool box)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOOL BOX</strong></td>
<td>1 ea Heavy-duty poly toolbox. 24” length (contains the below inventory)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 ea 8” crescent wrench</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1 ea 8” standard pliers</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1 ea 16 oz. claw hammer</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>2 ea 4” C-clamp</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1 ea Flathead screwdriver, small and large</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 ea 3/8&quot; SPA galvanized shackles, ½” SPA galvanized shackles</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1 ea Utility knife with extra blade set</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 ea Waterproof floatable flashlight with 2 D-cell batteries</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 sets Hardware set including: 5/16” x 1 1/4” SS bolts, 2 flat washers, nylock nuts</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 ea Duct Tape, Elec Tape</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PPE BAGS</strong></td>
<td>4 bags PPE Waterproof gear bag (each bag contains the below inventory)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 ea Hard hat with ratcheting head band</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 pr 16” PVC steel toe work boots, size 11, ASTM F2413-05 MI/75 C/75 compliant</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 pr PVC gloves, 12” gauntlet, size 11</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>2 pr Leather work gloves, large size</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 pr Safety glasses, meeting ANSI and OSHA specifications</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>6 pr Ear plugs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 pr White Tyvek suit without hood</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 ea Duct Tape, 1 roll</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DECON STATION</strong></td>
<td>Decontamination Kit Station (contains the below inventory)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 ea Poly wash tubs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 ea Degreaser detergent for decontamination</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 bx Nitrile glove liners, large size</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 ea PVC gloves, 12” gauntlet, size 11</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 ea Decontamination scrub brushes with long handles</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 cs Waste bags, 1 case or 100 bags, 33” x 40”, 4 mil</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 rl Visqueen sheeting, 20” x 100”, 4 mil</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 ea Drop tarps, 8” x 10”</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 ea 5-gallon plastic bucket</td>
<td></td>
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<tr>
<td><strong>ABSORBENTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 ea Pads, heavy weight adsorbent pads, 1 bag of 100 pads</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 ea Sweep, 100 feet of 19” heavy weight sweep with nylon web strap</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 ea Sorbent boom, heavy weight boom containing 4 sections of 5” x 10’</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(each with poly tension line and quick-clips for connecting)</td>
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<td></td>
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<tr>
<td><strong>MISC SUPPLIES</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>1 ea First aid kit (meets WAC 296-800-15020 for at least 10 people)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 ea 5-pound class ABC fire extinguishers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information book (Spill notification sheet, Job Hazard Analysis, tailgate safety, common MSDS’s, trailer inventory)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exhibit B

Pre-filing consultation record for the Spill Prevention Control and Countermeasure Plan
Email From Ecology Approving the SPCC as Revised in 2010
The statements that you provided in the first two paragraphs of your email are correct.

Please let me know if you need further assistance.

Sincerely,
Pat Irle
Hydropower Projects Manager
WA Dept of Ecology

To formalize our conversation on August 19, 2013, I discussed the requirement stated in our 401 certification that stipulates “Douglas PUD shall update the Project Spill Prevention Control and Countermeasures Plan (SPCC) pursuant to FERC requirements and recommendations provided by Ecology.”

As we discussed, the Wells Hydrocombine SPCC Plan was recently updated in 2010, with Ecology’s review and found to be satisfactory with no further review necessary until the required update in 2015.

Please let me know by email if this accurate and if not, any changes Ecology would recommend. Once we receive your email we will process this item with NERC.

Thank you,
Email to Aquatic SWG, NMFS, and BIA Requesting a 30 Day Review of the SPCC
Hi Aquatic SWG: please see the email below from Andrew and the attached draft Wells Hydrocombine Dam SPCC Plan. This draft plan is out for review with comments due to Andrew no later than Tuesday, October 1, 2013.

Thanks!
Kristi ☺

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
T 509.491.3151 x104
C 360.220.3988

Kristi, please distribute the attached updated SPCC plan and this email to the ASWG mailing list and Keith with BIA.

Douglas PUD’s 401 Certification requires us to maintain an updated Spill Prevention Control and Countermeasures Plan (SPCC). The SPCC is specifically designed to prevent the spill of oil from the Project and as such maintain an exceptional level of water quality. Douglas PUD works closely with the WA Dept. of Ecology to update this document every five years. Recall, this was an item that was listed on the ASWG’s yearly Action Plan we vetted last Jan and Feb. The most recent version of the SPCC is attached.

When the FERC issued a license for Wells Dam back in November of 2012 they required us to file an updated SPCC with them for review and approval. In addition, to submitting the plan to the FERC we need to provide a comment period to all ASWG agencies, NMFS and BIA. Douglas has already worked with Pat Irle and Ecology towards submitting the updated document with the FERC by the end of Oct. As per normal, in addition to submitting the plan we will provide FERC with a consultation record following the conclusion of a comment period.

Douglas PUD would like to have any additional comment from agencies by Oct 1st.
Any questions can be answered by myself or Lori Morris (Safety Specialist with Douglas PUD). I can be reached at the below contact info and Lori can be reached via email at lorim@dcpud.org or phone 509-881-2243.

Thanks all.

Andrew

Andrew Gingerich  
Sr. Aquatic Resource Biologist  
Douglas County Public Utility District  
1151 Valley Mall Parkway, East Wenatchee, WA 98802  
Office Phone: (509) 881-2323  
Email: andrewg@dcpud.org
Approval of the SPCC from the Aquatic SWG
Final
Meeting
Action Items

Aquatic Settlement Work Group

To: Aquatic SWG Parties                        Date: October 11, 2013
From: Michael Schiewe, Chair (Anchor QEA, LLC)
Re: Final Action Items of the October 9, 2013, Aquatic SWG Meeting

Below is a summary of Action Items from the Aquatic SWG meeting that was held in person at Douglas PUD headquarters in East Wenatchee, Washington, on Wednesday, October 9, 2013, from 9:00 a.m. to 12:30 p.m. These action items include the following:

I. Summary of Action Items
   1. Kristi Geris will contact Bob Rose and Steve Lewis to bring them up to speed on the details of the Aquatic SWG Extranet site (Item VI-2).
   2. Aquatic SWG members will set up their login information to the Aquatic SWG Extranet site as soon as instructions are received via email from Douglas PUD Information Systems (IS) staff (Item VI-2).
   3. Andrew Gingerich will develop a draft sturgeon stocking plan proposal, and draft Monitoring and Evaluation (M&E) Plan outline, and provide the drafts to Kristi Geris for distribution to the Aquatic SWG no later than October 31, 2013 (Item IV-5).
   4. Mike Schiewe will contact Bob Rose and Steve Lewis to bring them up to speed on the sturgeon discussions (Item VI-5).
   5. Chas Kyger will provide the 2013 Adult Pacific Lamprey Passage and Enumeration Study Update that was discussed at the meeting on October 9, 2013, to Kristi Geris for distribution to the Aquatic SWG (Item VI-8).
   6. Pat Irle will provide Chris Coffin’s email address to Kristi Geris to add to the Aquatic SWG distribution list (Item VI-9).
   7. Patrick Verhey will provide an official letter designating the current WDFW HCP Policy Representation to Kristi Geris for the administrative record (Item VI-10).

II. Summary of Decisions
   1. There were no Statements of Agreement (SOAs) approved at today’s meeting.
III. Agreements
   1. The Aquatic SWG members present approved the Spill Prevention Countermeasure Control (SPCC) Plan (Item VI-3).
   2. The Aquatic SWG members present approved the Water Quality Attainment Plan (WQAP) (Item VI-4).

IV. Review Items
   1. There are no items that are currently out for review.

V. Reports Finalized
   1. The final Bull Trout Stranding, Entrapment and Take Study Plan was submitted to the Federal Energy Regulatory Commission (FERC) on September 23, 2013, as distributed to the Aquatic SWG by Kristi Geris that same day.
APPENDIX M
DOUGLAS PUD WATER QUALITY ATTAINMENT PLAN
Via Electronic Filing

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington DC 20426

Subject: Wells Hydroelectric Project No. 2149 - Total Dissolved Gas Water Quality Attainment Plan – License Article 401

Dear Secretary:

Pursuant to Article 401 of the new license for the Wells Hydroelectric Project (Wells Project), the Public Utility District No. 1 of Douglas County (Douglas PUD) hereby submits for approval the attached Total Dissolved Gas Water Quality Attainment Plan (WQAP).

Article 401 requires Douglas PUD to file a WQAP with the Federal Energy Regulatory Commission (FERC) within one year of license issuance. The WQAP must be approved by the Washington State Department of Ecology (Ecology) and must be provided to the parties to the Aquatic Settlement Agreement (ASA), the National Marine Fisheries Service (NMFS) and the Bureau of Indian Affairs (BIA) for a 30-day review. In addition, Appendix A, section 6.7(2)(e) of the license requires that the WQAP be prepared in consultation with the Habitat Conservation Plan Coordinating Committee (HCP CC).

The final WQAP is attached as Exhibit A to this letter and was developed in consultation with the parties to the ASA including the United States Fish and Wildlife Service (USFWS), United States Bureau of Land Management (BLM), Washington State Department of Fish and Wildlife (WDFW), Ecology, the Confederated Tribes of the Colville Reservation (CCT) and the Confederated Tribes and the Bands of the Yakama Nation (YN). The BIA, the NMFS and the HCP CC were also provided an opportunity to review and comment on the WQAP during the 30-day ASA comment period beginning on August 27 & 28, 2013. Parties to the HCP CC include the NMFS, USFWS, WDFW, CCT, YN and Douglas PUD.
The only comments received on the WQAP were provided by Ecology during a meeting on September 5, 2013 at Douglas PUD headquarters. Douglas PUD revised the WQAP to address all of the comments received from Ecology and redistributed both the updated WQAP and the suggested revisions to the ASA parties. The revised WQAP (Exhibit A) was approved by the Aquatic Settlement Work Group following the close of the 30 day comment period during the monthly workgroup meeting on Wednesday October 9, 2013.

Douglas PUD respectfully requests that the FERC approve the enclosed WQAP prior to December 31, 2013. Several of the actions proposed in the WQAP require implementation starting in early January 2014 in order to prepare for the April bypass season. The pre-filing consultation record supporting the approval of the WQAP is attached as Exhibit B.

If you have any questions related to the Water Quality Attainment Plan, please feel free to contact me at (509) 881-2208 or sbickford@dcpwd.org.

Sincerely,

Shane Bickford
Supervisor of Natural Resources

Enclosure:

Exhibit A – Total Dissolved Gas Water Quality Attainment Plan.
Exhibit B – Pre-filing consultation record for the Total Dissolved Gas Water Quality Attainment Plan.

Copy: Pat Irle, Ecology
Charles McKinney, Ecology
Wells HCP Coordinating Committee – Members List
Wells Aquatic Settlement Work Group – Members List
Andrew Gingerich, Douglas PUD
Brad Hawkins, Douglas PUD
Exhibit A
Total Dissolved Gas Water Quality Attainment Plan
Total Dissolved Gas Water Quality Attainment Plan

Well Hydroelectric Project

FERC Project No. 2149

Prepared by:

Public Utility District No. 1 of Douglas County
East Wenatchee, Washington

August 2013
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**List of abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-C High</td>
<td>The highest TDG concentration in a day calculated as a rolling 12-hour average</td>
</tr>
<tr>
<td>401 Certification</td>
<td>Douglas PUD's Section 401 Water Quality Certification pursuant to the Clean Water Act</td>
</tr>
<tr>
<td>7Q10'</td>
<td>The highest stream flow for seven consecutive days that would be expected to occur once in ten years</td>
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<td>ASA</td>
<td>Aquatic Settlement Agreement</td>
</tr>
<tr>
<td>ASWG</td>
<td>Aquatic Settlement Work Group</td>
</tr>
<tr>
<td>BO</td>
<td>Biological Opinion</td>
</tr>
<tr>
<td>BPA</td>
<td>Bonneville Power Administration</td>
</tr>
<tr>
<td>CFD</td>
<td>Computational Fluid Dynamics</td>
</tr>
<tr>
<td>CFS</td>
<td>cubic feet per second</td>
</tr>
<tr>
<td>CHQW</td>
<td>Chief Joseph Dam Tailrace TDG Sensor</td>
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<tr>
<td>CWA</td>
<td>Clean Water Act</td>
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<td>EA</td>
<td>Environmental Assessment</td>
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<td>Ecology</td>
<td>Washington Department of Ecology</td>
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<td>EPA</td>
<td>Environmental Protection Agency</td>
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<tr>
<td>ESA</td>
<td>Endangered Species Act</td>
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<td>FCRPS</td>
<td>Federal Columbia River Power System</td>
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<td>Federal Energy Regulatory Commission</td>
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<td>Gas Abatement Plan</td>
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<td>GBT</td>
<td>Gas Bubble Trauma</td>
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<td>HCP</td>
<td>Anadromous Salmonid and Habitat Conservation Plan</td>
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<td>HZ</td>
<td>hertz</td>
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<td>IIHR</td>
<td>Hydroscience and Engineering Laboratory of the University of Iowa</td>
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<tr>
<td>JBS</td>
<td>Juvenile Bypass System</td>
</tr>
<tr>
<td>KCFS</td>
<td>thousand cubic feet per second</td>
</tr>
<tr>
<td>KW</td>
<td>kilowatts</td>
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<td>feet above mean sea level</td>
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<td>National Marine Fisheries Services</td>
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<td>Public Utility District</td>
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<td>QAPP</td>
<td>Quality Assurance Project Plan</td>
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<td>river mile</td>
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<td>Regulating Outlet</td>
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<tr>
<td>RPA</td>
<td>Reasonable and Prudent Alternatives</td>
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<td>TDG</td>
<td>Total Dissolved Gas</td>
</tr>
<tr>
<td>TMDL</td>
<td>Total Maximum Daily Load</td>
</tr>
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<td>USACE</td>
<td>United States Army Core of Engineers</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<td>---------</td>
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<td>USBOR</td>
<td>United State Bureau of Reclamation</td>
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<td>USGS</td>
<td>United States Geological Survey</td>
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<td>VOF</td>
<td>Volume of Fluid</td>
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<tr>
<td>WAC</td>
<td>Washington Administrative Code</td>
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<td>WEL</td>
<td>Wells Forebay TDG Sensor</td>
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<td>WQAP</td>
<td>Water Quality Attainment Plan</td>
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</table>
Executive Summary

The Washington Administrative Code (WAC) 173-201A-510(5)) states that for dams that cause or contribute to a violation of water quality standards, the dam owner is required to provide a detailed strategy for achieving compliance with the state water quality standards (WQS). The Wells Hydroelectric Project (Wells Project) is owned and operated by Public Utility District No. 1 of Douglas County (Douglas PUD). The Washington State Department of Ecology, through the issuance of its Clean Water Act 401 Water Quality Certification (401 Certification) associated with the Federal Energy Regulatory Commission’s (FERC) relicensing of the Wells Project, has required that Douglas PUD demonstrate compliance with the total dissolved gas (TDG) WQS within a ten-year period of the issuance of a new license for Wells Dam.

This Water Quality Attainment Plan (WQAP) provides a detailed strategy for achieving compliance with the TDG state WQS within the required timeframe found in the 401 Certification. The plan identifies all reasonable and feasible improvements that could be used to meet TDG standards, contains the analytical methods used to evaluate any reasonable and feasible improvements, provides a listing of any supplemental monitoring that is necessary to track compliance, includes benchmarks and reporting requirements sufficient for Ecology to track progress toward implementing the WQAP.

In support of the requirements above, the Wells WQAP identifies a specific and rigorously scheduled step-wise approach that includes adaptively managing Wells Project spill operations (via further identification and refinement of key Project operating parameters), implementation of an annual Gas Abatement Plan, reanalysis of the existing TDG model using enhanced modeling capabilities and parameter refinement, implementation of a TDG Reduction Alternatives Analysis, a feasibility analyses that includes environmental and economic factors, and exploration of other approaches available in the water quality standards including a second compliance interval or other procedural alternative provided in WAC 173-201A-510(5)(g).

The Wells Project TDG WQAP builds upon the recent reductions in TDG production at Wells Dam following the implementation of operations changes recommended based upon the results of past TDG studies at the Wells Project while evaluating the potential impacts associated with any new water quality related modifications at the Project against potential impacts to aquatic resources.
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1.0 Introduction

On May 27, 2010, Public Utility District No. 1 of Douglas County, Washington (Douglas PUD) filed, pursuant to requirements of the Federal Power Act (FPA), an application for a new license to continue operation and maintenance of the existing Wells Hydroelectric Project No. 2149 (Wells Project or Project). On November 9, 2012, the Federal Energy Regulatory Commission (FERC) issued a new operating license for the Project. Pursuant to the requirements of the Federal Power Act, the FERC adopted in its entirety, the conditions identified within the 401 Water Quality Certification (401 Certification) issued on February 27, 2012 by the Washington Department of Ecology (Ecology) pursuant to section 401 of the Clean Water Act (CWA).

Section 6.7(2)(e) of the 401 Certification requires Douglas PUD to develop a Water Quality Attainment Plan (WQAP) for Total Dissolved Gas (TDG) within one year of the issuance of the new FERC license for the Wells Project. A central component of the WQAP is the requirement for Douglas PUD to include a 10 year compliance schedule that provides a detailed strategy toward ensuring compliance with the state water quality standard (WQS). As detailed in the 401 Certification, the WQAP is intended to allow time for the completion of the necessary studies or for the resolution of the issue of elevated incoming TDG through rule-making or other means. Development of the WQAP is intended to meet the requirements of Section 6.7(2)(e) of the 401 Certification and the Washington Administrative Code (WAC) 173-201A-510(5). The WQAP shall:

i) Identify all reasonable and feasible improvements that could be used to meet TDG standards. Data on high TDG levels and flow coming into the Wells forebay and its effects on Project compliance shall be included;

ii) Contain the analytical methods that will be used to evaluate all reasonable and feasible improvements;

iii) Provide for any supplemental monitoring that is necessary to track compliance with the state’s WQS;

iv) Include benchmarks and reporting sufficient for Ecology to track Douglas PUD’s progress toward implementing this plan and achieving compliance within ten years of Ecology’s approval of the plan; and

v) The report of the study of reasonable and feasible improvements is due within one year of approval of the WQAP and should include the Aquatic Settlement Work Group (Aquatic SWG) and Douglas PUD’s recommendations for measures to be implemented. The report is subject to Ecology review and approval.

This WQAP has been developed consistent with the relevant requirements identified in the Wells Project 401 Certification and the WAC 173--201A-510(5). In Section 2.0, the WQAP provides background information on the Wells Project, associated facilities, applicable TDG standards and the current bypass operations intended to aid in juvenile fish passage at Wells Dam. Also in this section, TDG management within the Mid-Columbia River system relative to Wells Dam and historic and current Wells Project TDG
activities are also described. Section 3.0 of the WQAP, details an implementation plan that includes a 10-year compliance schedule describing a step-wise approach to improving TDG management activities at the Project toward compliance with the state WQS numeric criteria.

2.0 Background

2.1 Wells Project Description

The Wells Project is located at river mile (RM) 515.6 on the Columbia River in the State of Washington (Figure 1). Wells Dam is located approximately 30 river miles downstream from the Chief Joseph Hydroelectric Project, owned and operated by the United States Army Corps of Engineers (USACE); and 42 miles upstream from the Rocky Reach Hydroelectric Project owned and operated by Public Utility District No. 1 of Chelan County (Chelan PUD). The nearest town is Pateros, Washington, which is located approximately 8 miles upstream from Wells Dam.

The Wells Project is the chief generating resource for Douglas PUD. It includes ten generating units with a nameplate rating of 774,300 kW and a peaking capacity of approximately 840,000 kW. The spillway consists of eleven spill gates that are capable of spilling a total of 1,180 kcfs (thousand cubic feet per second). The crest of the spillway is approximately five and a half feet above normal tailwater elevation and two feet below tailwater elevation when plant discharge is 219 kcfs. The design of the Wells Project is unique in that the generating units, spillways, switchyard, and fish passage facilities were combined into a single structure referred to as the hydrocombine. Fish passage facilities reside on both sides of the hydrocombine, which is 1,130 feet long, 168 feet wide, with a dam top elevation of 795 feet above mean sea level (msl). The juvenile fish bypass (JBS) system was developed by Douglas PUD and uses a barrier system to modify the intake velocities on all even numbered spillways (2, 4, 6, 8 and 10). The Wells Project is considered a “run-of-the-river” project due to its relatively limited storage capacity.

The Wells Reservoir is approximately 30 miles long. The Methow and Okanogan rivers are tributaries of the Columbia River within the Wells Reservoir. The Wells Project boundary extends approximately 1.5 miles up the Methow River and approximately 15.5 miles up the Okanogan River. The surface area of the reservoir is 9,740 acres with a gross storage capacity of 331,200 acre-feet and usable storage of 97,985 acre-feet at the normal maximum water surface elevation of 781 feet.

2.1.1 Fish Spill Program

Wells Dam is a hydrocombine, where the spillbays are located directly above the powerhouse. Research in the mid-1980s demonstrated that a modest amount of spill would effectively guide a high proportion of the downstream migrating juvenile salmon and steelhead away from the turbines and into a surface oriented bypass system. The Wells Project JBS, which was subsequently developed in the late 1980s, has since proven to be the most efficient system on the mainstem Columbia River, providing high levels of fish protection that has met approval of the fisheries agencies and tribes (Skalski et al. 1996). The survival performance measures contained within the FERC-approved Habitat Conservation Plan (HCP) have been consistently exceeded, with a four-year survival average of 96.3 percent for juvenile steelhead and Chinook salmon (Bickford et al. 2011).
Figure 1. Map of the Wells Hydroelectric Project in Central Washington.

The Wells Dam JBS operates continuously from early April through late August and passes up to 2,200 cfs of water through each of the five JBS configured spillways. Under normal conditions the JBS will use roughly six to eight percent of the total river flow for fish guidance. The increased spill passed through the JBS has minor influence on TDG production (~0-2 percent) while providing a non-turbine passage route for over 90 percent of the spring and summer migration of juvenile salmonids. Historic
hydroacoustic data in combination with fyke netting efforts allowed the HCP Parties to identify dates for bypass operations to bracket 95 percent of the spring and summer juvenile salmon downstream migration. Since 2003, the JBS has been operated on a fixed schedule between April 12th and August 26th although in 2011, Douglas PUD evaluated past performance of the Wells Dam JBS operating dates relative to observed annual run timing (at the Rocky Reach Bypass) for both spring and summer migrants. With that data, a request was made to and granted by the HCP Coordinating Committee to revise operating dates in 2012 to start April 9th and end August 19th. These dates were also used in 2013 to operate fish passage spill for migrating juvenile salmonids (Douglas PUD 2012).

2.2 TDG Criteria and Regulatory Framework

Chapter 173-201A of the WAC defines the WQS for the surface waters of Washington State. Under the WQS, TDG shall not exceed 110 percent at any point of measurement in any state water body. However, the standards exempt dam operators from this TDG standard when the river flow exceeds the seven-day, 10-year-frequency flood (7Q10). The 7Q10 flow is the highest calculated flow of a running seven consecutive day average, using the daily average flows that may be seen in a 10-year period. The 7Q10 total river flow for the Wells Project was computed using the hydrologic record from 1974 through 1998, coupled with a statistical analysis to develop the number from 1930 through 1998. These methods follow the United States Geological Survey (USGS) Bulletin 17B, “Guidelines for Determining Flood Flow Frequency” and determined that the 7Q10 flow at Wells Dam is 246,000 cfs (Ecology et. al. 2004).

In addition to allowances for natural flood flows, the TDG numeric criteria (110 percent) may be adjusted to aid fish passage over hydroelectric dams when consistent with an Ecology-approved Gas Abatement Plan (GAP) per WAC 173-201A-200(1)(f)(ii)). The increased levels of spill resulting in elevated TDG levels are authorized by Ecology to allow salmonid smolts a non-turbine downstream passage route that is less harmful to fish populations than caused by turbine fish passage. This TDG exemption provided by Ecology is based on a risk analysis study conducted by the National Marine Fisheries Service (NMFS) (NMFS 2000). The GAP must be accompanied by fisheries management and physical and biological monitoring plans and is approved on a per application basis for juvenile fish passage past dams on the Columbia and Snake rivers. This adjustment comprises three separate standards to be met by dam operators.

1) TDG shall not exceed 125 percent in any one-hour period in the tailrace of a dam;

2) TDG shall not exceed 120 percent in the tailrace of a dam as measured as an average of the 12 highest consecutive hourly readings in any 24-hour period (12-C High); and

3) TDG shall not exceed 115 percent in the forebay of the next dam downstream as measured as the 12-C High.

A significant portion of the Wells Reservoir occupies lands within the boundaries of the Colville Indian Reservation. Wells Project operations do not affect TDG levels in tribal waters, where the Colville Tribe’s TDG standard is a maximum of 110 percent, year-round, at any point of sample collection (Colville Tribe 2010). This TDG standard is also Environmental Protection Agency’s (EPA) standard for all tribal waters.
on the Columbia River, from the Canadian border to the Snake River confluence. TDG levels on the Colville Reservation portion of the mainstem Columbia River within the Wells Reservoir are influenced by the operations of Chief Joseph Dam and other federal and non-federal dams upstream of the project. Each year, Wells Dam operates under this TDG criteria adjustment during its fish spill season (generally April to August) per an Ecology-approved GAP. Outside of the fish spill season, Wells Dam is required to adhere to the general TDG WQS numeric criteria of 110 percent at any point of measurement in any state water body (i.e., within the Wells Project Boundary).

2.2.1 Mid-Columbia TDG Total Maximum Daily Load
In 2004, Ecology, the Spokane Tribe of Indians and the U.S. EPA issued a joint Total Maximum Daily Load (TMDL) addressing TDG in the mainstem Columbia River from the Canadian border to the Snake River confluence (Ecology et al. 2004). The TMDL set TDG loading capacities and allocations for the mid-Columbia River and Lake Roosevelt, both in terms of percent saturation for fish passage and excess pressure above ambient for non-fish passage. Allocations are specified for each dam and for upstream boundaries. Fish passage allocations must be met at fixed monitoring stations. Non-fish passage allocations must be met in all locations, except for an area below each dam (other than Grand Coulee) from the spillway downstream to the end of the aerated zone. Attainment of allocations will be assessed at monitoring sites in each dam’s forebay and tailrace and at upstream boundaries (Ecology et al. 2004). Additional details of the TDG TMDL relevant to Wells Dam are provided below in Section 2.2.2.

2.2.2 TDG in the Mid-Columbia River System

2.2.2.1 Mid-Columbia River Non-Federal Projects
The Wells Project is one of five non-federal hydroelectric developments located within the mid-Columbia section of the Columbia River. Projects within this section of river are owned and operated by the three mid-Columbia Public Utility Districts or PUDs. Douglas PUD owns the Wells Project, Chelan PUD owns the Rocky Reach and Rock Island Projects and Grant PUD owns the Priest Rapids Project that consists of two dams (Wanapum and Priest Rapids). These five hydroelectric facilities operate under a complex set of FERC license requirements, as well as various energy and environmental agreements and policies intended to optimize the power and non-power benefits of the projects.

The Mid-Columbia Hourly Coordination Agreement is an agreement focused on coordinating the power operations of the seven mid-Columbia projects toward meeting daily load requirements through the assignment of "coordinated generation" through the Mid-Columbia Hourly Coordination Control Computer. Each project in the system has preferred operating criteria depending upon generation requests and environmental conditions and requirements. The preferred forebay elevation at each project is a combination of power demand, discharge from upstream projects and maximum and minimum elevations located within each projects respective FERC licenses. The Mid-Columbia Hourly Coordination Control Computer is used to maintain preset reservoir levels in order to meet load requirements and prevent involuntary spill, which has the potential to produce TDG. These preset reservoir levels are maintained at each project through management of a positive or negative “bias”
which assigns a project more or less generation depending on whether the reservoir elevation should be increased or decreased in order to maximize system benefits and minimize involuntary spill and resultant TDG. The agreement allows for intermittent trade-offs of maximum benefits at individual dams to spread benefits throughout the system in a coordinated fashion while meeting environmental, recreational, and power generation requirements (Kiefer 2009).

2.2.2.2 Mid-Columbia River Federal Projects

Chief Joseph Dam is part of the Federal Columbia River Power System (FCRPS), which comprises 29 dams. It is located on the Columbia River near Bridgeport, Washington, and is operated by the USACE. Chief Joseph Dam is located 30 miles upstream from the Wells Project and 52 miles downstream of Grand Coulee Dam and operates as a run-of-river hydropower project, fluctuating less than six feet in elevation over a normal year in Lake Rufus Woods (the reservoir behind Chief Joseph Dam). Chief Joseph Dam has no upstream fish passage and is considered the furthest upstream point of anadromous fish distribution in the Columbia River basin. Water discharge from Chief Joseph Dam is generally dispatched by the Bonneville Power Administration for the production of electricity and by the US Army Corps of Engineers (USACE) for flood control purposes (USACE 2000a).

Grand Coulee Dam, also part of the FCRPS, is operated by the U.S. Bureau of Reclamation (USBOR), and is located at Grand Coulee, Washington. Grand Coulee was completed with 18 generating units in 1942, prior to Chief Joseph Dam, and impounded what is now called Lake Roosevelt. The Project is authorized by Congress for uses associated with flood control, power production, and irrigation. The reservoir is managed by the USACE to reducing flooding downstream in the spring and to enhance electric generation in the fall and winter. Complete refill of Grand Coulee is normally targeted for June 30 each year and then dropped near elevation 1280 feet or higher by the end of September (full pool elevation is 1290 feet). Fall draft is limited to elevation 1265 feet by December 31 to ensure an 85% confidence of refill to the flood control rule curve on the planning date of April 10 per the supplemental Biological Opinion (NMFS 1998) and to be consistent with previous operations and studies conducted during ESA consultations (USACE 2000a).

The greatest water quality concern related to Chief Joseph and Grand Coulee dams is TDG levels in both Rufus Woods Reservoir and the Columbia River below the Chief Joseph Dam. Due to the height of the spillway and the configuration of the stilling basin at Grand Coulee Dam, TDG levels can easily exceed 110 percent. This problem is most acute during the spring and summer when both Grand Coulee and Chief Joseph dams are spilling water due to high runoff, and insufficient power demand does not allow all inflow to pass through generating units (USACE 2000a). In addition, spill configuration can have a dramatic effect on TDG production at both projects, for example during the summer of 2011 spilling out of regulating outlets (ROs) generated gas concentrations in excess of 135 percent below Grand Coulee Dam.

In 2004, Ecology, the Spokane Tribes of Indians, and the U.S Environmental Protection Agency (EPA) developed a TMDL report for TDG in the Mid-Columbia and Lake Roosevelt (Pickett et al. 2004). The document indicates that compliance in the Chief Joseph Dam tailrace is carried out by the Washington Department of Ecology, the Colville Confederated Tribes and EPA. Ecology’s standards differ between...
Phase I and Phase II of implementation of the TMDL with Phase I having identical WA State WQS TDG criteria during fish passage periods and Phase II being 73 mm of Hg (or 110% TDG) in the tailrace of Chief Joseph up to the mouth of the Okanogan River (Table A-1; Appendix 1; Pickett et al. 2004). In addition, TDG standards in the tailrace of Chief Joseph Dam are enforced by the Colville Confederated Tribes, whereby standards are 110% as measured at any time of year along the reservation boundary, including the Chief Joseph tailrace, and as an instantaneous measurement (Appendix 1; Pickett et al. 2004; Colville Tribe 2010). As such, standards in the Chief Joseph tailrace are somewhat convoluted and are either 115% \(^1\) at the face of Wells Dam during the fish passage season per Ecology’s standard or 110% at all times of the year in the Chief Joseph Dam tailrace per the Colville approved standard.

During the course of implementing this WQAP, Douglas PUD will seek clarity on the incoming TDG standards (i.e., Wells Dam forebay) because Chief Joseph Dam’s TDG values have a direct impact on the ability of the Wells Project to comply with Ecology’s WQS. In addition, Ecology’s adjustment to the TDG standards for the tailrace of Chief Joseph Dam needs to be accompanied by an Ecology approved GAP that provides a a biological monitoring plan that is directly tied to monitoring the fish passaging that particular hydroelectric facility. Currently, it is unclear to what degree Chief Joseph Dam is complying with these requirements as identified in the FCRPS fish passage TDG adjustment and as such the 110% standard may be more appropriate for Chief Joseph Dam. Even if the TDG standard is determined to be 115% in the forebay of Wells Dam, during the 2012 spill season, Chief Joseph Dam has been out of compliance more than 30% of the time in the Wells Dam forebay (See section 2.2.2.3 below). To address the issue of spill and resultant TDG production, the USACE and USBOR identified a preferred alternative of installing flow deflectors at Chief Joseph Dam combined with joint operations at Grand Coulee Dam (USACE 2000a). The joint operating policy, aimed at more effective management of TDG supersaturation at Grand Coulee and Chief Joseph dams, can limit RO operations and increase generation at Grand Coulee thereby providing additional spill capabilities at Chief Joseph Dam without increasing TDG for a comparable level of flow and spill.

### 2.2.2.3 Federal Gas Abatement and Spill Priority

In response to Reasonable and Prudent Alternative (RPA) 136 in the NMFS 2000 Biological Opinion (BO), construction of the spillway flow deflectors was initiated in 2005 at Chief Joseph Dam (BPA et al. 2010). Although Chief Joseph Dam does not have fish passage, during Phase I testing of the TMDL implementation (2004-2010), the project was operated under the higher TDG load allocation criteria

\(^1\) In 2008 the Washington Department of Ecology issued a TDG exemption for the FCRPS (including Chief Joseph Dam) during fish passage season. Ecology issued this adjustment following the USACE submission of a Gas Abatement Plan (GAP). The TDG exemption was approved until 2010. More recently the USACE submitted to Ecology another GAP to obtain a TDG exemption during the fish passage season for the years 2010-2014 (April 1-August 31\(^{st}\) of these years). In a letter dated February 10, 2012 Ecology approved the USACE’s TDG exemption from June 30 2010 to February 28, 2015. The letter also requested that the USACE submit it’s Phase I report on TDG studies in order to move into Phase II.
normally reserved for projects with beneficial fish passage via spill (i.e., similar to fish passage TDG adjustments issued annually at Wells Dam). The purposes for the Phase I TMDL load allocation tests were: 1) to evaluate whether the joint operations of Grand Coulee and Chief Joseph dams could produce less TDG, and 2) to authorize TDG in excess of the standard during the Phase I spill deflector construction and testing at Chief Joseph Dam. Testing of Chief Joseph Dam spill deflectors was completed in 2009 (BPA et al. 2010).

Since the completion of spill deflectors at Chief Joseph Dam in 2008, there has been a marked shift in federal spill operations resulting in a significant increase in the amount of spill at Grand Coulee and Chief Joseph dams. This increase in spill has resulted in a dramatic increase in the volume of water supersaturated with TDG entering the Wells Project. A primary factor for increased spill has been the significant development of new wind generation in the region resulting from renewable portfolio standards and Federal production tax credits, investment tax credits, and Renewable Energy Credits. Currently, 4,000 MW of wind generation are connected to BPA’s transmission grid in the Columbia River Basin (BPA 2013\(^2\)) and this is expected to grow to above 6,000 MW within 3 years. Wind generation usually occurs at night or in the spring when the generation is not needed. However, the power grid requires that system load and generation be balanced at all times. System imbalances can result in system frequency shifts that damage electronic equipment or cause system protection devices to trip. Federal regulations require system operators to maintain system frequency at 60 Hz at all times. Hydropower is one of the best generation sources for managing system frequency and load/generation imbalance due to wind (e.g., wind integration or dynamic capacity). However, curtailing hydroelectric power generation to facilitate the integration of wind into the electric grid often results in increased spill.

Contrary to the trends observed recently, the joint operations of Chief Joseph and Grand Coulee Reservoirs and installation of flow deflectors at Chief Joseph Dam were originally intended to reduce TDG levels within the mid-Columbia River. This is recognized in the 2008 BO for the FCRPS (NOAA 2008), in the Environmental Assessment (EA) and Finding of No Significant Impact for the flow deflectors (USACE 2000b), and in the FCRPS TDG TMDL (Ecology et al. 2004). With spill deflectors operational, Chief Joseph Dam should currently be operated under the TDG TMDL Phase 2 load allocation for the reach from Grand Coulee Dam to the Okanogan River: 73 mm Hg above saturation (i.e., 110 percent) under all conditions, with the narrow exception of any exceedances necessary to meet salmon augmentation flow requirements associated with the 2008 BO (e.g., 135 kcf at Priest Rapids Dam April 10-June 30) and during periods above the 7Q10 flow at the two federal projects.

