

Priest Rapids Hydroelectric Project (P-2114)

**SHALLOW WATER HABITAT WATER
QUALITY MONITORING PLAN**

License Article 401(a)(20)

By Ross Hendrick

Public Utility District No. 2 of Grant County, Washington
Priest Rapids Project
FERC Project Number 2114

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Executive Summary

Public Utility District No. 2 of Grant County, Washington (Grant PUD) owns and operates the Priest Rapids Hydroelectric Project (Project), located on the Columbia River downstream of Rock Island Dam (owned and operated by Public Utility District No. 1 of Chelan County (Chelan PUD)). The Project is licensed as Project No. 2114 by the Federal Energy Regulatory Commission (FERC), and includes Wanapum and Priest Rapids dams. A 401 water quality certification (WQC) for the operation of the Project was issued by the Washington State Department of Ecology (WDOE) on April 3, 2007, amended on March 6, 2008, and effective on issuance of the FERC license to operate the Project in April of 2008. Section 6.6.1(b) of the 401 WQC requires Grant PUD to conduct a short-term monitoring study to evaluate Dissolved Oxygen (DO), pH, and water temperature values in shallow water habitats. Article 401(a)(20) of the FERC license requires FERC approval prior to implementation of the study.

The following shallow water habitat water quality monitoring plan (SWQMP) provides the methods Grant PUD intends to undertake to collect and evaluate DO, pH, and water temperature values in shallow water habitats in both the Priest Rapids and Wanapum reservoirs. This SWQMP is being modeled after previous water quality monitoring studies conducted by Normandeau et al. (2000) and Juul (2003), with many of the methods and monitoring locations being similar to those used during those studies.

The objective of this SWQMP is to collect DO, pH, and water temperature data within shallow water habitats of the Project in order to determine compliance with water quality standards. The goal of this SWQMP is to collect the data in locations that are consistent with both the requirements of the 401 WQC (monitor DO, pH, and water temperature in shallow water habitats) and WDOE's water quality standards (which state that data collected for compliance purposes be taken in well-mixed portions of the water body, and not in shallow, stagnant, backwater areas).

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List of Abbreviations

Chelan PUD	Public Utility No. 1 of Chelan County
DO	dissolved oxygen
FERC	Federal Energy Regulatory Commission
FSM	fixed-site monitor
Grant PUD	Public Utility District No. 2 of Grant County
NIST	National Institute of Scientific Technology
LDO	Luminescent Dissolved Oxygen
NTU	Nephelometric turbidity units
Project	Priest Rapids Hydroelectric Project
QAPP	quality assurance project plan
RM	river mile
SWQMP	shallow water habitat water quality monitoring plan
TDG	total dissolved gas
WQC	401 Water Quality Certification
WDFW	Washington Department of Fish and Wildlife
WDOE	Washington Department of Ecology

1.0 Introduction

Public Utility District No. 2 of Grant County, Washington (Grant PUD) owns and operates the Priest Rapids Hydroelectric Project (Project), located on the Columbia River downstream of Rock Island Dam (owned and operated by Public Utility District No. 1 of Chelan County (Chelan PUD) (Figure 1). The Project is licensed as Project No. 2114 by the Federal Energy Regulatory Commission (FERC), and includes Wanapum and Priest Rapids dams. A 401 water quality certification (WQC) for the operation of the Project was issued by the Washington State Department of Ecology (WDOE) on April 3, 2007 amended on March 6, 2008, and effective on issuance of the FERC license to operate the Project in April of 2008. Section 6.6.1(b) of the 401 WQC requires Grant PUD to conduct a short-term monitoring study to evaluate Dissolved Oxygen (DO), pH, and water temperature values in shallow water habitats. Article 401(a)(20) of the FERC license requires FERC approval prior to implementation of the study.

The following shallow water habitat water quality monitoring plan (SWQMP) provides the methods Grant PUD intends to undertake to collect and evaluate DO, pH, and water temperature values in shallow water habitats in both the Priest Rapids and Wanapum reservoirs. This SWQMP is being modeled after previous water quality monitoring studies conducted by Normandeau et al. (2000) and Juul (2003), with many of the methods and monitoring locations being similar to those used during those studies.

1.1 Objectives

The objective of the SWQMP is to collect DO, pH, and water temperature data within shallow water habitats of the Project in order to determine compliance with water quality standards. The goal of the SWQMP is to collect the data in locations that are consistent with both the requirements of the 401 WQC (monitor DO, pH, and water temperature in shallow water habitats) and WDOE's water quality standards (which state that data collected for compliance purposes be taken in well-mixed portions of the water body, and not in shallow, stagnant, backwater areas).

1.2 Priest Rapids Project Description

The downstream boundary of the Project begins at the Priest Rapids Dam tailrace (River Mile [RM] 397.1) and extends upriver to the Rock Island Dam tailrace at RM 453.5 (Figure 1). Priest Rapids Dam, which was completed in 1961, has a 7,725-acre reservoir and a 10,103-foot-long by 179.5-foot-high dam spanning the Columbia River. The dam consists of left and right embankment sections; left and right concrete gravity dam sections; a left and right fish passage structure, each with an upstream fish ladder; a gated spillway section; and a powerhouse containing 10 vertical shaft integrated Kaplan turbine/generator sets with a total authorized capacity of 855 MW (Figure 2). Wanapum Dam consists of a 14,680-acre reservoir and an 8,637-foot-long by 186.5-foot-high dam spanning the Columbia River. The dam consists of left and right embankment sections; left and right concrete gravity dam sections; a left and right fish passage structure, each with an upstream fish ladder; a gated spillway; an intake section for future generating units; a downstream fish passage structure in one of the unused intake sections (unit No. 11); and a powerhouse containing 10 vertical shaft integrated Kaplan turbine/generator sets with a total authorized capacity of 1,410 MW (Figure 3).

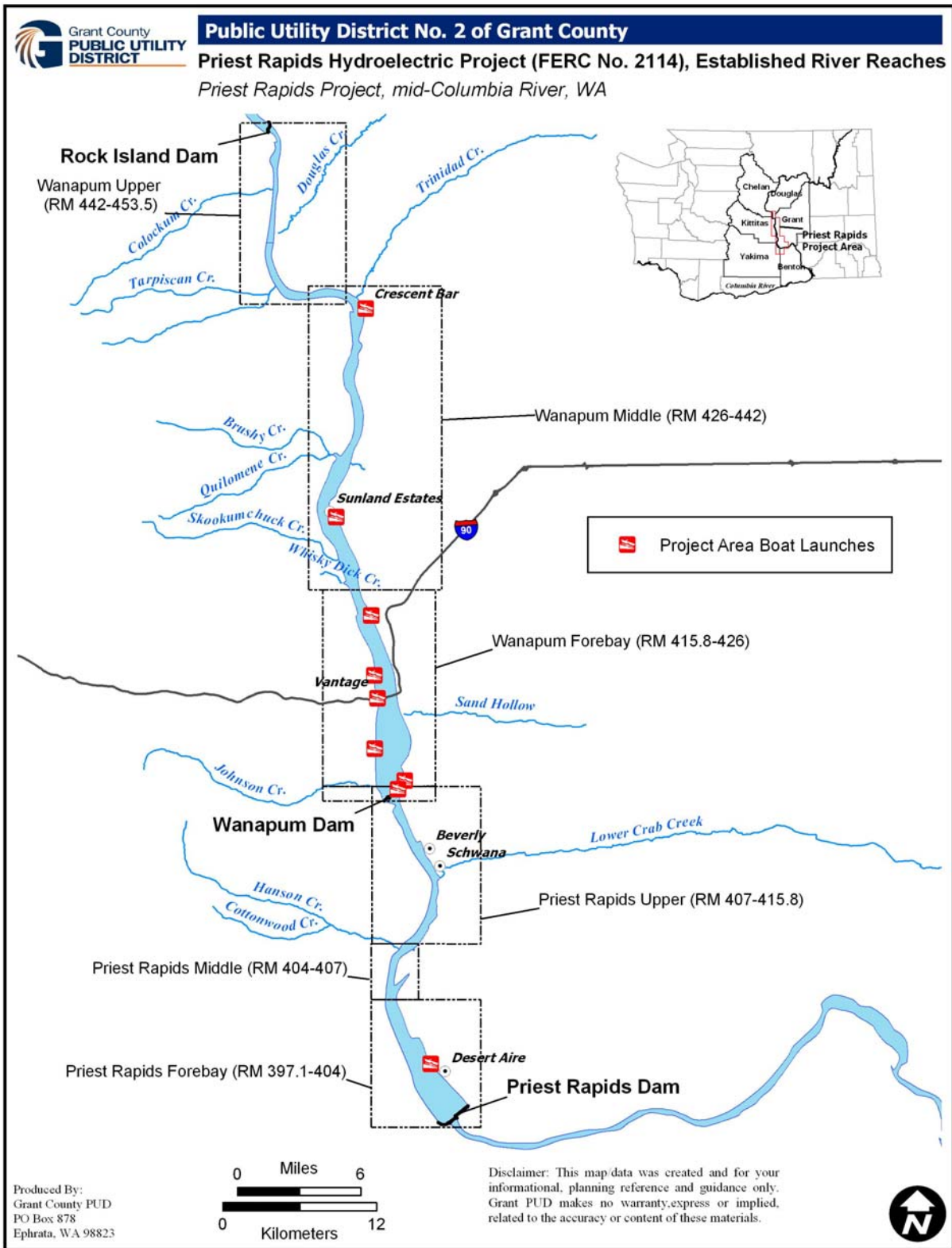


Figure 1 Priest Rapids Project Area and established river reaches presented by river mile (RM), mid-Columbia River, WA.