If operations at Chief Joseph Dam continue to exceed numeric TDG criteria (i.e., 115\% at the forebay of Wells Dam during the federal fish passage waiver criteria period and 110\% in the tailrace of Chief Joseph Dam adjacent to the Confederated Tribes of the Colville Reservation) at greater frequencies, the Wells Project will have a more difficult time meeting state WQS due to TDG exceedances of incoming waters. Despite the lack of fish passage facilities at Chief Joseph Dam, the USACE has obtained TDG waivers for

fish passage in recent years. Unlike typical TDG waivers, operators at Chief Joseph Dam have been allowed a year-round exemption from state WQS for TDG (personal communication, R. Turner, USACE). This has allowed increased spill at Chief Joseph Dam and has significantly increased TDG levels entering the Wells Project. High federal TDG levels make it almost impossible for the non-federal mid-Columbia River dams to meet the WQS for TDG while simultaneously meeting fish passage and survival standards. For example, during the 130-day fish bypass season at Wells Dam in 2012, TDG concentration in the Wells forebay exceeded 110 percent on all but 6 days and exceeded 115 percent on more than 50 percent of the bypass operation days (Table 1). If operations at Chief Joseph Dam continue to exceed numeric TDG criteria entering the Wells Project, achieving WQS compliance will be difficult if not impossible.

Therefore based upon the regulations for the federal system, Chief Joseph Dam has discharged high TDG into the Wells Project. This has a material impact on the ability of the Wells Project to meet its tailrace standard (described below in Section 2.3). Depending upon the different regulatory standards that may apply to the federal projects, the CHJ project exceeded the 115% standard more than 30% of spill season days or exceeded the 110% standard more than 90% of the spill season days as measured in the Wells Forebay.

Table 1. TDG Concentration of Water Received at Wells Dam during 2012 fish spill season (130 days) and Federal Hydrosystem Compliance above Wells Dam per applicable water quality standards.

<table>
<thead>
<tr>
<th></th>
<th>Applicable Water Quality Criteria</th>
<th>TDG standard in the Wells forebay</th>
<th>Number of spill season days with 7Q10 days removed</th>
<th>Number of days in compliance in the 130-day season</th>
<th>Days in Compliance with TDG Standards (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colville Confederated Tribes/EPA Ecology per TDG exemption</td>
<td>110%</td>
<td>98</td>
<td>8</td>
<td>8.2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>115%</td>
<td>98</td>
<td>67</td>
<td>68.4%</td>
<td></td>
</tr>
</tbody>
</table>

Note. Total number of fish passage days at Wells Dam in 2012 was 133. However, only 98 days were included in the above analysis since 35 days at Chief Joseph Dam had daily average flows above the 7Q10 flow value of 222 kcf.

2.3 Wells Project TDG Studies

2.3.1 Historic Flow and TDG Information

Flow from the Columbia River originates in the headwaters of the Canadian Rockies and picks up snow melt from tributary streams as it travels over 1,243 miles before emptying into the Pacific Ocean. There are 85,300 square miles of drainage area above Wells Dam. The natural hydrograph had low flows in November through January with high flows in May through July. Storage dams on the Columbia River
and its tributaries upstream of the Wells Project in the U.S. and Canada capture spring and summer high flows to hold for release in the fall and winter months. Figure 2 presents information on flows observed in 2011 and 2012 at Wells Dam. Extreme flows observed in 2011 and again in 2012 also include daily flows below the 7Q10 value of 246 kcfs (not captured in figure below) making compliance more challenging at Wells Dam. For context, the month of July is historically the highest flow month at Wells Dam and has an average daily flow well under 200 kcfs (data not shown 1968-2012). In 2011 and 2012, Wells Dam observed 34 and 36 days with flows above 246 kcfs (above 7Q10) respectively illustrating the observed dramatic flows during these recent years. Prior to 2011, 7Q10 flows had not been observed at Wells Dam for the previous four years.

![Figure 2](image)

**Figure 2.** 7Q-10 flows at Wells Dam occurred very frequently in 2011 and 2012 compared to the previous 4 years where daily mean flows of 246 kcfs were not observed.

**2.3.2 Relicensing Studies**
During the relicensing of the Wells Project, Douglas PUD implemented a series of detailed assessments to: 1) evaluate the potential impacts of the Project on TDG; and 2) determine the best Project spillway configuration and operation to minimize TDG production to comply with the state WQS.

2.3.2.1  TDG Production Dynamics Study

In 2006, Douglas PUD hired a team of hydraulic and TDG experts from the Pacific Northwest to help design a monitoring program for a study that would examine various operational scenarios and their respective TDG production dynamics.

To evaluate operational scenarios and better understand TDG production at the Project, thirteen sensors were placed along three transects in the tailrace; at 1,000, 2,500 and 15,000 feet below Wells Dam. There were also three sensors placed across the forebay, one being the fixed monitoring station midway across the face of the dam and two more a distance of 300 feet from the dam. The sensors were programmed to collect data in 15 minute increments for both TDG and water temperature. Each test required the operations of the dam to maintain static flows through the powerhouse and spillway for at least a three hour period. While there were 30 scheduled spill events, there were an additional 50 events where the powerhouse and spillway conditions were held constant for a minimum three hour period. These “incidental” events provided an opportunity to collect additional TDG data on a variety of Project operations that met study criteria and are included in the results of the 2006 TDG Abatement Study. Spill amounts ranged from 5.2 to 52 percent of project flow and volume of spill and total flows ranged from 2.2 to 124.7 kcfs for spill and 16.4 to 254.0 kcfs for total discharge. There were six tests that were done at flows that exceeded the Wells Dam 7Q10 flows of 246 kcfs.

Results of the study indicated that two operational scenarios, spread spill at low flow and spill conditions and concentrated spill at high flows and spill conditions, produced the lowest levels of TDG and recommended continued testing of operational measures to ameliorate TDG production at Wells Dam (EES et al. 2007). The 2006 study also indicated that the current location of the tailwater TDG compliance monitoring station is appropriate in providing representative TDG production information both longitudinally and laterally downstream of Wells Dam.

2.3.2.2  2007 Wells Project TDG Operations Playbook

In 2007, a Spill Playbook was developed to be used by operators at Wells Dam. The intent of the Spill Playbook was to guide Project operators in the configuration of spill operations (specifically the implementation of spread spill and concentrated spill) in a manner that further evaluated the results of the 2006 TDG study and that examined the Spill Playbook operating scenarios over a broader range of environmental conditions. There were no scheduled spill tests in 2007 and operators were instructed to utilize the playbook only during forced spill events (when river flows exceeded flows needed to meet load). Specific objectives of the 2007 assessment included:

1. Evaluate TDG production for concentrated spills over a range of operational conditions.

2. Evaluate TDG production for spread spills over a range of operational conditions.
3. Evaluate indirect effects, operational, and logistical concerns for concentrated spill that might limit their application for TDG management.

4. Collect additional TDG data in order to refine the relationships of spill momentum and submergence depth as they affect TDG production.

At the end of May 2007, it was determined that the logistics of operating gates 2 and 10 which require manual adjustments, made implementation of spread spill testing impractical. In addition, true spread spill would require the removal of all five of the JBS barriers (in even numbered spill ways) in order to direct equal flow quantities through all 11 spill gates. This operation is incompatible with the HCP and license requirements designed to improve passage for juvenile smolts. For these reasons coupled with the fact that the concentrated spill operation provided the best TDG performance during high flow and spill conditions, the remainder of the study emphasized testing the concentrated spill strategy.

River flows in spring 2007 were 108.7 percent of the 20-year average. The peak total river discharge at Wells Dam (based on daily averages) was 238 kcfs. The maximum daily spill flow was 127 kcfs. There were few spill events in excess of the fish bypass spill after May. Most of the spill events were of short duration, which did not meet the required 3-hour time period that is necessary to establish equilibrium conditions at the Wells tailrace TDG monitoring station (WELW).

Conclusions of the 2007 assessment are as follows:

1. 2007 was an above average water year. During the 2007 fish passage season (April 1-September 15) Wells Dam was able to maintain compliance with the TDG standards 97 percent of the time.

2. Maintaining a true spread spill pattern (equal flows through all spill gates) at Wells Dam, required removal of all of the JBS barriers in addition to utilizing manual lifts for spill gates 2 and 10. For these reasons it was not logistically feasible to utilize spread spill for low and moderate ranges of spill.

3. Spill in 2007 was not of a sufficient duration to adequately test the performance of a concentrated or concentrated spill pattern to minimize TDG below Wells Dam.

4. The spill data collected at Wells during 2007 were consistent with analytical results for the 2006 TDG Study (EES et al. 2007).

2.3.2.3 2008 Wells Project TDG Operations Playbook

The study objective for the 2008 Wells Project Spill Playbook was to further evaluate the effectiveness of the concentrated spill configuration at producing lower TDG production. The 2008 study focused attention on total spill volume, tailwater elevation and further tested the logistical constraints identified during the 2007 TDG study. Specific objectives included:

1. Evaluate TDG production for concentrated spills over a range of operational conditions.
2. Evaluate indirect effects, operational, and logistical concerns for concentrated spill that might limit their application for TDG management.

3. Collect additional TDG data in order to refine the relationships of tailwater elevation, spill momentum and submergence depth as they affect TDG production at low to moderate spill levels.

River flows in spring 2008 were 104.3 percent of the 20-year average. The peak total river discharge at Wells Dam (based on daily averages) was 270 kcfs. The maximum daily spill flow was 145 kcfs. Spill events that met the required 3-hour time period occurred from May to July;

Conclusions of the 2008 assessment are as follows:

1. There were 20 spill events that met the required 3-hour time period to establish equilibrium conditions at the WELW.

2. During these 20 events, total outflows at Wells Dam ranged from 22.7 to 260.8 kcfs. Total spill ranged from 6.6 to 98.0 kcfs. Wells forebay station (WEL) TDG ranged from 106 percent to 116 percent. WELW TDG ranged from 113 percent to 127 percent.

3. 2008 was an above average water year, with up to 128 percent of average river flows (June) and high TDG levels resulting from spill at Chief Joseph Dam (Wells forebay exceeded 115 percent TDG 23.8 percent of days monitored).

There were six spill events that exceeded the 246 kcfs 7Q10 flood flow at Wells Dam. These events occurred in May and June which is a month earlier than historic peak flows at Wells Dam.

2.3.2.4 2008-2009 Numerical Model Development

As part of the effort to relicense the Wells Project, in 2008 Douglas PUD secured the services of the IIHR-Hydroscience and Engineering Laboratory of the University of Iowa (IIHR) to develop an unsteady three-dimensional (3D) two-phase flow computational fluid dynamics (CFD) tool to predict the hydrodynamics and TDG distribution within the Wells tailrace. Two models were used in the study; a volume of fluid (VOF) model and a rigid-lid two-phase flow model.

The VOF model predicts the flow regime and the free-surface characteristics, recognizing that a spillway jet may plunge to depth in the tailrace or remain closer to the surface depending upon the geometry of the outlet and the tailwater elevation.

The rigid-lid model included 16,500 feet of the Wells tailrace, from Wells Dam downstream to the TDG compliance monitoring station. This two-phase flow model characterizes the hydrodynamics and three-dimensional distribution of gas volume fraction, bubble size and TDG in the Wells tailrace. The upstream velocity profiles derived from the VOF model were input to the rigid-lid model. The gas volume fraction and bubble diameter at the spillbays are the external parameters of the model.

The model was calibrated and validated using field data collected in 2006 during a TDG production dynamics study (EES et al. 2007). The model was then calibrated using data collected during spill tests.
conducted on June 4 and June 5, 2006. The spillway flow was spread across spillbays on June 4 and concentrated through a single spillbay on June 5. Agreement was attained between the depth-averaged velocity data collected in the field and those generated by the model. A gas volume fraction of 3 percent and bubble diameter of 0.5 mm in the spillbays produced TDG values that bracketed the 2006 field observations.

Once calibrated, the predictive ability of the model was validated by running the model for three different operational conditions tested in 2006. The model captured the lateral TDG distribution and the reduction of TDG longitudinally as observed in the field. The numerical results demonstrated that the model provides a reliable predictor of tailrace TDG and therefore can be used as a tool to identify Project operations that can minimize TDG concentrations downstream of Wells Dam.

In an April 2009 report (Politano et al. 2009), the model demonstrated that Wells Dam can be operated to meet the TDG adjustment criteria during the fish passage season with flows up to 7Q10 levels (246 kcfs) provided the forebay TDG levels are below 115 percent, at least nine of ten units are available and units are fully generating. Compliance was achieved through the use of a concentrated spill pattern through spillbay 7 and surplus flow volume through other spillbays in a defined pattern and volume. These preferred operating conditions create surface-oriented flows by engaging submerged spillway lips below the ogee, thus increasing degasification at the tailrace surface (surface jet), decreasing supersaturation at depth, and preventing high-TDG waters from bank attachment. These principles were the basis of the 2009 Wells Project Spill Playbook and were fully implemented for the first time during the 2009 spill season with success. Overall, no exceedances were observed in either the Wells Dam tailrace or the Rocky Reach forebay in 2009.

2.4 Post-relicensing TDG Compliance Activities

Since filing the Wells Project Final License Application on May 27th, 2010 (and receipt of a new operating license on November 9th, 2012), Douglas PUD has continued to implement activities toward improving TDG management within the Wells Project.

2.4.1 GAP and TDG Annual Reporting

Similar to past years, Douglas PUD submits to Ecology for approval and continues to operate under a GAP to support downstream fish passage (See Appendix A for the 2013 GAP). As required by the new FERC license for the Wells Project, Douglas PUD has begun coordinating the development of the GAP with the HCP Project Fish Bypass/Spill Operations Plan, using best available information to minimize TDG while maximizing the benefits of spill for ESA-listed anadromous salmonids. This coordination is accomplished in consultation with the Wells HCP Coordinating Committee and the Aquatic SWG. The GAP is filed with the FERC for approval following approval by the NMFS, the U.S. Fish and Wildlife Service, and Ecology. Each year, as required by the GAP, Douglas PUD develops and submits to Ecology for approval, a TDG Annual Report that describes the background, operations, and results of GAP implementation for the fish spill season.
2.4.2 Spill Playbook

Central to the Douglas PUD’s GAP approach is the continued implementation and adaptation of the Wells Project Spill Playbook. At the end of each spill season, Wells Project TDG performance during the spill season is evaluated to identify opportunities for operational improvements. Any identified improvements are integrated into the Project’s Spill Playbook toward improving TDG management in subsequent years.

In 2010, the concepts from the 2009 Spill Playbook were integrated into the 2010 Wells Project Spill Playbook given their effectiveness at minimizing the generation of TDG and in helping to maintain TDG levels below the WQS criteria during the previous year. High Columbia River flows in June, which exceeded the preceding 15-year average flow, resulted in several exceedances of the hourly (125 percent maximum) and 12C-High (120 percent) TDG limits in the Wells Dam tailrace, and Rocky Reach forebay (115 percent). In response, Douglas PUD implemented an in-season analysis of the 2010 Spill Playbook and determined that full implementation of the recommendations from IIHR Engineering Laboratory would require the removal of the juvenile fish bypass system flow barriers in one even numbered spillbay. Following the in-season analysis and consultation with the HCP Coordinating Committee, changes were made to the 2010 Spill Playbook that allowed for the removal of the juvenile fish bypass system barriers in spillbay 6. Specifically, the Spill Playbook was modified to state that when spill levels approach the 53 kcfs threshold, the JBS barriers in spillbay 6 would be removed in order to remain in compliance with the TDG criteria in the Wells Dam tailrace and Rocky Reach Dam forebay. When spill exceeded 53 kcfs, excess spill would be directed through spillbays 6 and 7 rather than through spillbays 5 and 7. This operational configuration resulted in a more compact spill pattern that reduced the air-water interface surface area between spillway flows and the subsequent potential for lateral mixing and air entrainment.

In February 2011, Douglas PUD conducted an additional technical analysis of the 2010 Spill Playbook (after in-season changes) and confirmed that continued implementation would be appropriate for 2011 with additional minor modifications. Following approval of the 2011 GAP by Ecology, the 2011 Spill Playbook was implemented. Only minor changes were made to the 2012 Spill Playbook as a result of high compliance during the 2011 spill season. It is important to note that Columbia River flows at Wells Dam in 2011 were the third-highest on record. The average flow in 2011 was 45.0% (59.4 kcfs) higher than the previous 16-year average.

In December of 2012 the final GAP report was completed for the 2012 spill season. After analysis it was determined that the 2012 spill season had the 3rd highest average monthly flows since 1969 (April-August). In addition incoming flows were above 110 percent on more than 95 percent of the 130 day spill/bypass season. Despite these conditions, Wells Dam demonstrated high compliance with all standards aside from the Rocky Reach 115 percent 12C-high forebay standard. Given these unique conditions, and high compliance performance in 2011 and 2012, no changes were suggested for the 2013 Spill Playbook.
2.4.3 Participation in Regional Work Groups

Per Douglas PUD’s Water Quality Management Plan, staff continue to participate in both the Water Quality Team and the Adaptive Management Team meetings to address regional water quality issues, including sharing the results from monitoring, measuring, and evaluating water quality in the Wells Project. However, Douglas PUD will not advocate for any water quality measures in regional forums without consulting with the Aquatic SWG.

2.4.4 TDG Monitoring Locations

TDG monitoring has been implemented in the Wells Dam forebay since 1984. The forebay station (WEL) is located midway across the deck of Wells Dam (47.94722 -119.86508). The tailrace station (WELW) is located on the left bank of the Columbia River 2.6 miles downstream of Wells Dam (47.91304 -119.89625). Results of the 2008-2009 TDG numerical modeling activities conducted by IIHR have also confirmed that the tailrace monitoring station is located at a site representative of the river, particularly during higher flows. Hach® HYDROLAB MiniSonde instruments equipped with TDG and temperature probes are deployed approximately 15 feet below normal surface water elevation and are calibrated monthly (example in Appendix B). Data from both stations are automatically transmitted by radio to Wells Dam, stored, and forwarded to the USACE. Weather data are recorded by Global Water, Inc. instrumentation, including an electronic barometer located on the deck of Wells Dam at 810 feet elevation.

In order to more effectively meet the requirements identified in the Wells Project 401 Certification, Douglas PUD shall install two additional TDG monitoring stations in 2013. A redundant probe will be added to the existing WELW station in the Wells Dam tailrace (WEL2; 47.94722 -119.86508) to ensure data continuity and quality. Furthermore, an additional reservoir monitoring station will be installed at Washburn Island (RM 537.5) to collect TDG data representative of water quality entering the Wells Project from Chief Joseph Dam operations (WELWASH; 48.088696 -119.675901). The current Chief Joseph Dam tailwater station (CHQW) minisonde TDG sensor is deployed along the right bank of the Columbia River, 0.75 miles downstream from the dam (Easthouse 2009). The river right location of the U.S. Army Corps of Engineers TDG sensor precludes it from collecting bulk flow data, and instead the sensor monitors spillbay water disproportionally. Under some conditions, water coming from Chief Joseph Dam spillbays is of lower TDG concentration than the powerhouse. For example, when the forebay at Chief Joseph Dam has high concentrations of TDG (e.g. greater than 120 percent) as a result of high spill volumes from Grand Coulee Dam and limited degassing through Rufus Woods Reservoir, water sent through the spillbays at Chief Joseph Dam may actually be stripped of gas via the spill deflectors. However, powerhouse flows are essentially identical to those in the forebay and can be missed by the CHQW sensor since powerhouse flows orient to river left. As a result of the CHQW location and the orientation of spill and powerhouse flows, bulk flows leaving the federal system and entering into the Wells Project are not accurately monitored (pers. comm. with Mike Schneider, USACE). The Washburn Island location is expected to help Douglas PUD:

1) Better understand TDG degassing in the Wells Project and expected TDG saturation in the Wells forebay.
2) Assure data quality at the Wells forebay TDG sensor since Washburn Island TDG values should correlate predictably with Wells forebay TDG values. Based on the comparison of the sensors at these two locations, technicians can ensure reliable data collection by scheduling sensor servicing when data appears to be erroneous.

3) More accurately assess TDG production from the federal power system upstream of Wells Dam, which may support improved management towards minimizing TDG production in the Columbia River.

Per Section 6.7(2)(c)(i) of the 401 Certification, Douglas PUD will monitor TDG and barometric pressure, as needed, at the forebay and tailrace stations on an hourly basis and shall transmit these data, on a daily basis to a web-accessible database available for use by Ecology and regional fish management agencies. Although not required by the 401 Certification, Douglas PUD will also make available water quality data collected at the Washburn Island station. In addition, Douglas PUD shall expand the temporal scope of the monitoring program and collect these data throughout the year in order to evaluate both compliance during the fish spill season (TDG adjustment criteria from April through August) and during the non-fish spill season (110 percent from September through May) as required in Section 6.7(2)(b) of the 401 Certification.

2.4.5 Quality Assurance of Data
Per Section 6.7(2)(c)(ii) of the 401 Certification, Douglas PUD’s TDG monitoring program must be accompanied by an Ecology approved Quality Assurance Project Plan (QAPP). To meet this requirement, Douglas PUD submitted to Ecology for approval, a QAPP for water temperature and TDG for the Wells Project. The QAPP describes the systematic approach that will be implemented by Douglas PUD and its contractors for collecting high quality and reliable data that can then be used to determine compliance for the associated parameters with the state’s WQS. Information in the QAPP includes background, organization/schedule, quality objectives, sampling design, measurement procedures, quality control, data management, and auditing and reporting. Ecology provided comments on the QAPP on April 8th, 2013 (Douglas PUD 2013; Appendix B). The QAPP was approved by all of the signatories to the Aquatic Settlement Work Group on May 8th, 2013 and was filed with the FERC on June 21, 2013. The FERC approved the QAPP on Aug 8th, 2013.

2.5 Wells Project TDG Activities Summary
Since 1985, Douglas PUD has monitored TDG in the Wells Project. Over the last three decades, TDG management has evolved from basic water quality monitoring to a Project operations and monitoring program focused on real-time, adaptive TDG reduction approaches to achieve compliance with state WQS numeric criteria and maximum protection of fish and aquatic resources. Douglas PUD has improved upon its monitoring capabilities and understanding of TDG production at Wells Dam through the implementation of TDG production studies, modeling, and an evolving Project operational playbook. In recent years, despite historic spring flows in 2011 and 2012 and water with high TDG concentrations entering the Wells Project from upstream sources, Douglas PUD has continued to demonstrate a high level of compliance with state WQS numeric criteria. With the issuance of a new FERC operating license
for the Wells Project, Douglas PUD shall continue to improve its TDG performance through additional activities described in Section 3.0 Implementation Plan below.

### 3.0 Implementation Plan

Per the Wells Project 401 Certification and the WAC 173--201A-510(5), Douglas PUD has developed an Implementation Plan (see Table 2: Compliance Schedule) that identifies a step-wise approach for evaluating Wells Project TDG production dynamics toward achieving compliance with the applicable TDG WQS. The Implementation Plan shall not exceed 10 years (from Ecology approval of this WQAP) and shall identify reasonable and feasible activities that could be used to meet standards, or if meeting the standards is not attainable, then to achieve the highest attainable level of improvement. The Implementation Plan briefly summarizes the analytical methods used to evaluate each TDG activity and the benchmarks and reporting sufficient for Ecology to track the applicant’s progress toward implementation within the designated time period.

It is important to note that critical to the implementation of the following activities toward appropriately evaluating Wells Project TDG compliance with the applicable TDG WQS requires a range of flow conditions over the 10-year compliance schedule. High or low water years may not fully support compliance evaluation study objectives and as such, the program may need to be adapted or extended depending upon annual performance. This may include refinement of existing proposed study objectives and activities in consultation with Ecology as well as supporting the need for an additional 10-year compliance schedule (Section 3.7 below). Note that sections 3.1-3.8 below are also cross referenced in the Compliance Schedule featured in Table 2.

#### 3.1 Spill Playbook

Since 2009, Douglas PUD has implemented a Wells Project Spill Playbook that identifies an operational framework for TDG management during the fish spill season. The TDG Spill Playbook was developed as a result of TDG modeling studies that determined that the fish spill season TDG adjustment criteria could be met through operational means (Politano et al. 2009). Each year, TDG performance at the Wells Project is evaluated using the TDG adjustment criteria (Section 2.2) as the compliance benchmark. Factors considered in the evaluation include TDG performance at all three TDG monitoring compliance points (WEL, WELW, and Rocky Reach Dam forebay) and associated Project operational configurations (i.e., generation, spill, and total inflow/outflow), flow, relevant Project operations and maintenance activities (e.g., unit outages, spillbay maintenance, etc.), and FCRPS operations upstream that impact TDG. A primary objective of the post-fish spill season TDG data evaluation is to identify additional operational modifications that may improve Project TDG performance. These modifications are integrated into the Spill Playbook for implementation in the subsequent fish spill season.

Per the 401 Certification, Douglas PUD will expand the Spill Playbook to address spill at the Wells Project year round in order to effectively manage spill events and evaluate compliance with the TDG WQS of 110 percent during the non-fish spill season (approximately September through March). This component of the Spill Playbook will likely utilize operational configurations different from the fish passage spill season to take advantage of the absence of structural constraints integral to the Project’s high fish survival. For example, during the non-fish spill season, the Wells Project may utilize a spread
spill configuration given the absence of fish JBS baffles in even numbered spillbays which limit the volume of water that can be passed through these structures. Spread spill configurations have been shown to minimize TDG production at Wells and other facilities but this configuration can only be used at Wells Dam outside of fish passage season since bypass barriers are needed to operate the JBS during the spring and summer fish migration. Similar to fish spill season TDG monitoring, Douglas PUD will evaluate the TDG performance of the Project during the non-fish spill season toward achievement of the TDG WQS and adaptive management of the Spill Playbook.

On an annual basis, the Wells Project Spill Playbook is included as a component of the GAP for review and approval by Ecology. Douglas PUD shall continue implementing an adaptive Spill Playbook during the 10-year compliance schedule which will allow for an opportunity to collect Project operational and TDG production information over a range of water years (i.e., low, average, high). These additional data will also be used to inform other TDG activities identified in the compliance schedule (e.g., operational refinements, model reanalysis, reduction alternatives study, etc.).

3.2 Biological Monitoring Program

As required in each Ecology-approved GAP for the Wells Project, Douglas PUD is required to implement a biological monitoring plan during the fish spill season that includes the NMFS recommendation to sample for Gas Bubble Trauma (GBT) in juvenile salmon when hourly tailrace TDG levels exceed 125 percent saturation (NMFS 2000).

In response to elevated hourly TDG levels exceeding 125 percent saturation in the Wells Project tailrace, during the fish spill season, Douglas PUD will continue to initiate biological monitoring of juvenile anadromous salmonids for the occurrence of GBT. Similar to past years, GBT monitoring will occur at the Rocky Reach Project Juvenile Bypass Facility and adult salmon traps at Wells Fish Ladders (when juvenile collection and broodstock collection programs are operating). Examinations will include juvenile life history stages of any anadromous salmonid species present at the facility and will be reported as percent of occurrence and when detected, degree of GBT observed. Results of the biological monitoring program will be reported during annual water quality reporting. Biological monitoring is ongoing and is proposed for each year of the 10-year compliance schedule consistent with GAP requirements. Any biological or water quality studies done for the purpose of potential changes to the WQS will be done in coordination with Ecology to help ensure that the approach and data will meet state and federal requirements. This would include a QAPP that clearly identifies the goals and objectives, with sampling protocols appropriate for each parameter and specie.

The collection of biological data serves two primary purposes. First, Douglas PUD is required to collect biological data to meet GAP requirements associated with the annual TDG adjustment for fish passage (see paragraph above). Secondly, the 401 Certification identifies potential alternative approaches (e.g., use attainability analysis and site specific variance) as part of implementing the TDG compliance schedule (WAC 173-201A-510(5)(g)). Although it is difficult to predict during the development of this document, the collection of biological data may also support subsequent standards imposed by Ecology that may be revised from the current standards. As such, Douglas PUD has identified the biological monitoring program which collects data in most years, as an activity that may support the TDG compliance schedule.
3.3 **Project Operations Database Development**

During the Wells Project relicensing process, the development of the TDG production dynamics model considered current operational and monitoring constraints of Project facilities as the baseline operating assumption (i.e., accepted constraints). However, the development of a higher resolution Project operations database would better inform operations toward the improvement of TDG management. Operations and data parameters may include but are not limited to bypass barrier use and removal, unit flow, unit outages, spill gate flow and pattern, forebay/tailrace water surface elevation, incoming TDG, and water temperature. Douglas PUD will also work with Wells Dam engineers, technicians and plant operators to identify opportunities for operational optimization (e.g., spill gate availability, automation, potential utility of spillbays 1 and 11, restrictions to bypass removal, etc.).

Douglas PUD will identify parameters for an updated operations database in Year 3. The Project operations will be utilized during years 4-6. Additional water years may be necessary if flows during the period fail to provide a representative range of historic flow conditions observed at the Wells Project. The fine scale operations database will be used to verify any additional model outputs.

3.4 **Re-evaluate TDG Model Assumption**

The IIHR TDG model suite (i.e., rigid lid and VOF models) developed during the Wells Project relicensing process in 2008 was operated under a set of assumptions (as required for all quantitative predictive models) for hydrodynamic characteristics such as gas volume fraction, bubble size, various free-surface features, and incoming TDG levels. If compliance with the TDG WQS is not yet achieved through continued implementation and optimization of the Spill Playbook (recommendations resulting from evaluation of the fine scale Project operations database), Douglas PUD will revisit and refine the assumptions used in the modeling framework if agreed to and recommended by Ecology and the Aquatic SWG. Field data collection in year 5 may be required to support an empirical evaluation of past model assumptions toward improving model accuracy and therefore, model performance.

3.5 **Updated TDG Model Activities**

If updating the assumptions of the TDG model are determined to be appropriate based upon activities described in Section 3.4, Douglas PUD will validate the updated model using the fine scale Project operations database. Validation activities will occur in year 7. Benchmarks to determine TDG model validation success will be similar to validation criteria used during the original TDG model development activities.

Once the updated TDG model has been validated, Douglas PUD could utilize the model to run new operational scenarios resulting from analyses of the Spill Playbook performance and the updated Project operations database. The updated Project TDG model may be used to evaluate scenarios that can improve Wells Project TDG performance for both the fish spill and non-fish spill season. The 2007 TDG Report (EES et al. 2007) indicated that spread spill may actually outperform concentrated spill operations as detailed in the Spill Playbook when all five bypass barriers have been removed and total project spilling is less than 50 kcf. A spread spill configuration at the Wells Project during fish spill
season was determined infeasible since bypass barriers prevent true spread spill and are required by the HCP for survival and bypass efficiency reasons. However, it is unknown if this operational change could be beneficial or feasible during the non-fish spill season.

At a minimum, selection criteria for the identification of any new operational scenarios to be evaluated by an updated TDG model will include but not be limited to empirical data that supports the potential to improve Wells Project TDG performance. Project operation scenarios will be provided to Ecology for review and approval. If the TDG model identifies operational scenarios that may improve Wells Project TDG performance toward achievement of the WQS, Douglas PUD will confirm the feasibility of implementing such scenarios with Wells Dam engineers and operators. Any scenarios that are determined to be logistically feasible could be integrated into the year 8 Spill Playbooks and implemented in parallel with data collection and validation. Field evaluation of model scenarios will occur during years 9 and 10 in order to ensure that data over a range of water years representative of the historic condition are collected.

3.6 TDG Reduction Alternatives Analysis

The 401 Certification requires that in year one of the Compliance Schedule, following the acceptance of the QAPP, Douglas PUD will conduct a TDG Reduction Alternatives Analysis. This document will be developed in year 1 following the approval of this WQAP. If by year 9, field evaluations of updated modeling scenarios indicate compliance with the TDG WQS are not yet achieved during specific conditions, Douglas PUD will then be required to implement another TDG Reduction Alternatives Analysis Study which would include an updated section of the original TDG Reduction Alternatives Analysis. The objective of these studies will be to conduct a comprehensive evaluation of any alternatives, both operational and structural, that may improve Project TDG management toward ultimately improving compliance with the TDG WQS criteria. As an example, under this scenario Douglas PUD would engage engineers and use other examples at projects to explore alternatives such as structural modifications. However, modifications would be modeled in the context of risks such as the reduced survival of juvenile salmon under newly constructed abatement features and the risks of reducing spill to comply with TDG standards but increasing mortality rates as a result of increased turbine route use. Under this process Douglas PUD would expect to consult the NMFS and other fishery agencies and tribes that have been involved in similar risk analyses.

In addition to identification of the possible alternatives, the study will evaluate the environmental and economic cost and benefit of implementing each alternative. This cost benefit analysis would include but not be limited to economic costs of implementing an alternative vs. the incremental improvements in TDG performance, feasibility of implementation, certainty of success, impacts to aquatic life including ESA-listed fish species passage and survival success, and the upstream federal spill program and its implications for Wells Project TDG management. Results of these studies will be shared with members of the Aquatic SWG, the other Mid-Columbia PUDs, and the USACE toward identification of any reasonable and feasible alternatives.
3.7 Continuing Wells Project TDG Management

Based upon the results of the 2023 TDG Reduction Alternatives Analysis and subsequent discussions with interested parties, Douglas PUD, in consultation with Ecology, will identify continuing TDG management activities at the Wells Project consistent with the 401 Certification and the WAC 173--201A-510(5). Alternatives may include development of a new 10-year compliance schedule (e.g., if reasonable and feasible alternatives are identified and agreed upon per activities in Section 3.6 or if representative flow conditions to support compliance activities do not occur), use attainability, site specific variance (e.g., compliance not fully achieved, alternatives detrimental to the survival of fishes that are inconsistent with ESA criteria and aquatic designated uses and determination that biological impacts due to Project TDG management is not likely to affect ESA listed species), or an alternative path such as specific additional analysis or activities. The results of any additional analyses or evaluation will be used to inform next steps within TDG attainment process.

3.8 Economics Analysis

For any future Wells Project TDG management alternatives, that may be identified as a result of the TDG Reduction Alternatives Analysis or any other TDG activities, Douglas PUD will conduct a comprehensive economics analysis. The analysis will expand upon the cost benefit analysis conducted as part of the TDG Reduction Alternatives Analysis.
<table>
<thead>
<tr>
<th>Measure</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8</th>
<th>Year 9</th>
<th>Year 10</th>
<th>QAPP Section Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation of adaptive spill playbook and collect data</td>
<td>Ongoing</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>3.1</td>
</tr>
<tr>
<td>Monitor gas bubble presence in biota</td>
<td>Ongoing</td>
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<td></td>
<td>3.2</td>
</tr>
<tr>
<td>Identify key Project operating parameters and develop database</td>
<td></td>
<td></td>
<td></td>
<td>Develop</td>
<td>Collect</td>
<td>Data</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.3</td>
</tr>
<tr>
<td>Revise relevant TDG model assumptions</td>
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<td></td>
<td></td>
<td></td>
<td>Contingent upon compliance if need, field test</td>
<td>3.4</td>
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<tr>
<td>Validation of updated Project TDG model</td>
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<td></td>
<td></td>
<td></td>
<td>Use data collected from fine scale operations monitoring and field sampling to verify model output and to ensure results are consistent with modeling expectations</td>
<td>3.5</td>
</tr>
<tr>
<td>Examine TDG model within the constraints of 110% standard.</td>
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<td>Contingent on Spill Playbook performance outside of fish spill season</td>
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<td></td>
<td></td>
<td>Test again if Model and playbooks are updated</td>
<td>3.5</td>
</tr>
<tr>
<td>Implement updated spill playbook</td>
<td>A) Test modeling and database via updated spill playbook</td>
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<td></td>
<td></td>
<td>B) Determine compliance with WAC</td>
<td>3.5</td>
</tr>
<tr>
<td>TDG Reduction Alternatives Analysis study (includes both operational/automation of ops and structural modifications and potential impacts to biological resources ESA listed fishes)</td>
<td>Develop</td>
<td></td>
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<td></td>
<td></td>
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<td>3.6</td>
</tr>
<tr>
<td>Consider updated WQAP, water quality compliance schedule, Use Attainability, site specific variance measures or alternative path forward toward compliance</td>
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<td></td>
<td>Use Attainability Analysis and Site Specific Standard, Or Develop Compliance Schedule</td>
<td>3.7</td>
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<tr>
<td>Economics analysis</td>
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<td></td>
<td></td>
<td></td>
<td>Contingent</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Could require additional years if flows don’t provide range of testing conditions required.
4.0 Reporting
Douglas PUD will provide a draft annual report to Ecology for review and approval summarizing the previous year's activities undertaken in accordance with the WQAP by February 28th of each year. Any decisions, statements of agreement, evaluations, or changes made pursuant to this WQAP will be included in the GAP annual report. Once the annual report is approved by Ecology, Douglas PUD will file the report with the FERC.

5.0 References


Public Utility District No. 1 of Douglas County, East Wenatchee, WA.


6.0 Appendices
APPENDIX A

WELLS 2013 GAS ABATEMENT PLAN AND BYPASS OPERATION PLAN
TOTAL DISSOLVED GAS ABATEMENT PLAN

WELLS HYDROELECTRIC PROJECT

(FERC Project No. 2149)

Prepared by:

Public Utility District No. 1 of Douglas County
East Wenatchee, Washington

February 1, 2013
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Executive Summary

Washington State Water Quality Standards (WQS) are defined in Washington Administrative Code (WAC) Chapter 173-201A, and are administered by the Washington Department of Ecology. Compliance with the total dissolved gas (TDG) standard requires that TDG not exceed 110 percent at any point of measurement in any state water body. A dam operator is not held to the TDG standards when the river flow exceeds the seven-day, 10-year frequency flood (7Q-10). In addition to allowances for natural flood flows, the TDG criteria may be adjusted to aid fish passage over hydroelectric dams when consistent with an Ecology-approved gas abatement plan. On a per-application basis, Ecology has approved a TDG adjustment to allow spill for juvenile fish passage past Columbia and Snake River dams (WAC 173-201A-200(1)(f)(ii)).

On the Columbia and Snake rivers there are three separate standards for the fish passage TDG adjustment: 1) TDG shall not exceed 125 percent in the tailrace of a dam, as measured in any one-hour period, 2) TDG shall not exceed 120 percent in the tailrace of a dam and 3) shall not exceed 115 percent in the forebay of the next dam downstream. Compliance with the latter two standards is determined using an average of the 12 highest consecutive hourly readings in any 24-hour period. The increased levels of spill, resulting in elevated TDG levels, are intended to allow increased fish passage with less harm to fish populations than what would be caused by turbine fish passage. This TDG adjustment provided by Ecology is based on a risk analysis study conducted by the National Marine Fisheries Service (NMFS) (NMFS 2000).

The goal of the Wells Total Dissolved Gas Abatement Plan (GAP) is to implement a long-term strategy to achieve compliance with the Washington State WQS criteria for TDG in the Columbia River at the Wells Hydroelectric Project (Wells Project) while continuing to provide safe passage for downstream migrating juvenile salmonids. Public Utility District No. 1 of Douglas County (Douglas PUD), which owns and operates the Wells Project, is submitting this GAP to Ecology as required for receipt of a TDG adjustment to aid fish passage at Wells Dam.
1.0 Introduction and Background

The Wells Hydroelectric Project Gas Abatement Plan (GAP) provides details on operational and structural measures to be implemented by Public Utility District No. 1 of Douglas County, Washington (Douglas PUD) at Wells Dam under the Federal Energy Regulatory Commission (FERC) license for Project No. 2149. These measures are intended to result in compliance with the modified Washington State water quality standards (WQS) for total dissolved gas (TDG) allowed under the TDG adjustment, provided incoming water to the Project is in compliance and flows are below the seven-day, 10-year frequency flood levels (7Q-10: 246 kcfs).

The goal of the GAP is to implement a long-term strategy to achieve compliance with the Washington State WQS for TDG in the Columbia River at the Wells Hydroelectric Project (Wells Project or Project), while continuing to provide safe passage for downstream migrating juvenile salmonids via the Juvenile Bypass System (JBS). Douglas PUD is the owner and operator of the Wells Project and is submitting this GAP to the Washington Department of Ecology (Ecology) for approval as required for receipt of a TDG adjustment for fish passage.

Since 2003, Ecology has approved GAPs and issued a TDG adjustment for the Wells Project. The most recent GAP was approved by Ecology in 2012.

This GAP contains three sets of information. Section 1.0 summarizes the background information related to regulatory and project-specific TDG information at the Wells Project. Proposed Wells Project operations and activities related to TDG management are contained in Sections 2.0 and 3.0. Section 4.0 provides a summary of compliance and physical monitoring plans, quality assurance and quality control procedures, and reporting.

1.1 Project Description

The Wells Project is located at river mile (RM) 515.6 on the Columbia River in the State of Washington (Figure 1). Wells Dam is located approximately 30 river miles downstream from the Chief Joseph Hydroelectric Project, owned and operated by the United States Army Corps of Engineers (USACE); and 42 miles upstream from the Rocky Reach Hydroelectric Project owned and operated by Public Utility District No. 1 of Chelan County (Chelan PUD). The nearest town is Pateros, Washington, which is located approximately 8 miles upstream from the Wells Dam.

The Wells Project is the chief generating resource for Douglas PUD. It includes ten generating units with a nameplate rating of 774,300 kW and a peaking capacity of approximately 840,000 kW. The spillway consists of eleven spill gates that are capable of spilling a total of 1,180 thousand cubic feet per second (kcf/s). The crest of the spillway is approximately five and a half feet above normal tailwater elevation and two feet below tailwater elevation when plant discharge is 219 kcf/s. The design of the Wells Project is unique in that the generating units, spillways, switchyard, and fish passage facilities were combined into a single structure referred to as the hydrocombine. Fish passage facilities reside on both sides of the hydrocombine, which is 1,130 feet long, 168 feet wide, with a dam top elevation of 795 feet above mean sea level (msl). The Juvenile Bypass System (JBS) was developed by Douglas PUD and uses a
barrier system to modify the intake velocities on all even numbered spillways (2, 4, 6, 8 and 10). The Wells Project is considered a “run-of-the-river” project due to its relatively limited storage capacity.

Figure 1. Map of the Wells Hydroelectric Project in Central Washington.

The Wells Reservoir is approximately 30 miles long. The Methow and Okanogan rivers are tributaries of the Columbia River within the Wells Reservoir. The Wells Project boundary extends approximately 1.5
miles up the Methow River and approximately 15.5 miles up the Okanogan River. The surface area of the reservoir is 9,740 acres with a gross storage capacity of 331,200 acre-feet and usable storage of 97,985 acre-feet at the normal maximum water surface elevation of 781 feet.

1.2 **Regulatory Framework**

Article 401(a) of the FERC license for the Wells Project requires that the GAP be developed in consultation with the National Marine Fisheries Service (NMFS), [United States Fish and Wildlife Service (USFWS)], Washington State Department of Fish and Wildlife, [Washington State Department of Ecology (Ecology)], Confederated Tribes of the Colville Reservation, Confederated Tribes and Bands of the Yakama Nation, United States Bureau of Land Management, and United States Bureau of Indian Affairs. The GAP must then be approved by NMFS and Interior before being submitted to Ecology and the Aquatic Settlement Work Group for approval. Once approved by the Aquatic Settlement Work Group and in particular Ecology, then the GAP is to be filed with the FERC for approval.

WAC Chapter 173-201A defines standards for the surface waters of Washington State. Section 200(1)(f) defines the WQS for TDG, and subsection ii defines the TDG criteria adjustment for fish passage.

Under the WQS, TDG shall not exceed 110 percent at any point of measurement in any state water body. However, the standards exempt dam operators from this TDG standard when the river flow exceeds the 7Q-10 flow. The 7Q-10 flow is the highest calculated flow of a running seven consecutive day average, using the daily average flows that may be seen in a 10-year period. The 7Q-10 total river flow for the Wells Project was computed using the hydrologic record from 1974 through 1998, coupled with a statistical analysis to develop the number from 1930 through 1998. These methods follow the United States Geological Survey (USGS) Bulletin 17B, “Guidelines for Determining Flood Flow Frequency” and determined that the 7Q-10 flow at Wells Dam is 246,000 cfs (Ecology et. al. 2004).

In addition to allowances for natural flood flows, the TDG criteria may be adjusted to aid fish passage over hydroelectric dams when consistent with an Ecology-approved gas abatement plan. This plan must be accompanied by fisheries management and physical and biological monitoring plans. Ecology may approve, on a per application basis, an interim adjustment to the TDG standard (110 percent) to allow spill for juvenile fish passage past dams on the Columbia and Snake rivers. Ecology-approved fish-passage adjustments comprise three separate standards to be met by dam operators: 1)TDG shall not exceed 125 percent in any one-hour period in the tailrace of a dam, 2) TDG shall not exceed 120 percent in the tailrace of a dam and 3) shall not exceed 115 percent in the forebay of the next dam downstream, with compliance criteria 2 and 3 measured as an average of the 12 highest consecutive hourly readings in any 24-hour period (12C High). The increased levels of spill resulting in elevated TDG levels are authorized by Ecology to allow salmonid smolts a non-turbine downstream passage route that is less harmful to fish populations than turbine fish passage. This TDG adjustment provided by Ecology is based on a risk analysis study conducted by the National Marine Fisheries Service (NMFS) (NMFS 2000).

A significant portion of the Wells Reservoir occupies lands within the boundaries of the Colville Indian Reservation. Wells Project operations do not affect TDG levels in tribal waters, where the Colville Tribes’ TDG standard is a maximum of 110 percent, year-round, at all locations. This TDG standard is also the
U.S. Environmental Protection Agency’s (EPA) standard for all tribal waters on the Columbia River, from the Canadian border to the Snake River confluence. TDG levels on the Colville Reservation portion of the mainstem Columbia River within Wells Reservoir result from the operations of upstream federal dams but in particular, the USACE’s Chief Joseph Dam (located immediately upstream of Wells Dam) and the US Bureau of Reclamation’s Grand Coulee Dam (located immediately upstream of Chief Joseph Dam).

1.2.1 7Q-10 Flood Flows
The 7Q-10 flood flow at the Wells Project is 246.0 kcfs. The Project is not required to comply with state WQS for TDG when project flows exceed this value.

1.2.2 Fish Spill Season
Although not defined in state regulations, the fish spill season at Wells Dam is determined by the Habitat Conservation Plan (HCP) Coordinating Committee and is intended to aid downstream juvenile salmonid fish passage over Wells Dam as an alternative to passage through the Project turbines. The fish spill season is generally April to end of August, but may vary from year to year. During non-fish spill, Douglas PUD will make every effort to remain in compliance with the 110 percent standard. During the fish spill season, Douglas PUD will make every effort not to exceed an average of 120 percent as measured in the tailrace of the dam. TDG at the Wells Project also must not exceed an average of 115 percent as measured in the forebay of the next downstream dam (Rocky Reach). These averages are calculated using the twelve (12) highest consecutive hourly readings in any 24-hour period. In addition, there is a maximum one-hour average of 125 percent, relative to atmospheric pressure, during fish spill season. Nothing in these special conditions allows an impact to existing and characteristic uses.

1.2.3 Incoming TDG Levels
During the fish spill season, TDG concentrations in the Wells Project forebay are primarily determined by the USACE’s upstream water management activities at Chief Joseph Dam and the Bureau of Reclamation’s activities at Grand Coulee Dam.

Since the completion of spill deflectors at Chief Joseph Dam in 2008, there has been a significant increase in the amount of spill at the Chief Joseph Project resulting from Federal Columbia River Power System (FCRPS)-wide operations. Recent increases in the amount of spill at Chief Joseph Dam have resulted in a dramatic rise in the volume of supersaturated water entering the Wells Project. For example, in 2012 Wells Dam received non-compliant water (>110%) on 125 days of the 133 days fish spill season. This mass influx of supersaturated water has resulted in significantly higher TDG concentrations observed in the forebay of Wells Dam that often exceeds TDG values of 115%.

Despite the absence of fish passage at Chief Joseph Dam, the USACE has operated under the assumption that the fish passage TDG adjustment approved by Ecology applies to all FCRPS dams, rather than the eight dams with fish passage in the lower Snake and Columbia rivers. Chief Joseph and Grand Coulee dams do not currently have upstream or downstream fish passage and subsequently do not have Ecology approved fish passage adjustment for spilling water above the 110% statewide uniform TDG.
standard. As a result, both the USACE and the Bureau of Reclamation are out of compliance with Washington State WQS, as well as the EPA TDG standard and the Colville Tribe’s TDG standard, whenever TDG in the Chief Joseph dam or Grand Coulee dam tailraces exceeds 110 percent.

In 2012 the USACE revamped their proposed spill priority list for the FCRPS in recognition of the 110 percent TDG standard for joint operations of Grand Coulee and Chief Joseph Dams. Douglas PUD strongly supported the USACE’s proposed 2012 spill priority as it was expected to reduce the future frequency and duration of non-compliant water entering the Wells Reservoir. Despite the spill priority modification in 2012, Douglas PUD consistently received non-compliant water from the upstream federal hydro-system above 110% on all but 8 days of the 133 day spill season. In addition Wells received water containing TDG over the 115% (12C-High) standard for more than 50% of the spill season days in 2012.

### 1.2.4 Total Maximum Daily Load

In June 2004, a total maximum daily load (TMDL) for TDG was jointly established for the Mid-Columbia River and Lake Roosevelt by Ecology, the Spokane Tribe of Indians, and EPA (Ecology et al. 2004). EPA’s issuance covers all waters above Grand Coulee Dam and all tribal waters; EPA’s TMDL covers all tribal waters of the Colville Confederated Tribes, including the right bank of the Columbia River from Chief Joseph Dam downstream to the Okanogan River confluence. Ecology’s issuance covers all state waters downstream from Grand Coulee Dam to the Snake River confluence.

A summary implementation strategy prepared by Ecology and the Spokane Tribe of Indians describes proposed measures that could be used to reduce TDG levels in the Columbia River. Short-term actions primarily focus on meeting Endangered Species Act (ESA) requirements, while long-term goals address both ESA and TMDL requirements (Ecology et. al., 2004). Many of the recommended TMDL actions are currently being addressed by Douglas PUD through the implementation of the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) for anadromous salmon, the Bull Trout Management Plan resulting from consultation with the U.S. Fish and Wildlife Service, and requirements described in current and past GAPs.

The Wells Project occupies waters both upstream and downstream of the Okanogan River. In waters upstream of the Okanogan River, the TMDL does not provide an exemption for fish passage spills (except as a temporary waiver or special condition as part of the short-term compliance period, as described in the Implementation Plan, Appendix A of the TMDL). Downstream of the Okanogan River, allocations are provided based on both the 110 percent criteria and the criteria established for fish passage in the Washington State WQS. Any adjustment for fish passage downstream of the Okanogan River requires an Ecology-approved Gas Abatement Plan or GAP (Ecology et al. 2004).

### 1.2.5 Additional 401 Certification Requirements

the Wells Project, as conditioned by its 401 Certification/Order No. 8981, would comply with all applicable provisions of 33 USC 1311, 1312, 1313, 1316, 1317 and appropriate requirements of Washington State law. The 401 Certification general conditions that are relevant to the GAP and the abatement of TDG under the TDG adjustment are as follows:

- Douglas PUD shall consult with Ecology before it undertakes any change to the Project or Project operations that might significantly and adversely affect compliance with any applicable water quality standard (including designated uses) or other appropriate requirement of state law.

- Copies of the Wells Project 401 Certification and associated permits, licenses, approvals and other documents shall be kept on site and made readily available for reference by Douglas PUD, its contractors and consultants, and by Ecology.

- Douglas PUD shall allow Ecology access to inspect the Project and Project records required under the 401 Certification for the purpose of monitoring compliance with conditions of the 401 Certification. Access will occur after reasonable notice, except in emergency circumstances.

- Douglas PUD shall, upon request by Ecology, fully respond to all reasonable requests for materials to assist Ecology in making determinations under the 401 Certification and any resulting rulemaking or other process.

- Douglas PUD shall operate the Wells Project in compliance with a GAP approved by Ecology. By February 28 of each year, Douglas PUD shall submit a GAP to Ecology for approval. Pending Ecology’s approval of each subsequent GAP, Douglas PUD shall continue to implement the activities identified within the previously approved plan.

- The GAP will include the Spill Operations Plan and will be accompanied by a fisheries management plan (section 2.2.1) and physical (section 4.1.1) and biological (section 2.2.2) monitoring plans. The GAP shall include information on any new or improved technologies to aid in the reduction in TDG.

- Commencing one year after issuance of a new FERC license, Douglas PUD shall monitor and report spills and TDG during non-fish spill season to determine TDG compliance with the 110 percent standard (see section 4.1.1). The non-fish spill season is defined as the times of the year that are not considered the fish spill season (generally April to end of August).

- If Douglas PUD, at any point, considers modifying any of the measures identified in the spill playbook, they will immediately develop proposed alternative(s) that will produce levels of TDG equal to or less than those estimated to be produced by the measures to be replaced. These measures should be implementable in a similar timeframe and must be submitted to Ecology for review and approval prior to implementation.

- The Project shall be deemed in compliance with the TMDL for TDG as long as it remains in compliance with the terms of the 401 Certification. The certification, including the GAPs and the
Water Quality Attainment Plan (section 2.2.4), is intended to serve as the Project’s portion of the Detailed Implementation Plan for the TDG TMDL.

The 401 Certification also contains specific conditions that are relevant to the GAP and the abatement of TDG under the TDG adjustment are as follows:

- Commencing one year after issuance of the new license, Douglas PUD shall monitor and report spills and TDG during non-fish spill season to determine compliance with the 110% standard.

- Douglas PUD shall maintain a TDG monitoring program at its Fixed Monitoring Locations in the forebay and tailrace of Wells Dam and/or at other locations as determined by Ecology, in order to monitor TDG and barometric pressure. Douglas PUD shall monitor TDG hourly throughout the year.

- The TDG monitoring program shall conform to the Ecology Quality Assurance Project Plan (QAPP) requirements per Section 6.7 (f) of the [license] order and the procedures shall be at least as stringent as the quality assurance/quality control calibration and monitoring procedures developed by the USGS for the Columbia River.

- Douglas PUD shall provide an annual TDG report to Ecology for review and approval by February 28th of each year.

- Within one year of issuance of the new license, Douglas PUD shall coordinate the annual HCP Project Fish Bypass/Spill Operations Plan with the GAP, using best available information to minimize the production of TDG. This coordination shall be accomplished in consultation with the Wells HCP Coordinating Committee and the aquatic SWG.

- Within one year of license issuance, Douglas PUD shall submit a Water Quality Attainment Plan for Ecology to review and approve. The plan shall include a compliance schedule to ensure compliance with the water quality criteria with 10 years.

- Douglas PUD shall manage spill toward meeting water quality criteria for TDG during all flows below 7Q10 by minimizing voluntary spill through operations, including scheduling maintenance based upon predicted flows, avoiding spill by coordinating operations with upstream dams to the extent that it reduces TDG, maximize power house discharge, especially during periods of high river flows, and manage voluntary spill in real time in an effort to continue to meet TDG numeric criteria consistent with the GAP.

1.2.6 Additional Requirements of the FERC Operating License

Article 401(a) of the FERC operating license for P-2149 requires that the Gas Abatement Plan be filed with the Commission for approval following the approval of the GAP by NMFS, USFWS and Ecology. Article 401(b) requires the TDG report be submitted to the Commission by February 28th of each year.
Article 401(c) requires Commission authorization of an application to amend the license, prior to the implementation of measures to address non-compliance with numeric water quality criteria.

### 1.3 History of Operations and Compliance

#### 1.3.1 Historical Flows

Flow from the Columbia River originates in the headwaters of the Canadian Rockies and picks up snow melt from tributary streams as it travels over 1,243 miles before emptying into the Pacific Ocean. There are 85,300 square miles of drainage area above Wells Dam. The natural hydrograph had low flows in November through January with high flows in May through July. Storage dams on the Columbia River and its tributaries upstream of the Wells Project in the U.S. and Canada capture spring and summer high flows to hold for release in the fall and winter months. Table 1 presents information on Columbia River flow, as measured at Wells Dam from 2002 to 2012, and shows that the current hydrograph of the Columbia River is controlled by upstream, federally managed storage and release regimes. Juvenile anadromous salmonid migration occurs within a regime of reduced high flows during the spring migration period.

In general, the hydropower system and reservoir operations in the Columbia River are coordinated through a set of complex agreements and policies that are designed to optimize the benefits and minimize the adverse effects of project operations. The Wells Project operates within the constraints of the Pacific Northwest Coordination Agreement, Canadian Treaty, Canadian Entitlement Agreement, Hourly Coordination Agreement, the Hanford Reach Fall Chinook Protection Program and the FERC regulatory and license requirements.
Table 1. Average monthly flows (kcsf) at Wells Dam, by month (2002-2012).

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1.3.2 Spill Operations

1.3.2.1 General Operation

The Hourly Coordination Agreement is intended to integrate power operations for the seven dams from Grand Coulee to Priest Rapids. "Coordinated generation" is assigned to meet daily load requirements via Central Control in Ephrata, WA. Automatic control logic is used to maintain pre-set reservoir levels to meet load requirements and minimize involuntary spill. These pre-set reservoir levels are maintained at each project via management of a positive or negative "bias". Positive or negative bias assigns a project more or less generation based on its reservoir elevation at a given time and thus, maximizes system benefits and minimizes involuntary spill.

1.3.2.2 Spill for Fish

Wells Dam is a hydrocombine design where the spillway is situated directly above the generating units. Research at Wells Dam in the mid-1980s showed that a modest amount of spill effectively guided 92.0-96.2% of the spring and summer downstream migrating juvenile salmonids through the JBS (Skalski et al. 1996; Table 2). The operation of the Wells JBS utilizes the five even-numbered spillways. These spillways have been modified with constricting barriers to improve the attraction flow while using modest levels of water. These spillways are used to provide a non-turbine passage route for downstream migrating juvenile salmonids from April through August. Normal operation of the JBS uses 10 kcsf. During periods of extreme high flow, one or more of the JBS barriers will be removed to provide adequate spill capacity to respond to an emergency plant load rejection. Spill barriers may also be removed to minimize TDG production during high spill events, or when flood flows are forecast. Bypass gates are opened when adjacent turbines are operating.
Typically, the JBS will use approximately 6 to 8 percent of the total river flow for fish guidance. Between the years 1997 and 2004, the volume of water dedicated to JBS operations has ranged from 1.5 to 3.2 million acre-feet annually. The operation of the JBS adds a small amount of TDG (up to 2 percent) while meeting a very high level of fish guidance and protection. This high level of fish protection at Wells Dam has met the approval of the fisheries agencies and tribes and is vital to meeting the survival performance standards contained within the FERC-approved HCP. The Wells Project JBS is the most efficient bypass system on the mainstem Columbia River.

<table>
<thead>
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<th>Species</th>
<th>% JBS Passage</th>
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<td>Yearling (spring) Chinook</td>
<td>92.0</td>
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<tr>
<td>Steelhead</td>
<td>92.0</td>
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<tr>
<td>Subyearling (summer/fall) Chinook</td>
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The JBS is used to protect downstream migrating juvenile salmonids. Fish bypass operations at Wells Dam falls into two seasons, Spring Bypass and Summer Bypass. For 21 years, the status of the fish migration for both spring and summer periods was monitored by an array of hydroacoustic sensors placed in the forebay of Wells Dam. The operation period for the juvenile bypass begins in April and ends in August; actual start and stop dates are set by the HCP Coordinating Committee, and are based on long-term monitoring to bracket the run timing of greater than 95 percent of both the spring and summer migrants. Up to thirteen million juvenile salmonids migrate past Wells Dam each year.

1.3.2.3 Flows in Excess of Hydraulic Capacity

The Wells Project is a “run-of-the-river” project with a relatively small storage capacity (~98,000 acre ft). By comparison, Grand Coulee Dam, two projects upstream of Wells Dam, has 58 times the storage capacity of the Wells Reservoir. River flows in excess of the ten-turbine hydraulic capacity (219 kcfs) at Wells Dam must be passed over the spillways.

The forebay elevation at Wells Dam is maintained between 781.0 and 771.0 msl. The Wells Project has a hydraulic generating capacity of 219 kcfs (ASL 2007) and a spillway capacity of 1,180 kcfs. In recent years however the Wells project has had less than 200 kcfs plant capacity due to ongoing generator and turbine rebuild and upgrade projects. Data for Columbia River flows for eighty-five years at Priest Rapids yielded a peak daily average discharge of 690 kcfs on June 12, 1948 (USGS web page for historical flows at Priest Rapids on the Columbia River, http://waterdata.usgs.gov/wa/nwis/dv/?site_no=12472800). Therefore, the hydraulic capacity of Wells Dam is well within the range of recorded flow data.

1.3.2.4 Flow in Excess of Power Demand

Spill may occur at flows less than the Wells Project hydraulic capacity when the volume of water is greater than the amount required to meet electric power system loads. This may occur during temperate weather conditions and when power demand is low or when non-power constraints on river
control results in water being moved through the Mid-Columbia at a different time of day than the power is required (i.e. off-peak periods). Hourly coordination (Section 3.2) between hydroelectric projects on the river was established to maximize generation by minimizing spill. Spill in excess of power demand provides benefit to migration juvenile salmonids. Fish that pass through the spillway survive at a higher rate relative to passage through a turbine and the turbulence in the tailrace generated by spill in excess of power demand increases tailrace velocity and reduces tailrace egress times. The reductions in tailrace egress time and increases in water turbulence and velocity reduce predation in the Wells tailrace.

1.3.2.5  Gas Abatement Spill

Gas Abatement Spill is used to manage TDG levels throughout the Columbia River Basin. The Technical Management Team (including NMFS, USACE, and Bonneville Power Administration [BPA]) implements and manages this spill. Gas Abatement Spill is requested from dam operators at other projects in the Columbia and Snake Rivers where gas levels are high. A trade of power generation for spill is made between operators, providing power generation in the river with high TDG and trading an equivalent amount of spill from a project where TDG is lower. Historically, the Wells Project has accommodated requests to provide Gas Abatement Spill. However, in an effort to limit TDG generated at the Wells Project, Douglas PUD has adopted a policy of not accepting Gas Abatement Spill at Wells Dam.

1.3.2.6  Other Spill

Other spill includes spill as a result of maintenance or plant load rejection. A load rejection occurs when the generating plant is forced off-line by an electrical fault, which trips breakers and shuts off generation. At a run-of-the-river hydroelectric dam, if water cannot flow through operating turbines, then the river flow that was producing power has to be spilled until turbine operation can be restored. These events are extremely rare, and would account for approximately 10 minutes in every ten years.

Maintenance spill is utilized for any activity that requires spill to assess the routine operation of individual spillways and turbine units. These activities include checking gate operation, conducting index and generator load testing and all other maintenance activities that would require spill to pass water. The FERC requires that all spillway gates be operated once per year. To control TDG levels associated with maintenance spill, Douglas PUD limits, to the extent practical, maintenance spill during period of peak flow.

1.3.3  Compliance Activities in Previous Year

1.3.3.1  Operational

Since the Wells Project is a “run-of-the river” project with a relatively small storage capacity, river flows in excess of the ten-turbine hydraulic capacity must be passed over the spillways. Outside of system coordination and gas abatement spill (Douglas PUD has adopted a policy of not accepting the latter), minimization of involuntary spill has primarily focused on minimizing TDG production dynamics of water spilled based upon a reconfiguration of spillway operations. The 2009 Wells Project GAP (Le and Murauskas, 2009) introduced the latest numerical model developed by the University of Iowa’s IIHR-
Hydroscience and Engineering Hydraulic Research Laboratories. The two-phase flow computational fluid dynamics tool was used to predict hydrodynamics of TDG distribution within the Wells Dam tailrace and further identify operational configurations that would minimize TDG production at the Project. In an April 2009 report, the model demonstrated that Wells Dam can be operated to meet the TDG adjustment criteria during the passage season with flows up to 7Q-10 levels provided the forebay TDG levels are below 115 percent. Compliance was achieved through the use of a concentrated spill pattern through Spillbay No. 7 and surplus flow volume through adjacent odd numbered spillbays in a defined pattern and volume. These preferred operating conditions create surface-oriented flows by engaging submerged spillway lips below the ogee, thus increasing degasification at the tailrace surface, decreasing supersaturation at depth, and preventing high-TDG waters from bank attachment. These principles were the basis of the 2009 Wells Project Spill Playbook and were fully implemented for the first time during the 2009 fish passage (spill) season with success. Overall, no exceedances were observed in either the Wells Dam tailrace or the Rocky Reach forebay in 2009.

In 2010, the concepts from the 2009 Spill Playbook were integrated into the 2010 Wells Project Spill Playbook given their effectiveness in maintaining levels below TDG criteria during the previous year. High Columbia River flows in June, which exceeded the preceding 15-year average flow, resulted in several exceedances of the hourly (125 percent maximum) and 12C-High (120 percent) TDG limits in the Wells Dam tailrace, and Rocky Reach forebay (115 percent). In response, Douglas PUD implemented an in-season analysis of the 2010 Spill Playbook and determined that full implementation of the recommendations from IIHR Engineering Laboratory would require the removal of the juvenile fish bypass system flow barriers in one even numbered spillbay. Following the in-season analysis and consultation with the HCP Coordinating Committee, changes were made to the 2010 Spill Playbook that allowed for the removal of the juvenile fish bypass system barriers in spillbay 6. Specifically, the Spill Playbook was modified to state that when spill levels approach the 53 kcfs threshold, the JBS barriers in spillbay 6 would be removed in order to remain in compliance with the TDG criteria in the Wells Dam tailrace and Rocky Reach Dam forebay. When spill exceeded 53 kcfs, excess spill would be directed through spillbays 6 and 7 rather than through spillbays 5 and 7. This operational configuration resulted in a more compact spill pattern that reduced the air-water interface surface area between spillway flows and the subsequent potential for lateral mixing and air entrainment.

In February 2011, Douglas PUD conducted an additional technical analysis of the 2010 Spill Playbook (after in-season changes) and confirmed that continued implementation would be appropriate for 2011 with additional minor modifications. Following approval of the 2011 GAP by Ecology, the 2011 Spill Playbook was implemented. Only minor changes were made to the 2012 spill playbook as a result of high compliance during the 2011 spill season.

In December of 2012 the final GAP report was completed for the 2012 spill season. After analysis it was determined that the 2012 spill season had the 3rd highest average monthly flows since 1969 (April-August). In addition incoming flows were reliably above 115%. Despite these conditions Wells Dam demonstrated high compliance with all standards aside from the Rocky Reach 115% 12C-high forebay standard since incoming flows to Wells were above 115% greater than 50% of the spill season days.
Given these unique conditions, and high compliance performance in 2011 and 2012, no changes are suggested for the 2013 spill playbook.

1.3.3.2 Structural
No structural modifications were implemented (none were scheduled) during the 2012 monitoring season, other than the removal of the JBS barriers, if needed, to accommodate high spill volumes in accordance with the Spill playbook. No structural modifications are planned for the 2013 spill season.

1.3.3.3 Biological Monitoring
NMFS has shown that Gas Bubble Trauma (GBT) is low if the level of TDG can be managed to below 120 percent (NMFS 2000). They recommend that “the biological monitoring components will include smolt monitoring at selected smolt monitoring locations and daily data collection and reporting only when TDG exceeds 125 percent for an extended period of time.” The 2012 Wells Project GAP has included the NMFS recommendation to sample for GBT in juvenile salmon when TDG levels exceed 125 percent saturation (NMFS 2000). In 2012, the 125 percent standard was exceeded on numerous occasions, but almost always when flows at Wells Dam were above 7Q-10 flood flows (246.0 kcfs). Regardless of 7Q-10 conditions, Douglas PUD conducted GBT sampling of juvenile salmonids at the Rocky Reach juvenile fish bypass, and in addition, sampled adult salmon at the Wells fish ladder traps. Over 800 adult salmon were collected and sampled from Wells Dam fish ladders, with none showing signs of GBT expression in 2012. Juvenile biological monitoring was initiated on May 3 and continued on days subsequent to 125% exceedences, which require monitoring. Daily monitoring continued until June 29, 2012, after which a three day/week sampling schedule was implemented due to TDG levels being sustained above 125 percent. Douglas PUD continued to monitor TDG conditions and biological responses until July 25, 2012.

Biological sampling indicated that GBT expression in juvenile salmonids examined at Rocky Reach averaged 1.25% for all 24 days of sampling, with a maximum daily occurrence of <6% of the fish examined. In all cases, GBT expression was mild with only a few cases of moderate expression (score of 1 or 2 on the 1-4 expression score scale). GBT expression peaked in late June and early July when the highest TDG values were observed in the Wells and Rocky Reach forebays. GBT expression was confounded by species specific sensitivities to levels of TDG coupled with changes to the species run composition during the spill season. Juvenile salmonids expressed varied amount of GBT by species. Coho expressed the highest incidence of GBT with steelhead and yearling Chinook expressing intermediate GBT and sockeye and subyearling Chinook appearing to be the most resilient to high TDG concentrations. Throughout the season, adult spring Chinook sampled at Wells Dam appeared to have few symptoms of GBT, even when TDG was above 130 percent in the Wells tailrace.

1.3.4 Compliance Success in Previous Year (2012)
TDG river flows in 2012 were much higher than historic flows at the Wells Project (Table 3); 156 percent of the 42-year average for the entire spill season. Flows in 2012 were the third-highest on record since Wells Dam was constructed (1997 and 1972 were slightly higher). The maximum hourly flow observed during the spill season was 314 kcfs on June 25 and flows frequently exceeded the 7Q-10 value of 246.0
kcfs. The average monthly flow from mid-June to the end of July exceeded the 7Q-10 value for the Wells Project in 2012.

Table 3. Average monthly river flow volume (kcfs) during the TDG monitoring season at the Wells Project in 2012 compared to the previous 42-year average (1969-2011), by month.

<table>
<thead>
<tr>
<th>Month</th>
<th>1969-2011</th>
<th>2012</th>
<th>Percent Difference from 42-year Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>115.6</td>
<td>174.1</td>
<td>+151%</td>
</tr>
<tr>
<td>May</td>
<td>149.4</td>
<td>217.2</td>
<td>+145%</td>
</tr>
<tr>
<td>June</td>
<td>164.5</td>
<td>232.9</td>
<td>+142%</td>
</tr>
<tr>
<td>July</td>
<td>132.2</td>
<td>253.8</td>
<td>+192%</td>
</tr>
<tr>
<td>August</td>
<td>104.6</td>
<td>158.7</td>
<td>+152%</td>
</tr>
<tr>
<td>All</td>
<td>133.3</td>
<td>207.34</td>
<td>+156%</td>
</tr>
</tbody>
</table>

High flows and incoming water out of compliance with the TDG standards, resulted in elevated TDG. On June 29 forced spill reached 167.5 kcfs, the maximum hourly value for the 2012 season (total outflow was 312.8 during the same hour). These high spill events were attributed to both flow volumes in excess of the Project’s hydraulic capacity, and flows in excess of the power system needs and/or transmission system capacity. Spill volume across the April-August spill season was over 260 percent of the preceding 17-year average (Table 4).
Table 4. Average monthly spill (kcfs) during the TDG monitoring season at the Wells Project in 2012 compared to the 17-year average (1995-2011), by month.

<table>
<thead>
<tr>
<th>Month</th>
<th>1995-2011 Mean</th>
<th>1995-2011 Std Dev</th>
<th>2012 Mean</th>
<th>2012 Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>10.9</td>
<td>7.0</td>
<td>20.6</td>
<td>13.7</td>
</tr>
<tr>
<td>May</td>
<td>21.9</td>
<td>20.7</td>
<td>59.0</td>
<td>18.6</td>
</tr>
<tr>
<td>June</td>
<td>36.4</td>
<td>39.6</td>
<td>65.4</td>
<td>41.9</td>
</tr>
<tr>
<td>July</td>
<td>15.1</td>
<td>11.2</td>
<td>84.4</td>
<td>28.4</td>
</tr>
<tr>
<td>August</td>
<td>7.9</td>
<td>2.1</td>
<td>12.5</td>
<td>9.4</td>
</tr>
<tr>
<td>Spill Season</td>
<td>18.4</td>
<td>16.1</td>
<td>48.4</td>
<td>37.0</td>
</tr>
</tbody>
</table>

As a result of these high spill volumes and the reception of non-compliant upstream water from the federal hydro-system, TDG exceeded the fish passage exception levels in early May, through early August. Of the 133 days during the spill season, there were 56 days when one or more hours had flows at Wells Dam above the 7Q-10 value. During the 2012 monitoring season, the TDG criterion for the forebay of Wells Dam was exceeded on all but 8 days (94.0% of the spill season). If days where the Wells forebay exceedances are not excluded from compliance analysis except when TDG levels in the Wells tailrace are equal to or less than incoming forebay TDG levels, compliance for all three standards range from 49-98%. The 2012 compliance summary is reported in Table 5.