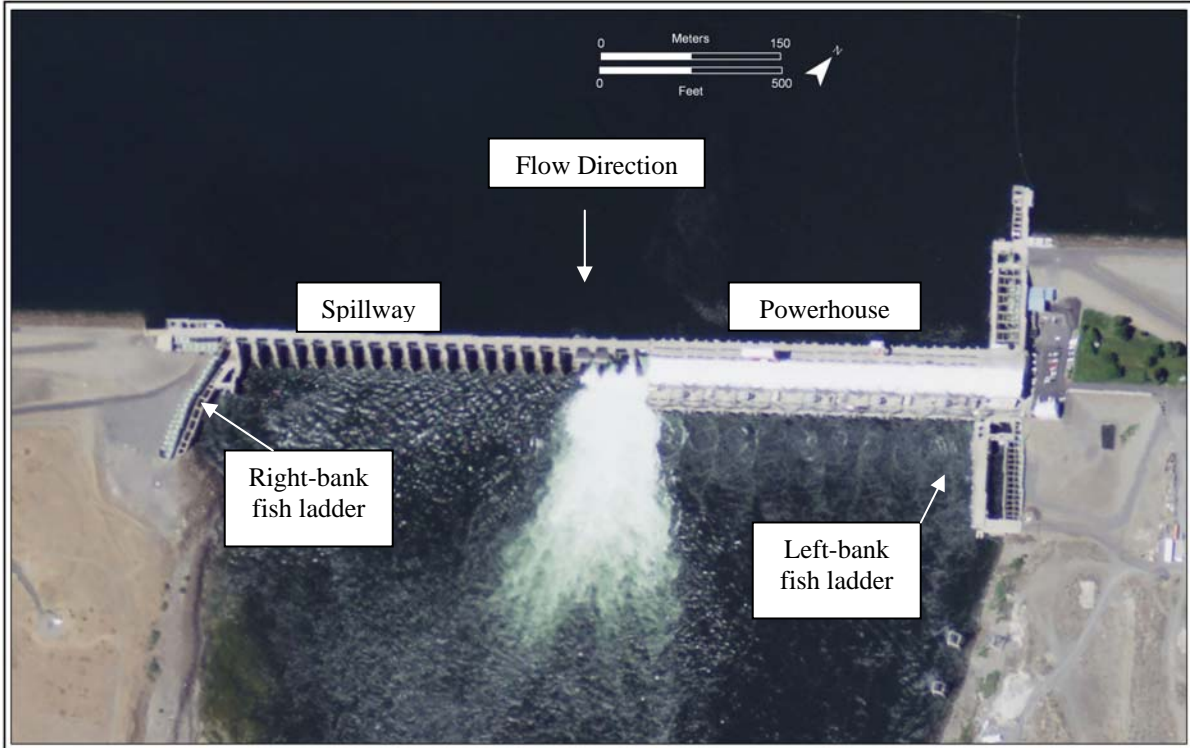


Figure 2 Aerial photograph of Priest Rapids Dam, mid-Columbia River, WA.

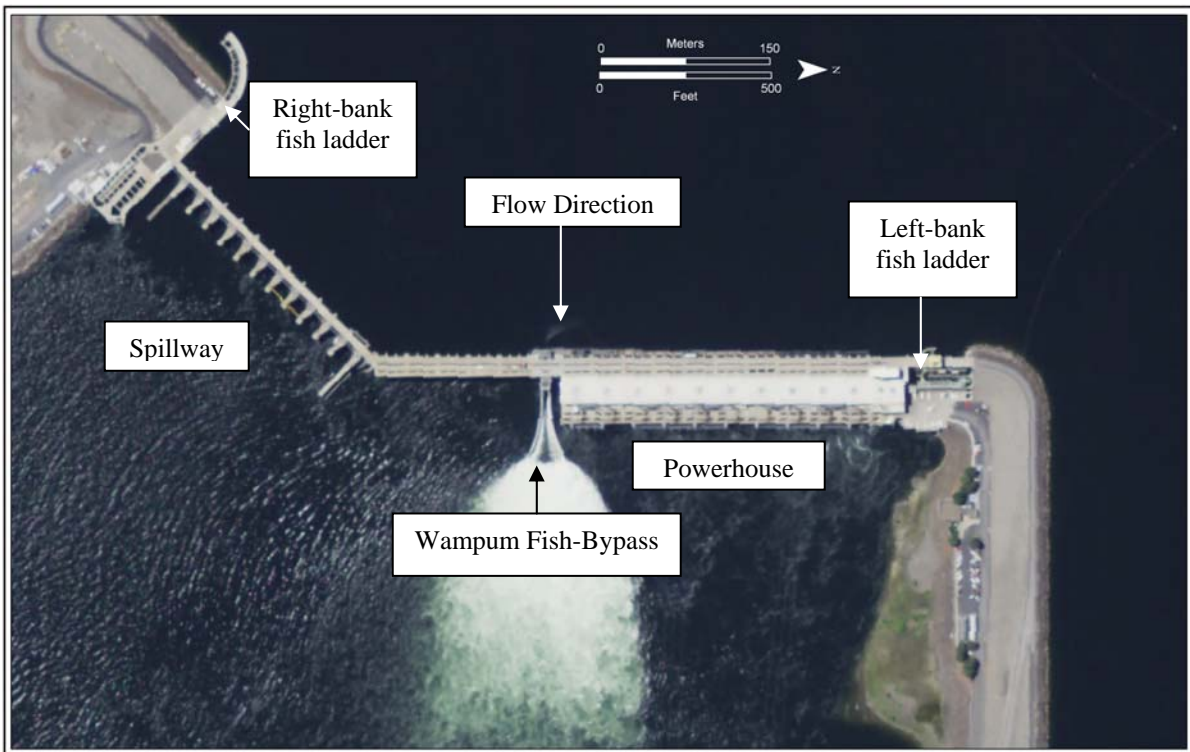


Figure 3 Aerial photograph of Wanapum Dam, mid-Columbia River, WA.

1.2.1 Fixed Site Water Quality Monitoring Stations

Grant PUD currently operates and maintains four fixed-site water quality monitoring stations (FSMs) that record water depth (m), barometric pressure (mm/hg), TDG (mm/hg), temperature (°C), dissolved oxygen (DO; mg/L), pH (units), and turbidity (NTU). Barometric pressure, TDG, and temperature are monitored on an hourly basis throughout the year, while depth, DO, pH, and turbidity grab-samples are collected every two to three weeks throughout the year in accordance with the FSM maintenance and calibration schedule. Each of the parameters collected at the FSM stations are collected in accordance with a WDOE approved Quality Assurance Project Plan (QAAP; Hendrick 2009). Grant PUD FSMs are located midway across the river channel in the forebay and tailrace of each dam. Chelan PUD also operates and monitors a FSM station located in the Rock Island Dam tailrace, approximately 38 river miles upstream of Wanapum Dam, during the fish-spill season. This allows Grant PUD to monitor upstream river conditions. Each Grant PUD FSM station is equipped with a Hydrolab[®] Corporation Model DS5X[®], DS4A[®], or Minisonde[®] 5X or 4A multi-probe enclosed in submerged conduit. Multi-probes are connected to an automated system that allows Grant PUD to monitor barometric pressure, TDG, and water temperature on an hourly basis. A National Institute of Scientific Technology (NIST) certified barometer located at each FSM provides the barometric pressure readings necessary to correct the partial pressure readings taken by the Hydrolab[®] multi-probes. For a complete description of the FSMs see Hendrick 2009. Dissolved oxygen, pH, and water temperature data collected from the FSMs will be used as part of the analysis of shallow water quality data collected as part of this SWQMP.

1.3 Regulatory Framework

The following sections provide information related to the water quality standards for the Columbia River within the Project for water temperature, DO, and pH.

1.3.1 Water Temperature

WAC 173-201A-602 designates the section of the Columbia River within the Project as salmonid spawning, rearing, and migration habitat, and therefore 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, WAC 173-201A-602 provides that temperatures below Priest Rapids Dam shall not exceed a 1-DMax of 20.0°C due to human activities. When natural conditions exceed a 1-DMax of 20.0°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any time, exceed $t = 34/(T + 9)$. Portions of the Columbia River within the Project are currently classified as impaired for temperature under Section 303(d) of the Clean Water Act. Portions of the Columbia River upstream of the Project also are currently classified as impaired for temperature. WDOE has indicated that a Total Maximum Daily Load (TMDL) for temperature is expected to be developed by the Environmental Protection Agency (EPA) that will establish a final wasteload and load allocation for temperature (WDOE 2007).

It should be noted that WDOE's water quality standards have specific provisions that discuss the monitoring of water temperatures. In WAC 173-201A-200(1)(c)(vi) it states that:

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; and

(B) Not be taken from shallow stagnant backwater areas, within isolated thermal refuges, at the surface, or at the water's edge.

The above provisions will be further discussed in the Methods section.

1.3.2 Dissolved Oxygen

The water quality criteria for DO within the Project require that DO be greater than 8.0 milligrams per liter (mg/L). When DO is lower than the 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 (WAC 173-201A-200(1)(f)).

Similar to the water temperature, WDOE's water quality standards have specific provisions that discuss the monitoring of DO. In WAC 173-201A-200(1)(c)(iv) it states that:

D.O. 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; and

(B) Not be taken from shallow stagnant backwater areas, within isolated thermal refuges, at the surface, or at the water's edge.

The above provisions will be further discussed in the Methods section.

1.3.3 pH

WAC 173-201A-200(1)(g) provides that pH shall be within the range of 6.5 to 8.5 units with a human-caused variation within the above range of less than 0.5 units.

2.0 Existing Water Quality Data

There have been several water quality evaluations conducted within the Project, including two by Normandeau et al. (2000) and Juul (2003), each of which evaluated DO, pH, and temperature data at the same locations within the Project reservoirs. The following provides a brief combined summary of the two evaluations:

- 1). Normandeau et al. 2000:
 - a. Water column profile data (temp., DO, pH) at 1 m depth intervals to 10 m, every 5 m thereafter
 - i. Monthly grab-samples (March-December) in 1999
 - ii. Right bank, thalweg, left bank

- 2). Juul 2003:
 - a. Water column profile data (DO, pH, and water temperature) collected at 1 m intervals to 10 m, every 5 m thereafter
 - i. Bi-monthly grab-samples (Aug.-Oct) in 2001 - Right bank, thalweg, left bank
 - b. Thermister array data collected at 1, 3, and 5 m
 - i. Hourly from June-Oct. (2000) and June-Nov. (2001)
 - ii. Right bank, thalweg, left bank
- 3). Summary Results of both Normandeau et al. and Juul 2003 studies:
 - a. The reservoirs did not stratify thermally
 - b. The reservoirs had minimal lateral variability
 - c. Temperatures were $>18^{\circ}\text{C}$ 25-62% of time
 - d. Subsequent modeling determined no negative temperature impacts caused by reservoirs (Perkins et al. 2002)
 - e. DO measurements were >8 mg/L
 - f. pH measurements were between 6.5 and 8.5 units

The data collected as part of the above referenced studies were collected along eight transect locations, within the 55-mile stretch of the Columbia River, based on the need to collect samples from forebay and tailrace areas of each dam, the main inflow into the project, as well as mid-reservoir locations. Figure 4 provides the location of the eight transects used during the Normandeau et al. (2000) and Juul (2003) studies. The locations were meant to be representative of the overall Project's water quality conditions, as well as capture both vertical and lateral variability. These sections of the river are generally well-mixed and encounter enough flow to avoid stagnant water conditions; this would appear to meet the monitoring provisions for water temperature and DO discussed in Section 1.2.

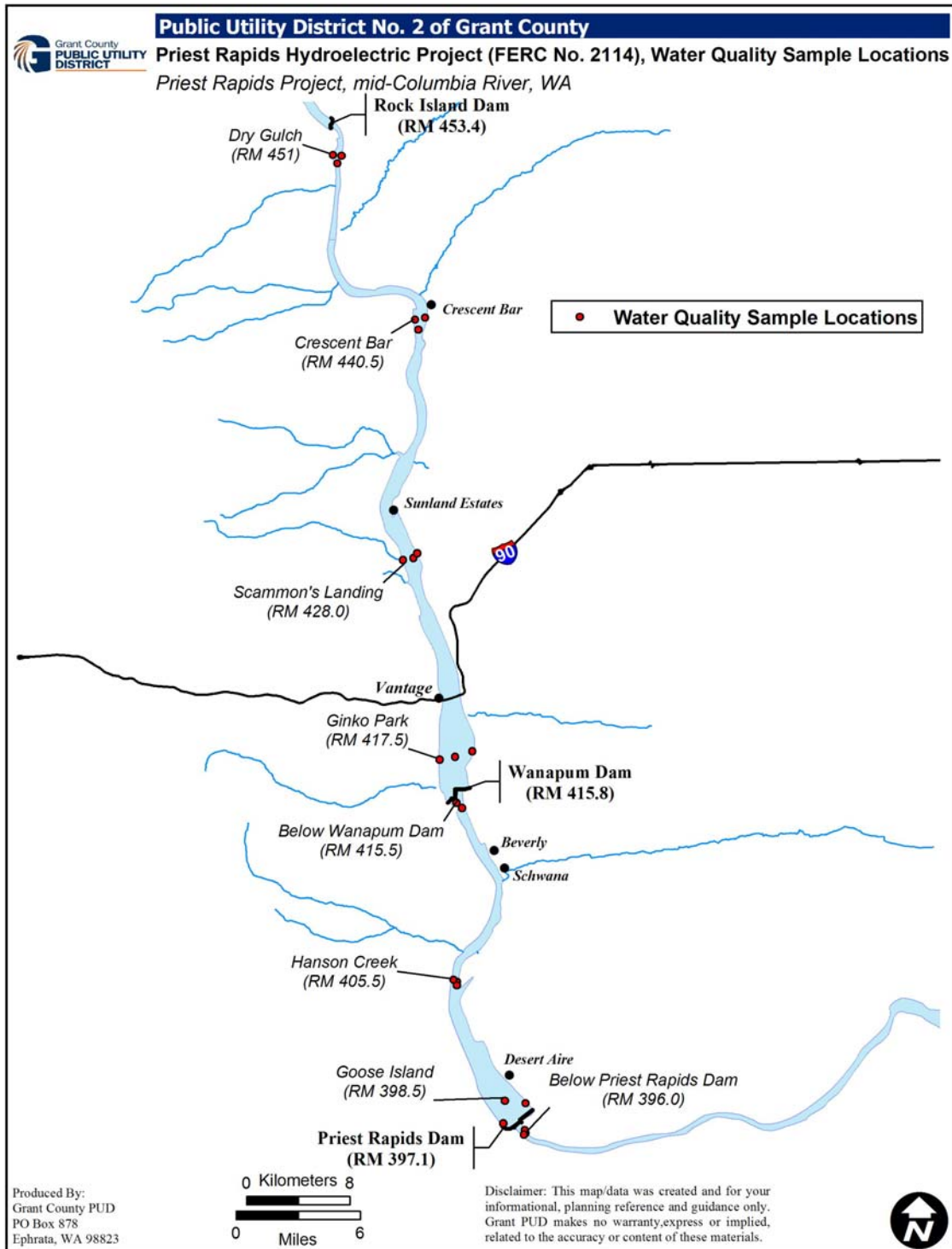


Figure 4 Sample locations used during previous water quality studies (Normandeau et al. (2000) and Juul (2003) within the Priest Rapids Project, mid-Columbia River, WA.

3.0 Methods

In order to meet the objectives of this study, the following methods will be used to collect data associated with the SWQMP.

3.1 Monitoring Locations

In order to meet the objective and goal of the SWQMP (as defined in Section 1.2), the monitoring locations for collected water temperature, DO, and pH data will be at the same locations used during the Normandeau et al. (2000) and Juul (2003) studies. This will result in a total of eight transects where data will be collected from the thalweg, right bank, and left bank locations every 1 m in depth down to 10 m, and then every 5 m thereafter. Using these locations will serve a twofold purpose:

- 1). Will allow direct comparisons with historical data collected from 1999-2001 as reported by Normandeau et al. (2000) and Juul (2003), which will help determine any major changes in the water quality throughout the Project area since that time period.
- 2). Will meet the goal of this study, which is to collect the data in locations that are consistent with both the requirements of the 401 WQC (monitor DO, pH, and water temperature in shallow water habitats) and WDOE's water quality standards (which state that data collected for compliance purposes be taken in well-mixed portions of the water body, and not in shallow, stagnant, backwater areas (WAC 173-201A-200(1)(c)(vi) and 173-201A-200(1)(d)(iv) respectively). These sample locations represent both well-mixed portions of the river, yet the left and right bank locations will also provide information related to shallow water habitats.

Furthermore, collecting data in the thalweg will allow for comparisons with the shallow water habitat areas (at left and right bank locations), which will help define lateral variability across the river channel. Data collected at Grant PUD's existing FSM stations (see Hendrick 2009) will also be used for comparison purposes. Table 1 provides the details related to each transect location, while Figure 4 (in Section 2) provides a map of the transect locations. It should be noted that there will be a slight modification to the left-bank monitoring location at the Hanson Creek transect, as the previous studies collected data within Lake Geneva; this is a backwater area and instead a location close to the left bank will be selected.

Table 1 Approximate GPS locations and river miles for the Priest Rapids and Wanapum reservoir sampling stations

LOCATION	APPROXIMATE RIVER MILE	APPROXIMATE GPS COORDINATES
Below Priest Rapids Dam		
Mid-channel (thalweg)	396.0	N 46° 38.278' W 119° 54.125'
Western shore (right bank)		N 46° 38.385' W 119° 54.172'
Eastern shore (left bank)		N 46° 38.198' W 119° 54.230'
Goose Island		
Mid-channel (thalweg)	398.5	N 46° 39.621' W 119° 55.381'
Western shore (right bank)		N 46° 38.671' W 119° 55.491'
Eastern shore (left bank)		N 46° 39.497' W 119° 54.097'
Hanson Creek		
Mid-channel (thalweg)	405.5	N 46° 44.622' W 119° 58.242'
Western shore (right bank)		N 46° 44.716' W 119° 58.446'
Eastern shore (left bank)		TBD ¹
Below Wanapum Dam		
Mid-channel (thalweg)	415.5	N 46° 51.907' W 119° 57.861'
Western shore (right bank)		N 46° 52.133' W 119° 58.200'
Eastern shore (left bank)		N 46° 44.476' W 119° 58.252'
Ginko Park		
Mid-channel (thalweg)	417.5	N 46° 53.706' W 119° 59.121'
Western shore (right bank)		N 46° 53.935' W 119° 59.213'
Eastern shore (left bank)		N 46° 54.277' W 119° 57.205'
Scammon's Landing		
Mid-channel (thalweg)	428.0	N 47° 02.375' W 120° 00.728'
Western shore (right bank)		N 47° 02.296' W 120° 01.359'
Eastern shore (left bank)		N 47° 02.582' W 120° 00.497'
Crescent Bar		
Mid-channel (thalweg)	440.5	N 47° 11.939' W 120° 00.327'
Western shore (right bank)		N 47° 12.365' W 120° 00.539'
Eastern shore (left bank)		N 47° 12.438' W 119° 59.923'
Dry Gulch		
Mid-channel (thalweg)	451.0	N 47° 18.924' W 120° 05.233'
Western shore (right bank)		N 47° 19.286' W 120° 05.509'
Eastern shore (left bank)		N 47° 19.245' W 120° 04.986'

¹TBD = To be determined; there will be a slight modification to the left-bank monitoring location at the Hanson Creek transect, as the previous studies collected data within Lake Geneva; this is a backwater area and instead a location close to the left bank will be selected and new GPS points will be collected.

3.2 Monitoring Procedures

The following sections present the monitoring procedures that will be used as part of this SWQMP, designed to meet the objectives of the SWQMP discussed in Section 1.2.

3.2.1 Frequency

Data for the SWQMP will be collected every two weeks from May 1 through September 30 of the year following FERC approval (per Article 401(a)(20) of Grant PUD's operating license for the Project), unless FERC approves by April 15 then the study will occur in the same year as FERC approval. These frequencies and time periods will provide enough data to determine the condition of the water throughout the Project, as well as determine potential vertical and lateral variations, which can then be compared to historical data collected from 1999-2002 (Normandeau et al. 2000 and Juul 2003). Data collected at the FSM stations will match the monitoring frequencies at the transect locations.

3.2.2 Monitoring Depths

The bi-monthly grab samples will be collected at 1 m intervals down to 10 m, and every 5 m thereafter (for the thalweg locations). At the left and right bank (e.g. eastern and western shore) monitoring locations, the samples will be taken close enough to the bank to be within the littoral or edge habitats where water depth is shallow enough for light penetration and macrophyte growth. At the FSM stations, the monitoring depth will vary with forebay and tailrace elevations throughout the year. Given the depth of the standpipes at each FSM station, the depths should range between three and five meters.

3.2.3 Equipment

The equipment used for this monitoring effort will be Hydrolab[®] multi-probes. Grant PUD's QAPP for the FSM stations provides additional information on Hydrolab[®] series 5 and 4a multi-probes (Hendrick 2009). Hydrolab[®] probes are used throughout the Columbia River Basin, including use by other Columbia River dam operators (e.g. Chelan PUD 2007, Tanner 2003, and Corps 2008).