Table 5. 2012 compliance summary.

<table>
<thead>
<tr>
<th></th>
<th>Days with 7Q-10 flows removed</th>
<th>Considering 7Q-10 flows</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wells Tailrace 125% hourly standard</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days out of compliance</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Spill/bypass season</td>
<td>77</td>
<td>133</td>
</tr>
<tr>
<td>DCPUD Percent compliance</td>
<td>97%</td>
<td>98%</td>
</tr>
<tr>
<td><strong>Wells Tailrace 120% 12C-High standard</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days out of compliance</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Spill/bypass season</td>
<td>77</td>
<td>133</td>
</tr>
<tr>
<td>DCPUD Percent compliance</td>
<td>82%</td>
<td>89%</td>
</tr>
<tr>
<td><strong>Rocky Reach Forebay 115% 12C-High standard</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days out of compliance</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td>Spill/bypass season</td>
<td>77</td>
<td>127*</td>
</tr>
<tr>
<td>DCPUD Percent compliance</td>
<td>49%</td>
<td>69%</td>
</tr>
</tbody>
</table>

* Six days where the Rocky Reach forebay sensor failed has been removed from the analysis.
Despite extended periods of high flows, incoming TDG and spill, unit 7 rebuild, the Wells Project attained a high percentage of compliance when periods of flows in excess of 7Q-10, and periods when incoming water to the Project exceeded TDG criteria, are removed from the analysis. These encouraging results support the continued implementation of the 2012 Spill Playbook in 2013 during the fish passage season.

2.0 Proposed Operations and Activities

2.1 Operational Spill

2.1.1 Minimizing Involuntary Spill

Based on the Wells Project’s improved TDG performance as a result of 2012 operations associated with implementation of the Wells Project Spill Playbook, similar operating principles will be implemented for the 2013 fish passage season.

As discussed in Section 1.3.3.1 above, high Columbia River flows in 2012 resulted from high flood flows and subsequent forced spill. Often, incoming water in the forebay was already above tailrace compliance levels. However, operations following the 2012 Spill Playbook, when forebay inflows were below 115 percent TDG adjustment criterion and below 7Q-10 flows, resulted in high rates of compliance. Similarly to 2012, the 2013 Spill Playbook is proposing to shift concentrated spill away from spillway 7 to spillway 5. Spillway 5 was selected because spill through this bay can be more reliably supported by discharge from adjacent turbine units. The turbine discharge from Units 4 and 5 are expected to further enhance the surface jet being spilled through spillway 5. The updated Spill Playbook for 2012 is attached as Appendix 1.

In addition to minimizing involuntary spill through the implementation of the Spill Playbook, Douglas PUD shall manage spill toward meeting water quality criteria for TDG during all flows below 7Q-10 as follows:

- Minimize voluntary spill through operations including to the extent practicable, by scheduling maintenance based on predicted flows;
- Avoid spill by continuing to coordinate operations with upstream dams, to the extent that it reduces TDG;
- Maximize powerhouse discharge, especially during periods of high river flows; and
- During fish passage season, manage voluntary spill levels in real time in an effort to continue to meet TDG numeric criteria.
2.2 **Implementation**

2.2.1 Fisheries Management Plans

Juvenile salmon and steelhead survival studies conducted at the Wells Project in accordance with the HCP have shown that the operation of the Wells Project, of which the JBS is an integral part, provides an effective means for outmigrating salmon and steelhead to pass through the Wells Project with a high rate of survival (Bickford et al. 2001, Bickford et al. 2011) (Table 6). The Wells JBS is the most efficient juvenile fish bypass system on the mainstem Columbia River (Skalski et al. 1996). The Wells Anadromous Fish Agreement and HCP (Douglas PUD 2002) is the Wells Project’s fisheries management plan for anadromous salmonids, and directs operations of the Wells JBS to achieve the No Net Impact (NNI) standard for HCP Plan Species. The Aquatic Resource Management Plans (for white sturgeon, bull trout, Pacific lamprey, resident fish, water quality, and aquatic nuisance species) in the Wells Project’s Aquatic Settlement Agreement (developed in support of the pending Wells Project operating license) are the fisheries management plans for all other aquatic life designated uses.


<table>
<thead>
<tr>
<th>Species</th>
<th>% Project Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearling Chinook (2010)</td>
<td>96.4</td>
</tr>
<tr>
<td>Yearling Chinook and Steelhead (1998, 1999)</td>
<td>96.2</td>
</tr>
</tbody>
</table>

In spring 2010, Douglas PUD conducted a survival verification study with yearling Chinook salmon, a required 10-year follow-up study to confirm whether the Wells Project continues to achieve survival standards of the Wells Anadromous Fish Agreement and HCP. Approximately 80,000 Passive Integrated Transponder (PIT)-tagged yearling summer Chinook were released over a 30 day period in 15 replicates. The study determined that juvenile Chinook survival from the mouth of the Okanogan and Methow rivers averaged 96.4 percent over the 15 replicate releases of study fish (Table 6). This result confirms conclusions from the three previous years of study and documents that juvenile fish survival through the Wells Project continues to exceed the 93 percent Juvenile Project Survival Standard required by the HCP (Bickford et al. 2011).

The current phase designations (status of salmon and steelhead species reaching final survival determination) for the HCP Plan Species are summarized in Table 7. Specific details regarding survival study design, implementation, analysis, and reporting are available in annual summary reports prepared and approved by the Wells HCP Coordinating Committee.
Table 7. Wells Hydroelectric Project Habitat Conservation Plan Species Phase Designations.

<table>
<thead>
<tr>
<th>Species</th>
<th>Phase Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearling (spring) Chinook</td>
<td>Phase III(^1) – Standards Achieved (22-Feb-05)</td>
</tr>
<tr>
<td>Steelhead</td>
<td>Phase III – Standards Achieved (22-Feb-05)</td>
</tr>
<tr>
<td>Sockeye</td>
<td>Phase III – Additional Juvenile Studies (22-Feb-05)</td>
</tr>
<tr>
<td>Subyearling (summer/fall) Chinook</td>
<td>Phase III – Additional Juvenile Studies (22-Feb-05)</td>
</tr>
<tr>
<td>Coho</td>
<td>Phase III – Additional Juvenile Studies (27-Dec-06)</td>
</tr>
</tbody>
</table>

In 2013, Douglas PUD shall continue to operate Wells Dam adult fishways and the JBS in accordance with HCP operations criteria to protect aquatic life designated uses. Furthermore, all fish collection (hatchery broodstock and/or evaluation activities) or assessment activities that occur at Wells Dam will require approval by Douglas PUD and the HCP Coordinating Committee to ensure that such activities protect aquatic life designated uses.

Douglas PUD shall continue to operate the Wells Project in a coordinated manner toward reducing forebay fluctuations and maintaining relatively stable reservoir conditions that are beneficial to multiple designated uses (aquatic life, recreation, and aesthetics). Coordinated operations reduce spill, thus reducing the potential for exceedances of the TDG numeric criteria and impacts to aquatic life associated with TDG.

2.2.2 Biological Monitoring

As in past years, if hourly TDG levels exceed 125 percent in the tailrace of Wells Dam, Douglas PUD will conduct adult and juvenile salmonid GBT sampling. Douglas PUD will work with the Washington Department of Fish and Wildlife hatchery programs to monitor the occurrence of GBT on adult salmon collected in the Wells Dam and Wells Hatchery fishways. Upon collection of broodstock, hatchery staff will inoculate each fish, place a marking identification tag on them and look for any fin markings or unusual injuries. It is expected that adult broodstock sampled for GBT will consist of spring and summer Chinook and sockeye since they are the species migrating through the Wells Project during fish spill periods where high TDG is a concern, however all encountered salmonids including steelhead and bull trout will be examined.

The JBS at Wells Dam does not have facilities to allow for juvenile fish sampling and observation. To address GBT sampling for juvenile anadromous salmonids if hourly TDG levels exceed 125 percent in the tailrace of Wells Dam, Douglas PUD will request biological sampling of migrating juveniles for symptoms of GBT at the Rocky Reach juvenile bypass sampling facility on the day subsequent to the exceedence. Target species for juvenile GBT sampling will consist of coho, sockeye, and yearling and subyearling Chinook and steelhead. If flood flows above 7Q-10 persist for extended timeframes (more than one

\(^1\) Phase III = Dam survival >95 percent or project survival >93 percent or combined juvenile and adult survival >91 percent (Standard Achieved).
2.2.3 Water Quality Forums
Douglas PUD is currently involved in the Water Quality Team meetings held in Portland, Oregon. The purpose of the Water Quality Team is to address regional water quality issues. This forum allows regional coordination for monitoring, measuring, and evaluating water quality in the Columbia River Basin. Douglas PUD will continue its involvement in the Water Quality Team meetings for further coordination with other regional members.

Douglas PUD is also currently involved in the Transboundary Gas Group that meets annually to coordinate and discuss cross border dissolved gas issues in Canada and the U.S. Douglas PUD will continue its involvement with the Transboundary Gas Group.

In 2012, Douglas PUD actively participated in regional water quality forums with Ecology, Washington Department of Fish and Wildlife, Tribal Agencies, the U.S. Fish and Wildlife Service, NMFS, the USACE, and other Mid-Columbia PUDs (i.e., Grant and Chelan counties). These meetings, ranging from the Transboundary Gas Group to meetings with the USACE to individual telephone and email information exchange, allow for regional coordination for monitoring, measuring, and evaluating water quality in the Columbia River Basin. Douglas PUD is proposing to continue its involvement in such forums to further improve coordination with other regional water quality managers.

2.2.4 Water Quality Attainment Plan and Quality Assurance Project Plans
In November 2012, Douglas PUD received a new operating license for Wells Dam from the FERC. By October 2013 Douglas PUD is required to submit a Water Quality Attainment Plan (WQAP) and Water Quality Assurance Project plans (QAPP) for temperature and total dissolved gas monitoring to Ecology for review and approval. After Ecology approval, Douglas PUD shall submit the WQAP and QAPP plans to FERC for approval prior to implementation.

The WQAP shall include a compliance schedule to ensure compliance with TDG criteria within 10 years. The WQAP will also allow time for the completion of the necessary studies or for the resolution of the issue of elevated incoming TDG from upstream projects through rule-making or other means. The WQAP shall be prepared in consultation with the Aquatic Settlement Work Group (Aquatic SWG) and the HCP Coordinating Committee and shall meet the requirements of WAC 173-201A-510(5). The WQAP shall:

- Identify all reasonable and feasible improvements that could be used to meet TDG criteria. Data on high TDG levels and flow coming into the Wells forebay and its effects on Project compliance shall be included;
- Contain the analytical methods that will be used to evaluate all reasonable and feasible improvements;
• Provide for any supplemental monitoring that is necessary to track compliance with the numeric WQS; and

• Include benchmarks and reporting sufficient for Ecology to track Douglas PUD’s progress toward implementing this plan and achieving compliance within ten years of Ecology’s approval of the plan.

If implementing the compliance schedule does not result in compliance with TDG criteria at the time the compliance schedule expires, Douglas PUD may explore other alternative approaches available in the water quality standards, including a second compliance schedule or alternatives provided in WAC 173-201A-510(5)(g).

3.0 Structural Activities

No structural modifications related to spill are scheduled to occur at the Wells Project in 2013. As in 2012, high flow volume and spill may require JBS barrier removal per this GAP (see Appendix 2: 2013 Spill Playbook). The removal of JBS barriers to reduce TDG production at Wells Dam has been integrated into the Juvenile Fish Bypass Operating Plan that is annually approved by the HCP Coordinating Committee.

4.0 Compliance and Physical Monitoring

4.1 Monitoring Locations

4.1.1 TDG

TDG monitoring has been implemented in the Wells Dam forebay since 1984. Douglas PUD began monitoring TDG levels in the Wells Dam tailrace in 1997 by collecting data from a boat and drifting through the tailrace at four points across the width of the river. During the transect monitoring, no TDG “hot spots” were detected; the river appeared completely mixed horizontally. A fixed TDG monitoring station was established in 1998. The placement of the fixed monitoring station was determined based upon the 1997 work and was further verified as collecting data representative of river conditions during a 2006 TDG assessment at Wells Dam (EES et. al. 2007). Results of the 2008-2009 TDG numerical modeling activities conducted by University of Iowa/IIHR also confirmed that the tailrace monitoring station is located at a site representative of the mixed river flow, particularly during higher flows. Furthermore, locations of both forebay and tailrace sensors had to be protected to avoid sensor/data loss and damage and for safe accessibility during extreme high flows. The current locations of both the forebay and tailrace monitors took these criteria into consideration.

TDG monitoring at the Wells Project typically commences on April 1 and continues until September 15 annually. This monitoring period encompasses the operation of the Wells JBS as well as when river flows are at their highest and when a majority of spill occurs. Throughout this period, data from both forebay and tailrace sensors are transmitted by radio transmitters to a master radio at Wells Dam. This system is checked at the beginning of the season for communication between the probes and
transmitters by technicians at Wells Dam. TDG data are sent and logged at the Douglas PUD Headquarters’ building in 15-minute intervals. Information on barometric pressure, water temperature and river gas pressure is sent to the USACE on the hour over the Internet. The four data points (15 minute) within an hour are used in compiling hourly TDG values, the 24-hour TDG average and the 12C-High readings in a day (24-hour period).

In 2013, Douglas PUD intends to operate a redundant TDG sensor in the tailrace location. Should the primary sensor fail data gaps can be filled from the second sensor. Installation timeframe will be contingent upon regulatory agencies’ approvals for in-water work and modification of the shoreline within the ordinary high water mark. Hourly TDG data transmissions to the USACE of Wells forebay and tailrace station data will be expanded to cover the year-round monitoring requirement (starting April 1, 2013).

Starting in 2013, Douglas PUD is planning on installing and operating a new TDG sensor station in the Wells Reservoir located several miles downstream of Chief Joseph Dam. This new TDG sensor station will provide reliable mixed flow TDG readings from Chief Joseph Dam. The current system operated by the USACE below Chief Joseph Dam collects TDG values from the spillways at the dam and does not provide information on TDG passing through the turbines at Chief Joseph Dam originating from Grand Coulee Dam and does not provide an accurate reading of mixed flow TDG being directed at the Wells forebay.

### 4.2 Quality Assurance

The broad purpose of a well-designed Quality Assurance Project Plan (QAPP) is to attain data of the type and quality needed to make future decisions surrounding the need, or lack thereof, for changes to project operation and construction related to compliance with TDG and temperature standards.

#### 4.2.1 TDG

Douglas PUD will develop a QAPP for TDG in early 2013 in coordination with the Department of Ecology. Briefly, as part of the Douglas PUD’s Quality Assurance/Quality Control (QA/QC) program, Douglas PUD’s water quality consultant will visit the TDG sensor sites monthly for maintenance and calibration of TDG instruments. Calibration follows criteria established by the USACE, with the exception of monthly rather than bi-weekly calibration of sensors. A spare probe will be available and field-ready in the event that a probe needs to be removed from the field for repairs.

The consultant will inspect instruments during the monthly site visits and TDG data will be monitored weekly by Douglas PUD personnel. If, upon inspection of instruments or data, it is deemed that repairs are needed, they will be promptly made. Occasionally during the monthly sensor calibration, an error may develop with the data communication. These problems are handled immediately by technicians located at Wells Dam. Generally, the radio transmitters at each fixed station will run the entire season without any problems.

Douglas PUD will collect TDG data year round beginning April 1, 2013 but spill season data (April 9 – August 19) will be reported separately in an annual GAP report submitted to the Department of Ecology.
and FERC. As part of the quality assurance process, data anomalies will be removed. This would include data within a 2-hour window of probe calibration and any recording errors that result from communication problems. Data errors will prompt a technician or water quality specialist or consultant site visit, to inspect the instrument and repair or replace, if necessary. Real time data will be made available to the public by November 2013.

4.3 Reporting

Upon approval of the Wells GAP and issuance of a Wells Project TDG adjustment, Douglas PUD will submit an annual report to Ecology no later than February 28 subsequent to each year that the TDG adjustment is approved. The annual report will summarize all GAP activities conducted for the prior year (i.e., annual report filed February 28, 2013 will be for all GAP activities conducted in 2012) as required by Ecology and the FERC. In addition to reporting on spill season compliance, the annual report will include TDG compliance outside the spill season (110%), per the 401 Certification Section 6.7 2) c) iii).

5.0 Conclusions

Pending approval by Ecology, implementation of the measures identified within the 2013 GAP are intended to serve as a long-term strategy to maintain compliance with the Washington State WQS for TDG in the Columbia River at the Wells Project while continuing to provide safe passage for downstream migrating juvenile salmonids.
6.0 Literature Cited


7.0 Appendices
I. No Forced Spill

The Wells Dam JBS should be operated continuously throughout the juvenile salmon outmigration (April 9 to August 19 for 2013). The standard Wells HCP operating criteria, as described in Section 4.3.1 of the Wells HCP, will apply to the 2013 operating season. The operating criteria includes requirements that at least one bypass bay be operated during the entire JBS season, requires that no turbine is operated without an adjacent bypass bay being open and requires that all five bypass bays be operated continuously for 24 hours when the Chief Joseph Dam uncoordinated discharge estimate for that day is 140 kcf/s or greater. The Wells JBS is normally operated with 1.7 kcf/s passed through S2 and S10, and 2.2 kcf/s through S4, S6, and S8. Figure 1 (below) assumes that the Chief Joseph Dam uncoordinated discharge estimate is greater than 140 kcf/s or sufficient turbines units are operating that all five bypass bays are open.

Figure 2. Operational configuration under no forced spill (JBS only).
I. Total Spill ≤ 53.0 kcfs, JBS barriers in place

As forced spill increases, Project Operators should allocate all spill through S5 until the maximum capacity is reached through that spillbay (~43.0 kcfs). Note that S5 spill requires support of generation flows from units 4 and 5 to minimize TDG production. This, along with the already established JBS spill (10.0 kcfs) would equal 53.0 kcfs (Figure 3). Over 90% of the spill events over the past decade could have been handled under this configuration.

Figure 3. Operational configuration under spill ≤ 53.0 kcfs (including JBS).
II. JBS Barrier Removal Criteria

When either of the following occurs, remove the JBS barrier in S6:

Spill in S5 reaches 30 kcf and total spill is expected to exceed 40 kcf for more than 8 hours, or total spill is expected to exceed 53 kcf. After the JBS barrier is removed from S6 and when flow through S5 is at least 30 kcf, shift 15 kcf to S6 (Figure 3). It is best to have generating units 4, 5, and 6 operating to support this spill configuration. Once at least 15 kcf is being spilled through S6, spill can be allocated to S5 until 43.0 kcf is reached.

![Figure 3](image_url)

Figure 3. Operational configuration once spill reaches 30 kcf in S5 and is expected to be above 40 kcf for more than 8 hours (JBS removed). Shift sufficient spill from S5 to maintain a minimum of 15 kcf spill at S6. Note that the 15.0 kcf includes the existing 2.2 kcf JBS flow.
III. Short duration decreases in Forced Spill (<53.0 kcfs) and JBS Barriers in S6 Removed

If after removal of JBS barrier in S6, total spill drops below 53 kcfs (between 10-53 kcfs), and is expected to stay in this range for only a short period (4 days or less), direct spill through S6 up to 15 kcfs (total spill < 22.9 kcfs). When total spill exceeds 22.8 kcfs, direct the remainder of spill through S5.

IV. Forced Spill (> 53.0 kcfs) and JBS Barriers in S6 Removed

After S5 reaches 43.0 kcfs, additional spill should be allocated to S6 (S6 is already spilling at least 15.0 kcfs need to fully engage the submerged spillway lip below the ogee). As flow increases, spill should continually increase through S6 until paired with S5 (e.g., 43.0 kcfs through S5 and 26.0 kcfs through S6) (Figure 4). Eventually, S6 will reach 43.0 kcfs (93.8 kcfs, Figure 4).

Figure 4. Operational configuration under forced spill > 53.0 kcfs (including JBS flow, with removal of JBS barriers in S6). In this instance spill has reached the 43.0 kcfs maximum in S5 and additional spill is being allocated to S6 (26.0 kcfs).
Figure 5. Operational configuration under forced spill > 53.0 kcfs (including JBS). In this instance (93.8 kcfs of spill), S6 has been fully allocated and 43.0 kcfs is now allocated through both S5 and S6.

V. Forced Spill (> 93.8 kcfs) and JBS Barriers in S6 Removed

After both S5 and S6 reach 43.0 kcfs, spill can also be allocated to S7. Since a minimum of 15.0 kcfs is needed to fully engage the submerged spillway lip below the ogee, spill through S6 should be relocated to S7 (Figure 6). As flow increases, spill can be continually increased through S7 until paired with S6 (30.0 kcfs through S6 and S7, while S5 continues at 43.0 kcfs). After this point, both S6 and S7 can be increased until all three spillbays have reached 43.0 kcfs (136.8 kcfs of spill, Figure 7).
Figure 6. Operational configuration under forced spill > 96.0 kcf. In this instance (96.8 kcf of total spill), spill from S6 is relocated to S7 to maintain concentrated flow with S5. A spill of 16.0 kcf is maintained in S7 as to engage the submerged spillway lip.
Figure 7. Operational configuration under forced spill > 96.0 kcfs (with removal of JBS barriers in S6). In this instance (136.8 kcfs of total spill), 43.0 kcfs is allocated through S5, S6, and S7.

VI. Forced Spill (> 136.8 kcfs)
Forced spill exceeding 136.8 kcfs rarely occurs (less than 0.5%). If these conditions arise and total river flow exceeds 246.0 kcfs, then 7Q-10 conditions are occurring and Wells Dam is exempt from the TDG standards. Under this situation, Project Operators may perform any combination of operations to ensure that flood waters are safely passed. Also, at this point, JBS barriers will likely be removed allowing additional flexibility to spill up to 43 kcfs each through S2, S4, S6, and S8. Project Operators may pass spill through S3 in a similar fashion to operations mentioned above (starting at a minimum of 15.0 kcfs to ensure that spillway lips are engaged).

VII. JBS Re-Installment Criteria
Once spills of less than 40.0 kcfs are predicted for at least four days, JBS barriers should be re-installed in S6.
## II. Spill Lookup Table

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<th>Spillbay Number</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>I. No Forced Spill</td>
<td>10.0</td>
<td>0.0</td>
</tr>
<tr>
<td>II. Spill (≤ 53.0 kcfs), min.</td>
<td>11.0</td>
<td>0.0</td>
</tr>
<tr>
<td>II. Spill (≤ 53.0 kcfs), max.</td>
<td>53.0</td>
<td>0.0</td>
</tr>
<tr>
<td>III. Spill (&gt; 53.0 kcfs, S6 JBS out), min.</td>
<td>54.0</td>
<td>0.0</td>
</tr>
<tr>
<td>III. Spill (&gt; 53.0 kcfs, S6 JBS out), max.</td>
<td>93.8</td>
<td>0.0</td>
</tr>
<tr>
<td>IV. Spill (&gt; 93.8 kcfs, S6 JBS out), min.</td>
<td>96.8</td>
<td>0.0</td>
</tr>
<tr>
<td>IV. Spill (&gt; 93.8 kcfs, S6 JBS out), max.</td>
<td>136.8</td>
<td>0.0</td>
</tr>
<tr>
<td>V. Spill (&gt;137.0 kcfs), min.</td>
<td>137.0</td>
<td>0.0</td>
</tr>
<tr>
<td>V. Total Flow (&gt;246 kcfs), max.</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Operators may adjust as needed.*

*TDG exemption in place when total river flows exceed 246.0 kcfs.*

**Notes:**
(1) No spill through S1 and S11 as to minimize interference with fish ladders.
(2) Even-numbered spillbays are designated as the Juvenile Bypass System (JBS).
(3) Primary spillbays for forced spill are S5, S6, S7, S3, and S9 (in that order).
Appendix C - 2013 Bypass Operating Plan – Wells Project
Memorandum

TO: Wells HCP Coordinating Committee
FROM: Tom Kahler, Shane Bickford, Douglas PUD
DATE: December 26, 2012
SUBJECT: Wells Dam 2013 Juvenile Fish Bypass Operating Plan

Anticipated Juvenile Migrants during the 2013 Juvenile Fish Bypass Period

The 2013 spring and summer outmigration of naturally produced juvenile HCP Plan Species at Wells Dam will consist of offspring of adults that spawned above Wells Dam during brood years (BY) 2011 and 2012 (Table 1). The spring migration will include juvenile spring Chinook, coho, sockeye, and steelhead, and summer/fall Chinook sub-yearlings will migrate during both spring and summer bypass operations.

Table 1. Ladder counts at Wells Dam of HCP Plan Species whose progeny are anticipated to migrate through the Wells Project during the 2013 bypass period. Juvenile steelhead migrate predominantly as yearlings from the Okanogan River and as age-2 and age-3 fish from the Methow River; thus, 2009, 2010, and 2011 steelhead adult counts are included (BY 2010, 2011, and 2012, respectively).

<table>
<thead>
<tr>
<th>Species</th>
<th>Adult Migration Year</th>
<th>Ladder Count</th>
<th>Juvenile Migration</th>
</tr>
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<tbody>
<tr>
<td>Spring Chinook</td>
<td>2011</td>
<td>8,122</td>
<td>Spring</td>
</tr>
<tr>
<td>Summer/Fall Chinook</td>
<td>2012</td>
<td>46,835</td>
<td>Summer</td>
</tr>
<tr>
<td>Coho</td>
<td>2011</td>
<td>5,796</td>
<td>Spring</td>
</tr>
<tr>
<td>Sockeye</td>
<td>2011</td>
<td>111,508</td>
<td>Spring</td>
</tr>
<tr>
<td>Summer Steelhead</td>
<td>2009</td>
<td>25,422</td>
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<tr>
<td>Summer Steelhead</td>
<td>2010</td>
<td>12,929</td>
<td>Spring</td>
</tr>
<tr>
<td>Summer Steelhead</td>
<td>2011</td>
<td>12,069</td>
<td>Spring</td>
</tr>
</tbody>
</table>

Scheduled hatchery releases above Wells Dam in 2013 include yearling spring Chinook from the Methow Fish Hatchery (495,000) and the Winthrop National Fish Hatchery (WNFH; 375,000). The WNFH also will release approximately 300,000 coho. Summer Chinook yearlings will be released from the Carlton (420,000) and Similkameen (620,000) acclimation ponds. Hatchery steelhead scheduled for release above Wells Dam include approximately 150,000 fish to the Methow Basin and 100,000 to the Okanogan Basin from Wells Hatchery, and 114,000 to the Methow Basin from WNFH. In general, the hatchery yearling Chinook, coho and steelhead are
scheduled for release after April 15th with Winthrop coho and Wells steelhead scheduled for release after April 20th. By mid-May, all of the yearling Chinook and coho will have been released. The steelhead releases have historically continued into late May.

**2013 Juvenile Fish Bypass Operations**

Operation of the bypass system throughout the 2013 season will follow the criteria contained within the Wells Dam Juvenile Dam Passage Survival Plan (Wells Juvenile Bypass Plan) found in Section 4.3 of the Wells HCP. One of the main goals of the Wells Juvenile Bypass Plan is to provide bypass operations for at least 95% of both the spring and summer migration of juvenile plan species.

From 2004 through 2011, the timing of the implementation of bypass operations was based upon an analysis of 21 years of hydroacoustic and 14 years of species composition information collected on juvenile run patterns at Wells Dam. From the data available to the Wells HCP Coordinating Committee in February 2004, they agreed that initiation of the Wells bypass system on April 12th and termination on August 26th would conservatively provide bypass operations for more than 95% of both the spring and summer migrations of juvenile Plan Species.

In 2011, Columbia Basin Research performed an analysis using seven years of passage data obtained from daily sampling at the Juvenile Sampling Facility of the Rocky Reach Juvenile Fish Bypass System to more accurately estimate the contemporary percentage of the migration of spring and summer migrants that passed during bypass operations at Wells Dam. From that analysis, the Wells HCP Coordinating Committee adjusted the starting and ending dates for bypass operations at Wells Dam, moving the starting date three days earlier to April 9 to cover early-migrating natural origin spring Chinook, and moving the ending date seven days earlier to August 19 to more accurately reflect the contemporary passage timing of the sub-yearling Chinook outmigration. Thus, for 2012, bypass operations at Wells Dam commenced at 00:00 on April 9 and ended at 24:00 hours on August 19. For accounting purposes, the end of the 2012 spring bypass season was June 13th at 24:00 hours and the beginning of the summer bypass season was June 14th at 00:00 hours.

Upon completion of the 2012 bypass season, Columbia Basin Research updated the original analysis that supported the decision by the Wells Coordinating Committee to adjust the dates of bypass operations. The updated analysis determined that the adjusted dates of bypass operations at Wells Dam in 2012 provided bypass passage for 99.96 percent of yearling Chinook, 99.86 percent of steelhead, 100 percent of sockeye, and 99.30 percent of subyearling Chinook. Based upon this high level of compliance with the HCP bypass operating criteria (exceeding the 95% bypass-passage criteria for all species), Douglas PUD proposes to commence operation of the bypass system starting at 00:00 on April 9 and to end operations at 24:00 hours on August 19. For accounting purposes, the 2013 spring bypass season will end on June 13th at 24:00 hours and the beginning of the summer bypass season will begin on June 14th at 00:00 hours.

Dam safety emergency action planning, as required by the Federal Energy Regulatory Commission (FERC), calls for Douglas PUD to operate Wells Dam with sufficient automatic-gate-opening capacity in the spillways to pass the flow from a plant load rejection of up to 200 thousand cubic feet per second (kcfs), in addition to any concurrent initial spillway discharge.
Of the 11 spillways at Wells Dam, only spillways 3 through 9 have automated gate hoists. Thus, the seasonal installation of bypass barriers in spillways 2, 4, 6, 8 and 10, substantially reduces the automatic-gate-opening capacity of Wells Dam by reducing the capacity of each bypass spillway to 8.6 kcfs. Consequently, Douglas PUD must remove bypass barriers systematically when discharge estimates exceed certain flow thresholds, as per Table 2, sufficient to provide the necessary automatic-gate-opening flow capacity as described in the FERC-required Emergency Action Plan for the Wells Project (EAP, Appendix I). Decisions to remove bypass barriers for dam safety considerations will be made each Monday (or at other times as necessary) during the bypass period and will be based on weekly forecasts of combined discharge from Chief Joseph Dam and side-flows from the Okanogan and Methow rivers (from the National Weather Service Northwest River Forecast Center [NWRFC]; http://www.nwrfc.noaa.gov/stp/stp.cgi).

Table 2. Schedule for removal of spillway flow-barriers (bypass barriers) to accommodate flood flows and load rejections.

<table>
<thead>
<tr>
<th>Inflow Forecast (kcfs)</th>
<th>Bypass Barriers Removed</th>
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<tbody>
<tr>
<td>Up to 200</td>
<td>None</td>
</tr>
<tr>
<td>200 – 240</td>
<td>Spillway 6</td>
</tr>
<tr>
<td>240 – 275</td>
<td>Spillways 6, 8</td>
</tr>
<tr>
<td>275 – 310</td>
<td>Spillways 4, 6, 8</td>
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<tr>
<td>310 – 350</td>
<td>Spillways 4, 6, 8, 10, &amp; preset gates 10, 11 to spill excess of 312 kcfs</td>
</tr>
<tr>
<td>350 – 400</td>
<td>Spillways 4, 6, 8, 10, &amp; preset gates 1, 10, 11 to spill excess of 312 kcfs</td>
</tr>
<tr>
<td>400 – 450</td>
<td>All spillways (2, 4, 6, 8, 10)</td>
</tr>
</tbody>
</table>

Juvenile Fish Bypass Operations and Clean Water Act TDG Compliance

Seasonal bypass operations generally coincide with the spring freshet, an event during which operators of hydroelectric projects must cope with flows that often exceed the hydraulic capacity of their powerhouses. When flows exceed the hydraulic capacity of the generating units, water must be passed via the spillway in what is termed “involuntary spill.” Involuntary spill increases the concentration of atmospheric gases in the water below hydroelectric projects, and can result in excessive levels of total dissolved gas (TDG) that may injure fish. To minimize the potential for fish injury, the Washington Department of Ecology (WDOE) imposes TDG standards on operators of hydroelectric projects.

Extensive study of spill operations at Wells Dam and modeling exercises at the University of Iowa provide the basis for the development of annual spill “playbooks” for operations at Wells Dam aimed at achieving the WDOE standards for TDG in the Wells tailrace. From modeling and physical-spill studies over the past several years, Douglas PUD has determined that concentrating spill through the middle of the spillway and supporting that concentrated spill with turbine discharge results in the most effective minimization of TDG in the Wells tailrace. Specifically, the best TDG performance is achieved when concentrating involuntary spill through Spillway 5, and allocating additional spill, beyond the capacity of Spillway 5, to Bypass Bay 6 and then to Spillway 7, up to a maximum of 43 kcfs per spillway.

To accomplish this TDG-minimizing pattern of concentrated spill requires the removal of the bypass barriers from at least one spillway during periods with excessive involuntary spill. The removal of the bypass barriers from one bypass bay takes approximately eight hours and requires
the use of a four-man mechanical crew and the powerhouse gantry cranes. To comply with the TDG standards below Wells, the bypass barriers must be removed from at least one spillway whenever involuntary spill exceeds 30 kcf/s and one or both of the following conditions applies: 1) prolonged (> 8 hours) involuntary spill in excess of 40 kcf/s is predicted (based on forecasted tributary inflows from the NWRFC and estimated discharge from Chief Joseph Dam provided by the US Army Corps of Engineers); or 2) total spill is predicted to exceed 53 kcf/s, regardless of duration. Once involuntary spill of less than 40 kcf/s, for a period of at least four days is predicted, the respective bypass barriers would be reinstalled. At river flows greater than 240 kcf/s, bypass barriers would be removed from additional bypass bays as described above (see Table 2) and reinstalled sequentially as appropriate.

Juvenile Fish Bypass Contingency Plan

The failure of a gate-hoist cable in a bypass spillway at Wells Dam in late August 2010 provided the impetus for the development of a contingency plan for bypass operations during similar events that could occur in the future. Under the 2010 Juvenile Fish Bypass Contingency Plan (Bypass Contingency Plan), in the event of a failure of a bypass gate or other such accident or unanticipated mechanical failure that rendered impossible normal bypass operations, Douglas PUD’s initial response would follow the Wells Juvenile Bypass Plan, shutting down associated turbine units as prescribed in Section 4.3 of the Wells HCP. However, high river discharge in 2011 and 2012 highlighted the need to incorporate the consideration of TDG into the Bypass Contingency Plan, and we have modified the plan accordingly.

During periods of high river discharge, mid-Columbia hydroprojects maximize powerhouse discharge to minimize spill and associated increases in TDG. Shutting down a turbine at Wells Dam when all other turbines are loaded would increase spill by 20 kcf/s, which would also increase TDG. However, losing function of one bypass unit at Wells Dam affects two turbine units; thus, shutting down both turbine units associated with the malfunctioning bypass spillway would increase spill by 40 kcf/s. Therefore, Douglas PUD has modified the Bypass Contingency Plan to avert unnecessary increases in TDG from shutting turbine-units due to a mechanical failure of the bypass system.