3.3 Calibration and Maintenance - Quality Assurance/Quality Control

Calibration and maintenance of the individual sensors of the Hydrolab[®] multi-probes will follow the manufactures recommendations and regionally accepted methods used by other resource agencies conducting similar monitoring programs, such as the United States Geological Survey, U.S. Army Corps of Engineers (Corps), and other mid-Columbia River Dam operators. The general calibration, maintenance, and deployment methods (see below) for the multi-probes also follow regionally accepted methods; these methods are taken from Grant PUD's QAPP for the FSM stations (Hendrick 2009).

To ensure accurate data collection, each sensor will be calibrated prior to each sampling event. During the sampling events, the sensors will be allowed to equilibrate prior to recording the data and an average of five readings (taken over a five-minute period) will be used as the composite value for that location and depth, which will assure proper sensor equilibration.

3.3.1 Water Temperature

Grant PUD will follow the recommended maintenance for temperature sensors, which typically includes cleaning of the sensor to remove biological or chemical deposits. The temperature sensor is not removable and does not require any other maintenance except to verify that the connection is securely fastened to the multi-probe. Grant PUD also conducts a visual check for damage.

Hydrolab[®] does not currently require a calibration method for the temperature sensor, as they calibrate the temperature sensor during construction of the multi-probes. However, per the recommendation of WDOE (2009), Grant PUD will test all Hydrolab[®] temperature sensors against a NIST thermometer at least once per year prior to the spring/summer monitoring period. Multi-probes and the NIST thermometer will be placed into an ice bath to verify temperature accuracy. Data collected during exposure to the ice bath will be compared to the certified thermometer to ensure that the temperature sensors of each respective multi-probe are performing properly. If inaccuracies are apparent in the Hydrolab[®] temperature sensors, they will not be deployed for temperature monitoring until the problem causing the inaccuracy can be identified and corrected.

3.3.2 Dissolved Oxygen

In 2003, Hydrolab[®] made commercially available a new DO sensor technology. A Luminescent Dissolved Oxygen (LDO) sensor was established to reduce the maintenance and calibration needs of previous technologies, such as the Clark Cell and Winkler Titration methods (Mitchell 2006). This sensor offers significant enhancements in terms of accuracy and sensor life over other existing technologies used to measure DO, including optodes using intensity-based measurements and the ability to self-correct for temperature and other changes in the sensor electronics (Mitchell 2006). Maintenance of the LDO sensor is simpler than the Clark Cell, consisting of cleaning the sensor with cotton swabs and distilled water to remove any excess debris or oil and replacing the protective cap once per year (Hach Company 2006). Starting in 2005, all new Hydrolab[®] series 5 multi-probes were fitted with an LDO sensor for DO collection; and Grant PUD currently has five series 5 multi-probes and uses them exclusively as the QA/QC probe used to collect DO, pH, and turbidity grab-samples.

3.3.3 pH

There are two types of sensors that are used for pH on the multi-probes deployed by Grant PUD. Both incorporate a glass electrode and pH reference electrode/Teflon junction. These sensors may be used in combination or used separately as part of the SWQMP.

Maintenance includes cleaning the glass bulb with methanol and then gently scrubbing it with a cotton swab. The pH reference housing is filled with pH reference solution by gently pulling the housing out or by removing the housing using a flat head screwdriver, depending on style. Care is taken to avoid leaving air or bubbles inside the housing when finished.

Calibration entails rinsing the sensor(s) with distilled water and performing a pH response slope check using known pH standards, usually 7 and 10-pH standard. The sensor(s) are then submerged in 7-pH standard and pH readings are allowed to stabilize. The multi-probe is then reprogrammed to pH 7 which removes any prior deviation of greater than 0.01 units. This step is

repeated using a pH 10 standard. All sensors are rinsed with distilled water before and after calibrations (Hydrolab 1999).

3.4 Data Management

The water temperature, DO, and pH, data during this study will be recorded on a PDA using Hydrolab's® Hydras 3 Pocket PC software. After each sampling event, the data will be transferred to spreadsheet and re-checked for quality assurance. After each sample date, the data will be entered into a spreadsheet and analyzed at the end of the study, and then presented in the summary report (see Section 4).

All calibration and maintenance data collected for the FSM stations, including data from the Hydrolab® sensors, BP sensors, etc. will be recorded on a PDA using Hydrolab's® Hydras 3 software, which will then be transferred to an excel spreadsheet and backed-up daily. Summary calibration and maintenance data will be included in the annual water quality monitoring report.

3.5 Analytical Methods

The analytical methods for data collected for this SWQMP will center on two principle objectives:

- 1). Verify compliance with WDOE 401 WQC (2007) and WDOE water quality standards (WDOE 2006); and
- 2). Compare with historical water quality data collected from 1999-2001.

Analytical methods for each parameter to be monitored are included below.

Water temperature, DO, and pH data collected as part of this SWQMP will be displayed graphically showing vertical, longitudinal, and temporal trends from each transect and FSM locations. Data will also be compared to historical data as reported by Juul (2003) and Normandeau et al. (2000). Evaluations for compliance with DO, pH, and turbidity water quality criteria will also be made. Results from these analyses will be included in the summary report.

4.0 Reporting

At the end of the sampling period, data analyses will be completed and a summary report will be provided to WDOE. The summary report will include results of the sampling, comparison with historical data, summary of calibration and quality assurance/quality control results, data omissions and errors, etc.

5.0 Adaptive Management

The 401 WQC (WDOE 2007) provides several adaptive management provisions that require Grant PUD to reexamine monitoring procedures, quality control, and analytical methods based on results of data (e.g. in or out of compliance with water quality standards, sudden deviations from historic trends, etc), changes in operational, or changes in WDOE water quality standards. Although the SWQMP is a short-term study that will occur over the course of six-months, Grant PUD will use adaptive management as needed during the SWQMP. Examples include possible changes in the monitoring locations based on field-conditions, changes in monitoring protocols based on the contractor doing the work, variations of the sampling event dates based on field and/or weather-conditions, etc. Any significant changes in the SWQMP will be coordinated with the Priest Rapids Fish Form prior to the changes occurring (as feasible).

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WDOE (Washington State Department of Ecology). 2009. Letter to Grant PUD; RE: Request for Comment - Draft 2009 Quality Assurance Project Plan for Monitoring Selected Water Quality Parameters within the Priest Rapids Hydroelectric Project. Sent by Ms. D. Marcie Mangold on January 16, 2009.

Appendix A
Consultation Comment Letters and Meeting Minutes – Draft Shallow Water Habitat
Water Quality Monitoring Plan

From: <Jim_L_Craig@fws.gov> [Jim_L_Craig@fws.gov]
Sent: Monday, January 25, 2010 3:43 PM
To: Thomas J Dresser Jr
Cc: drohr5@aol.com; Jerry.Marco@colvilletribes.com; CarlMerkle@ctuir.com;
William.Tweit@dfw.wa.gov; Alyssa S. Buck; Curtis Dotson; Debra A Williams; Ross
R. Hendrick; bryan.nordlund@noaa.gov; scott.carlon@noaa.gov;
richelledra@yahoo.com; brose@yakama.com; parker@yakama.com
Subject: Re: PRCC: Documents for your review and comment

Tom,

I reviewed the two documents and have the following comments.

1. A Study Plan to Evaluate Fish Ladder Water Temperature at Priest Rapids Dam - LA 401 (a)(21)

Page 5 within Methods section: It would be beneficial to state that analysis will include comparisons of 7 day minimum, maximum and average daily water temperatures (as was done with temp data during the 2002 to 2004 study). The way it is written on page 5 just says daily averages will be compared. This would also comport better with EPA's guidance for temperature criteria for salmon and trout (criteria based on the 7 day average of the daily maximum values).

Thanks for including river mileage information in Figure 1 (as per Bryan Nordland's earlier suggestion).

2. Shallow Water Habitat Water Quality Monitoring Plan - LA 401(a)(20)

Excuse me for this as I know it may largely be a subjective matter but I am having a little difficulty in resolving what constitutes "shallow water habitats" and whether or not this draft plan will completely meet the full intention of the 401 Water Quality Certification (WQC) requirement. For example, in several places the draft plan paraphrases what the WQC requires regarding this plan (i.e. "conduct a short-term study to evaluate DO, pH, and water temperature values in shallow water habitats"). But the WQC (Section 6.6.1(b)) actually goes a bit further requiring that this study include areas containing macrophyte beds. The last part of the WQC requirement regarding inclusion of areas containing macrophyte beds is missing from the draft plan and it is not clear if any of the monitoring sites will attempt to sample the water column over macrophyte bed areas. While the draft plan calls for sampling of shallow waters (e.g. data will be collected from the thalweg, right bank, and left bank locations every 1 m in depth down to 10 m, and then every 5 m thereafter) it seems clear most measurements will come from deeper water areas. When I think of shallow water habitats in a reservoir I do not think of 1 m deep in the mid-channel - I think of the littoral or edge habitats where water depth is usually shallow enough for light penetration and macrophyte growth. The draft plan also makes reference of the need to develop a study that is consistent with WDOE's water quality standards which are paraphrased as meaning samples must be taken in the dominant aquatic habitat, in well-mixed portions of the water body, and not in shallow, stagnant backwater areas. Those technical requirements make obvious sense and this draft plan should clearly meet that guidance but in meeting that standard is the WQC requirement for sampling over macrophyte beds being subordinated? There seems to be a bit of a paradox between the requirement of the WQC and DOE's own water quality standards. Perhaps this is simply a matter for DOE to clarify.

Section 2.0 subsection 3. (d): Perkins et al. 2002 is not listed in literature cited section.

Section 3.1: draft report states that monitoring locations will be at the same locations used during the previous studies (1999 - 2001) and that may be the case but there are some differences between locations given in Figure 4 and Table 1. Granted most sample locations are similar and differences do not exceed 1.5 river miles but there are some differences in name and location.

And as above, thanks for including river mile information in your figures (1& 4).

That's it.

Jim L. Craig
Project Leader
U.S. Fish and Wildlife Service
Mid-Columbia River Fishery Resource Office
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To
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bryan.nordlund@noaa.gov, scott.carlon@noaa.gov

cc
DWillil@gcpud.org, richelledra@yahoo.com, rhendrl@gcpud.org

Subject
PRCC: Documents for your review and comment

PRCC:

Attached are two documents for your review and comment. Your comments are requested on or before February 4, 2010. Please see the attached cover letter accompanying each document. Comments are to be sent directly to Tom Dresser as

outlined in the cover letter. A presentation regarding each document will be provided at our next PRCC meeting.

1. A Study Plan to Evaluate Fish Ladder Water Temperature at Priest Rapids Dam - LA 401 (a)(21)

2. Shallow Water Habitat Water Quality Monitoring Plan - LA 401(a)(20)

Additionally, I am in the process of updating the "PRCC Studies and Reports List" to help in keeping us all on target and in sync with the several documents that we have before us. Accordingly, the PRCC Studies and Reports List will follow shortly. I will also ask Debbie to post these two documents to the secure PRCC website.

Looking forward to seeing you at our next PRCC meeting on Wednesday, January 27th, 9:00 am at the Grant PUD SeaTac office. Happy New Year. Thanks, everyone.

Denny[attachment "DRAFT_FLWaterStudy_Plan_Final_01-07-10.pdf" deleted by Jim L Craig/MCFO/R1/FWS/DOI] [attachment "ShallowWaterHabitat_WQMonitoringPlan_Final_010709.pdf" deleted by Jim L Craig/MCFO/R1/FWS/DOI]



Meeting Minutes

Priest Rapids Fish Forum

Wednesday, September 02, 2009

9:00 – 3:00

Grant PUD SeaTac Office

Technical Members

Stephen Lewis, USFWS
Marcie Mangold, WDOE
Tom Dresser, GCPUD
Ben Lenz, GCPUD

Patrick Verhey, WDFW
Bob Dach, BIA
Mike Clement, GCPUD

ATTENDEES:

Brad James, WDFW (on phone)
Molly Hallock, WDFW
Patrick Verhey, WDFW
Mike Clement, GCPUD
Ben Lenz, GCPUD (on phone)
Debbie Williams, GCPUD

Brian Nass, LGL
Marcie Mangold, WDOE (on phone)
Bob Rose, YN (on phone)
Keith Hatch (on phone)
Ross Hendrick, GCPUD
Kevin Malone, Facilitator

Meeting Minutes

- I. **Welcome and Introductions** – Attendees introduced themselves around the table and on the conference line.
- II. **Agenda Review** – No additions were made to the agenda.
- III. **Action Item Review** - All action items were reviewed.
- IV. **PRFF Protocol Discussion**
 - A Discussion and proposed Vote on Protocols – No discussion or vote took place because of the lack of a quorum.
- V. **White Sturgeon Update** - FERC approval hasn't been received yet, so field work (Section C of Plan) will be moved to 2010. FERC approval was received for the Native Resident Fish Management Plan on Monday, August 31, 2009. In order of submission, Grant PUD anticipates that the White Sturgeon Management Plan should be next

up for approval. Via Web Ex Conferencing, Lenz and Clement shared video of their trip to the White Sturgeon facility in Cranbrook, B.C. Approximately one million eggs were taken during the 2009 spawning season in B.C. Grant PUD staff will be visiting the facility again during the various life cycles and invited PRFF members to attend. Juvenile releases happen in the spring, with spawning taking place mid June to the end of July. Disease issues, and how to handle them were discussed. Biosecurity precautions were followed diligently at the facility.

- VI. **Aquatic Invasive Species (AISP) and Shallow Water Monitoring Plan (SWMP)** - Hendrick provided an update on the AIS and Shallow Water Monitoring Plans. The second preliminary draft of the AIS was sent to WDOE and WDFW on September 01, 2009. After consultation with Washington Department of Ecology (WDOE) and Washington Department of Fish and Wildlife (WDFW), PRFF members will be provided with a 30 day review period. The final report will be submitted to the Federal Energy Regulatory Commission (FERC) and WDOE prior to March 31, 2010.

AISP - The plan covers education (with focus on recreational use), monitoring designed to help catch new species before they establish themselves (36 samples collected throughout each reservoir monthly for presence/absence of zebra/quagga mussel veligers, substrate monitoring, and shoreline/boat launch AIS plant surveys), and rapid response (pro-active approach; coordination with WDFW/WDOE).

SWMP – Hendrick explained that main purpose today's presentation was to provide PRFF with an opportunity to discuss and provide input on selection of sampling locations, based on past studies. Hendrick explained that past (1999-2002) water quality monitoring efforts have provided a good picture of Dissolved Oxygen (DO), pH, and water temperatures in each reservoir. These locations were selected by the Limnological Solution Working Group during the re-licensing period, based on available information on habitat use. These locations are also well-mixed, which is in-line with WDOE's water quality standards (which state that samples taken for compliance purposes should be taken from well-mixed portions of the river). Hendrick suggests that in order to gather direct comparisons with historical data and to remain within well-mixed portions of the river, the same monitoring locations be used for the SWMP as in the 1999 - 2002 studies. Mangold stated that WDOE will be checking to make sure the SWMP sampling locations are in well-mixed portions of the river, in accordance with WDOE water quality standards.

Lewis asked clarifying question regarding the purpose of the SWMP in relation to the Bull Trout Management Plan (BTMP). Hendrick noted that the SWMP is not specifically intended to meet the BTMP water quality monitoring components, as the fixed-site monitoring stations

(which collect data year-round) will be used for that purpose as identified in the BTMP.

Hendrick will begin preparing the draft SWMP using the same locations used in the 1999 – 2002 studies, with the goal of sending it out for PRFF review by November 01, 2009. If members have areas other than those discussed in today's presentation that they would like to have monitored, he asked that they be emailed to him prior to the next meeting on October 07, 2009 along with support of the rationale (biological or other) behind the request.

VII. Pacific Lamprey Study Plan

A Group Discussion of any items related to the 2010 Adult Lamprey Evaluation prior to drafting of Final Study Plan -
Nass explained that PRFF member's comments have been incorporated into the Pacific Lamprey Study Plan (PLSP).

Members discussed objectives of the study and tagging alternatives. Rose would like to understand the behavior of fish as they approach and enter the fish ladder, and questioned if flow reductions would make a difference.

The primary goal of the study is to tag 300 fish to evaluate fish ladder improvements and determine passage efficiency. If more fish are trapped, Nass explained that they would also be tagged. Half Duplex Pit-tags will be used for the study, with new detection arrays being placed in the fish ladders. Grant PUD will also be tagging lamprey with acoustic tags to evaluate the lower PRD fishway and to see if changes to the ladder operations have improved since the 2001 – 2002 studies.

Rose explained that because JSAT tags are being used to tag fish at Bonneville Dam, he would like to monitor those fish as well. The Yakama Nation has 95 radio tags that could possibly be used for lamprey tributary behavior studies. Rose would like to coordinate use of the radio tags if anyone has ideas of how to use them. Nass noted there is no intention to install radio tags in lamprey at Priest Rapids (PR), or to monitor fish that have been tagged with them other than monitoring HD PIT-tagged fish that were tagged by the COE downstream. Rose asked that all other fishways in the Priest Rapids Project (Project) also be monitored for lamprey passage. Clement noted that all 6 fish ladder entrances are identical and because the PRD left-bank entrance receives the highest amount of lamprey activity, that is the location which will be monitored. Previous studies provided information that suggests that fish readily approached and entered fishway entrances at both Wanapum and Priest Rapids dams.

Acoustic tags being used for the lamprey study are left over from the salmonid spring study. A tag battery life test has been conducted and will be approximately 21 to 25 days.

An acoustic telemetry study will be conducted at the PR left bank junction pool.

Members discussed the following contingency plans if there is a low run year. Structure passage efficiency - video, entrance to exit – HD PIT, junction pool use - Acoustic, and nighttime flow reductions. Nass questioned what the committee would want to achieve by implementing nighttime flow reductions. He explained that Grant PUD is addressing lamprey passage in the lower fishway by modifications to the fishway.

Fish ladder outages will start in mid - November. If so we need to know any requested changes before then. Plan to move ahead with testing things, we will continue to move ahead with this plan, and any adjustments would be made on the fly, stated Nass.

Rose suggested that acoustic tag receivers be placed at the exit of the fishway to determine if fish go into the turbines and back through the Project, or continue up stream.

The plan is to trap lamprey every night until the target sample size is collected, then traps will be pulled. In an effort to minimize recapture there is no plan to sample the run.

Rose suggested that an alternative strategy to fish collection be considered. Because lampreys travel through the Project from August to October, Rose questions if fish trapped at the beginning of the season might be different than fish trapped later in the season. Could changes in water temperature change a lamprey's performance, size, and metabolic capabilities? Clement cautioned that as soon as the water cools off, the fish stop moving and begin over wintering and could possibly not move through the fishway at all. Rose asked that different strategies be added to the study proposal. Clement suggested that Rose provide some alternate strategies for the group to discuss but that because this is a passage study, we should try and select fish earlier in the run that are more representative of actively moving and migratory fish. Fish later in the run, would be more likely to be representative of fish that are preparing to over winter, thus, we would potentially not be able to monitor or measure there passage.

Fish count discrepancies between PR and Rock Island Dam were discussed. Fish counting methodologies and differences between PUD's is a concern. Rose suggested that a mobile tracker be included in the Study Plan, so that when acoustic

tags leave the Project, the ability to track them upriver remains. Clement stated that can be included in the study, but reminded members that it's difficult to track fish in noisy area's. As soon as crowders are installed, lamprey will have no other way to get through the fishways but through the video count stations. That should make counts in the Project extremely accurate. The release of acoustic tagged fish in pulses of 3 might give a more efficient with mobile tracking, suggested Rose.

Because tracking fish after they leave the Project is outside the original scope of work, Nass and Clement will have to discuss this issue further. Clement thought that a boat survey of the reservoir could possibly be conducted to monitor the acoustically tagged lamprey. Rose noted that he would like to have the ability to extend the nature of the study. Clement suggested that Bob provide this in more detail for future discussions.

- VIII. **Next Meeting:** October 07, 2009, Grant PUD Natural Resources Office, Ephrata, WA.



Meeting Minutes

Priest Rapids Fish Forum

Wednesday, October 07, 2009

2:00 – 3:00

Conference Call

PRFF Technical Members

Stephen Lewis, USFWS*
 Bob Rose, YN*
 Bob Heinith, CRITFC*
 Tom Dresser, GCPUD
 Ben Lenz, GCPUD

Patrick Verhey, WDFW
 Keith Hatch, BIA
 Marcie Mangold, WDOE
 Mike Clement, GCPUD

Attendees: (*Denotes PRFF Technical Member):

Steve Lewis, USFWS* (on phone)
 Bob Rose, YN* (on phone)
 Bob Heinith, CRITFC* (on phone)
 Mike Clement, GCPUD*
 Ross Hendrick, GCPUD
 Kevin Malone, Facilitator

Patrick Verhey, WDFW*
 Keith Hatch, BIA* (on phone)
 Brian Nass, LGL
 Ben Lenz, GCPUD*
 Debbie Williams, GCPUD

Action Items:

1. **Malone will contact Heinith for his protocol vote.**
2. **A final draft Pacific Lamprey Study Plan will be sent to members by Nass and Clement.**

Decisions:

1. **PRFF members in attendance approved PRFF protocols.**

Meeting Minutes

- I. **Welcome and Introductions** – Attendees introduced themselves around the table and on the conference line.