Section 4.3 of the Wells HCP directs Douglas PUD to shut down the turbine units adjacent to the bypass spillway that is not operating due to either a lack of water or an inability to operate the bypass spillway. Under the 2010 Bypass Contingency Plan, the associated turbine units would have remained inactive until personnel at Wells Dam could determine the cause of the bypass failure and the nature of and time required for the necessary repair. Under the new Bypass Contingency Plan, if shutting down the turbines would not threaten compliance with TDG standards, Douglas PUD would shut down the associated turbine units. However, if doing so would threaten compliance with TDG standards, Douglas PUD would not shut down the associated turbines but would instead direct spill through spillways adjacent to the affected turbine units in a manner that provides bulk flow for fish passage while minimizing TDG (Figure 1, Option 1). Douglas PUD would consult the Spill Playbook (see above) to select such spill configurations, and would spill at least 10 kcf/s through selected spillways to engage the submerged flip-lip as a TDG minimization measure and to provide bulk flow for fish attraction to the surface passage route. In circumstances where turbine shutdown would not jeopardize TDG compliance, Douglas PUD would shut down the associated turbine units to evaluate and
repair the malfunction, but may then elect to move the bypass barriers from the inoperable bypass spillway to an adjacent, non-bypass spillway to obtain the use of an additional turbine unit (see Figure 1, options 2 and 3). The gate for that substitute bypass spillway would then be set at the standard 1-foot opening for bypass spillways and the adjacent turbine unit could be operated without constraints. This configuration would meet the intent of HCP Section 4.3 by providing bypass spill immediately adjacent to every operating turbine unit and would comply with the goal of the Total Dissolved Gas Abatement Plan.

During the repair of a bypass malfunction, Douglas PUD would daily reevaluate forecasts of Chief Joseph Dam discharge, tributary inflows, and TDG conditions, as well as repair progress, and determine which bypass option to implement.

**Figure 1.** Evaluation flow chart for daily decisions regarding bypass, spill, and turbine operations during a bypass malfunction.
APPENDIX B

EXAMPLE HYDROLAB MINISONDE MONTHLY CALIBRATION REPORT
**Site Visit / Calibration Report**

**Client:** Public Utility District No. 1 of Douglas County

---

**Date:** 23-May-13  
**Site:** WEL

**Arrival Time:** 10:35  
**Departure Time:** 11:45

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**BP mmHg**

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<td>BP Station: 742.3 mmHg</td>
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**Comments:** Bad power conn (bendix) on WEL transformer. Replaced with CBE conn.

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**Calibration Type:** Field  
**Probe ID:** 46856

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| TDG 100%       | 742.3 | 742 | 742 |
| TDG 113%       | 842.3 | 842 | 842 |
| TDG 126%       | 942.3 | 941 | 942 |
| TDG 139%       | 1042.3 | 1041 | 1042 |

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**Comments:** 872
**Date:** 23-May-13

**Site:** WELW

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**Arrival Time:** 12:20

**Departure Time:** 12:50

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**Comments:**

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**Calibration Type:** Field

**Probe ID:** 62022

**Date:** 23-May-13

**Time:** 12:30

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<td>TDG 113%</td>
<td>843.2</td>
<td>843</td>
</tr>
<tr>
<td>TDG 126%</td>
<td>943.2</td>
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**Comments:** 984

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Report created: May 28, 2013
APPENDIX C

QUALITY ASSURANCE PROJECT PLAN FOR WATER TEMPERATURE AND TOTAL DISSOLVED GAS FOR WELLS HYDROELECTRIC PROJECT
QUALITY ASSURANCE PROJECT PLAN FOR WATER TEMPERATURE AND TOTAL DISSOLVED GAS

WELLS HYDROELECTRIC PROJECT

FERC NO. 2149

February 2013

Prepared by:
Andrew Gingerich
Public Utility District No. 1 of Douglas County
East Wenatchee, WA

Prepared for:
Washington Department of Ecology
Yakama, WA
For copies of this plan, contact:

Public Utility District No. 1 of Douglas County
Attention: Natural Resources
1151 Valley Mall Parkway
East Wenatchee, WA 98802-4497
Phone: (509) 884-7191
E-Mail: andrewg@dcpud.org
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TERMS AND ABBREVIATIONS

401 Certification  Wells Dam 401 Certification issued by the Washington Department of Ecology as part of the Federal Power Act requirement
7-DADMax 7-day average of the daily maximum temperatures
7Q-10 Flow highest calculated flow of a running seven consecutive day average, using the daily average flows that may be seen in a 10-year period
12C-High average of the 12 highest consecutive hourly readings in any 24-hour period
ASA Aquatic Settlement Agreement
Aquatic SWG Aquatic Settlement Work Group
BP barometric pressure
cfs cubic feet per second
CROHmS Columbia River Operational Hydromet System
CWA Clean Water Act
DART Data Access in Real Time
DO dissolved oxygen
Douglas PUD Public Utility District No. 1 of Douglas County
DQO decision quality objectives
Ecology Washington State Department of Ecology
EPA Environmental Protection Agency
FERC Federal Energy Regulatory Commission
FSU field services unit
GAP Gas Abatement Plan
GBT gas bubble trauma
HCP Wells Anadromous Fish Agreement and Habitat Conservation Plan
kcfs thousand cubic feet per second
mg/L milligrams per liter
mmHg millimeters of mercury
MSL mean sea level
MQO measurement quality objectives
MS Microsoft
MW megawatt
N/A not applicable
NEMA National Electrical Manufacturers Association
NIST National Institute of Standards and Technology
NMFS National Marine Fisheries Service
Project Wells Hydroelectric Project
QA quality assurance
QA/QC quality assurance/quality control
QAPP Quality Assurance Project Plan
QC quality control
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>RM</td>
<td>river mile</td>
</tr>
<tr>
<td>TDG</td>
<td>total dissolved gas</td>
</tr>
<tr>
<td>TMDL</td>
<td>total maximum daily load</td>
</tr>
<tr>
<td>USACE</td>
<td>U.S. Army Corps of Engineers</td>
</tr>
<tr>
<td>USFWS</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>USGS</td>
<td>U.S. Geological Survey</td>
</tr>
<tr>
<td>WAC</td>
<td>Washington Administrative Code</td>
</tr>
<tr>
<td>WDFW</td>
<td>Washington Department of Fish and Wildlife</td>
</tr>
<tr>
<td>WDOE</td>
<td>Washington Department of Ecology</td>
</tr>
<tr>
<td>WQMP</td>
<td>Water Quality Management Plan</td>
</tr>
<tr>
<td>WQS</td>
<td>Water Quality Standards</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

The Wells Hydroelectric Project (Wells Project) 401 Water Quality Certification (401 Certification) issued by the Washington Department of Ecology (Ecology) requires that Public Utility District No. 1 of Douglas County (Douglas PUD) develop a Quality Assurance Project Plan (QAPP) to support the implementation of a water quality monitoring program (for temperature and TDG). This QAPP describes a systematic approach for collecting high quality and reliable data that may be used to determine compliance of these parameters with the State of Washington’s Water Quality Standards (WQS) for the Wells Project. Information provided in this QAPP includes the following:

1. Background
2. Project Description
3. Organization and Schedule
4. Quality Objectives
5. Sampling Process Design (Experimental Design)
6. Measurement Procedures
7. Quality Control
8. Data Management Procedures
9. Audits and Reports
10. References

Adaptive management, as defined by the Aquatic Settlement Agreement (ASA), will be employed when updating this QAPP. Any required updates will be vetted with those parties as required by the 401 Certification and the FERC License.
1.0 BACKGROUND

1.1 Relicensing and 401 Certification

As part of the relicensing process for the Wells Hydroelectric Project (Wells Project or Project), Public Utility District No. 1 of Douglas County (Douglas PUD) obtained a 401 Water Quality Certification (401 Certification) from the Washington Department of Ecology (Ecology). On September 30, 2010, Douglas PUD submitted to Ecology an application for a 401 Certification pursuant to the provisions of 33 USC §1341 (§401 of the Clean Water Act). On September 12, 2011, Douglas PUD withdrew its request and reapplied. On February 27, 2012, Ecology concluded that the Wells Project, as conditioned by its 401 Certification/Order No. 8981, complied with all applicable provisions of 33 USC 1311, 1312, 1313, 1316, 1317 and appropriate requirements of Washington State law.

According to the Wells Project 401 Certification section 7(a), Douglas PUD is required to prepare a Quality Assurance Project Plan (QAPP) for water quality measures:

i) Douglas PUD shall prepare study plans that include a quality assurance project plan (QAPP) for each water quality parameter to be monitored in each plan. The QAPPs shall follow the Guidelines for Preparing Quality Assurance Plans for Environmental Studies (July 2004 Ecology Publication Number 04-03-030) or its successor. The QAPPs shall contain, at a minimum, a list of parameter(s) to be monitored, a map of sampling locations, and descriptions of the purpose of the monitoring, sampling frequency, sampling procedures and equipment, analytical methods, quality control procedures, data handling and data assessment procedures and reporting protocols.

ii) Douglas PUD shall review and update the QAPPs annually based on a yearly review of data and data quality. Ecology may also require future revisions to the QAPP based on monitoring results, regulatory changes, changes in Project operations, and/or the requirements of TMDLs. The initial QAPPs and any changes shall be submitted to the ASWG for review and are subject to approval by Ecology. Implementation of the monitoring program shall begin upon Ecology's written approval of the QAPP, unless otherwise provided by Ecology.

On November 9, 2012 the Federal Energy Regulatory Commission (FERC) issued a new operating license for the Wells Project. All 401 Certification requirements were adopted in the License Order, including those pertaining to the QAPP (License Article 401(a)).
1.2 Total Dissolved Gas Regulatory Framework

Washington Administrative Code (WAC) Chapter 173-201A defines standards for the surface waters of Washington State. Section 200(1)(f) defines the water quality standards (WQS) for total dissolved gas (TDG), and subsection (ii) defines the TDG criteria adjustment for fish passage (Ecology 2011).

Under the WQS, TDG shall not exceed 110 percent at any point of measurement in any state water body. However, the standards exempt dam operators from this TDG standard when the river flow exceeds the highest calculated flow of a running seven consecutive day average, using the daily average flows that may be seen in a 10-year period (7Q-10 flow). The 7Q-10 total river flow for the Wells Project was computed using the hydrologic record from 1974 through 1998, coupled with a statistical analysis utilizing data from 1930 through 1998. These methods are consistent with the United States Geological Survey (USGS) Bulletin 17B, “Guidelines for Determining Flood Flow Frequency” and determined that the 7Q-10 flow value at Wells Dam is 246,000 cubic feet per second (cfs; Lombard and Kirchmer 2004).

In addition to allowances for natural flood flows, Ecology may approve, on a per application basis, an interim adjustment to the TDG standard (110 percent) to allow spill for juvenile fish passage past dams on the Columbia and Snake rivers. Such an adjustment requires the development of an Ecology-approved Gas Abatement Plan (GAP). This plan must be accompanied by fisheries management and physical and biological monitoring plans and is required annually or as otherwise determined by Ecology. The increased levels of spill resulting in elevated TDG levels are authorized by Ecology to allow salmonid smolts a non-turbine downstream passage route that is less harmful to fish populations than turbine fish passage. This TDG adjustment provided by Ecology is based on a risk analysis study conducted by the National Marine Fisheries Service (NMFS; NMFS 2000). Ecology-approved fish-passage adjustments comprise three separate standards to be met by dam operators:

1) TDG shall not exceed 125 percent in any one-hour period in the tailrace of a dam;  
2) TDG shall not exceed 120 percent in the tailrace of a dam; and  
3) TDG shall not exceed 115 percent in the forebay of the next dam downstream.

Compliance criteria 2 and 3 are measured as an average of the 12 highest consecutive hourly readings in any 24-hour period (12C-High).

A significant portion of the Wells Reservoir occupies lands within the boundaries of the Colville Reservation. Wells Project operations do not affect TDG levels in tribal waters, where the Colville Tribes’ TDG standard is a maximum of 110 percent, year-round, at all locations. This TDG standard is also the U.S. Environmental Protection Agency’s (EPA) standard for all tribal waters on the Columbia River, from the Canadian border to the Snake River confluence. TDG levels on the Colville Reservation portion of the mainstem Columbia River within Wells Reservoir are determined by the operations of upstream federal dams but in particular, the U.S. Army Corps of Engineer’s (USACE) Chief Joseph Dam (located approximately 30 miles upstream of Wells Dam) and the U.S. Bureau of Reclamation’s Grand Coulee Dam (located approximately 51 miles upstream of Chief Joseph Dam).
1.2.1 Fish Spill and Non-Fish Spill Season

Although not defined in state regulations, the fish spill season at Wells Dam is determined by the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) Coordinating Committee and is intended to aid downstream juvenile salmonid fish passage via Wells Dam spill as an alternative to passage through the turbines. The fish spill season is generally early April to late August, but may vary from year to year. Each year during the fish spill season, Douglas PUD operates the Wells Project in accordance with an Ecology-approved GAP. During the fish spill season, Douglas PUD will make every effort not to exceed 125 percent in any one-hour period or a 12C-High of 120 percent as measured in the Wells Project tailrace and a 12C-High of 115 percent as measured in the forebay of the next downstream dam (Rocky Reach). Nothing in these special conditions allows an impact to existing and characteristic uses.

During non-fish spill (i.e., approximately September through March), the Wells Project is subject to the 110 percent TDG WQS. Douglas PUD will make every effort to remain in compliance with the 110 percent standard.

Douglas PUD will report Wells Project TDG monitoring data for both the spill and non-fish spill season from the previous year by February 28th of every year in an annual TDG report (previously called a GAP report). This report will be reviewed and approved by Ecology and the Aquatic Settlement Work Group (Aquatic SWG). The final report will be filed annually with the FERC by the February 28th deadline. The report will also be filed with the NMFS as required in the terms and conditions contained within their 2012 Wells Project Biological Opinion (BO).

1.3 Water Temperature Regulatory Framework

Under the WQS Chapter 173-201A-602 of the WAC, Ecology designates the section of the Columbia River within the Wells Project as a “salmonid spawning, rearing, and migration” water body and therefore, requires that water temperature must remain below 17.5°C, as measured by the 7-day average of the daily maximum temperatures (7-DADMax). When a water body's temperature is warmer than the criteria (or within 0.3°C of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C. In addition, the standard for the lower Okanogan and Methow rivers (both have lower reaches of the river within the Wells Project) is identical to the Columbia River temperature criteria, except that in the Methow River, the criterion is 13°C from October 1 to June 15 to support spawning and incubation protection for native char, salmon and trout (Ecology 2006). Portions of the Columbia River within the Wells Project boundary are currently classified as impaired for temperature under Section 303(d) of the Clean Water Act. A Total Maximum Daily Load (TMDL) for temperature is expected to be developed by EPA in the future that will establish a load allocation for all of the Columbia River dams including the Wells Project.

Douglas PUD will report Wells Project water temperature monitoring data by April 30th of every year (for prior year’s monitoring activities). This report will be reviewed and approved by Ecology and the Aquatic SWG. The final report will be filed annually with the FERC by the April 30th deadline.
2.0 PROJECT DESCRIPTION

2.1 Purpose and Objectives

The purpose of this QAPP is to outline the methods of collecting water temperature and TDG data within the Wells Project. This QAPP is designed to attain data of the type and quality necessary to inform future decisions; in this case, the data will be used to evaluate temperature and TDG compliance of the Wells Project with the state WQS and whether additional measures may be necessary to achieve compliance.

Specific objectives of this QAPP include:

1. Documenting year-round physical values for TDG and seasonal values of temperature in the Wells Project in a systematic, reliable, and robust manner.
2. Making the data publically available via a license implementation webpage.
3. Managing a complete and expanding dataset.
4. Using monitoring data to support the development of plans and reports (e.g., GAP, TDG Report, Water Temperature Report, Aquatic SWG Report, the Wells Project Water Quality Attainment Plan [WQAP], etc.).
5. Using adaptive management, as defined in the Aquatic Settlement Agreement (ASA), to strengthen the quality and reliability of the data collected and to support the goals and objectives of the water quality monitoring program.

2.2 Wells Hydroelectric Project

The Wells Project is located at river mile (RM) 515.8 on the Columbia River in the State of Washington. Wells Dam is located approximately 30 river miles downstream from the Chief Joseph Dam, owned and operated by the USACE, and 42 miles upstream from the Rocky Reach Dam, owned and operated by Public Utility District No. 1 of Chelan County. The nearest town is Pateros, Washington, which is located approximately 8 miles upstream from the Wells Dam.

The Wells Project is the chief generating resource for Douglas PUD. It includes ten generating units with a nameplate rating of 774.3 MW and a peaking capacity of approximately 840 MW. The design of the Wells Project is unique in that the generating units, spillways, switchyard, and fish passage facilities were combined into a single structure referred to as the hydrocombine. Fish passage facilities reside on both sides the hydrocombine, which is 1,130 feet long, 168 feet wide, with a crest elevation of 795 feet in height. The juvenile fish bypass (JBS) system was developed by Douglas PUD and uses a barrier system to modify the intake velocities on all even numbered spillways (2, 4, 6, 8 and 10).

The Wells Reservoir is approximately 30 miles long. The Methow and Okanogan rivers are tributaries of the Columbia River within the Wells Reservoir. The Wells Project boundary extends approximately 1.5 miles up the Methow River and approximately 15.5 miles up the Okanogan River. The normal maximum surface area of the reservoir is 9,740 acres with a gross storage capacity of 331,200 acre-feet and usable storage of 97,985 acre-feet at elevation of 781 feet above mean sea level (msl). The normal maximum water surface elevation of the reservoir is 781 feet (Figure 1).
Figure 1. Location Map of the Wells Project.
2.3 TDG and Water Temperature Evaluations at Wells Dam

2.3.1 TDG

TDG levels associated with the operation of the Wells Project have occasionally been measured above the numeric criteria and are more likely to occur during April through August as a result of high flows, high TDG levels entering the Project from the operations of upstream projects, unit outages, or a combination of the above. Similar to other Columbia River hydroelectric facilities, probabilities for TDG exceedances are highest during late spring periods of high flow and low electrical demand, coupled with the Project’s run-of-the-river nature and relatively limited storage capacity.

During the relicensing of the Wells Project, three studies were performed to evaluate the ability of the Project to meet the TDG numeric criteria. The first two were field studies where physical TDG data was collected above and below Wells Dam under different operational scenarios (Columbia Basin Environmental 2006, EES Consulting Inc. et al. 2007) and the third study was the development of an unsteady-state three-dimensional two-phase numerical model (Politano et al. 2009). The model was developed to observe the predicted movement of water through the Project and how gas bubbles interacted with Project flows to produce TDG under various operating scenarios. Model results allowed Douglas PUD to identify specific Project operations that produce less TDG in both the near and far field under different flow conditions. According to the model output, concentrated spill operations of sufficient flows coupled with the appropriate configuration of unit generation (i.e., below operating spillways) across the Project reduced TDG production and increased the degasification of Project outflows at the free surface (i.e., reduced plunging spillway flows and air entrainment). Notably, reduced load, especially when flows are at or near 246 thousand cubic feet per second (kcfs), reduces TDG performance at Wells since spill over generation at Wells Dam enhances the surface jet of spilled water thereby maximizing air water interaction and increasing degasification. The model was tested using an available 9 out of 10 units and each unit passing 20 kcfs. Under these conditions Wells Dam was able to meet WAC WQS standard for TDG when incoming water from upstream was in compliance.

Based upon the modeling results, Douglas PUD developed a “Playbook” identifying a specific Project operational work flow process using a combination of spill gate and generating unit settings that would minimize TDG production and thereby meet TDG numeric criteria. Each year, the Playbook is updated, as needed, based upon the Project’s TDG performance in the preceding year. An updated Playbook is included as part of the annual GAP filing in support of the Ecology-approved fish-passage adjustments for TDG at the Wells Project.

In 2011 and 2012, Columbia River flows at Wells Dam were the fourth- and third-highest, respectively, on record during the months of April through August. During the month of July 2012, Wells Dam received almost twice as much water than the monthly average since the Project was commissioned in the late 1960’s. In addition, the total rebuild of unit 7 reduced the plant capacity at Wells Dam for both of these years by more than 20 kcfs. Despite these unusual factors, Wells Dam showed high compliance with all three TDG adjustment criteria when flows were below the 7Q-10 value (246 kcfs).
2.3.2 Water Temperature

2.3.2.1 Reservoir and tributaries

The 7-DADMax temperature data recorded since 2001 indicate that the portion of the Columbia River upstream of and within the Project generally warms to above 17.5°C (see WQS numeric criteria) in mid-July and drops below the numeric criterion by early October. Temperatures in the Methow River upstream of the Project warm to above 17.5°C in mid-July and drop below the numeric criteria by September, while trends in the Okanogan River upstream of the Project indicate warming above 17.5°C from early June with cooling by late September.

To assess compliance with the state WQS for temperature (during the Wells Project FERC relicensing process), two 2-dimensional laterally-averaged temperature models (using CEQUAL-W2) were developed that represented existing (or “with Project”) conditions and “without Project” conditions of the Wells Project, including the Columbia River from the Chief Joseph Dam tailrace to Wells Dam, the lowest 15.5 miles of the Okanogan River, and the lowest 1.5 miles of the Methow River. The results were processed to develop daily values of the 7-DADMax, and then compared for the two conditions.

The model analyses demonstrated that “with Project” temperatures in the Columbia, Okanogan and Methow rivers do not increase more than 0.3°C compared to ambient (“without Project”) conditions anywhere in the reservoir, and that the Project complies with the state WQS for temperature (West Consultants Inc. 2008). However, a full evaluation of potential temperature impacts of hydroelectric power generation on the Columbia River will most likely require analysis of hydraulic and temperature conditions on a system-wide basis. Hydraulic and temperature influences from upstream dams complicate the evaluation of Project-related impacts. The only way to properly understand these impacts is to examine the river water temperatures more comprehensively through a system-wide TMDL study such as that which is under consideration for development by EPA. Currently, Douglas PUD is participating in the Sovereign Technical Team Water Quality Workgroup which is developing a temperature model that will inform Columbia River Treaty negotiations with the Canadian Government.

2.3.2.2 Fish Ladders

According to the HCP BO issued by NMFS, all entities that use the fish trapping facilities at Wells Dam are required to monitor the ladders every two hours May 1 to November 15 and discontinue trapping operations when fish ladder water temperatures exceed 68.0°F (20.6°C). In 2001 and 2003, Douglas PUD added supplemental temperature recording equipment at Pool 39 near the broodstock collection facilities in the east fishway at Wells Dam to ensure compliance with requirements in the NMFS HCP BO. In 2001, hourly data indicated that water temperatures at this location in the east fish ladder did not exceed 68.0°F (20.6°C) at any time during the monitoring period, which ran from late July to early December. In 2003, data were recorded every two hours and exceedances of greater than 68.0°F (20.6°C) were observed on only three hourly occasions.
3.0 ORGANIZATION AND SCHEDULE

3.1.1 Personnel

This water quality monitoring project is to be conducted primarily by Douglas PUD personnel and experienced contractors hired by Douglas PUD. All personnel conducting work have experience working with or collecting water quality data in addition to having a background in aquatic ecology. Douglas PUD will provide implementation and contractor oversight of equipment installation, data collection and report writing. Regulatory oversight and approval of the QAPP will be provided by Ecology. The Aquatic SWG members will provide peer review on the study design and any reports. Key personnel include:

Andrew Gingerich, Douglas PUD. Oversees the implementation of all water quality measures found within the 401 Certification, Wells Project License Order and Water Quality Management Plan (WQMP) contained within the ASA.

Chas Kyger, Douglas PUD. Serves as an alternate technical lead for water quality resources. Also provides contractor oversight, report development and technical editing support.

Shane Bickford, Douglas PUD. Natural Resources Supervisor responsible for the implementation of all aquatic and terrestrial resource measures.

Beau Patterson, Douglas PUD. Provides land use oversight and serves as Douglas PUD’s land owner liaison.

Mary Mayo, Douglas PUD. Provides support for administrative activities including contract invoice accounting and technical editing and review.

Dan Stolp, Douglas PUD. Serves as the communications lead for the wireless transmission of data.

Rich Klein, Douglas PUD. Serves as the database lead for all water quality data received by Douglas PUD.

Bao Le, HDR Engineering, Inc. Supports water quality resources including technical editing and report development. Also provides technical and regulatory assistance on all water quality program objectives.

John Lemons, Columbia Basin Environmental. Serves as the TDG lead technician which includes station maintenance, calibration, and quality assurance/quality control (QA/QC) activities of TDG monitoring equipment.

Greg Perry, United States Geological Survey (USGS). Spokane District Field Manager for the stream monitoring field program.

Patrick Miller, USGS. Spokane District lead technician for the stream monitoring field program. Serves as the temperature monitoring station technician responsible for calibration, station maintenance and QA/QC activities.

Patricia Irle, Ecology. Hydropower Projects Manager, CRO. Ecology’s lead responsible for tracking compliance with terms of the Wells Project 401 Certification and Aquatic Settlement Agreement.

3.1.2 Schedule

The schedules below will be managed to meet the implementation and reporting requirements of the Wells Project 401 Certification and FERC License Order. An estimated schedule for setup and annual reporting is provided below:

3.1.2.1 QAPP Development and Monitoring Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 15</td>
<td>Send Draft QAPP to Ecology</td>
</tr>
<tr>
<td>March 15 2013</td>
<td>QAPP comments received from Ecology</td>
</tr>
<tr>
<td>March 20 2013</td>
<td>Secure professional services agreement with USGS</td>
</tr>
<tr>
<td>March 30 2013</td>
<td>Install TDG stations</td>
</tr>
<tr>
<td>March 30 2013</td>
<td>Distribute revised QAPP (per Ecology comments) to Aquatic SWG</td>
</tr>
<tr>
<td>April 1 2013</td>
<td>Forebay and tailrace TDG stations operational</td>
</tr>
<tr>
<td>April 30 2013</td>
<td>QAPP comments received from Aquatic SWG</td>
</tr>
<tr>
<td>June 30 2013</td>
<td>Install temperature stations</td>
</tr>
<tr>
<td>July 30 2013</td>
<td>Temperature stations operational</td>
</tr>
<tr>
<td>June 30 2013</td>
<td>File Final QAPP with the FERC</td>
</tr>
</tbody>
</table>

3.1.2.2 Annual Reporting Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-Jan</td>
<td>Draft TDG Report to Ecology and Aquatic SWG</td>
</tr>
<tr>
<td>15-Feb</td>
<td>Receive comments from Ecology and Aquatic SWG</td>
</tr>
<tr>
<td>28-Feb</td>
<td>File Final TDG Report with Ecology and the FERC</td>
</tr>
<tr>
<td>30-Jan</td>
<td>Draft GAP to Ecology, HCP and Aquatic SWG</td>
</tr>
<tr>
<td>15-Feb</td>
<td>Receive comments from Ecology, HCP and Aquatic SWG</td>
</tr>
<tr>
<td>28-Feb</td>
<td>File Final GAP with Ecology and the FERC</td>
</tr>
<tr>
<td>30-Jan</td>
<td>Draft Temperature Report to Ecology</td>
</tr>
<tr>
<td>28-Feb</td>
<td>Temperature Report comments from Ecology</td>
</tr>
<tr>
<td>30-Mar</td>
<td>Draft Temperature Report to Aquatic SWG</td>
</tr>
<tr>
<td>30-Apr</td>
<td>File Final Temperature Report with the FERC and Ecology</td>
</tr>
<tr>
<td>30-Mar</td>
<td>Incorporate water quality reporting in annual Aquatic SWG report</td>
</tr>
<tr>
<td>30-Apr</td>
<td>Receive comments from Aquatic SWG on annual water quality parameters</td>
</tr>
<tr>
<td>30-May</td>
<td>File Aquatic SWG Annual Report with the FERC</td>
</tr>
</tbody>
</table>
3.1.2.4 Schedule Limitation

Douglas PUD will work towards meeting the QAPP Development and Monitoring Schedule described above, however some factors exist that may limit the ability for implementation in accordance with the schedule. These factors include the permitting and regulatory review required for the installation of water quality instrumentation to support the monitoring program (i.e., review and processing of a Joint Aquatic Resources Permit Application and the potential need for implementation of the State Environmental Policy Act process or USACE section 10 and county shoreline permits). In addition, high flows, which typically occur during the spring run-off period, may preclude safe installation of water temperature stations as scheduled.

It is important to note that per the Wells Project 401 Certification, the development of the QAPP and installation of water quality monitoring stations are not required to be completed until the end of October of 2013 (by the end of the first year of the FERC license). However, Douglas PUD’s advanced schedule is proposed in consideration of the additional time required for the regulatory permitting and review process, as needed. In the event that environmental or permitting activities preclude Douglas PUD from meeting the above QAPP Development and Monitoring Schedule, and further, prevents Douglas PUD from meeting the within one year requirements for water quality monitoring, both Ecology and the FERC will be formally notified and Douglas PUD will submit a request for a modified schedule.

4.0 QUALITY OBJECTIVES

4.1 DECISION QUALITY OBJECTIVES (DQO) Process

The DQO Process is used when data are being used to select between two clear alternative conditions or to determine compliance with a standard. For this QAPP, a DQO Process will be implemented using the monitoring data (i.e., water temperature and TDG) for relevant parameters to determine compliance with the state WQS. Actions that could be taken if measurements indicate that state WQS numeric criteria are not met have already been defined in Douglas PUD’s WQMP and 401 Certification. These potential actions include:

1. Continued sampling to determine the accuracy and repeatability of a violation.
2. Employing adaptive management, as defined by the ASA to address non-compliance in water quality measures, if and when they occur. Examples include:
   a. Identifying reasonable and feasible actions that could be used to meet TDG and water temperature WQS numeric criteria.
   b. Exploring other alternative approaches available in the water quality standards provided in WAC 173-201A-510(5)(g).
4.1.2 Representativeness

Obtaining representative measurements or samples requires the use of properly operated and calibrated equipment and requires a good sampling design as well as good execution of that design. A result is representative of a population when it reflects accurately the desired characteristics of that population. A set of representative samples is said to be valid if it provides a true representation of the temporal and spatial variations of the population characteristic (Lombard and Kirchmer 2004). For the water temperature and TDG monitoring program, Douglas PUD proposes a spatial distribution of instrumentation and a temporal collection regime for water quality data that is representative of the quality of water entering and exiting the Wells Project and that is sufficient to evaluate Wells Project compliance with the state WQS numeric criteria for relevant parameters.

TDG sensors will be placed in the forebay (near unit six) and in the tailrace of Wells Dam. The placement of the sensors has been confirmed as representative of bulk flow prior to passing Wells Dam and leaving the tailrace (Columbia Basin Environmental 2006, EES Consulting Inc. et al. 2007). The forebay and tailrace sensors will provide a representative value of TDG production through Wells Dam and allow for the determination of Wells Dam’s ability to meet WAC standards.

During the summer of 2011, Wells Dam forebay values for TDG were often measured as higher than those determined in the Chief Joseph Dam tailrace. The USACE has determined that the placement of the TDG sensor maintained below Chief Joseph Dam causes inaccurate Chief Joseph Dam tailrace TDG values. The Chief Joseph Dam tailrace sensor is located below the spillway on river right and does not capture turbine outflow during certain operations. TDG in turbine outflow can be higher than spill flows when the spillway at Chief Joseph Dam is degassing supersaturated water in the forebay. Whereas, supersaturated water passing through the powerhouse is not stripped of gas (Pers. Comm. Mike Schneider, USACE). Given the unique hydrodynamics below Chief Joseph Dam and the lack of bulk flow representation, Douglas PUD is proposing to install an additional TDG station at Washburn Island (Washburn Island is downstream of Chief Joseph Dam, upstream from the Okanogan River and is being located at a site that contains mixed flow). The Washburn Island location will help Douglas PUD understand TDG degassing in the Wells Project and expected TDG saturation in the Wells Forebay. In addition it will help proof the Wells forebay TDG sensor since Washburn Island TDG values should predict Wells Forebay TDG values. Based on the comparison of the sensors at these two locations, technicians can service the sensors when data appears to be erroneous to ensure reliable data is being obtained. Finally, the Washburn Island location will more accurately assess TDG loading from the federal power system above Wells Dam, which may support improved management towards minimizing TDG production in the Columbia River.

The frequency of TDG data collection (15 minute intervals or more frequently year-round) is designed to provide a sufficient number of data points, which will represent real time TDG conditions in the Wells Project and allow Douglas PUD to evaluate TDG compliance in consideration of incoming water quality conditions in addition to TDG management activities occurring at Wells Dam throughout the year.
The proposed boundary locations for temperature sensors will provide a representation of water temperatures entering into and leaving the Wells Project. Boundary locations include the Chief Joseph Dam tailrace, the Okanogan River at RM 10.5 and the Methow River at RM 1.5. In addition, the temperature monitoring station in the Wells Dam forebay will collect a depth profile to allow Douglas PUD to continue to verify the lack of thermal stratification in the Wells Reservoir. Fishway thermistors will provide representative data to assist Douglas PUD in determining if trapping salmonids is allowable under NMFS BO temperature criteria for ESA listed fishes.

Together, proposed locations and depth of TDG and temperature sensors will provide the necessary information for a precise and accurate evaluation of the Wells Project’s ability to continue to meet WAC compliance criteria for TDG and water temperature. Finally, samples will be taken in a consistent manner for all measurement locations.

4.1.3 Comparability

In order to compare data collected under this QAPP with historic Wells Project water quality data, TDG and water temperature data will be collected using instrumentation and standardized procedures similar to the historic water quality program. Instrumentation will consist of Hydrolab® Minsonde sensors as has been utilized in the past for TDG and water temperature sensors used by the USGS at their existing stream gauge stations. Methodology for data collection and processing will be similar to or comparable to previous water quality monitoring activities in the Wells Project. The data resolution in this study is not only intended to be comparable to data collected at the Project in the past, but to support future TMDL development and any modeling that may be required to support Columbia River Treaty negotiations. In addition, the majority of TDG and water temperature data collected on the Columbia River is collected using identical equipment and nearly identical data collection protocols, as proposed in this QAPP.

4.1.4 Completeness

The sampling design is intended to provide, at a minimum, hourly data or 168 single location samples per week at each station. For TDG monitoring, data collection will occur year-round and thus provide over 8,736 data points per station each year. Redundant sampling in the design should reduce the probability of data gaps even when unforeseen events occur such as instrument failure or damage due to weather or environmental factors. In addition, the real-time recording and dissemination of the data allows for the prompt identification of a failed sensor and immediate equipment service or replacement; thereby minimizing data loss and improving data completeness.

4.2 MEASUREMENT QUALITY OBJECTIVES (MQO)

All water quality monitoring instrumentation will be calibrated per factory recommended specifications prior to deployment and serviced in the field on a monthly or more frequent schedule, as needed. If an instrument does not meet specifications it will not be deployed. In addition, if a sensor appears to be sending erroneous data, the site will be visited toward
recalibrating the instrumentation and an evaluation will be conducted to determine the quality and validity of the data associated with the event.

The repeatability and sensitivity of the equipment needs to be within the allowable deviations from water quality criteria in order to avoid reaching a false conclusion regarding whether or not criteria have been met. The MQOs for these parameters, based on water quality criteria allowances for human effects (smallest reference level for decision making) and instrument capabilities are presented in Table 1.

### Table 1. Measurement quality objectives

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Smallest Reference Level for Decision Making</th>
<th>Range of Instrument</th>
<th>Accuracy</th>
<th>Sensitivity/Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDG Station (MiniSonde/ Hydrolab)</td>
<td>Temperature 0.3°C</td>
<td>-5 to 50°C</td>
<td>± 0.1°C</td>
<td>0.01°C</td>
</tr>
<tr>
<td></td>
<td>TDG 1 % Saturation</td>
<td>400 to 1400 mmHg</td>
<td>± 1.5 mmHg</td>
<td>1.0 mmHg (0.1% saturation)</td>
</tr>
<tr>
<td>Temperature Station (Waterlog H-377 sensor)</td>
<td>Temperature 0.3°C</td>
<td>-40 to 105°C</td>
<td>± 0.1°C</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### 5.0 SAMPLING PROCESS DESIGN

Douglas PUD maintains two TDG stations during the spill season (April- August) but will be installing two additional TDG stations in 2013 and expanding its TDG program to year-round monitoring beginning in March of 2013. Similar to the past TDG program, all TDG instrumentation will also collect temperature data. In addition, Douglas PUD maintains redundant (2 per location) temperature Tidbit loggers at six locations upstream of the dam. In 2013, Douglas PUD plans on replacing the existing Tidbit temperature loggers with real time monitoring stations and making data available on a public website. In previous years, temperature data was shared with the public and agencies by request. Additional information on the proposed monitoring and sampling design is provided below.