- II. **Agenda Review** – No additions were made to the agenda.
- III. **PRFF Protocol Discussion**
- A Discussion and proposed Vote on Protocols – Members reviewed and edited protocols via Web Ex. The intent of the meeting attendance verbiage is to ensure that a vote will not be taken during special meetings. (Keith, you had feedback on this topic, please feel free to provide further clarification). **PRFF members in attendance approved PRFF protocols. Malone will contact Heinith for his protocol vote.**
- IV. **White Sturgeon Update** - Lenz updated members on the White Sturgeon Management Plan (WSMP). FERC approval has not been received to date. Grant PUD is moving forward with facility designs; Lenz hopes to have them out for review by the end of November. Appendix C of the WSMP details what will take place during the spring 2010 field work. The afternoon of the November 4th PRFF meeting will be dedicated to White Sturgeon discussions. Prioritization of sturgeon sources will be discussed at that time.
- V. **Aquatic Invasive Species (AISP) and Shallow Water Monitoring Plan (SWMP)**
- AISP** - Washington Department of Ecology (WDOE) and Washington Department of Fish and Wildlife (WDFW) has reviewed the AISP and will meet with Hendrick on 10/20/09 to discuss comments they provided. After the meeting a second draft will be distributed for 30 day review. The goal is to finalize the AISP by March 31, 2010.
- SWMP** – Hendrick didn't receive additional monitoring locations from members as requested, so the same collection sites as used in previous SWMP studies will be used. He will proceed with development of the study plan, and hopes to have it out for review by the first of November.
- VI. **Pacific Lamprey Study Plan (PLSP)** - Based on feedback from the Yakama Nation (YN), United States Fish and Wildlife Service (USFWS), and WDFW, additional hydrophones will be located, and positioned to evaluate fishway entrance approaches and monitor for fallback. Concerns of potential fall back, turbine entrainment, and downstream passage have been addressed and incorporated into the study plan. If enough fish aren't trapped, double tagging with an acoustic and half duplex pit-tag will be considered.
- A skeleton Table of Contents for the annual Lamprey Report will be distributed at the next meeting. It will review activities relative to the PLSP, status, activities through out the Columbia Basin and how they relate or not to the Priest Rapids Project (Project). The report is a living document regarding regional lamprey studies that are applicable to the Project. It is due to FERC by March 2010.

Today is the end of the comment period for the PLSP. Comments were provided by the USFWS, WDFW and YN. Comments and Grant PUD responses will be added as appendices to the PLSP. Nass would like to have the PLSP finalized at the next meeting. **A final draft Pacific Lamprey Study Plan will be sent to members by Nass and Clement.**

Nass, Nicholls, and Clement will give a lamprey presentation to the Priest Rapids Coordinating Committee on October 28, 2009. They will discuss closing of an orifice via remote pneumatic control in the fishway to increase trapping efficiency with the PRCC.

Prior to tag battery expiration, Grant PUD intends to track lamprey as they travel through the Project.

- VII. **Next Meeting:** November 04, 2009 at 10:00 a.m. at the Grant PUD Natural Resources Office, Ephrata, WA.



MEETING

Priest Rapids Coordinating Committee

Wednesday, January 27, 2010

9:00 a.m. – 3:00 p.m.

Grant PUD SeaTac Office

PRCC Members

Scott Carlon/Bryan Nordlund, NMFS

Jerry Marco, CCT

Bob Rose, YN

Bill Tweit, WDFW

Jim Craig, USFWS

Tom Dresser/Curt Dotson, GCPUD

Carl Merkle, CTUIR

Denny Rohr, Facilitator

Attendees: (*Denotes PRCC member)

Bryan Nordlund, NMFS*

Bill Tweit, WDFW*

Jim Craig, USFWS*

Marcie Mangold, WDOE (on phone @ 10:00)

Carson Keeler, GCPUD (on phone @ 10:00)

Denny Rohr, Facilitator

Jerry Marco, CT* (on phone)

Bob Rose, YN*

Teresa Scott, WDFW*

Curt Dotson, GCPUD*

Debbie Williams, GCPUD (on phone)

Action Items:

1. Rohr and Dotson will discuss a northern pikeminnow fishing derby with Chelan PUD and the Wenatchee Rotary Club.
2. Dotson will talk with Chelan and Douglas PUD staff regarding a subyearling draft white paper.
3. Rohr will contact Tracy Hillman, FCWG facilitator, regarding attending the next PRCC meeting to discuss potential FCWG studies.
4. Mangold will discuss Fish Ladder Water Temperature monitoring plan with WDFW.
5. Dotson will discuss Fish Ladder Water Temperature concerns with Ross Hendrick.
6. Mangold will provide the correct interpretation of the 401 requirement defining whether a monitoring plan or a study plan is required for Fish Ladder Water Temperature, and if Wanapum Dam should be included in the plan.

7. PRCC members will send Fish Ladder Water Temperature comments and concerns to Rohr by February 04, 2010. Grant PUD will address issues and send answers back via email.
8. Dotson will draft a task authorization to conduct a FLIR flight by the contractor conducting the Predator Index Study.
9. Nordlund will send October 28, 2009 meeting minutes comments to Williams.
10. Marco will send November 23, 2009 meeting minutes comments to Williams.

Decisions:

1. PRCC members approved the 2009 Steelhead and Sockeye Acoustic Tag Survival Study (Skalski) Report.
2. PRCC members approved the 2009 Behavior and Survival Analysis of Steelhead and Sockeye through the Priest Rapids Project (Blue Leaf) Report.
3. The email vote approving the Draft 2010 Steelhead and Sockeye Acoustic Tag Survival Study Plan was affirmed by PRCC members.
4. Grant PUD will develop a list of annual reports that will be replaced by Executive Summary.
5. PRCC members approved the Executive Summary of the Avian Predation Annual Report.
6. PRCC members agreed to accept executive summaries in place of full annual reports for a trial period of two years. Presentations will be provided for each topic covered by executive summary.

Draft Meeting Minutes

- I. **Welcome and Introductions** – Rohr welcomed the Priest Rapids Coordinating Committee (PRCC) and asked PRCC members and visitors to provide self-introductions.
- II. **Agenda Review** – Rose requested that Northern Pikeminnow Fishing Derby be added to the agenda for discussion.
 - A. **Northern Pikeminnow Fishing Derby** - PRCC members discussed using \$10,000 to \$15,000 from the No Net Impact (NNI) Fund to hire a contractor to hold a northern pikeminnow fishing derby in the Wanapum Reservoir. The Wenatchee Rotary Club has conducted Chelan PUD's annual derby for the past eleven years. Concerns discussed include: public safety, permitting, and impacts to the predator index study currently being conducted. Positives included recreation and the removal of predators. **Rohr and Dotson will discuss the parameters of a northern pikeminnow fishing derby with Chelan PUD**

and the Wenatchee Rotary Club and report back to the committee.

- III. **Action Items Review** – Rohr reviewed and provided updates to action items identified during the November 23, 2009 PRCC meeting.
- IV. **Update: Fish Mode Operations** - This subject was presented at the November 27, 2009 PRCC meeting. Accordingly, Nordlund asked that before a Statement of Agreement (SOA) is drafted by Grant PUD requesting the ability to utilize the generating capacity in excess of the maximum operating limit established by “Fish Mode” for each turbine-generator, as Emergency Contingency Reserve capability, that additional biological aspects be looked at. Identification of the information to be reviewed needs additional discussion. Accordingly, this subject will be discussed further at the next PRCC meeting.
- V. **Action Item for Approval: Draft 2009 Steelhead and Sockeye Acoustic Tag Survival Study (Skalski) Report** – Dotson will incorporate PRCC members’ comments into the report. **PRCC members approved the 2009 Steelhead and Sockeye Acoustic Tag Survival Study (Skalski) Report.**
- VI. **Action Item for Approval: 2009 Behavior and Survival Analysis of Steelhead and Sockeye through the Priest Rapids Project (Blue Leaf) Report** - PRCC members appreciated the new format in which the report was provided and said this report represents “excellence in reporting”. Members discussed potential causes (i.e. environmental river conditions, water temperature, river flow) of salmonid behavioral differences as summarized in the report. **Nordlund and Rose will send comments to Dotson. PRCC members approved the 2009 Behavior and Survival Analysis of Steelhead and Sockeye through the Priest Rapids Project (Blue Leaf) Report.**
- VII. **Action Item: Draft 2010 Steelhead and Sockeye Acoustic Tag Survival Study Plan** – Committee members approved this Plan on November 23, 2009 subject to final comments and approval of Rose. Rose had no further comments and notified Rohr of his approval by email of December 3, 2009. Rohr requested affirmation of final approval of this Study Plan. Committee members approved.
- VIII. **Action Item for Approval: Draft 2010 Priest Rapids Steelhead and Sockeye Behavior Study Plan** - Dotson explained that the 1:20 model in Iowa will be completed the week of February 08, 2010. Dye will be used to test proposed operational options of Tainter Gate 22 (TG22). Dotson will present video taped findings at the next PRCC meeting and TG 22 operations will be discussed at that time. Nordlund asked that flow amounts be modeled to determine if attraction flows change, and that the dead spot identified in the tailrace be looked at relating to predation issues. Grant PUD will be looking at methods to evaluate flow during the 2010 behavior study. PRCC members approved the 2010

Priest Rapids Steelhead and Sockeye Behavior Study Plan with the understanding that TG-21 & 22 flows is still being discussed.

A. Options - Tainter Gate 22 - See discussion above, VIII.

- IX. **ACTION ITEM: Follow Up Discussion of White River Nason View Property Proposal** - PRCC members discussed the PRCC Habitat Subcommittee's (HSC) request for funding from the No Net Impact (NNI) Fund for this property acquisition. Rohr informed the PRCC committee members that the HSC had met on January 14, 2010 and discussed this subject further, subsequent to the PRCC decision on November 23, 2009 to not use NNI funds for this proposal. Accordingly, the HSC modified the request to that of NNI funding be used for one half of the previously requested \$388,790, and the remaining one half would be from the Habitat Supplemental Fund. Rohr stated to the PRCC committee members that because this property contains habitat for sockeye spawning, HSC members felt use of NNI funding was appropriate.

Additional PRCC committee members discussion focused on long term habitat planning and coordination of hatchery and habitat actions. The committee members requested that Rohr have further discussion with HSC members regarding habitat planning and coordination of hatchery and habitat actions and report back to the PRCC at the next meeting. Rohr suggested that a combined meeting of the PRCC and the HSC may be in order. Rohr will discuss the PRCC comments with the HSC members at their next meeting on February 12, 2010.

- X. **ACTION ITEM: Executive Summary of Avian Predation Annual Report** - Because the annual Progress and Implementation Report required by the Federal Energy Regulatory Commission (FERC) only requires executive summaries (ES), not annual reports, Grant PUD asked the PRCC to accept ES in place of other annual reports. PRCC members agreed to receive ES for a two year trial period. A final determination as to if the ES is meeting their needs will be made then. Because Nordlund isn't comfortable losing the rest of the information found in an annual report, he requested that presentations be given on each topic covered by ES. This year, Avian and Pikeminnow annual reports have been replaced by ES. **Grant PUD will develop a list of annual reports that will be replaced by Executive Summary.**

Executive summaries will include the following:

- Reference of original reports if reader wants study details.
- Methods used will be referenced as "the same in previous years". Exceptions from previous study methods will be presented in ES
- List referencing things that haven't changed.
- List referencing where all information related to the study plan can be found.

- Link all reports together.

PRCC members approved the Executive Summary of the Avian Predation Annual Report. PRCC members agreed to accept executive summaries in place of full annual reports for a trial period of two years. Presentations will be provided for each topic covered by executive summary.

- XI. **Review of Sub-Yearling Workshop** - All participants thought the workshop was beneficial, but it appears technology to conduct a sub-yearling survival study involving “reservoir survival” isn’t available at this time. The PRCC (and HCP) committee has not come to any formal conclusions as a result of attending the workshop. They were waiting to review the write-up from the workshop. Comments to workshop meeting minutes are being incorporated by the presenters, and will be circulated to the HCP and PRCC committees upon completion by Schiewe (HCP facilitator). Dotson explained that it was his understanding that this workshop would be taking the place of the ‘white paper’ that was going to be drafted by Chelan, Douglas, and Grant PUD’s, presenting the different aspects of tagging technologies presently available for conducting a sub-yearling survival study.

In an effort to coordinate what was learned at the workshop, following the workshop write-up review, **Dotson will discuss with Chelan and Douglas PUD staff that participated in the workshop the issue of further follow-up to the workshop with a draft white paper outlining future collaborative efforts to conduct a sub-yearling study. The white paper will discuss regulatory issues, known facts, a conclusion, and next steps.**

- XII. **Fall Chinook**

- A. **NNI Funding for Fall Chinook** - Rose questioned the committee’s comfort level with using No Net Impact (NNI) Funds to pay for fall Chinook studies in the Hanford Reach (HR) that won’t be funded by Grant PUD. He explained that Grant PUD accepts 20% responsibility for mortalities caused by inundated flows in the HR and have agreed to fund 20% of studies approved by the Fall Chinook Work Group (FCWG). The studies will help identify what is happening with flow fluctuations and what improvements need to be made. Regarding the amount of responsibility and funding (by Grant PUD), Dotson stated that he was not familiar enough with the details surrounding the HR and would need to speak with those in the Grant staff that are presenting working on that project and are the FCGW representative.

Tweit explained that HR fall Chinook spawning escapements have dropped to low levels in the past couple of years and have stayed there; “they aren’t doing so well”. He reiterated the

importance of investigating how habitat, harvest, hydro, and ocean productivity cycling is related to their decline. Tweit agreed Grant PUD isn't solely responsible for HR flow fluctuations, and appreciates the arbitrary number chosen to reflect Grant PUD's funding responsibility because it identifies the amount of additional funding that will be required to complete the studies. Additional funding sources were discussed.

Members discussed Bonneville Power Administrations (BPA) contribution to flow fluctuations in the HR and questioned how to illustrate their responsibility.

Because funding of HR studies would compete with other projects for NNI funds, members were asked to create a list of potential projects that might be funded with NNI funds.

XIII. INFORMATIONAL UPDATES: WebEx Presentations and Comment Deadlines

- A. A Study Plan to Evaluate Fish Ladder Water Temperature at PR Dam – LA 401 (a)(21)** - Carson Keeler presented a PowerPoint presentation via WebEx on this plan. Marcie Mangold, Washington Department of Ecology (WDOE) participated to answer questions. Comments were received by United States Fish and Wildlife Service, Washington Department of Fish and Wildlife and National Marine Fisheries Service. PRCC members questioned Grant PUD's interruption of the 401 Certification 6.6.2 requirements.

PRCC members questioned why Wanapum Dam fish ladder monitoring was not included in the study plan. Dotson explained that baseline fish ladder temperature data was collected from 2002-2004 at Priest Rapids and Wanapum dams. Because no significant increases from upstream to downstream temperatures were found in the ladders during those three years of baseline data collection studies and no modifications have been made to the Wanapum Fish Ladders, and no modifications are planned for the future, Grant PUD felt there was no need to include it in the study plan.

Grant PUD's interpretation of the requirement was to verify that changes (i.e. modifications) which are scheduled to take place to the fish ladders at Priest Rapids Dam don't have a negative impact on water temperatures in the ladders as compared to the baseline data. Grant PUD's plan included no additional monitoring after the initial testing, unless additional modifications to the ladder were conducted.

PRCC members interpretation of the 401 Certification (Section 6.6.2) is that temperature monitoring should take place above, below and in the middle of the fish ladders at both dams. They

also believe monitoring should occur on a periodic basis. **Mangold will discuss Fish Ladder Water Temperature monitoring with WDFW after further internal discussion.** Nordlund noted issues with data in Appendix A and suggests some further QA/QC take place before using it for comparison purposes. **Dotson will discuss Fish Ladder Water Temperature concerns with Ross Hendrick.** Nordlund and Scott anticipated a monitoring plan, not a study plan. **Mangold will provide the “correct” interpretation of the 401 requirement defining whether a monitoring plan or a study plan is required for Fish Ladder Water Temperature, and if Wanapum Dam should be included in the plan.** Nordlund suggests a temperature probe be placed in the ladder to continually monitor water. Mangold needs additional time to comment on the plan. **PRCC members will send Fish Ladder Water Temperature Study Plan comments and concerns to Rohr by February 04, 2010. Grant PUD will address those comments.**

Because the 401 Certification mandates that Grant PUD consult with both the PRCC and the Priest Rapids Fish Forum (PRFF), PRCC members requested that future plans have more review time allotted them. How future coordination takes place needs to be addressed. It was suggested that meeting minutes be shared between the two committees on issues that overlap. Rose advocates that in this case, the PRFF defers to the PRCC, as they don't have the technical ability to make decisions regarding fish ladders. Scott commented that communication between committee is key to making communication work.

- B. Shallow Water Habitat Water Quality Monitoring Plan (SWMP) – LA401 (a)(20) - Carson Keeler presented a PowerPoint presentation via WebEx on this plan. Marcie Mangold, WDOE participated to answer questions.**

Comments submitted by USFWS were addressed in the final draft. Monitoring locations were addressed. Mangold explained that a general representation of shallow habitat, not micro-habitat was the intent of the plan. The water standards don't call for shallow habitat monitoring at all and we have to be careful not to run into those areas because it goes against water quality standards, stated Mangold. Rose believes that water quality standards are also a component of the biological value or nexus, and thinks that in some of the micro climate shallow water, the warmer water could be attractive to pikeminnow and salmonids. He suggests that FLIR flights be flown to help determine where predators are setting up. If it's found that predators are setting up in a certain area, those areas could be addressed during the predator control study. Dotson explained

that Grant PUD already conducts beach seining to get rid of northern pikeminnow juveniles from such areas and didn't agree to the value of using FLIR flights. If the objective is northern pikeminnow removal, Grant PUD is already doing it. Comments are due by February 04, 2010. **After discussion, Dotson agreed to draft a task authorization to conduct a FLIR flight by the contractor conducting the Predator Index Study, thus removing the request of FLIR flights from the SWMP. The draft TA will be discussed at the February PRCC meeting.** PRCC members wanted to be made aware of any parts of the SWMP that the PRFF had concerns about, if any. If they have no issues, the PRCC will also approve it. Rohr will notify PRCC members of the PRFF's vote. If they vote "no", the reasons why will be discussed.

- C. **Aquatic Invasive Species Plan LA401(a)(22) – Informational Report** - Sent to PRCC at Tweit's request.

XIV. **INFORMATIONAL UPDATES: Presentations and Comment Deadlines** - The following reports were distributed for a 30 day comment period on January 08, 2010. They asked that those reports that are 'annual reports' (i.e. DPAAP, FOP, etc.) have a table added outlining changes made that year to the previous year's report.

- A. **Downstream Passage Alternatives Action Plan for 2010, LA401 (a)(1, 8, 9)** - Comments due February 08, 2010.
- B. **Fishery Operations Plan for 2010, LA 404** - Comments due February 08, 2010.
- C. **Progress and Implementation Report for 2009-10** - Comments due February 08, 2010.

XV. **UPDATES**

- A. **Record of the PRCC Studies and Reports**
- B. **Committee Reports** - Not discussed.
- C. **PR Left Bank Fish Ladder Maintenance** - Ladders maintenance and modifications for lamprey passage is going well and all ladders should be watered up and in compliance and operating by the first of April.
- D. The Iowa Model will be completed the week of February 08, 2010.

XVI. **Approval of Meeting Minutes**

- **October 28, 2009 - Nordlund will send comments to Williams.** Approved with changes by Nordlund.
- **November 23, 2009 - Marco will send comments to Williams.** Approved with comments by Marco.

XVII. **Next Meeting:** February 24, 2010, Grant PUD SeaTac Office



DRAFT Meeting Minutes

Priest Rapids Fish Forum

Wednesday, February 03, 2010

10:00 – 3:00 p.m.