#### 5.1 TDG

Douglas PUD maintains two real time water quality monitors at the Wells Dam. These instruments record barometric pressure (BP), water temperature, and TDG every fifteen minutes. The forebay sensor is located on the upstream face of the dam near turbine unit six and the tailwater monitor is located approximately two miles downstream of the dam on the river left bank. Hourly data from these sites are transmitted to the Columbia River Operational Hydromet System (CROHmS) operated by the USACE– Northwest Division. An additional reservoir monitoring station at Washburn Island (RM 537.5) and a redundant tailwater probe will be added in 2013. The subsequent Wells Project TDG monitoring system will consist of the following stations:
1. Forebay station located on the upstream face of Wells Dam near unit 6, (WEL).
2. Tailwater station located approximately 2.5 miles downstream on the eastern shore, (WELW)
3. Redundant probe located at the tailwater site, (WEL2) and
4. Washburn Island station (WELWASH).

The location of TDG monitoring stations are illustrated in figures 2, 3, and 5.

5.2 Water Temperature

Douglas PUD will maintain water temperature sensors at six locations in the Wells Project. Loggers used in previous years were Tidbit thermistors (Onset), which are programmed to collect hourly data year-round and will be used until new remote stations can be installed. Previously, Douglas PUD downloaded the loggers two to four times a year based on river conditions and access. In 2013, upon approval of this QAPP, Douglas PUD plans on installing remote temperature monitoring stations at the following locations to meet 401 Certification requirements and monitor compliance with the state WQS temperature numeric criteria. Locations and duration of monitoring include:

April 1st to October 31st
   1. Methow River, RM 1.5 - Project Boundary
   2. Columbia River, RM 544.5 - Chief Joseph Dam Tailrace
   3. Okanogan River, RM 10.5 - Project Boundary

May 1st to November 15th
   4. Wells Dam Forebay (three depths)
   5. Wells Dam Fishways
   6. Wells Dam Auxiliary Water Supply

Temperature monitoring locations are illustrated in figures 2 through 6.
Figure 2. Proposed locations of TDG/temperature, temperature stations only and Washburn Island TDG station within the Wells Project boundary.
Figure 3. Proposed locations of forebay and tailrace TDG/temperature stations and temperature stations only. Sensors pictured include two redundant tailrace TDG stations and one forebay station above turbine unit six, one fishway temperature and auxiliary water supply station and one forebay water temperature profile sensor (surface, mid and deep depths) affixed to the debris boom.
Figure 4. Proposed Methow River boundary temperature sensor.
Figure 5. Proposed Okanogan River boundary temperature sensor and additional TDG station location off of Washburn Island.
Figure 6. Proposed Chief Joseph tailrace (Columbia RM 544.5) temperature sensor.
6.0 MEASUREMENT PROCEDURES

6.1 TDG equipment

Hydrolab® miniSonde multi-probes (sensors) will be used to monitor TDG in the Wells Project. Hydrolab® probes are used throughout the Columbia River Basin by other Columbia River dam operators (e.g. Chelan PUD 2007, and Corps 2008). Probes are deployed via PVC conduit with a perforated end cap. A sensor communication cable is connected to a communications box on the shoreline. The communication box is connected to a wireless modem that sends data via radio or cellular frequencies back to a server at Wells Dam. A 20 watt solar panel and a voltage regulator keep a 12 volt battery charged, which provides power to the communications box.

6.2 Water Temperature monitoring equipment

With the exception of a change in instrumentation and components, the same system (i.e., sensor connected to communications box with wireless modem to send data to Wells Dam and powered by solar panel) used to collect TDG data will be used for water temperature data collection. Changes in equipment include a Design Analysis H-377 temperature sensor, Sutron GOES radio/logger, GOES satellite antenna and cable, 20 watt solar panel, and voltage regulator. Onshore housing includes a National Electrical Manufacturers Association (NEMA) enclosure, 12 volt sealed lead-acid battery, galvanized pipe, flex conduit, fittings, and other hardware.

7.0 QUALITY CONTROL

Listed below are the general calibration and maintenance procedures to be conducted for TDG and temperature quality assurance methods. Calibration and Quality Assurance Protocols have been adopted and modified, as appropriate, from those used in the USGS stream monitoring protocols as is required by the Wells Project 401 Certification.

7.1 Calibration and Maintenance Protocol for TDG

Calibration and maintenance follows a modified standard procedure used by the USGS’s Guideline and Standard Procedures for Continuous Water-Quality Monitors: Station Operations, Record Computation, and Data Reporting (Wagner et al. 2006). Key elements of this procedure are provided below for both laboratory and field components:

7.1.1 Laboratory

1. Calibrate secondary standard field barometer to National Institute of Standards and Technology (NIST) traceable source.
2. Calibrate secondary standard multiprobe using known standards.
3. Perform integrity check of replacement membranes.
7.1.2 Field

1. Inspect fixed monitoring sites and document any problems monthly or as required.
2. Document pre-calibration water temperature and TDG measurements.
3. Remove sensor from housing, inspect for damage and document findings.
4. Remove TDG membrane, being careful to prevent moisture from entering TDG sensor. Visually inspect membrane and document findings.
5. Perform four-point calibration as follows:
   A. Attach pressure gauge to TDG sensor and release pressure.
   B. Check the zero by comparing TDG pressure from sensor to barometric pressure reported by secondary standard. Document readings and adjust TDG sensor, if necessary.
   C. Using the digital pressure gauge, gradually add sufficient pressure to the TDG sensor to “bracket” the expected in situ pressures (~300 mmHg). The TDG sensor should report pressures equivalent to the ambient BP (zero) plus the additional pressure, e.g. at BP=760 mmHg with 300 mmHg added pressure, the sensor should report 1060 mmHg.
   D. Recheck the zero.
   E. Repeat if adjustments were required.
6. Install fresh TDG membrane. Monitor the TDG pressure as the membrane is attached. Pressure should increase as the seal is formed and then gradually return to ambient BP.
7. Replace sensor guard, if so equipped.
8. Perform final membrane check by immersing entire sensor in carbonated water, i.e. seltzer water. TDG pressure should increase rapidly and exceed ~1000 mmHg. Remove sensor from seltzer water and ensure that the pressure gradually returns to atmospheric levels. If pressures do not rise rapidly or if they instantly return to atmospheric levels, the membrane may have been damaged. Repeat steps 6-8 with a new membrane (Note: It is important that the sensor guard be replaced BEFORE performing the membrane integrity check as it is possible to damage the membrane during this action).

After each eight week interval, the data are reviewed and analyzed. Data will be compared to expected values using incoming TDG values, spill volumes and Rocky Reach forebay values. Erroneous data will be noted and described in annual reporting. At the completion of the water year, the final TDG data will be reviewed by the Douglas PUD’s water quality technical lead.
7.2   Calibration and Maintenance Protocol for Temperature

Like TDG, temperature calibration and maintenance follows a modified standard procedure used by the USGS’s Guideline and Standard Procedures for Continuous Water-Quality Monitors: Station Operations, Record Computation, and Data Reporting (Wagner et al. 2006). Key elements of this procedure are provided below:

1. Water temperature sensors are verified in the lab before deployment.
2. At site visits, the sensor is checked against a digital thermistor which has been verified to be within USGS data-quality requirements with a NIST certified thermometer, as described by Wilde (2006).
3. A 5-point calibration is performed annually at the USGS Field Services Unit (FSU) in Tacoma, Washington, with additional 2-point calibrations performed twice annually.
4. Field sensors are verified and checked within +/-0.2°C accuracy, otherwise returned to vendor or discarded.
5. Temperature data will be collected in a cross-section adjacent to the sensor location, at different flow and temperature regimes, to check and possibly adjust for the collected data being representative of the river at the sampling point.

After each eight week interval, the data will be reviewed and analyzed, corrections will be applied if needed, and the database will be updated. At the completion of the water year, the final tables will be checked and reviewed by senior hydrographers.

8.0   DATA MANAGEMENT PROCEDURES

8.1.1   Data Access for TDG and water temperature

Data will be collected in a format that will include the location of collection, the time of day that each sample is taken, and the sample date. Data will be transferred to a Microsoft (MS) Access database since large volumes of data are anticipated, precluding the use of MS Excel. Data will be transmitted to Ecology or any other public agency by request. However, all final data will be published electronically at Douglas PUD’s Wells Project license implementation website.

TDG and temperature data will be stored internally but also made available in real-time via the Columbia River DART (Data Access in Real Time) website and Douglas PUD’s external website. TDG data will also be transmitted to the USACE’s Columbia Basin Water Management Division Webpage which serves as the information clearing house for all real-time hydroelectric project water quality data on the Snake and Columbia rivers. Wells Project water quality data will be publically available at:

1.  http://www.cbr.washington.edu/dart/dart.html and

A link to these pages will also be provided on Douglas PUD’s Wells Project license implementation website.
9.0 REPORTING

Monthly and bimonthly calibration reports for TDG and temperature monitoring locations, respectively, will be developed, reviewed and approved. All reports, including charts, diagrams, and data prepared by field personnel will be appended to annual reports. Key reports include:

1. Annual GAP
3. Annual Water Temperature Report
4. Annual Water Quality Management Plan Report or Memo
5. Revised version of the QAPP (if available)
6. Revised version of the WQAP (if available)
10.0 REFERENCES


Exhibit B
Pre-filing consultation record for the Total Dissolved Gas Water Quality Attainment Plan
Email to Aquatic SWG, NMFS and BIA Requesting 30 Day Review of Water Quality Attainment Plan
Andrew Gingerich

From: Kristi Geris <kgeris@anchorqea.com>
Sent: Tuesday, August 27, 2013 8:23 PM
To: Keith Hatch (Keith.Hatch@bia.gov); Andrew Gingerich; Bao Le; Beau Patterson; Bill Towey (bill.towey@colvilletribes.com); Bob Jateff (jatefjrj@dfw.wa.gov); Bob Rose; ’Brad James’; ’Bret Nine’; ’Bryan Nordlund (bryan.nordlund@noaa.gov)’; ’Chad Jackson’; Charlie McKinney (cmck461@ecy.wa.gov); Chas Kyger; Chris Sheridan; ’Donella Miller’; Jason McLellan; Jeff Korth (korthjwk@dfw.wa.gov); ’Jessi Gonzales’; Keith Kirkendall (Keith.Kirkendall@noaa.gov); kirk.truscott@colvilletribes.com; Kristi Geris; Mary Mayo; Mike Schiewe; Pat Irle (pirl461@ecy.wa.gov); ’Patrick Luke’; Patrick Verhey (Patrick.Verhey@dfw.wa.gov); Paul Ward (ward@yakama.com); Shane Bickford; ’Steve Lewis’; ’Steve Parker (parker@yakama.com)’
Subject: FW: Request to review WQAP
Follow Up Flag: Follow up
Flag Status: Completed

Hi Aquatic SWG: please see the email below from Andrew and the attached draft Water Quality Attainment Plan (WQAP). This draft plan is out for review with comments due to Andrew no later than Tuesday, October 1, 2013.

Thanks!
Kristi 😊

Kristi Geris

ANCHOR QEA, LLC
kgeris@anchorqea.com
T 509.491.3151 x104
C 360.220.3988

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Tuesday, August 27, 2013 2:34 PM
To: Kristi Geris
Cc: Pat Irle (pirl461@ecy.wa.gov) (pirl461@ecy.wa.gov); Tom Kahler; Shane Bickford
Subject: Request to review WQAP

Kristi,

Please send the attached Water Quality Attainment Plan (WQAP) and this email to the ASWG mailing list and Keith at BIA.

The WQAP is a requirement found in section 6.7(2)[e] of Douglas’ Water Quality 401 Certification. Douglas is required within one year of license issuance, to submit this plan to Ecology for review and approval. The plan is designed show how over the next 10 years Douglas can demonstrate TDG compliance at Wells Dam. In addition to Ecology’s review and approval, Douglas’ FERC issued Operating License (November of 2012) requires that we share the plan with the ASWG, NMFS and BIA for comment (Article 401 a in the Order). Comments will be complied in a consultation record as per usual when we file the revised and accepted document with the FERC. The revised document is due to the FERC by the end of October.
As such, please review the document and provide comments to me no later than Oct. 1st 2013. We will revise the document and include comments prior to seeking approval during the October 9th ASWG meeting.

As per normal, please let me know if you have specific questions about this document or process.

Thanks
Andrew

Andrew Gingerich
Sr. Aquatic Resource Biologist
Douglas County Public Utility District
1151 Valley Mall Parkway, East Wenatchee, WA 98802
Office Phone: (509) 881-2323
Email: andrewg@dcpud.org
Email to HCP Coordinating Committee Requesting 30 Day Review of Water Quality Attainment Plan
Hi HCP-CC: please see the email below from Tom and the attached draft Water Quality Attainment Plan (WQAP). This draft plan is out for review with comments due to Tom prior to the HCP Coordinating Committees’ meeting on September 27, 2013, when the WQAP will be up for CC approval.

Thanks!
Kristi 😊

---

From: Tom Kahler [mailto:tomk@dcpud.org]
Sent: Wednesday, August 28, 2013 10:18 AM
To: Kristi Geris
Cc: Mike Schiewe; Shane Bickford; Andrew Gingerich
Subject: FW: Request to review WQAP

Hi Kristi,

Please forward this to the CC also, as that same section of our 401 specifies that preparation of the WQAP will be in consultation with the HCP CC. We request that the CC review and provide comments on the WQAP, and request CC approval of the WQAP at the September CC meeting. I apologize that that would provide only a 27-day review period, but we need to get the approval in the final meeting minutes before the filing deadline at end of October.

Thanks,

Tom

---

From: Andrew Gingerich
Sent: Tuesday, August 27, 2013 2:34 PM
To: Kristi Geris (kgeris@anchorqea.com)
Kristi,

Please send the attached Water Quality Attainment Plan (WQAP) and this email to the ASWG mailing list and Keith at BIA.

The WQAP is a requirement found in section 6.7(2)(e) of Douglas’ Water Quality 401 Certification. Douglas is required within one year of license issuance, to submit this plan to Ecology for review and approval. The plan is designed show how over the next 10 years Douglas can demonstrate TDG compliance at Wells Dam. In addition to Ecology’s review and approval, Douglas’ FERC issued Operating License (November of 2012) requires that we share the plan with the ASWG, NMFS and BIA for comment (Article 401 a in the Order). Comments will be complied in a consultation record as per usual when we file the revised and accepted document with the FERC. The revised document is due to the FERC by the end of October.

As such, please review the document and provide comments to me no later than Oct. 1st 2013. We will revise the document and include comments prior to seeking approval during the October 9th ASWG meeting.

As per normal, please let me know if you have specific questions about this document or process.

Thanks
Andrew

Andrew Gingerich
Sr. Aquatic Resource Biologist
Douglas County Public Utility District
1151 Valley Mall Parkway, East Wenatchee, WA 98802
Office Phone: (509) 881-2323
Email: andrewg@dcpud.org
HCP Coordinating Committee Action Items from September 24, 2013 Meeting-
Notice to Review and Provide Water Quality Attainment Plan Comments No Later
than October 9, 2013
This memorandum provides a summary of action items, decisions, and documents out for review as agreed on at the Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCP) Coordinating Committees (CC) meeting that met at the Radisson Gateway Hotel, in SeaTac, Washington, on Tuesday, September 24, 2013, from 9:30 am to 12:00 pm. These action items include the following:

**ACTION ITEM SUMMARY**

- Chelan PUD will incorporate average spill levels (i.e., a “spill line”) in the graphs included in the draft Rock Island and Rocky Reach 2013 Fish Spill Report, and provide the revised draft report to Kristi Geris for distribution to the Coordinating Committees. Chelan PUD will be requesting approval of the revised draft report at the Coordinating Committees’ conference call on October 22, 2013 (Item II-A).

- Steve Hemstrom will provide an updated flow duration curve for valid survival studies using the 1929-1977 dataset to which the 1983-2012 dataset is added, and for comparison, also using only the 1983-2012 dataset, to Kristi Geris for distribution to the Coordinating Committees (Item II-C). *(Note: Hemstrom will also include data from the month of June in the summer study period in both updated flow duration curves, as agreed to at the Coordinating Committees’ July 23, 2013 conference call.)*

- Tom Kahler will investigate options to streamline the Coordinating Committee’s review and approval process of Douglas PUD documents that require Coordinating Committee consultation by the Federal Energy Regulatory Commission (FERC) (Item III-A).
Coordinating Committees representatives will provide comments and/or approval of the Wells Dam Water Quality Attainment Plan via email to Tom Kahler (with copy to Kristi Geris) no later than October 9, 2013 (Item III-A).

Tom Kahler will revise the draft 2013 Wells Dam Post-Season Bypass Report, as requested by the National Marine Fisheries Service (NMFS), and will provide the revised draft report to Kristi Geris for distribution to the Coordinating Committees. Douglas PUD will be requesting approval of the revised draft report at the Coordinating Committees’ conference call on October 22, 2013 (Item III-B).

The Coordinating Committees’ meeting on October 22, 2013 will be held via conference call (Item V-C).

The Coordinating Committees’ meeting on November 26, 2013, is rescheduled to November 19, 2013, and will be held in person at the Radisson Hotel in SeaTac, Washington (Item V-C).

The Coordinating Committees’ meeting on December 24, 2013, is rescheduled to December 17, 2013, and will be held either by conference call or in person at the Radisson Hotel in SeaTac, Washington, as is yet to be determined (Item V-C).

Tom Kahler will contact Jeff Fryer about possibly providing a presentation on the Columbia River Inter-Tribal Fish Commission’s (CRITFC) sockeye studies at the Coordinating Committees’ meeting on November 19, 2013 (Item V-C).

Mike Schiewe will contact Denny Rohr regarding the Coordinating Committees’ remaining 2013 meetings arrangements (Item V-C).

DECISION SUMMARY

- No Statements of Agreement (SOAs) were approved at today’s meeting.

AGREEMENTS

- Coordinating Committees representatives present agreed to hold their meeting on October 22, 2013 by conference call (Item V-C).
- Coordinating Committees representatives present agreed to reschedule their meeting on November 26, 2013, to November 19, 2013, which will be held in person at the Radisson Hotel in SeaTac, Washington (Item V-C).
- Coordinating Committees representatives present agreed to reschedule their meeting on December 24, 2013, to December 17, 2013, which will be held either by
conference call or in person at the Radisson Hotel in SeaTac, Washington, as is yet to be determined (Item V-C).

REVIEW ITEMS

- “Assessment of Factors Limiting the Productivity of Summer Chinook Salmon in the Mid-Columbia River” by Hillman, Murauskas, and Hemstrom (2013), which was distributed to the Coordinating Committees on June 26, 2013, is available for review, with comments due to Steve Hemstrom (as discussed at the Coordinating Committees meeting on June 25, 2013).

REPORTS FINALIZED

- There are no reports that have been recently finalized.
HCP Coordinating Committee Meeting Minutes from September 24th, 2013
Indicating no Comments Received on the WQAP and the Completion of the Review Period
REVIEWED MEMORANDUM

To: Wells, Rocky Reach, and Rock Island HCPs Coordinating Committees
From: Michael Schiewe, Chair
Cc: Kristi Geris
Re: Revised Minutes of the September 24, 2013 HCPs Coordinating Committees Meeting (v2)

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met at the Radisson Gateway Hotel, in SeaTac, Washington, on Tuesday, August 27, 2013, from 9:30 am to 12:00 pm. Attendees are listed in Attachment A of these meeting minutes.

ACTION ITEM SUMMARY

- Chelan PUD will incorporate average spill levels (i.e., a “spill line”) in the graphs included in the draft Rock Island and Rocky Reach 2013 Fish Spill Report, and provide the revised draft report to Kristi Geris for distribution to the Coordinating Committees. Chelan PUD will be requesting approval of the revised draft report at the Coordinating Committees’ conference call on October 22, 2013 (Item II-A).
- Steve Hemstrom will provide an updated flow duration curve for valid survival studies, using the 1929 to 1977 dataset to which the 1983 to 2012 dataset is added, and for comparison, also using only the 1983 to 2012 dataset, to Kristi Geris for distribution to the Coordinating Committees (Item II-C). (Note: Hemstrom will also include data from the month of June in the summer study period in both updated flow duration curves, as agreed to at the Coordinating Committees’ July 23, 2013, conference call.)
- Coordinating Committees representatives will provide comments and/or approval of the Wells Dam Water Quality Attainment Plan (WQAP) via email to Tom Kahler (with copy to Kristi Geris) no later than October 9, 2013 (Item III-A). (Note: Coordinating Committees members provided no specific comments on the WQAP by the comment deadline, nor did they request additional time for review.)
- Tom Kahler will investigate options to streamline the Coordinating Committees’ review and approval process of Douglas PUD non-HCP documents that require Coordinating Committees consultation by the Federal Energy Regulatory Commission (FERC) under the new Wells license (Item III-A).
- Tom Kahler will revise the draft 2013 Wells Dam Post-Season Bypass Report, as requested by the National Marine Fisheries Service (NMFS), and will provide the revised draft report to Kristi Geris for distribution to the Coordinating Committees. Douglas PUD will request approval of the revised draft report at the Coordinating Committees’ conference call on October 22, 2013 (Item III-B).
- The Coordinating Committees’ meeting on October 22, 2013, will be held via conference call (Item V-C).
- The Coordinating Committees’ meeting on November 26, 2013, is rescheduled to November 19, 2013, and will be held in person at the Radisson Hotel in SeaTac, Washington (Item V-C).
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- Tom Kahler will contact Jeff Fryer about providing a presentation to the Coordinating Committees on the Columbia River Inter-Tribal Fish Commission’s (CRITFC’s) sockeye studies at the Coordinating Committees’ meeting on November 19, 2013 (Item V-C).
- Mike Schiewe will contact Denny Rohr regarding the Coordinating Committees’ remaining 2013 meetings arrangements (Item V-C).

**DECISION SUMMARY**

- No Statements of Agreement were approved at today’s meeting.

**AGREEMENTS**

- Chelan PUD agreed to extend fish counts at Rocky Reach Dam into the “off-season” winter months in 2014/2015 (Item I-A).
- Coordinating Committees representatives present agreed to hold their meeting on October 22, 2013, by conference call (Item V-C).
- Coordinating Committees representatives present agreed to reschedule their meeting from November 26, 2013, to November 19, 2013, which will be held in person at the Radisson Hotel in SeaTac, Washington (Item V-C).
- Coordinating Committees representatives present agreed to reschedule their meeting from December 24, 2013, to December 17, 2013, which will be held either by conference call or in person at the Radisson Hotel in SeaTac, Washington, as is yet to be determined (Item V-C).

REVIEW ITEMS

- “Assessment of Factors Limiting the Productivity of Summer Chinook Salmon in the Mid-Columbia River” by Hillman, Murauskas, and Hemstrom (2013), which was distributed to the Coordinating Committees on June 26, 2013, is available for review, with comments due to Steve Hemstrom (as discussed at the Coordinating Committees meeting on June 25, 2013).
- Kristi Geris sent an email to the Coordinating Committees on August 28, 2013, notifying them that the draft Wells Dam WQAP is available for review. As discussed at today’s meeting, comments and/or approval of the draft plan are due to Tom Kahler (with copy to Geris) no later than October 9, 2013 (Item III-A). (Note: Coordinating Committees members provided no specific comments on the WQAP by the comment deadline, nor did they request additional time for review.)

REPORTS FINALIZED

- There are no reports that have been recently finalized.

I. Welcome

Mike Schiewe welcomed the Coordinating Committees and asked for any additions or other changes to the agenda. The following revisions were requested:

- Steve Hemstrom added updates on two Chelan PUD action items from the last Coordinating Committees meeting on August 27, 2013; and also an update on Chelan PUD staffing.
HCP Coordinating Committees  
Meeting Date: September 24, 2013  
Document Date: October 18, 2013  

- Mike Schiewe added a follow-up discussion on the Fish Passage Center’s (FPC’s) Comparative Survival Study (CSS) Presentation.

A. Meeting Minutes Approval (Mike Schiewe)

The Coordinating Committees reviewed the revised draft August 27, 2013 conference call minutes. Kristi Geris said there was one outstanding comment remaining to be discussed regarding the discussion following the FPC’s CSS Presentation. Steve Hemstrom had noted the high sockeye smolt-to-adult ratios (SARs) based on Dr. Kim Hyatt’s work, and added that sockeye are the highest migrating fish in the Upper Columbia. Hemstrom clarified sockeye are the farthest migrating fish in the Upper Columbia. The Coordinating Committees members present approved the draft August 27, 2013, conference call minutes as revised. Kirk Truscott approved the revised draft minutes via email on September 23, 2013. Geris will finalize the meeting minutes and distribute them to the Committees.

Action items from the last Coordinating Committees meeting on August 27, 2013, and follow-up discussions were as follows: (Note: italicized item numbers below correspond to agenda items from the August 27, 2013 meeting.)

- **Chelan PUD will summarize available data on fish passage at Rocky Reach Dam during the “off-season” winter months, and provide these data to Kristi Geris for distribution to the Coordinating Committees (Item II-B).**
  
  Steve Hemstrom said that he spoke with Rocky Reach Dam staff and found that little “off-season” work has been conducted, and only specific to bull trout; and that other species were not tabulated. He spoke with the only remaining counter from the bull trout work, but the counter could not specifically recall observing other fish.

- **Chelan PUD will evaluate the potential to extend fish counts at Rocky Reach Dam into the “off-season” winter months, starting winter 2014/2015 (Item II-B).**
  
  Steve Hemstrom said that Chelan PUD will extend fish counts at Rocky Reach Dam into the “off-season” winter months in 2014/2015.
II. Chelan PUD

A. 2013 Rock Island and Rocky Reach Fish Spill Report (Steve Hemstrom)

Steve Hemstrom said that the final draft 2013 Rock Island and Rocky Reach Fish Spill Report (Attachment B) was distributed to the Coordinating Committees by Kristi Geris on September 20, 2013. He said that charts were added to provide a visual depiction of daily passage and index counts, including when spill started and ended; and he added that these charts will be included in spill reports from this point forward. He reviewed 2013 Rocky Reach summer spill, and noted that the Data Access in Real Time (DART) database can be queried to obtain daily spill averages in cubic feet per second. Bryan Nordlund suggested incorporating a range of collection efficiencies, or bypass efficiencies, into the report, which could then be used to calculate outmigration data. Lance Keller noted that the index counts are based on 2-hour daily sampling events, where collection is representative of the entire day. Therefore, to incorporate such data, the entire index would need to be expanded. Nordlund said he had hoped that some form of a juvenile index would provide some estimation of whether the adult returns are as expected. He said, however, that it now appears impractical to include these data.

Schiewe noted the Rocky Reach summer spill percentage (i.e., 11.73%) is off target (i.e., 9%), and suggested incorporating a “spill line” into the charts to convey forced spill. Hemstrom agreed a spill line would help clarify certain data, and said that he would incorporate average spill levels (i.e., a “spill line”) in the graphs included in the draft Rock Island and Rocky Reach 2013 Fish Spill Report, and provide the revised draft report to Geris for distribution to the Coordinating Committees.

Nordlund noted the spike in subyearling Chinook outmigration in June followed by a larger outmigration in July, and asked if this is normal. Hemstrom replied that it is, and Keller added that the initial pulse was likely attributed to hatchery releases; and noted that DART is a good resource to look more closely at those numbers. Schiewe also added that it seems these data should align with Douglas PUD’s data from their subyearling study as well, and Tom Kahler confirmed that they do.
Hemstrom reviewed 2013 Rock Island spring and summer spill, and noted that spring spill continued directly into summer spill, with no interruption in spill. He also noted the 2-day flatline in juvenile index counts in August when the Rock Island Right Adult Ladder was dewatered to repair the bowed vane in the picket-barrier leading to the auxiliary water system space. Keller also noted the dip around July 4, and explained that it was due to trap complications. Hemstrom said that Chelan PUD is planning to run the bypass longer next year, but the exact duration is yet to be determined.

Chelan PUD will request approval of the revised draft 2013 Rock Island and Rocky Reach Fish Spill Report at the Coordinating Committees’ conference call on October 22, 2013.

B. Chelan County Noxious Weed Board Plan for Application of Milfoil Control Chemical in Rocky Reach Reservoir, 2014 (Steve Hemstrom)

Steve Hemstrom said that Chelan PUD and the Washington State Department of Ecology (Ecology) met by conference call to discuss concerns about the Chelan County Noxious Weed Board’s proposed pilot application of Triclopyr triethylamine (TEA) near the mouth of the Entiat River. Hemstrom said that Ecology shares the same concerns regarding potential impacts to summer and fall Chinook salmon and lamprey. He said that Chelan County does not yet have approval to carry out the pilot application of TEA, and explained that the County has been operating under a feasibility grant, but application requires a separate grant. He said the Ecology indicated that if there are too many issues surrounding the application of TEA, then the permit would not be granted. Hemstrom added that he believes Ecology would be the agency to award the grant. Hemstrom said that he will keep the Coordinating Committees updated as more develops.

C. Valid Study Flow Duration Curve Preparation (Steve Hemstrom)

Steve Hemstrom said that the updated flow duration curve for valid survival studies is almost complete. He requested to carry forward his action item to provide an updated flow duration curve for valid survival studies, using the 1929 to 1977 dataset to which the 1983 to 2012 dataset is added, and for comparison, also using only the 1983 to 2012 dataset, to Kristi Geris for distribution to the Coordinating Committees. (Note: Hemstrom will also include data from the month of June in the summer study period in both updated flow duration curves, as agreed to at the Coordinating Committees’ July 23, 2013, conference call.)
D. Chelan PUD Staffing Update (Steve Hemstrom)

Steve Hemstrom announced that Chelan PUD has selected a replacement biologist to fill the position formerly held by Josh Murauskas. Hemstrom said that Catherine Willard, previously with the U.S. Forest Service Entiat Ranger District, will start September 30, 2013. He said that Willard will also support Alene Underwood with HCP Hatchery Committees' project work.

III. Douglas PUD

A. DECISION: Wells Dam Water Quality Attainment Plan (Tom Kahler)

Tom Kahler said that the draft Wells Dam WQAP was distributed to the Coordinating Committees by Kristi Geris on August 28, 2013. He said the WQAP is one of several non-HCP documents drafted and reviewed by Andrew Gingerich and the Aquatic Settlement Workgroup (SWG), but that now also require Coordinating Committees consultation under the new FERC license. Kahler said historically, these types of documents have not required Coordinating Committees’ review and added that this one in particular addresses meeting water quality standards for Washington State. He said the WQAP needs to be reviewed and approved, and finalized in the meeting minutes prior to submitting the final document to FERC by the end of October 2013. Mike Schiewe noted that this document has been reviewed by the Aquatic SWG and is up for approval at the October 9, 2013, meeting. He added that Pat Irle, the Aquatic SWG Technical Representative for Ecology, did not flag any issues while discussing the draft plan at the last Aquatic SWG meeting.

Kahler reviewed key components of the plan, including measures to improve total dissolved gas (TDG) models, alternatives analyses, and TDG management strategies. Schiewe noted the ongoing issues in the Wells Forebay due to incoming TDG, which Ecology has been forthright in recognizing that Douglas PUD has limited ability to control. Schiewe said that, although not written in a Washington Administrative Code, it has been verbally agreed to by Ecology that if the forebay TDG is out of compliance, as long as the project does not add TDG, the project is still considered in compliance. He also noted that additional TDG monitoring stations were recently installed that will hopefully provide more representative readings of incoming TDG.
Bryan Nordlund suggested streamlining the Coordinating Committees’ review and approval process of all of these FERC-required non-HCP documents, as opposed to reviewing and approving each individually. Schiewe agreed and suggested that Douglas PUD put together PowerPoint presentations to review the key components of each document. Kahler said that the FERC license does not specifically state that Coordinating Committees’ approval is required; rather, the opportunity to review is required. Schiewe said that, except for NMFS, Coordinating Committees members can always defer to their Aquatic SWG Technical Representative counterpart. Jim Craig suggested approving the draft WQAP by email, and dovetailing the Coordinating Committees’ approval with the Aquatic SWG’s next meeting. Coordinating Committees representatives agreed to provide comments and/or approval of the Wells Dam WQAP via email to Kahler (with copy to Geris) no later than October 9, 2013; and Kahler said that he will investigate options to streamline the Coordinating Committees’ review and approval process of Douglas PUD non-HCP documents that require Coordinating Committees consultation according to the FERC license.

B. Draft 2013 Wells Dam Post-Season Bypass Report (Tom Kahler)

Tom Kahler said that the draft 2013 Wells Dam Post-Season Bypass Report (Attachment C) was distributed to the Coordinating Committees by Kristi Geris on September 23, 2013. He recalled that in 2011, John Skalski and Richard Townsend of Columbia Basin Research conducted analyses on bypass migration at Wells Dam. Based on those analyses, the Coordinating Committees agreed that beginning in 2012, Wells bypass operations for spring outmigration would be changed from beginning April 12 to beginning April 9; and from ending August 26 to ending August 19. He said that 2013 was the second year of implementing these bypass operation changes, and noted that Douglas PUD achieved the HCP requirement to provide bypass operations during 95% of the juvenile salmon and steelhead migration passing Wells Dam. He said further, that as described in Table 2 in Attachment C, bypass routes were provided for at least 98% of each plan species’ migrations.

Bryan Nordlund asked if average travel times as described in Table 1 of Attachment C were based on Chelan PUD’s acoustic tag studies. Kahler replied that they were except for the yearling Chinook data, which were based on the Douglas PUD 2010 survival verification study; and subyearling Chinook, for which they used the travel times for steelhead and
sockeye. Kahler said that he would revise the text describing Table 1 to reflect that average travel times were based on passive integrated transponder (PIT) tag studies for yearling Chinook, and acoustic tag studies of steelhead and sockeye for the other species. Kahler also acknowledged that those data on yearling Chinook are not representative of the run at large; however, he explained that they were used because the estimate is conservative.

Mike Schiewe asked for clarification of the meaning of the last column in Table 3 of Attachment C. Kahler explained that the value listed in the last column represents the amount of time (days) that the actual start date (second column) could have been adjusted and the 95% standard would still have been achieved. For example, in 2013, bypass operations could have started at 00:00 hours on April 10, and 98% coverage of the yearling Chinook outmigration would have still been achieved, but waiting until April 11 would have resulted in not achieving the 95% standard. In other words, at some point on April 10 enough fish migrated through Wells that had we waited until the April 11 to start the bypass operations we would have missed too large a proportion of the run to achieve the 95% standard.

Nordlund asked, regarding Table 3 of Attachment C, if the date by which the first 5% passed (fifth column) is modeled data, and Kahler replied that it is. Teresa Scott asked if those are modeled data, then why are the cumulative proportions not all 5%? Kahler explained that the cumulative count includes the entire day (i.e., 24 hours), but bypass dates always start at 00:00 hours.

Kahler said that he will revise the draft 2013 Wells Dam Post-Season Bypass Report, as requested by NMFS, and will provide the revised draft report to Geris for distribution to the Coordinating Committees. Douglas PUD will request approval of the revised draft report at the Coordinating Committees’ conference call on October 22, 2013.

IV. Hatchery and Tributary Committees Update (Mike Schiewe)

Mike Schiewe reported that the HCP Hatchery Committees did not meet in September due to the limited number of people available to attend. He said that a conference call is scheduled for October 7, 2013, to discuss time-sensitive agenda items, including:
• Live-Spawning Twisp River Steelhead Broodstock Update: The Yakama Nation (YN) plans to discuss live-spawning Twisp River steelhead for the YN Steelhead Kelt Reconditioning Program. The program is currently located at Winthrop National Fish Hatchery, and the YN has expressed interest in the Methow Fish Hatchery for live-spawning and early-rearing. The program is funded through the next few years through Columbia River Fish Accords funds; however, there is reluctance about the risk of transmitting disease. Bob Rogers of the Washington Department of Fish and Wildlife (WDFW) will be on the call to discuss potential fish health issues.

• Hatchery and Genetic Management Plans Update: In the midst of all of the permitting issues, there was potential that certain steelhead programs would go uncovered. NMFS agreed to provide letters extending existing permits. Tom Kahler confirmed that NMFS recently provided a letter to all applicable programs extending the current permits. He added that no end date was specified on the extension.

Schiewe updated the Coordinating Committees on the following actions and discussions that occurred at the last Tributary Committees’ meeting on September 23, 2013:

• Budget Amendment: The Wells Tributary Committee approved a $25,000 increase in funding for Trout Unlimited on the Twisp River Well Conversion Project. A recent system test found that the system was unable to produce the desired production of 150 gallons per minute. The driller and hydrogeologist said that the well will produce the required production if it is deeper. The additional funds will be used to deepen the well.

• Contract Extension: The Wells and Rocky Reach Tributary Committees granted a one year, no cost contract extension to the Okanagan Nation Alliance for the Shingle Creek Fish Passage Project.

• General Salmon Habitat Program Projects: Four projects selected to receive Plan Species Account funds were not selected to receive matching funds from the Salmon Recovery Funding Board (SRFB). Tom Kahler said there were some really high-priced projects that reduced the total number of SRFB-funded projects in this funding round relative to previous funding rounds. The Chelan County Natural Resource Department asked for additional clarity on the rejection of the Icicle-Peshastin Irrigation District Pump Exchange Project, and Kahler explained that there were too many concerns with the proposed project that had not been satisfactorily addressed.
by the project sponsor. Jim Craig added that Icicle-Peshastin did not want to be encumbered by pumping costs.

- **Okanagan Project Tours:** The Tributary Committees will tour habitat restoration projects in Canada on October 9 and 10, 2013.
- **Next Steps:** The next Tributary Committees meeting will be on November 15, 2013.

V. HCP Committees Administration

A. *Fish Passage Center’s Comparative Survival Study Presentation Follow-Up (Mike Schiewe)*

Mike Schiewe said that Bob Rose recently spoke with Michele DeHart of the FPC; however, he could not attend the meeting today because he was meeting with contractors at the Marion Drain sturgeon facility.

Teresa Scott recalled the FPC’s estimates that fish passage at dams only represent a sliver of the entire life cycle process. She said based on this estimate, she would be hard-pressed to ask more of the PUDs when, for example, ocean conditions are a major driver for returns.

Bryan Nordlund said that, compared to numbers calculated by the HCPs at each project, he was surprised by the survival numbers that the FPC presented. He said he then realized that the CSS numbers are “limited,” and represent only a composite fraction of what is really returning to the upper Columbia River, versus a statistically valid study on a project. Nordlund recalled several years back when a group of fish released in the Yakima River did poorly, and the CSS reported that it was due to passage issues in the Columbia River. He said another thing he had a hard time reconciling were the poor SARs that were presented, when there are such high counts at the dams. Nordlund said there were several limitations in their analyses, and they presented them as if they were dam operations. He said that CSS data were also presented in a recent article in the *NW Fishletter* that discussed the current status of the Federal Columbia River Power System Biological Opinion, which Nordlund said reflected the same incompleteness that was presented to the Coordinating Committees.

Jim Craig said that he appreciates the opportunity to learn about the CSS; however, there were many unverified assumptions. He added that the Independent Scientific Review Panel also provided a review suggesting problems with the analyses. Craig said he believes that the
claims the CSS are advocating are premature given the minimal data they have, and added that he feels more comfortable with the PUD survival estimates.

Nordlund said that he was unclear on why the FPC cannot analyze all of the PIT-tag data, when everything is available in the PIT-Tag Information System (PTAGIS). He added that he wondered what they were really asking for. Nordlund said that he is curious about the 2010 PIT-tag studies and what those SARs look like. Tom Kahler said that he started looking through those data; however, he was not evaluating SARs. Rather he was looking at differences between the treatment and control groups; which, Kahler added, would show delayed mortality effects. Nordlund asked if returning minijacks were tracked, and Kahler replied that they were, and were excluded from the data analysis (i.e., “censoring”). Kahler also noted that the FPC sampling at Rock Island was not representative of the run at large because of the condition of fish likely to be entrained into an unscreened gatewell.

Schiewe said that he briefly spoke with Denny Rohr about follow-up discussions at the Priest Rapids Coordinating Committee Hatchery Sub Committee (PRCC HSC) meeting, and Rohr indicated that discussions were, for the most part, ongoing. Nordlund said that, based on conversations within the PRCC following the FPC’s CSS presentation, the PRCC feels that they may need to develop a formal response. He added that Grant PUD has been publicizing how successful their programs are, and now the CSS is claiming poor SARs. Nordlund said that the PRCC may develop a document distinguishing the sources of those data, and how they may or may not fit with project survival estimates.

Scott said that WDFW is considering modifying TDG standards to accommodate an increase in the gas cap, and added that she is uncertain of the implications this would have in terms of a spill experiment. Schiewe asked if this meant that the U.S. Army Corp of Engineers would be granted a permanent waiver, opposed to the typical annual waiver. Scott replied that she believes this means the level of the waiver would be increased; i.e., the waiver will still be on an annual basis, but ground rules for an experiment would be established. Scott said that the details have not yet been discussed, but WDFW is doing their due diligence at this point of the process. Scott also noted that Oregon State has a completely different rule process. Kahler asked whether for dams on the Washington-Oregon border, the rules go by the most conservative standard. Schiewe recalled the huge body of information that was developed in
the 1970s about the cumulative effects of high gas—a time when high TDG was impacting returning adult salmon. Schiewe said that he would hope that those data should be considered. Nordlund asked how WDFW is consulting with Ecology, and Scott replied that WDFW was recently invited to participate in a meeting with Ecology to discuss what needs to be completed in terms of process. She said that this meeting would be composed of a staff group to discuss process-wise options to present to the directors. She said that those 1970s data would be considered, experts would be consulted, and risks and conditions would be discussed. Scott noted that the experts consulted would likely include members of the HCP Coordinating Committees.

Steve Hemstrom said he thought it would be difficult for Ecology to prove that increased spill will increase survival or benefit SARs. He said that it will also be difficult to prove the benefit of increasing spill will outweigh the detriment of TDG. Nordlund also noted that since all project passage systems are different, and spillway passage survival at each project is different, he did not understand how the proposed FPC study using a blanket uniform spill percentage could be construed to optimize juvenile fish survival for the Columbia River.

Lance Keller noted the potential for adverse impacts on adults, and added that juveniles are just as important as adults, but mathematically for SARs, adults weigh heavier.

Scott agreed with Craig’s sentiments that while the CSS has a lot of data on the Snake River, it is unrealistic to expect to be at the same stage on the Upper Columbia. She recalled two questions presented by the FPC: 1) can the PUDs help those involved in the CSS better understand the PIT-tagged groups that are available to increase the sample size in Upper Columbia; and 2) can the PUDs do anything to increase the number of tags in the Upper Columbia. Scott suggested that keeping communication lines open about these things may be helpful. Schiewe noted WDFW’s fairly extensive presence in Central Washington in the Chiwawa and the Methow, and suggested that if WDFW is interested in assisting those groups, there are staff in those areas who should be able to communicate and coordinate on data.

Schiewe said that at this point, there is a lot of concern that conclusions are being drawn that people are not comfortable with and noted that Rose will also want to weigh in on the discussion when he is available.
B.  HCP Coordinating Committees Distribution List (Mike Schiewe)

The Coordinating Committees revisited the restrictions for the HCP Coordinating Committees distribution list, and the Coordinating Committees representatives present agreed to maintain the distributions lists as previously prescribed.

C.  Next Meetings (Mike Schiewe)

Mike Schiewe said that Denny Rohr requested that the Coordinating Committees reschedule their October 22, 2013, meeting to October 29, 2013, to accommodate the PRCC HSC’s schedule. Schiewe suggested instead of rescheduling the meeting, holding the meeting by conference call. Coordinating Committees representatives present agreed to hold their meeting on October 22, 2013, by conference call.

Schiewe reviewed the remaining 2013 Coordinating Committees meeting schedule; to accommodate the holidays, he suggested rescheduling the November and December meetings one week in advance of the typical meeting dates. He also suggested holding the November meeting in person, and the December meeting either by conference call or in person, as is yet to be determined. Coordinating Committees representatives present agreed to reschedule their meeting from November 26, 2013, to November 19, 2013, to be held in person at the Radisson Hotel in SeaTac, Washington; and to reschedule their meeting from December 24, 2013, to December 17, 2013, which will be held either by conference call or in person at the Radisson Hotel in SeaTac, Washington, as is yet to be determined. Schiewe said that he will contact Rohr regarding the Coordinating Committees’ remaining 2013 meetings arrangements.

Tom Kahler said that Jeff Fryer contacted him about providing a presentation on CRITFC’s sockeye studies at the next Coordinating Committees’ in-person meeting. Kahler said that he will contact Fryer about possibly presenting at the Coordinating Committees’ meeting on November 19, 2013.

Remaining 2013 Coordinating Committees’ meeting schedule:
• The next scheduled Coordinating Committees meeting is October 22, 2013, to be held by conference call.

• The meeting on November 19, 2013, will be held in person at the Radisson Hotel in SeaTac, Washington.

• The meeting on December 17, 2013, will be held either by conference call or in person at the Radisson Hotel in SeaTac, Washington, as is yet to be determined.

**List of Attachments**

Attachment A       List of Attendees  
Attachment B       Chelan PUD’s Final Draft 2013 HCP Preliminary Rocky Reach and Rock Island Fish Spill Report  
Attachment C       Draft 2013 Wells Dam Post-Season Bypass Report
### List of Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Mike Schiewe</td>
<td>Anchor QEA, LLC</td>
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<td>Kristi Geris</td>
<td>Anchor QEA, LLC</td>
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<td>Steve Hemstrom*</td>
<td>Chelan PUD</td>
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<td>Lance Keller*</td>
<td>Chelan PUD</td>
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<td>Tom Kahler*</td>
<td>Douglas PUD</td>
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<tr>
<td>Bryan Nordlund*</td>
<td>National Marine Fisheries Service</td>
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<tr>
<td>Jim Craig*</td>
<td>U.S. Fish and Wildlife Service</td>
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<tr>
<td>Teresa Scott**†</td>
<td>Washington Department of Fish and Wildlife</td>
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</tbody>
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**Notes:**
- * Denotes Coordinating Committees member or alternate
- † Joined by phone
Andrew Gingerich

From: Irle, Pat (ECY) <PIRL461@ECY.WA.GOV>
Sent: Wednesday, October 02, 2013 2:05 PM
To: Andrew Gingerich
Subject: RE: Water Quality Attainment Plan for TDG with Ecology Comments 10_01_13 Final

Great!!

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Wednesday, October 02, 2013 1:15 PM
To: Irle, Pat (ECY)
Subject: Water Quality Attainment Plan for TDG with Ecology Comments 10_01_13 Final

Got your message. We removed the reference to the 401 and added your suggested text. Please find the revised version attached (specific change is in the Biological Monitoring Program Section 3.2- as you know).

Let me know what you think.

I’ll send it to Kristi for distribution if we’re all set.

Thanks
Andrew
Thought you might like to hear what HQ had to say – great job!

After re-reading the plan, I thought it would be helpful to include a little bit more detail in Section 3.2 Biological Monitoring Program. Something like:

“Any biological or water quality studies done for the purpose of potential changes to the WQS will be done in coordination with Ecology to help ensure that the approach and data will meet state and federal requirements. This would include a QAPP that clearly identifies the goals and objectives, with sampling protocols appropriate for each parameter and specie.”

Feel free to reword. I know you would do this, but it might be a helpful reminder to your successors.

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Pat –
I reviewed the WQ attainment plan and I don’t have any substantive comments to modify the plan. The PUD did a great job conveying their challenge managing TDG, which Ecology recognizes is made more complicated by the actions of the upstream (and system-wide) FCRPS operations.

I must say that I usually have suggested edits on other APs I review – but this plan seems solid.

Again, thanks for the opportunity to review this – it really helps me understand the 401 and their TDG issues better. And sorry for the delay!

Thanks, Chad

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Comments? Any idea when you might be able to complete your review? (Any chance you could have it done by next Wednesday, at the latest? I know this is a very short time frame...)
Distribution of Revised Water Quality Attainment Plan to the Aquatic SWG
Following the Incorporation of Comments From Ecology
Hi Aquatic SWG: please see the email below from Andrew and the attached final Water Quality Attainment Plan.

Thanks!
Kristi 😊

Kristi Geris
ANANCHOR QEA, LLC
kgeris@anchorqea.com
T 509.491.3151 x104
C 360.220.3988

From: Andrew Gingerich [mailto:andrewg@dcpud.org]
Sent: Wednesday, October 02, 2013 2:34 PM
To: Kristi Geris
Subject: Revised Water Quality Attainment Plan (WQAP)

Kristi, please forward the revised WQAP and comments below to the ASWG.

During a 30 day review (drafts distributed 8/27/13), Douglas PUD received comments from the WA dept. of Ecology on Douglas WQAP document. The essence of the comments from Ecology are captured below and the resulting revised WQAP is attached. In addition to the comments below, Ecology provided Douglas with some helpful editorial changes that I did not show below since they were editorial in nature.

This document is up for approval at the Oct 9th ASWG meeting. As per norm, please let me know if you have questions.

Andrew
509-881-2323

1. Ecology suggested adding a List of Anacronymys or Abbreviations in the document since this document uses and introduces a lot of them.
   a. Douglas’ Response: Good idea. LOA added to the document
2. Ecology suggested adding a description of the regulatory criteria and regulating bodies for the Chief Joseph Hydroelectric Project. Ecology specifically noted the 2004 TMDL that was developed between Ecology, the Spokane Tribes and EPA.
   a. Douglas’ Response: Good idea. Douglas tried to capture this information in section 2.2.2.2 where a paragraph was added to discuss the various regulatory WQS for the Chief Joe tailrace and Wells Dam Forebay. We specifically emphasized how Douglas would seek clarification on the criteria moving forward since TDG compliance upstream is very important for Douglas to be able to show compliance with WQS over this ten year period.

3. Ecology suggested showing FCRPS TDG compliance above Wells Dam for both the 110% Colville CT standard and the 115% Ecology standard during the fish spill season.
   a. Douglas’ Response: Made sense. As such, Douglas updated Table 1 in the document to show the different the USACE compliance during the 2012 season with both WQS.

4. Ecology suggested revising Figure 2 to show 7Q10 flows over the last few years if Douglas’ intention was to show how dramatic flows have been over the last couple years. Revising the figure would simplify the message and allow Douglas to show recent flow data at Wells.
   a. Douglas’s Response: Douglas revised the figure accordingly and changed the in text reference to comment more specifically on how dramatic flows make compliance more difficult compared to average freshet flows.

5. Ecology suggested that section 3.2, “Biological Monitoring Program” be removed from the document since it was required by Douglas PUD’s GAP and not clear why it would be useful in terms of 10 TDG compliance. Ecology further suggested that if Douglas wanted to keep it, Douglas would need to speak directly to how the data might be used.
   a. Douglas’ Response: We added a final paragraph to this section that suggested that data might be used by regulators at some point to adjust at TDG standard, which would affect Douglas’ ability to meet compliance and two that although it’s unlikely this data might be used to support a site specific TDG standard at some point.

6. Ecology suggested removing physical year references such as 2015 and changing the compliance schedule to “year x” of a ten year schedule.
   a. Douglas Response: Revision changed accordingly

7. Ecology suggested making section 3.x more consistent with the compliance schedule in table 2. References could be more explicit.
   a. Douglas Response: The compliance schedule table (Table 2) was modified to include a QAPP section reference. In addition, text from the table was pulled and inserted into section 2 to capture this suggestion.

8. Ecology suggested including the following text to the Biological Monitoring Section, “Any biological or water quality studies done for the purpose of potential changes to the WQS will be done in coordination with Ecology to help ensure that the approach and data will meet state and federal requirements. This would include a QAPP that clearly identifies the goals and objectives, with sampling protocols appropriate for each parameter and species.”.
   a. Douglas Response: Douglas inserted the suggested language in the respective section.
Aquatic SWG Approval of the Final Water Quality Attainment Plan
Final Meeting Action Items

Aquatic Settlement Work Group

To: Aquatic SWG Parties
From: Michael Schiewe, Chair (Anchor QEA, LLC)
Re: Final Action Items of the October 9, 2013, Aquatic SWG Meeting

Below is a summary of Action Items from the Aquatic SWG meeting that was held in person at Douglas PUD headquarters in East Wenatchee, Washington, on Wednesday, October 9, 2013, from 9:00 a.m. to 12:30 p.m. These action items include the following:

I. Summary of Action Items
   1. Kristi Geris will contact Bob Rose and Steve Lewis to bring them up to speed on the details of the Aquatic SWG Extranet site (Item VI-2).
   2. Aquatic SWG members will set up their login information to the Aquatic SWG Extranet site as soon as instructions are received via email from Douglas PUD Information Systems (IS) staff (Item VI-2).
   3. Andrew Gingerich will develop a draft sturgeon stocking plan proposal, and draft Monitoring and Evaluation (M&E) Plan outline, and provide the drafts to Kristi Geris for distribution to the Aquatic SWG no later than October 31, 2013 (Item IV-5).
   4. Mike Schiewe will contact Bob Rose and Steve Lewis to bring them up to speed on the sturgeon discussions (Item VI-5).
   5. Chas Kyger will provide the 2013 Adult Pacific Lamprey Passage and Enumeration Study Update that was discussed at the meeting on October 9, 2013, to Kristi Geris for distribution to the Aquatic SWG (Item VI-8).
   6. Pat Irle will provide Chris Coffin’s email address to Kristi Geris to add to the Aquatic SWG distribution list (Item VI-9).
   7. Patrick Verhey will provide an official letter designating the current WDFW HCP Policy Representation to Kristi Geris for the administrative record (Item VI-10).

II. Summary of Decisions
   1. There were no Statements of Agreement (SOAs) approved at today’s meeting.
III. Agreements

1. The Aquatic SWG members present approved the Spill Prevention Countermeasure Control (SPCC) Plan (Item VI-3).

2. The Aquatic SWG members present approved the Water Quality Attainment Plan (WQAP) (Item VI-4).

IV. Review Items

1. There are no items that are currently out for review.

V. Reports Finalized

1. The final Bull Trout Stranding, Entrapment and Take Study Plan was submitted to the Federal Energy Regulatory Commission (FERC) on September 23, 2013, as distributed to the Aquatic SWG by Kristi Geris that same day.
APPENDIX N
LAMPREY ENTRANCE EFFICIENCY AND OPERATIONS STUDY PLAN
ADULT PACIFIC LAMPREY FISHWAY ENTRANCE EFFICIENCY AND OPERATIONS STUDY PLAN
WELLS HYDROELECTRIC PROJECT

FERC PROJECT NO. 2149

September 2013

Prepared by:

Chas Kyger
Public Utility District No. 1 of Douglas County
East Wenatchee, Washington
1.0 INTRODUCTION

The Pacific Lamprey Entrance Efficiency (LEE) and Operations Study (OS) Plan is designed to evaluate potential operational and physical ladder entrance modifications to create an environment at the fishway entrances that are conducive to adult lamprey passage without significantly impacting passage of adult salmonids. The LEE and OS Plan outlines a strategy for identifying potential problem areas negatively impacting lamprey entrance efficiency and implementing and evaluating potential modifications to operating criteria or structures to the Wells Hydroelectric Project (Wells Project or Project) fishway entrances. Results from previous and ongoing studies of adult Pacific lamprey passage at the Wells Project will serve as the framework for developing future studies and potential modifications to operating criteria and the fishway entrances. In addition, current and emerging information about operational and structural modifications at other Columbia River dams, and the effect of such modifications on adult Pacific lamprey entrance efficiency and passage will be used to inform and guide future activities under the LEE and OS Plan.

1.1 Regulatory Framework

Development of plans to address LEE and OS requirements are contained under Objective 1 of the Pacific Lamprey Management Plan (PLMP). The LEE plan is one of five components of section 4.1.5 of the PLMP which outlines measures to identify, design, and implement operational and structural modifications at fishway entrances to improve upstream passage of adult Pacific lamprey. The development of an OS plan is the principal component of section 4.1.1 of the PLMP (Upstream Fishway Operations Criteria). Public Utility District No. 1 of Douglas County (Douglas PUD) proposes to develop one plan (LEE and OS Plan) to address both requirements contained within the PLMP.

Development of the LEE and OS Plan also meets requirements contained within the U.S. Department of Interior (USDOI) and U.S. Fish and Wildlife Service (USFWS) Fishway Prescription for the Wells Project (section 5.6.2).

The PLMP and USFWS Fishway Prescriptions section 5.6.2 list the following requirements for the LEE and OS Plans:

Operations Study Plan (PLMP Section 4.1.1): Within 1 year of license issuance or as soon as practicable following consultation with the FWS, the WCC, the Aquatic SWG and the BIA, the Licensee shall develop an Operations Study Plan (OS Plan) that specifically identifies operational measures to be evaluated, the proposed monitoring strategy, implementation timeline and criteria for success. The plan shall include a component to evaluate the effects of lamprey measures on salmon.

Entrance Efficiency (PLMP Section 4.1.5): Within 1 year of license issuance or as soon as practicable following consultation with the FWS, the Aquatic SWG, and the BIA, the Licensee shall develop a Lamprey Entrance Efficiency Plan (LEE Plan) for evaluating operational and
physical ladder entrance measures intended to increase lamprey passage into the adult fishway without significantly impacting the passage of adult salmonids.

In addition to implementation of activities associated with the PLMP and USFWS Fishway Prescriptions, the Federal Energy Regulatory Commission (FERC) Operating License for the Wells Project also requires that the development and implementation of these plans occur in consultation with the Aquatic Settlement Work Group (SWG) and the Anadromous Fish Agreement and Habitat Conservation Plan (HCP) Coordinating Committee (CC). Members of these two implementation work groups are comprised of the National Marine Fisheries Service (NMFS), USFWS, Bureau of Land Management (BLM), Washington Department of Fish and Wildlife (WDFW), Washington Department of Ecology (Ecology), Yakama Nation (Yakama), and Confederated Tribes of the Colville Reservation (Colville). The Bureau of Indian Affairs (BIA) is a non-voting observer in the Aquatic SWG process. Upon approval by the Aquatic SWG and HCP CC, Douglas PUD shall submit the LEE and OS Plan to the FERC for approval prior to implementation.

1.1.1 Effects on Adult Salmonid Passage

Consistent with requirements of the PLMP, USFWS Fishway Prescription and the HCP, the LEE and OS Plan must include a component to evaluate the effects of any operational and structural modifications for lamprey on adult salmonid passage. The HCP CC must be consulted prior to implementing any proposed modifications. Following the evaluation of proposed modifications, the HCP CC will be consulted to determine whether the proposed modifications should be made permanent, removed, or modified.

1.2 Wells Project Pacific Lamprey Studies

Until recently, relatively little information was available on Pacific lamprey in the mid-Columbia River Basin. However, with increased interest in the species coupled with the process to relicensing the Wells Project, Douglas PUD initiated studies to address Pacific lamprey passage and migratory behavior in the Project consistent with currently available technology. Results of these studies provide baseline information for identifying potential problems with adult lamprey entrance and passage efficiency at the Wells Project.

1.2.1 2001-2003 Project Pacific Lamprey Study

In 2004, Douglas PUD contracted with LGL Limited to opportunistically collect lamprey passage information at Wells Dam during the completion of a lamprey passage study being conducted at Rocky Reach Dam by the Public Utility District No. 1 of Chelan County (Chelan PUD). A total of 150 lamprey were radio-tagged and released below Rocky Reach Dam. The radio-tags used in this study had an expected operational life of 45 days (Nass et al. 2005). It is important to note that as a result of the lamprey release site being located over 50 miles downstream of Wells Dam, the value of the study results for the Project was limited by the relatively small numbers of tagged fish detected in the Wells Dam tailrace (n=18) and the fact that many of the radio-tags detected at Wells Dam were within days of exceeding their expected battery life.
The 2004 study at Wells Dam was implemented through a combination of fixed-station monitoring at the dam and fixed-stations at tributary mouths. Collectively, these monitoring sites were used to determine migration and passage characteristics of lamprey entering the Project Area. Of the 150 adult lamprey released below Rocky Reach in 2004, 18 (12% of 150) were detected in the Wells Dam tailrace, and ten (56% of 18) of these were observed at an entrance to the fishways at Wells Dam. A total of 3 radio-tagged lamprey passed Wells Dam prior to expiration of the tags, resulting in a project efficiency estimate of 30% (3 of 10) for the study period. A single lamprey was detected upstream of Wells Dam at the mouth of the Methow River (Nass et al. 2005). Median time required to pass through the fishway was 0.3 d and accounted for 8% of the Project Passage time (Nass et al. 2005).

The 2004 study at Wells Dam provided preliminary passage and behavioral information for migrating adult lamprey, the limited observations (n=18) and the mature condition of the batteries in the tagged fish that did approach Wells Dam resulted in an inability of the study to address the objectives of the 2004 study.

1.2.2 2007-2008 Project Pacific Lamprey Study

In 2007, Douglas PUD contracted with LGL Limited to conduct a second lamprey radio-telemetry study at Wells Dam. The study was scheduled to occur from early August through November and utilized tags that had 87 days of battery life. A total of 21 adult lamprey were tagged and released for the purpose of this study. However, due to very low adult lamprey returns to Wells Dam in 2007 (n=35) and low trapping efficiency, only 6 adult Pacific lamprey were captured at Wells Dam during trapping activities (August 14 to October 3). Therefore, 15 additional adult lamprey were collected at Rocky Reach Dam, transported to Wells Dam, tagged and released. The study was repeated in 2008 to obtain additional information. Overall, 2007-2008 study results indicate that any potential areas of impediment at Wells Dam are restricted entirely to the entrance and lower fishway, as upper fishway passage efficiency (releases in the fishway) was 100% for the two consecutive study years (LGL Limited and Douglas PUD 2008). A comprehensive report was produced in February of 2009 containing the results from the two-year radio-telemetry behavior studies (Robichaud et al. 2009). Results indicated that the “greatest impediment to successful passage of adult lamprey at Wells Dam appears to be the conditions at the fishway entrance, probably related to water velocities that limit swimming and attachment capabilities.” An equally significant impediment to successful passage of adult lamprey at Wells Dam in 2008 was the installation of perforated plates on the floor of the weir orifices in an effort to increase trapping efficiency for the 2008 study. Robichaud et al. further recommended the following:

- Implement a reduction in fishway head differential to reduce entrance velocities to levels within the swimming capabilities of Pacific lamprey (0.8 to 2.1 m/s). These proposed flow reductions should be restricted to hours of peak lamprey activity (i.e., nighttime) and within their primary migratory period at Wells Dam (August-September).
- Remove perforated plates from orifice floors at the current trapping locations and discontinue trapping efforts at Wells Dam.
Consider using monitoring tools that are less intrusive, do not require the collection of fish from the ladders at Wells Dam, and minimize the surgical implantation of tags in fish that are nearing their physiological limits.

1.2.3 2009-2010 Wells Project DIDSON Studies

In response to Robichaud et al. (2009), Douglas PUD, in consultation with the Aquatic SWG, prepared a plan to implement and evaluate measures to enhance entrance efficiency of adult Pacific lamprey at Wells Dam (Johnson et al. 2011). These measures, originally scheduled for year two after license issuance (2013), were designed to determine whether temporary velocity reductions at the fishway entrances would enhance the attraction and relative entrance success of adult lamprey at Wells Dam fishways.

Dual-frequency identification sonar (DIDSON) units were deployed at Wells Dam fishway entrances during the peak of historic Pacific lamprey migration in 2009 (20 August to 24 September) and 2010 (7 August to 30 September). DIDSON was used to sample lamprey behavior and upstream passage events along the entire width of the fishway entrances and 1.3 m of vertical coverage above the sills (about 26% of the wetted vertical opening). Lamprey passage was examined relative to variable head differential treatments and entrance velocities. In 2009, three head differential treatments were tested: existing high (0.48 m; or 3.0 m/sec), moderate (0.31 m; or 2.4 m/sec) and low condition (0.15 m; or 1.8 m/sec) (Johnson et al. 2010). In 2010, only two of the 2009 treatments were used: existing high, and the moderate head differential conditions (Johnson et al. 2011). Treatments were grouped in 3-day blocks and lasted four hours each evening in 2009 (21:00 through 00:59). In 2010, the treatments were paired and lasted eight hours each evening (17:00 through 00:59). Data collected during the treatment periods were reviewed and all lamprey observations were described.

Combining both years, a total of seven lamprey observations were recorded where lamprey were observed to encounter the entrance sill heading upstream (N = 5 in 2009; and N = 2 in 2010). Five of these seven observations were in the east fishway and two were in the west fishway. Overall, five of the seven observations showed successful entry into the fishways (71%). During reduced head differential treatments, five observations were recorded with four of the five resulting in successful entry (80% entrance efficiency). Three of three observations with the moderate head differential condition resulted in successful entry (100% entrance efficiency). During high head differential conditions, one of the two lamprey observed entered a fishway (50% entrance efficiency).

Four lamprey exhibited attach and burst behaviors (one during low (25%), two during moderate (50%) and one during high head differential conditions (25%)), all of which resulted in successful entry into the fishways. One of three lampreys that did not exhibit the former behavior successfully entered the fishway, under the moderate treatment condition. The other two lamprey that did not exhibit attach and burst behavior did not successfully enter the fishway.

Extremely low Columbia River basin lamprey runs during the study years resulted in few fish observed at Wells Dam (the ninth and last hydroelectric project on the Columbia River [river mile 516] with fish passage). In total, nine and two lamprey were enumerated at Wells Dam fishway count windows in 2009 and 2010, respectively. Low sample sizes precluded statistical
evaluation of these results. Nonetheless, operational modifications implemented in these two years of study suggest that lamprey entrance efficiency may be increased with lower head conditions. Pooling observations that occurred during reduced head differential treatments shows 80% (4 of 5) entrance efficiency compared to 50% (1 of 2) under the current operating condition (high condition). Study results suggest that reduced head differentials show promise in providing an environment conducive to upstream passage of lamprey.

1.2.4 2011 Wells Dam Fishway Velocity Measurements

In 2011, Douglas PUD hired Jacobs Engineering and Northwest Hydraulic Consultants to measure fishway entrance velocities at different ranges of tailrace elevations at the existing 1.5 ft head differential and a reduced 1.0 ft head differential. The measurements showed that operating the fishways at the reduced 1.0 ft head differential reduced entrance velocities approximately 20% compared to the existing 1.5 ft head differential operating condition.

1.2.5 2011-2013 Lamprey Operations

Based upon the results of the 2009-2010 DIDSON studies and fishway entrance velocity measurements, as a best management practice in 2011 through 2013, Douglas PUD operated the fishways with a 1.0 foot head differential during the hours 17:00 and 00:59, once five lamprey had been counted at Rocky Reach Dam and continuing through September 30. Outside those hours, fishway collection-gallery operations were maintained at the “normal” head differential of 1.5 feet.

1.2.6 2013 Adult Pacific Lamprey Passage and Enumeration Study

The goal of the 2013 Pacific lamprey study is to evaluate the effect of the Wells Project and its operations on translocated adult Pacific lamprey upstream passage behavior and to evaluate operational treatments at the fishway entrance and structural modifications to the fishway count window areas designed to improve lamprey enumeration.

Fishway operations treatment conditions at Wells Dam will be similar to operations for the DIDSON Study conducted in 2010 (Johnson et al. 2011); two head differential treatments, including the existing high condition (0.48 m) and a moderate condition (0.31 m), will be implemented. A treatment condition will occur over a 7-hour block (19:00 through 02:00) and will be changed daily (i.e., existing high condition one day and moderate condition the next day).

In recent years, the efficacy of using narrower bar screens as a way to improve the enumeration of smaller salmon, steelhead and lamprey passing adult fishways has been tested at PUD and federal dams (LGL et al. 2011, ACOE 2011). The use of smaller leads has resulted in no reduction in travel time and has not increased the fallback rates within the fish ladders at those dams tested (Peery et al. 2011). During the 2012-2013 Wells Dam ladder maintenance period (December 2012 through January 2013), Douglas PUD fixed several broken pickets and at the same time upgraded the pickets to a new 11/16th inch spacing at the request of the Aquatic SWG and HCP CC. The maintenance and upgrades to these pickets are intended to improve the counts of salmon, steelhead and lamprey migrating upstream through the east and west fishways at
Wells Dam. This study will evaluate the behavior and performance of these new temporary pickets in guiding adult lamprey through the existing fish count stations.

Given the extremely low numbers of adult lamprey passing Wells Dam in recent years, up to 100 adult lamprey will be collected at Bonneville Dam over a four-week period in July 2013. In addition, up to 25 fish at Priest Rapids Dam will also be captured. All fish will be transported to Wells Hatchery, tagged, and released. Details of tagging, release, and monitoring methods are identified in Longview Associates and Douglas PUD (2012).

The data collected during this study will be used to evaluate passage behavior and success of radio-tagged lamprey compared to prior years of study at Wells Dam to determine whether lamprey enumeration can be enhanced without negatively impacting the lamprey passage rates and times within the upper fishways. Results of this study will be available in early 2014.

1.3 Structural and Operational Modifications at Other Columbia River Hydroelectric Projects

Radio-telemetry studies of adult lamprey migration patterns past dams and through reservoirs in the lower Columbia River during 1997 to 2002 provided the earliest data sets on lamprey passage timing, travel times, and passage success at hydroelectric projects (Vella et al. 2001; Ocker et al. 2001; Moser et al. 2003a; Moser et al. 2003b). While these studies have shown that 87% to 96% of the radio-tagged lamprey released migrate upstream and are detected at Bonneville Dam, less than 50% of the lamprey which encounter an entrance actually pass the dam (Le et al. 2013). In recent years, Columbia River basin hydroelectric facilities have begun modifying fishways and fishway operations to facilitate the upstream passage of adult lamprey. Army Corps of Engineers (ACOE) and utilities with hydroelectric facilities in the basin are in various phases of design implementation and evaluation of passage improvements including those operational and structural improvements focused on improving lamprey entrance efficiency and lower fishway passage efficiency.

1.3.1 Modifications to Fishway Entrances to Improve Entrance Efficiency

From 1996 to 1999 keyhole entrances were installed at Wanapum and Priest Rapids Dams. In 2001-2002, Public Utility District No. 2 of Grant County (Grant PUD) conducted a comprehensive passage evaluation. Entrance efficiencies ranged between 53% and 100% for Priest Rapids Dam and 54% and 100% for Wanapum Dam for the two years of study.

1.3.2 Modifications to Fishway Operations to Improve Upstream Passage

Since the cumulative evidence on adult lamprey passage at dams has indicated that fishway entrances may be a major passage bottleneck, a significant effort was undertaken by the ACOE to develop and evaluate new entrance designs and operations. In 2007 and 2008, ladder flows at Power House 2 (PH2) fishway at Bonneville Dam were placed on standby at night. The combined 2007 and 2008 results suggest that some reduction in entrance velocity is beneficial for lamprey passage, but that these benefits are velocity-dependent and that zero attraction flow
is probably a deterrent. Entrances with higher velocities under normal operation (capable of a larger net reduction in velocity) may provide relatively more benefit from velocity reductions than entrances with lower velocities (Johnson et al. 2009). The 2009 evaluation revealed that overall dam passage metrics in 2009 were similar to estimates observed in prior years. Of the 596 lamprey tagged and released, 471 (79%) approached the dam, 383 (64%) entered, 177 (29%) passed the dam thru September 30. Comparison of treatment vs. control nights at PH2 entrances indicated that there was a benefit of the lower velocity treatment to entrance efficiency (entrance: approach ratio) for tagged lamprey (ACOE 2009). Currently, the ACOE continues to implement reduced nighttime flow operations at a variety of facilities including the Bonneville Dam Washington Shore Fish Ladder and McNary Dam Oregon Shore Fish Ladder (Le et al. 2013).

2.0 GOALS AND OBJECTIVES

Goals of the LEE and OS Plan include:

- Identifying potential areas at the Wells Dam fishway entrances that may negatively impact adult lamprey entrance efficiency and/or identify potential negative effects of Wells Dam fishway operating conditions on adult lamprey passage;

- Based upon best available information, evaluating and implementing, if appropriate, any potential operational or structural modifications at Wells Dam fishway entrances that may improve lamprey entrance efficiency;

- Designing and implementing studies to evaluate the effects of modifications on lamprey and salmonid passage, and if necessary, making changes to modifications and re-evaluating effects;

- Ultimately determining if the modifications are beneficial to lamprey entrance efficiency and passage, while not negatively impacting salmonid passage, and filing FERC license amendments to make beneficial modifications permanent.

Each aspect of the LEE and OS Plan will involve consultation with the Aquatic SWG including the potential to improve lamprey entrance efficiency and to not negatively impact bull trout passage. In addition, consultation with, and approval from the Wells HCP CC is also required due to the potential effects of structural and operational modifications on salmon and steelhead.

2.1 Identification of Entrance Efficiency and Passage Problems and Potential Modifications

Douglas PUD and the Aquatic SWG shall utilize results from previous studies of fishway entrance modifications and changes to fishway operating criteria at Wells Dam and other Columbia River basin hydroelectric projects as the primary source of information for identifying potential operational and structural modifications to the Wells fishway entrances. Results from previous studies will be used to identify potential problem areas or highlight observed
improvements in lamprey entrance efficiency and passage that have been attributed to such modifications. Before selecting any modifications for implementation and evaluation at Wells Dam, the Aquatic SWG must agree that there is sufficient evidence that identifies a specific problem area at the fishway entrances with negative impacts on lamprey entrance efficiency, and that the proposed modification(s) are designed to and have been shown (through previous studies) to mitigate those impacts. If there is no evidence available to suggest a specific problem area, the Aquatic SWG may request development of a study to examine specific components of the fishway entrances to determine which if any of the components negatively impact lamprey entrance efficiency. Similarly, if fishway operating conditions are suspected to be negatively impacting adult lamprey passage, the Aquatic SWG may propose a study to evaluate the effects of the current operating conditions and modifications to operating conditions on lamprey passage.

2.2 Potential Operational and Structural Modifications

Operational modifications to improve adult lamprey passage have been previously evaluated at Wells Dam and other Columbia River basin hydroelectric projects. The primary operational mechanism that may be modified to improve adult lamprey entrance efficiency is a reduction of head differential in the collection gallery which thereby reduces the velocities measured at the entrance. These operational modifications typically target hours between dusk and the early morning when adult lamprey migratory activity is at its peak. Adjustments to head differential are limited by the designed operational range of the fishways and at Wells Dam, existing requirements for passing salmon, steelhead and bull trout. The fishways must also be operated in accordance to the criteria outlined in the Wells HCP and the USFWS Fishway Prescription.

Structural modifications to the Wells Dam fishway entrances may be similar to modifications implemented at other hydroelectric projects, or novel modifications that specifically address unique characteristics of the Wells Dam fishways. Potential structural modifications may include, but are not limited to, rounding of sill edges, installation of attachment plates or ramps, installation of baffles, installation of LPS structures near the entrance.

2.3 Study Development

The scope of studies developed in support of the LEE and OS Plan will be to specifically investigate potential problems with lamprey entrance efficiency and if needed evaluate structural modifications to the fishway entrances to improve lamprey entrance efficiency. Studies in support of the fishway operations component of the plan will be designed to specifically address modifications to fishway operating criteria.

Prior to conducting any study, study plans will be developed in consultation with the Aquatic SWG. The Wells HCP CC will also be consulted when operational or structural modifications are proposed. Potential study methods include, but are not limited to, radio or acoustic telemetry, DIDSON, underwater video/infrared imaging, and Passive Integrated Transponder (PIT) technology. Similar to the 2013 Adult Pacific Lamprey Passage and Enumeration Study at Wells Dam, lamprey may be translocated from other locations in the Columbia River Basin in order to acquire sufficient sample size for studies, if necessary. It should be noted that using
translocated fish for a passage study at Wells Dam is itself inherently risky. Some level of passage bias is likely to be inherent when using fish transported for downriver locations for studies at Wells Dam. However, given the limited number of lamprey observed at Wells Dam, some form of translocation may be needed in order to attempt to meet minimum sample size requirements for statistically valid study results. The use of translocated lamprey for future studies may only be warranted, however, if they are shown to interact and attempt to pass the dam and not fail to approach the dam or travel downstream.

Following approval by the Aquatic SWG and the HCP CC, all study plans will be filed with FERC for approval. No studies or modifications will be implemented until FERC approval is granted.

2.4 Evaluation of Operational and Structural Modifications

Operational modifications may be evaluated based on several lamprey passage criteria including entrance efficiency, passage time (in collection gallery and lower fishway), or fall back rate. Structural modifications will be evaluated based on the effects to lamprey entrance efficiency after modifications compared to entrance efficiency prior to the modifications. Appropriate statistical methods will be used to test for effects of structural or operational modifications.

If results of evaluation studies suggest that ladder modifications are warranted, Douglas PUD, in consultation with the Aquatic SWG and HCP CC, shall design and make changes to the ladder and then re-examine the effects of the new modifications using similar methods to those used in the original evaluations.

Determining the effects of operational or structural modifications on salmon, steelhead and bull trout passage will be a required objective of any study. Effects on salmon, steelhead and bull trout passage will be tested using statistically rigorous methods and only following agreement of the HCP CC for salmon and steelhead and the Aquatic SWG for bull trout.

2.5 Compliance

Consistent with the FERC license and the PLMP, Douglas PUD shall exhibit steady progress, as agreed to by the Aquatic SWG, towards improving adult lamprey passage until performance at Wells Dam is determined to be similar to other mid-Columbia River hydroelectric dams, or until scientifically rigorous standards and evaluation techniques are established by the Columbia River Basin Lamprey Technical Workgroup, or its successor, and adopted regionally. The Aquatic SWG will then evaluate, and if applicable and appropriate, adopt these standards for use at Wells Dam. If compliance is achieved, Douglas PUD shall only be required to implement activities pursuant to Section 4.1.7 (Periodic Monitoring) of the PLMP for adult Pacific lamprey passage.
2.6 Regional Coordination

Regional coordination of actions taken under the LEE and OS Plan will take place in support of requirements of the PLMP. This includes participation in Pacific lamprey work groups in order to support regional conservation efforts (e.g., the Pacific Lamprey Technical Work Group and the USFWS Lamprey Conservation Initiative). Activities may include but are not limited to information exchanges with other entities, meeting attendance, and coordination of Douglas’ Pacific lamprey activities with other entities conducting lamprey research in the mid-Columbia River. Activities may also include conducting PLMP research within the Project, and sharing that information with other entities.

2.7 Reporting and FERC Approval

All activities carried out under the LEE and OS Plan will be reported upon in the PLMP Annual Report in fulfillment of section 4.4 of the PLMP. Pursuant to FERC license article 401 for the Wells Hydroelectric Project, all study plans, design drawings, study reports, etc. related to the LEE and OS Plan will be filed with the FERC for approval prior to implementation. In addition, all parties to the Aquatic SWG and HCP CC will be consulted during all stages of development and implementation of the LEE and OS Plan. If the Aquatic SWG and HCP CC recommend adopting permanent modifications to structural components of the Wells fishway entrances or the fishway operating criteria, Douglas PUD shall file a notice with the FERC indicating the desire to install a proposed permanent modification to the fishways at Wells Dam.
3.0 REFERENCES


Flow chart of the Lamprey Entrance Efficiency and Operations Study Plan implementation process.
APPENDIX O
AQUATIC NUISANCE SPECIES
MANAGEMENT PLAN
AQUATIC NUISANCE SPECIES MANAGEMENT PLAN
WELLS HYDROELECTRIC PROJECT
FERC PROJECT NO. 2149

April 2013

Prepared by:
Public Utility District No. 1 of Douglas County
East Wenatchee, Washington
EXECUTIVE SUMMARY

The Aquatic Nuisance Species Management Plan (ANSMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP) will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification for the Wells Hydroelectric Project (Project).

To ensure active stakeholder participation and support, the Public Utility District No. 1 of Douglas County (Douglas) developed all of the resource management plans in close coordination with agency and tribal natural resource managers (Aquatic Settlement Work Group or Aquatic SWG). During the development of this plan, the Aquatic SWG focused on developing management priorities for resources potentially impacted by Project operations. Members of the Aquatic SWG include the U.S. Fish and Wildlife Service (USFWS), Washington Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Indian Nation (Yakama), and Douglas.

The National Marine Fisheries Service (NMFS) was invited to participate in the development of Aquatic Resource Management Plans, but declined because its interests are currently satisfied by the measures within the HCP.

The goal of the ANSMP is to prevent the introduction and/or spread of aquatic nuisance species in Project waters. Douglas, in collaboration with the Aquatic SWG, has agreed to implement several PMEs in support of the ANSMP. The PMEs presented within the ANSMP are designed to meet the following objectives:

Objective 1: Implement best management practices to prevent Eurasian watermilfoil (Myriophyllum spicatum) proliferation during in-water (i.e., construction, maintenance, and recreation improvements) improvement activities in the Project.

Objective 2: Continue participation in regional and state efforts to prevent the introduction and spread of aquatic nuisance species. Activities include continued monitoring for the presence of ANS, monitoring bycatch data collected during other aquatic management plan activities, and conducting education outreach within the Project.

Objective 3: In response to proposed changes in the Project requiring FERC approval, the Aquatic SWG will assess the potential effects, if any, with respect to the introduction or proliferation of aquatic nuisance species in the Project to inform management decisions to support success of the ANSMP and will implement reasonable and appropriate measures to address any potential effects.

This ANSMP is intended to be compatible with other aquatic nuisance species management plans in the Columbia River mainstem. Furthermore, this management plan is intended to be...
supportive of the HCP, Bull Trout Management Plan, Pacific Lamprey Management Plan, Resident Fish Management Plan, White Sturgeon Management Plan, and Water Quality Management Plan by continuing to prevent the introduction and/or spread of aquatic nuisance species in Project waters. The ANSMP is intended to be not inconsistent with other management strategies of federal, state and tribal natural resource management agencies.
1.0 INTRODUCTION

The Aquatic Nuisance Species Management Plan (ANSMP) is one of six Aquatic Resource Management Plans contained within the Aquatic Settlement Agreement (Agreement). Collectively, these six Aquatic Resource Management Plans are critical to direct implementation of Protection, Mitigation, and Enhancement measures (PMEs) during the term of the new license and, together with the Wells Anadromous Fish agreement and Habitat Conservation Plan (HCP), will function as the Water Quality Attainment Plan (WQAP) in support of the Clean Water Act Section 401 Water Quality Certification for the Wells Hydroelectric Project (Project).

To ensure active stakeholder participation and support, the Public Utility District No. 1 of Douglas County (Douglas) developed all of the resource management plans in close coordination with agency and tribal natural resource managers (Aquatic Settlement Work Group or Aquatic SWG). During the development of this plan, the Aquatic SWG focused on developing management priorities for resources potentially impacted by Project operations. Entities invited to participate in the Aquatic SWG include the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Washington Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), the Confederated Tribes of the Colville Reservation (Colville), the Confederated Tribes and Bands of the Yakama Indian Nation (Yakama), and Douglas.

The ANSMP will direct implementation of measures to prevent the introduction and/or spread of aquatic nuisance species in Project waters. To ensure active stakeholder participation and support, Douglas developed this plan, along with the other aquatic management plans, in close coordination with the members of the Aquatic SWG.

The Aquatic SWG agrees on the need to develop a plan for the long-term management and prevention of aquatic nuisance species in the Project. This management plan summarizes the relevant resource issues and background (Section 2), identifies goals and objectives of the plan (Section 3), and describes the relevant PMEs (Section 4) for aquatic nuisance species during the term of the new license.

2.0 BACKGROUND

Nonnative aquatic species may be released or “introduced” into an aquatic environment intentionally or unintentionally. Most often, such species are unable to adapt to their new environments and do not form self-sustaining populations (ANSC 2001). However, if such a species is able to adapt, become established, and thrive, it has the potential to threaten the diversity or abundance of native species and aquatic habitats and may even affect economic resources and human health. Such species are considered aquatic nuisance species or ANS (ANSC 2001).

RCW 77.60.130 defines the term aquatic nuisance species as a “nonnative aquatic plant or animal species that threatens the diversity or abundance of native species, the ecological stability of infested waters, or commercial, agricultural, or recreational activities dependent on such
waters” (RCW 2007). Since few natural controls exist in their new habitat, ANS may spread rapidly, damaging recreational opportunities, lowering property values, clogging waterways, impacting irrigation and power generation, destroying native plant and animal habitat, and sometimes destroying or endangering native species (ANSC 2001).

2.1 Aquatic Nuisance Species of Concern

2.1.1 Eurasian Watermilfoil (Myriophyllum spicatum)

Eurasian watermilfoil (EWM) is an aquatic plant native to Europe, Asia, northern Africa, and Greenland. It was once commonly sold as an aquarium plant (Ecology 2007). EWM may have been introduced to the North American continent at Chesapeake Bay in the 1880’s, although evidence shows that the first collection was made from a pond in the District of Columbia during the fall of 1942. By 1985, EWM had been found in 33 states, the District of Columbia, and the Canadian provinces of British Columbia, Ontario, and Quebec (Ecology 2007). The first documented occurrence of EWM in the State of Washington was in 1965. The source of introduction was most likely from sources in Canada and despite an effort to stop its spread, EWM infestations in Lake Osoyoos, British Columbia spread down through the Okanogan Lakes and into the Okanogan River and the Columbia River in 1974 (Duke 2001).

EWM is extremely adaptable with the ability to thrive in a variety of environmental conditions. It grows in still to flowing waters, can tolerate salinities of up to 15 parts per thousand, grows rooted in water depths from 1 to 10 meters, and can survive under ice (Ecology 2007). Relative to other submersed plants, EWM requires high light, has a high photosynthetic rate, and can grow over a broad temperature range (Ecology 2007). EWM exhibits an annual pattern of growth. In the spring, shoots begin to grow rapidly as water temperatures approach 15 degrees centigrade. When they near the surface, shoots branch profusely, forming a dense canopy (Ecology 2007). Typically, plants flower upon reaching the surface and die back to the root crowns, which sprout again in the spring.

Although EWM can potentially spread by both sexual and vegetative means, vegetative spread is considered the major method of reproduction. During the growing season, the plant undergoes autofragmentation. The plant fragments often develop roots at the nodes before separation from the parent plants. Fragments are also produced by wind and wave action, control harvest activity and boating activities, with each plant fragment having the potential to develop into a new plant (Ecology 2007).

EWM is classified as a class B noxious weed by the Washington State Noxious Weed Control Board (WNWCB 2007). Class B noxious weeds are nonnative plants whose distribution is limited to portions of Washington State. Additionally, EWM has been identified as a nuisance species in the Washington State Aquatic Nuisance Species Management Plan (ANSC 2001). EWM can adversely impact aquatic ecosystems by forming dense canopies that often shade out native vegetation. Monospecific stands of EWM affect aquatic habitat, water quality, can impact power generation and irrigation, and interfere with recreational activities. In Washington, private and government sources spend about $1,000,000 per year on EWM control (Ecology 2007).
2.1.2 Zebra Mussel (Dreissena polymorpha) and Quagga Mussel (Dreissena rostriformis bugensis)

Zebra and quagga mussels are freshwater, bivalve mollusks that typically have a dark and white (zebra-like) pattern on their shells. They are native to Eurasia and were both introduced into the Great Lakes as a result of ballast water discharge from transoceanic ships that were carrying veligers, juveniles, or adult mussels (USGS 2007). Zebra mussels first invaded North America in the mid-1980s and quagga mussels invaded a few years later in 1989 (USFWS 2007). These two species are closely related with subtle morphological differences. More research is needed on North American quagga mussels to assess ecological differences between the two species, but the practical implications of both species are essentially identical (USFWS 2007). The North American distribution of these species has been concentrated in the Great Lakes region of the U.S. with the zebra mussel distribution also spanning farther into the southern U.S. (Figure 2.1-1). Despite recent measures to prevent their westward expansion, quagga mussels were discovered in the Lake Mead Recreation Area. Populations have subsequently been found throughout the Boulder Basin of Lake Mead (Figure 2.1-1) and in more than a dozen reservoirs serving Southern California (Pam Meacham, pers. comm.).

![Figure 2.1-1 Zebra and Quagga Mussel Sightings Distribution Map (USGS 2007).](image-url)
Zebra and quagga mussel size varies from microscopic to two inches long. Typical lifespan is up to 5 years. Both species may spawn year around if conditions are favorable. Peak spawning typically occurs in spring and fall. *Dreissena* are dioecious (either male or female) with external fertilization. Both species are prolific reproducers. Fecundity is high with a few individuals having the capability of producing millions of eggs and sperm (USFWS 2007). After fertilization, pelagic microscopic larvae, or veligers, develop within a few days and these veligers soon acquire minute bivalve shells. Free-swimming veligers drift with currents for three to four weeks until suitable substrate for settling is located. Adults attach to hard surfaces via byssal threads, but can detach and move to new habitat. Both species can tolerate a wide range of water temperatures (1-30°C), low velocities (<2 m/sec), and prefer hard surfaces for attachment although quagga mussels can live in soft sediments (USFWS 2007). Zebra mussels are typically found just below the surface to about 12 meters and quagga mussels are typically found at any depth where oxygen is available (USFWS 2007).

Zebra mussels have caused major ecological and economic problems since their arrival in North America, and quagga mussels pose many of the same threats. Both species are prolific filter feeders, removing substantial amounts of phytoplankton and suspended particulate from the water thus impacting aquatic ecosystems by potentially altering food webs (USGS 2007). *Dreissena*’s ability to rapidly colonize hard surfaces causes serious economic problems. These major bio-fouling organisms can clog water intake structures such as pipes and screens, therefore reducing capabilities for power and water treatment plants. Recreation-based industries and activities have also been heavily impacted; docks, breakwalls, buoys, boats, and beaches have all been heavily colonized (USGS 2007). Zebra mussel densities have been reported to be over 700,000 individuals per square meter in some facilities in the Great Lakes area. Each year, the economic impact to the U.S. and Canada is approximately $140 million in damage and control costs (Sea Grant 2007).

### 2.2 Project Information

Past aquatic studies contributing information to aquatic nuisance species of concern, discussed above, consisted of an aquatic macrophyte species composition and mapping survey (Lê and Kreiter 2005) and a macroinvertebrate assessment and rare, threatened, and endangered (RTE) species survey (Bioanalysts 2006). Results of these studies and other Project aquatic studies indicate that the aquatic ecosystem within the Project is composed of a diverse community of flora and fauna consisting of varied aquatic taxa such as plankton, macroinvertebrates (insects, snails and bivalves), fish, and plants. Although nonnative species are present within Project waters, the aquatic community is characterized by a native species dominated assemblage. It is important to note the varying degree to which a nonnative species can be characterized as a “nuisance” species. The many factors that determine a nonnative species’ magnitude of infestation and impact are complex and not always well understood.

#### 2.2.1 Aquatic Macrophytes

Some information exists on aquatic macrophyte communities in the mid-Columbia River system. Vegetation mapping in and around the Rocky Reach Reservoir (River Miles (RM) 473.6 to 515.5) identified 979 acres of aquatic macrophytes (Duke 2001) out of a total surface area of 8,167 acres (Duke 2001). Nonnative EWM represented 34 percent of the biomass samples.
collected from within the Rocky Reach Reservoir (Duke 2001). In the Priest Rapids and Wanapum reservoirs, the composition of EWM in the aquatic macrophyte community was higher at 42 percent of littoral plant biomass (Normandeau et al. 2000).

In August and September 2005, Douglas conducted an aquatic macrophyte study in the Wells Reservoir. Sixty-one transects totaling 369 sample points were completed during the 2005 study (Lê and Kreiter 2005). Depths of up to 30 feet were sampled and sampling points along transects were completed at intervals of 5 feet or less. A total of nine aquatic plant species were documented (Table 2.2-1). Table 2.2-1 presents the percentage of samples in which each of the identified aquatic species was categorized as the dominant species (consisting of >60 percent of the sample composition). The two most dominant species in samples collected were common waterweed (Elodea canadensis) and leafy pondweed (Potamogeton foliosus) at 24.7 percent and 16.7 percent, respectively. Both of these species are native. EWM was dominant in only 6.3 percent of samples (Table 2.2-1). Samples with no plants (absent) consisted of 41.7 percent of all samples taken. This observation supports the concept that macrophyte communities maintain a patchy distribution.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Percentage of samples in which dominant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chara spp.</td>
<td>Muskgrass</td>
<td>.003% (1/396)</td>
</tr>
<tr>
<td>Elodea canadensis</td>
<td>Common waterweed</td>
<td>24.7% (98/396)</td>
</tr>
<tr>
<td>Myriophyllum spicatum</td>
<td>Eurasian watermilfoil</td>
<td>6.3% (25/396)</td>
</tr>
<tr>
<td>Potamogeton crispus</td>
<td>Curly leaf pondweed</td>
<td>4.3% (17/396)</td>
</tr>
<tr>
<td>Potamogeton foliosus</td>
<td>Leafy pondweed</td>
<td>16.7% (66/396)</td>
</tr>
<tr>
<td>Potamogeton nodosus</td>
<td>American pondweed</td>
<td>1.3% (5/396)</td>
</tr>
<tr>
<td>Potamogeton pectinatus</td>
<td>Sago pondweed</td>
<td>0.8% (3/396)</td>
</tr>
<tr>
<td>Potamogeton zosteriformis</td>
<td>Flat-stemmed or eelgrass pondweed</td>
<td>2.3% (9/396)</td>
</tr>
<tr>
<td>Absent</td>
<td></td>
<td>41.7% (165/396)</td>
</tr>
</tbody>
</table>

Although EWM is present in the Project, the 2005 study indicated that it is not a dominant component of the Project aquatic plant community. During the Project study, EWM was often sub-dominant to several native species in samples collected. These contrasting observations between the Wells Reservoir and downstream reservoirs (Rocky Reach, Priest Rapids, and...
Wanapum) where EWM was found to be the most abundant species are not clearly understood. One possible explanation may be that EWM, which is a species that can proliferate from plant fragments (Ecology 2001), has increased its ability to colonize due to potentially higher levels of disturbance in the downstream reservoirs as compared to the Wells Reservoir. The Rocky Reach Reservoir serves a larger population base, maintains an EWM removal program at recreational sites, and has higher levels of recreational use and development as compared to the Wells Reservoir. It is possible that these activities directly and indirectly re-mobilize EWM plant fragments and increase the potential for colonization in the Rocky Reach Reservoir as well as in downstream reservoirs (Lê and Kreiter 2005).

2.2.2 Aquatic Macroinvertebrates

In September and October 2005, Douglas conducted an aquatic invertebrate inventory and an assessment of the presence of rare, threatened, and endangered (RTE) aquatic invertebrates within the Wells Reservoir. The overall objective of the study was to document the distribution, habitat associations and qualitative abundance of the current aquatic invertebrate (e.g., clams, snails and insects) assemblage in the Wells Reservoir.

Samples were collected within representative habitats throughout the Wells Reservoir using an air lift suction device, Ponar grabs and colonization baskets. A total of 17 sites were sampled. In addition to the varied aquatic insects and worms found during the survey, approximately 20 species of freshwater mollusks were identified during the inventory from dredge samples (Table 2.3-1). Within the Methow, Okanogan and Columbia portions of the Wells Reservoir, 13, 11, and nine species of mollusks were present, respectively. Of the 20 species, 10 gastropods (snails) and 10 bivalves (clams, mussels) were identified. The gastropods included nine native species and one nonnative species (Big-ear radix, *Radix auricularia*). Similarly, the bivalves also included nine native species and one nonnative species (Asian clam, *Corbicula fluminea*) (BioAnalysts, Inc. 2006). The 2005 macroinvertebrate assessment did not discover the presence of any zebra mussels or quagga mussels within the Project.

2.2.3 Project Aquatic Nuisance Species Monitoring

In 2006, Douglas, in coordination with the Aquatic Nuisance Species Division of WDFW, began monitoring for zebra mussels and quagga mussels in Project waters. Activities consisted of monthly plankton tows to target mussel veligers at sites downstream of boat launches within the Wells Reservoir. Sampling activities were conducted during the summer and early fall when recreational boating activity is at a peak. Sampling protocols were provided by WDFW. All samples were sent back to WDFW for analysis. To date, none of the samples collected within the Project have contained any signs of zebra or quagga mussel presence.

In 2007, Douglas, in coordination with the Center for Lakes and Reservoirs at Portland State University, installed a permanent substrate sampler in the Wells Dam forebay to monitor for zebra and quagga mussel colonization within the Project. Douglas staff checks the substrate sampler monthly throughout the year as specified by the monitoring protocol. To date, no signs of zebra or quagga mussel presence have been detected. Both of these monitoring activities are ongoing.
Table 2.3-1  Mollusks collected from sampling stations on the Methow, Okanogan, and Columbia rivers during the 2005 Project Aquatic Macroinvertebrate Inventory.

<table>
<thead>
<tr>
<th>Location</th>
<th>Common Name</th>
<th>Taxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methow River</td>
<td>Western pearlshell</td>
<td><em>Margaritinopsis falcata</em></td>
</tr>
<tr>
<td></td>
<td>Striate fingernail clam</td>
<td><em>Sphaerium striatinum</em></td>
</tr>
<tr>
<td></td>
<td>Ridgebeak peaclam</td>
<td><em>Pisidium compressum</em></td>
</tr>
<tr>
<td></td>
<td>Western lake fingernail clam</td>
<td><em>Musculium raymondi</em></td>
</tr>
<tr>
<td></td>
<td>Shortface lanx</td>
<td><em>Fisherola nuttalli</em></td>
</tr>
<tr>
<td></td>
<td>Ashy pebblesnail</td>
<td><em>Fluminicola fuscus</em></td>
</tr>
<tr>
<td></td>
<td>Western floater</td>
<td><em>Anodonta kennerlyi</em></td>
</tr>
<tr>
<td></td>
<td>Ubiquitous peaclam</td>
<td><em>Pisidium casertanum</em></td>
</tr>
<tr>
<td></td>
<td>Big-ear radix*</td>
<td><em>Radix auricularia</em></td>
</tr>
<tr>
<td></td>
<td>Golden fossaria</td>
<td><em>Fossaria obrussa</em></td>
</tr>
<tr>
<td></td>
<td>Prairie fossaria</td>
<td><em>Fossaria (Bakerilymnaea) bulimoides</em></td>
</tr>
<tr>
<td></td>
<td>Ash gyro</td>
<td><em>Gyraulus parvus</em></td>
</tr>
<tr>
<td></td>
<td>Ubiquitous peaclam</td>
<td><em>Corbicula sp.</em></td>
</tr>
<tr>
<td></td>
<td>Western lake fingernail clam</td>
<td><em>Margaritinopsis falcata</em></td>
</tr>
<tr>
<td></td>
<td>Striate fingernail clam</td>
<td><em>Sphaerium striatinum</em></td>
</tr>
<tr>
<td></td>
<td>Ridgebeak peaclam</td>
<td><em>Pisidium compressum</em></td>
</tr>
<tr>
<td></td>
<td>Ubiquitous peaclam</td>
<td><em>Pisidium casertanum</em></td>
</tr>
<tr>
<td></td>
<td>Asian clam*</td>
<td><em>Corbicula fluminea</em></td>
</tr>
<tr>
<td></td>
<td>Ashy pebblesnail</td>
<td><em>Fluminicola fuscus</em></td>
</tr>
<tr>
<td></td>
<td>Fragile ancylid</td>
<td><em>Ferrissia californica</em></td>
</tr>
<tr>
<td></td>
<td>Ash gyro</td>
<td><em>Gyraulus parvus</em></td>
</tr>
<tr>
<td></td>
<td>Western lake fingernail clam</td>
<td><em>Musculium raymondi</em></td>
</tr>
<tr>
<td></td>
<td>Asian clam*</td>
<td><em>Corbicula fluminea</em></td>
</tr>
<tr>
<td></td>
<td>Ridgebeak peaclam</td>
<td><em>Pisidium compressum</em></td>
</tr>
<tr>
<td></td>
<td>Three ridge valvata</td>
<td><em>Valvata tricarinata</em></td>
</tr>
<tr>
<td></td>
<td>Rocky Mountain physa</td>
<td><em>Physella propinququa propinququa</em></td>
</tr>
<tr>
<td></td>
<td>Ash gyro</td>
<td><em>Gyraulus parvus</em></td>
</tr>
<tr>
<td></td>
<td>Golden fossaria</td>
<td><em>Fossaria (F.) obrussa</em></td>
</tr>
<tr>
<td></td>
<td>Prairie fossaria</td>
<td><em>Fossaria (Bakerilymnaea) bulimoides</em></td>
</tr>
<tr>
<td></td>
<td>Big-ear radix*</td>
<td><em>Radix auricularia</em></td>
</tr>
</tbody>
</table>

OKANOGAN RIVER

*Nonnative taxon.

3.0  GOAL AND OBJECTIVES

The goal of the ANSMP is to prevent the introduction and/or spread of aquatic nuisance species in Project waters. Douglas, in collaboration with the Aquatic SWG, has agreed to implement several PMEs in support of the ANSMP. The PMEs presented within the ANSMP are designed to meet the following objectives:
Objective 1: Implement best management practices to prevent Eurasian watermilfoil proliferation during in-water (i.e., construction, maintenance and recreation improvements) improvement activities in the Project.

Objective 2: Continue participation in regional and state efforts to prevent the introduction and spread of aquatic nuisance species. Activities include continued monitoring for the presence of ANS, monitoring bycatch data collected during other aquatic management plan activities and conducting education outreach within the Project.

Objective 3: In response to proposed changes in the Project requiring FERC approval, the Aquatic SWG will assess the potential effects, if any, with respect to the introduction or proliferation of aquatic nuisance species in the Project to inform management decisions to support success of the ANSMP and will implement reasonable and appropriate measures to address any potential effects.

The ANSMP is intended to be compatible with other aquatic nuisance species management plans in the Columbia River mainstem. Furthermore, this management plan is intended to be supportive of the HCP, Bull Trout Management Plan, Pacific Lamprey Management Plan, Resident Fish Management Plan, White Sturgeon Management Plan, and Water Quality Management Plan by continuing to prevent the introduction and/or spread of aquatic nuisance species in Project waters. The ANSMP is intended to be not inconsistent with other management strategies of federal, state, and tribal natural resource management agencies.

The schedule for implementation of specific measures within the ANSMP is based on the best information available at the time the Plan was developed. As new information becomes available, implementation of each activity may be adjusted through consultation with the Aquatic SWG.

4.0 PROTECTION, MITIGATION AND ENHANCEMENT MEASURES

In order to fulfill the goals and objectives described in Section 3.0, Douglas, in consultation with the Aquatic SWG, has agreed to implement the following PMEs.

4.1 Implement Best Management Practices During Recreational Improvement Activities (Objective 1)

If at any time during the new license term, Douglas is required to construct, improve or maintain recreation access at boat launches and swim areas and the removal or disturbance of aquatic macrophyte beds that contain Eurasian watermilfoil may potentially occur, Douglas will implement containment efforts utilizing best management practices agreed to by the Aquatic SWG during such activities.

**Douglas will implement the following best management practices (BMPs) to prevent the spread of ANS during contracted construction or maintenance of recreation enhancement measures:**
For any contracted construction and maintenance activities requiring in-water work, Douglas will require, as part of construction bids, the inclusion of BMPs to address potential ANS threats. Prior to contract award, Douglas contract management staff will review and approve the sufficiency of proposed ANS BMPs with contractors and if necessary, require modifications in proposed ANS BMP implementation scope. Contractors will be instructed to share information with all sub-contractors prior to the start of work.

All equipment will undergo thorough inspection prior to entry into the Project to prohibit the introduction of ANS.

Inspections will be carried out on construction equipment and watercraft at a staging area dedicated to equipment and watercraft cleaning. This site will be located away from the ordinary high water line and away from any storm drains that run into Project waters. Douglas will provide adequate training and information on ANS inspection and cleaning procedures to personnel responsible for inspections at field sites. An inspection process for vehicles and equipment that arrive onsite from other areas will be provided. Equipment from rental agencies, outside contractors, and managing partners will also be subject to inspection and cleaning. Pre-cleaning inspections will be used to identify problem areas and determine whether hand removal of large accumulations of soil and debris is necessary before washing of equipment. Douglas will provide equipment necessary for conducting proper inspections.

Douglas will provide adequate training and information on ANS cleaning procedures to personnel responsible for cleaning watercraft and equipment. Specific information on cleaning of in-water equipment and watercraft will be provided. Special cleaning and decontamination protocols and methods will be required for equipment and watercraft that has been previously used in areas where zebra mussels and other Dreissendid species are present.

Douglas will require that records of inspections and cleanings be provided for all watercraft and construction equipment used in or near project waters prior to, and after completion of construction projects. Inspection and cleaning records will include the location and date the watercraft or equipment was last used, date of inspection, findings of inspections, and the date and method used during the last cleaning. Inspection and cleaning records will be used to ensure that all watercraft and equipment has undergone proper inspection and cleaning before use in project waters.
4.2 Participation in Regional and State ANS Efforts (Objective 2)

4.2.1 Coordination with Regional and State Entities

Douglas shall continue to coordinate with regional and state entities to implement activities in Project waters to monitor for the presence of ANS, specifically zebra and quagga mussels. Activities covered by this objective will consist of monitoring for the presence of zebra and quagga mussels as is identified in Section 2.2.3. If ANS are detected during monitoring activities, Douglas will immediately notify the appropriate regional and state agencies and assist in the implementation of reasonable and appropriate measures to address the ANS presence as is consistent with ANS Management protocols.

In the event of positive identification of new ANS within the Project area, Douglas will conduct the following response activities:

• Douglas will immediately notify Ecology and WDFW of positive or suspected ANS species identified during monitoring and/or boat inspections. Photographs will be taken and sent to Ecology or WDFW for assistance in identification. If necessary, samples may also be collected for positive identification.

• Once the presence of ANS has been positively determined, Douglas will within 30 days of the positive identification (requiring confirmation by relevant agencies), begin monitoring at multiple sites throughout the Project to determine the extent and distribution of the new ANS within the Project. Monitoring methods will vary depending on species and will be developed in consultation with the Aquatic SWG.

• If zebra mussels or other Dreissenid species are discovered in Project waters, Douglas will also notify upstream and downstream operators (Corps and Chelan PUD) and the Columbia River Basin Team. Douglas will help coordinate subsequent Columbia River Basin Team rapid response actions as applicable to the Project, such as implementing mandatory boat inspections, boat launch closures, quarantines, treatments, etc., in consultation with the Aquatic SWG.

• Douglas will work collaboratively with Ecology and WDFW, and in consultation with the Aquatic SWG, to develop an appropriate control response. Douglas will cooperate with the Columbia River Basin Team in implementing rapid response actions. It is anticipated that the Columbia River Basin Team will use up to the date technical information to guide decisions. The Columbia River Basin Team is also expected to follow the protocols contained within the 100th Meridian Initiative (Heimowitz and Phillips 2011) as it applies to the containment of zebra and other Dreissenid species.

• Appropriate information will also be provided to the public about any new ANS observations. Up-to-date outreach will be provided the public with information about the presence and distribution of the ANS in Project waters, and on the appropriate measures being implemented to prevent the proliferation of the species.

• After initial response efforts are conducted, Douglas will assist the Columbia River Basin Team in implementing control and/or eradication actions as appropriate based on the location, extent,
and type of ANS identified. The Aquatic SWG will be consulted when selecting control and eradication methods.

Douglas shall participate in information exchanges and regional efforts to coordinate monitoring activities.

4.2.2 Monitor Bycatch from other Project Aquatic Resource Management Activities

Douglas shall monitor bycatch data collected from ongoing Project aquatic resource management activities for aquatic nuisance species presence to support regional and state efforts and the ANSMP. Such ongoing activities may consist of broodstock collection activities at Wells Dam and in associated Project tributaries, the northern pikeminnow removal program, water quality monitoring and any other aquatic resource activities related to implementation of Aquatic Resource Management Plans for bull trout, Pacific lamprey, white sturgeon, and resident fish.

4.2.3 ANS Information and Education

Douglas shall make information regarding the effects of ANS introductions and the importance of prevention available to the public. Such outreach activities may consist of posting signage at Project recreation areas and boat launches.

Douglas shall also provide literature produced by appropriate state entities (Ecology and WDFW) for distribution at the visitor centers of local communities of the Project (Pateros, Brewster, Bridgeport) including Wells Dam.

4.3 Monitor and Address ANS Effects to Aquatic Communities During Changes in Project Operations (Objective 3)

If at any time during the new license term, future changes in Project operations requiring FERC approval are proposed and the Aquatic SWG concludes that such proposed operations may encourage the introduction or proliferation of aquatic nuisance species within the Project, the Aquatic SWG will assess the potential effects, if any, in order to make informed management decisions.
If the assessment identifies adverse effects to Aquatic Resources due to aquatic nuisance species attributable to changes in Project operations, Douglas shall consult with the Aquatic SWG to select and implement reasonable and appropriate PMEs to address the identified adverse effect(s).

4.4 Reporting

Douglas will provide a draft annual report to the Aquatic SWG summarizing the previous year’s activities undertaken in accordance with the ANSMP. The report will document all ANS activities conducted within the Project. Furthermore, any decisions, statements of agreement, evaluations, or changes made pursuant to this ANSMP will be included in the annual report. If significant activity was not conducted in a given year, Douglas will prepare a memorandum providing an explanation of the circumstances in lieu of the annual report.
5.0 REFERENCES