Conference Call/WebEx

Technical Members

Stephen Lewis, USFWS
Bob Rose, Yakama Nation
Bob Heinith, CRITFC
Tom Dresser, GCPUD
Ben Lenz, GCPUD

Patrick Verhey, WDFW
Keith Hatch, BIA
Marcie Mangold, WDOE
Mike Clement, GCPUD

ATTENDEES: (*Denotes PRFF Technical member)

Patrick Verhey, WDFW*
Molly Hallock, WDFW
Steve Lewis, USFWS*
Bryan Nass, LGL
Alyssa Buck, Wanapum
Mike Clement, GCPUD*
Keith Garner, GCPUD
Kevin Malone, Facilitator

Chad Jackson, WDFW
Brad James, WDFW
Bob Rose, Yakama Nation*
Emily Anderson, Longview Assoc.
Ross Hendrick, GCPUD
Ben Lenz, GCPUD*
Debbie Williams, GCPUD

Action Items:

1. Pacific Lamprey Comprehensive Passage Evaluation Report comments are due by February 28, 2010.
2. Williams will send the Pacific Lamprey Comprehensive Passage Evaluation Report in Word format to all PRFF members.
3. Malone will send an email to Heinith asking for his approval of the Aquatic Invasive Species Plan.
4. Verhey will develop a list of plans that required coordination by the PRFF and PRCC.
5. Williams will send Grant PUD Natural Resources Annual and Non-Annual Reports to PRCC members.

6. Lenz, Clement, and Garner will determine if aquaculture practices are covered by Grant PUD's Section 10 permit, bull trout BiOp, or file with the Corp and USFWS.

Decisions:

1. PRFF members in attendance approved the Aquatic Invasive Species Plan.

Draft Meeting Minutes

- I. **Welcome and Introductions** – Attendees provided self introductions.
- II. **Agenda Review** – No additions were made to the agenda.
- III. **Action Item Review** - Action items were reviewed. A brief summary of each action follows:

#1 - Currently, the Priest Rapids Hatchery (PRH) is undergoing design modifications for future expansion. The existing National Pollution Discharge Elimination System (NPDES) for PRH is currently being reviewed by Grant PUD regulatory staff. It will be updated by June 2010. Because there will be a mutual point of discharge, the sturgeon hatchery that will be built at Priest Rapids hatchery will use the existing NPDES.

#2 - Lenz recommends use of sonic tags instead of JSAT tags because they have a 10 yr. tag life versus the JSAT's less than one year life.

- IV. **Pacific Lamprey Comprehensive Passage Evaluation Report** - Emily Anderson, Longview Associates, and Bryan Nass, LGL presented a PowerPoint presentation on the Pacific Lamprey Comprehensive Passage Evaluation Report. They explained that the report was written to be easily updated, and that new information will be easily identified in the future. Because the report was written, using all available basin wide lamprey literature, and communication with leaders in the field, it is the most complete, comprehensive lamprey document for the Priest Rapids Project (PRP), explained Nass.

Malone noted that cost effectiveness hasn't been defined by PRFF members yet, but needs to be. For this report, cost effectiveness was defined as "If the objective is applicable and reasonable at the PRP, then it was given a yes." If current technology isn't available to complete a project, "It was considered not cost effective", but Grant PUD is open to reevaluating technology/processes in the future. Clement stated "Grant PUD will evaluate the objective or issue from a common sense approach. If an idea makes sense and will help lamprey survival and passage, is reasonable and feasible, and is cost-effective, we'll likely implement it. Cost effectiveness will address particular components of the Pacific Lamprey Management Plan

(PLMP). If it's inconsistent with the PLMP, isn't reasonable, feasible, or not cost effective, then Grant PUD will object to doing it." Malone reminded PRFF members that in order to take an issue to dispute resolution, why something is, or is not cost effective must be explained. The 401 Certification discusses "cost effectiveness" in plans written for Grant, Chelan and Douglas PUD's. Members reviewed examples of how cost effectiveness was evaluated in the plan. Nass explained that at no time was a dollar value assessed to a project in order to determine cost effectiveness. PRFF members noted their approval of the plan so far. **Comments are due by February 28, 2010.** Received comments will be responded to and placed in the document prior to being sent to FERC on, or before March 31, 2010. **Williams will send the report in Word format to all PRFF members.**

V. **Pacific Lamprey Modifications s Update Presentation** - Clement showed pictures of modifications completed to date. Traps, orifice closure devices and ramps have been installed. Crowders will be installed by February 08, 2010. Members participating in the ladder modification tour should meet at Grant PUD HED @ 9:30 on Monday, February 8th. Left bank ladders will be watered after the tours and right bank ladders will then be taken out of service.

VI. **Aquatic Invasive Species Plan (AIS) -**

A **Vote to Approve** - Hendrick joined the meeting at 1:17 p.m. Comments were received from WDFW and WDOE. WDFW was happy with changes made to the plan. Hendrick explained that additional educational and monitoring, and more adaptive management was added to the draft plan. A motion to approve was made by Verhey, and seconded by Lewis. **Malone will send an email to Heinith asking for his approval. PRFF members in attendance approved the Aquatic Invasive Species Plan.**

VII. **Shallow Water Monitoring Plan - Rose approves the plan.**

A **Vote to Approve** - Comments are due tomorrow. PRCC members want the PRFF to approve this plan prior to PRCC approval. If they have no issues, the PRCC will also approve it. Rose requested that FLIR flights be conducted to gather temperature data. Grant PUD agreed to draft a Statement of Agreement authorizing the contractor conducting the PRCC Predator Index Study to conduct FLIR flights, thus removing the request of FLIR flights from the SWMP. USFWS, WDFW, and Wanapum approve the plan as written

VIII. **Priest Rapids Fish Ladder Temperature Modeling Plan -**

A **Vote to Approve Plan** - Interpretations as to what is required in the 401 Certification 6.6.2 were discussed at the January PRCC meeting. It was explained that PRCC members questioned why Wanapum Dam fish ladder monitoring was not included in the

study plan. Grant PUD staff explained that baseline fish ladder temperature data was collected from 2002-2004 at Priest Rapids and Wanapum Dams. Because significant increases in water temperatures from upstream to downstream were not found in the ladders, and because modifications have not, and are not being made to fish ladders at Wanapum Dam, Grant PUD felt there was no need to include it in the study plan. Grant PUD's interpretation of the requirement was to verify that changes made to fish ladders at Priest Rapids Dam do not impact water temperatures as compared to the baseline data. Grant PUD's draft plan included no additional monitoring after the initial testing.

PRCC members interpretation of the study plan was that temperature monitoring should take place above, below and in the middle of the fish ladders at both dams. They also believe monitoring should occur on a periodic (5-10 year) basis. PRCC members anticipated a monitoring plan, not a study plan. Based on the discussion with the PRCC and comments received to date, Grant PUD intends on modifying the plan to include monitoring at both dams on a more periodic (e.g. every 5 years) basis.

Because the 401 Certification mandates that Grant PUD consult with both the PRCC and the PRFF, PRCC members requested that future plans that require coordination between the two committees have more review time allotted them. How future coordination takes place needs to be addressed. It was suggested that meeting minutes be shared between the two committees on issues that overlap.

Rose does not plan to send comments, as Bryan Nordlund, the NMFS PRCC representative will be sending comments that cover his concerns. **Verhey will develop a list of plans that required coordination by the PRFF and PRCC. Williams will send Grant PUD Natural Resources Annual and Non-Annual Reports to PRCC members.**

White Sturgeon Update:

- B **Facility Construction Schedule** - Mike Nicholls will be the engineer in charge of construction. Because the intake siphon at Priest Rapids Hatchery feeds fall Chinook production and will need to be tied into for the sturgeon hatchery, the construction window of opportunity will be limited to late summer for the supply line to the sturgeon facility.

Nicholls hopes to have permitting level designs ready by the second quarter. The National Pollution Discharge Elimination System (NPDES) deadline for fall Chinook permitting at the Priest Rapids Hatchery is June 2010. The target completion date is for 2011, with operations starting in 2012. Verhey questioned who

will run the hatchery, and if plans for a residence are included. Lenz overheard that one of the three proposed residences at Priest Rapids Hatchery will be used for the sturgeon facility. The operator of the sturgeon facility could be determined by a Request for Proposal (RFP) based on sturgeon culture expertise. The contract will be awarded to the contractor who meets criteria outlined in the RFP.

Verhey questioned who will run the hatchery, and if plans for a residence are included. Lenz explained that one of the three proposed residences at Priest Rapids Hatchery will be used for the sturgeon facility. The operator of the sturgeon facility could be determined by a Request for Proposal (RFP) based on sturgeon culture expertise. The contract will be awarded to the contractor who meets criteria outlined in the RFP.

- C **January 7th Marion Drain Tour Review** - PRFF members toured the Yakama Nation (YN) Marion Drain Sturgeon Facility (MDSF) on January 07, 2010. Clement explained that Tom Dresser, Grant PUD and Paul Ward, YN have agreed that the MDSF will meet Grant PUD's sturgeon production needs until the Priest Rapids Sturgeon Hatchery is complete. If for some reason the YN can't meet Grant PUD's production timeline at the MDSF Grant PUD's intends to obtain fish from Cranbrook, B.C. Clement expects that WDFW and the YN will support that plan, otherwise, it would be unlikely that Grant PUD could meet its' goal of releasing 6500 yearlings into the Project reservoirs. A lot of construction and tasks remain: placing tanks, covers, incubation stacks, and staffing.

Lenz explained that Grant PUD and the YN have talked about what it will take to make it this happen, and are developing a scope of work that will be shared with the PRFF when it's fully developed. The timeline to moving this forward is critical. Broodstock collection is a large piece of the puzzle. Questions that remain to be answered include: Priest Rapids broodstock collection by Golder & Associates, Outline McNary broodstock collection efforts by the YN. WDFW is concerned that because these populations are small, they could easily be over mined. They requested that agencies collecting broodstock work in coordination with each other.

Clement noted that Chelan PUD will be working with the YN to collect broodstock from McNary and/or Priest Rapids Project reservoirs. Grant PUD will be targeting 8 ripe females, and an equal number of males, and might possibly collect milt regionally. James asked to have each program recognize the other, and maybe share male or females. Not have two completely separate programs. Chelan PUD might take their fish off site to either the

Ringold or Chelan Falls facility, noted Clement. Late October is when a final decision is necessary about using surplus juveniles from the Kootenay (Cranbrook) facility in British Columbia. The Lake Roosevelt Trans Boundary (LRTB) team would have to authorize something like that first, if MDSF doesn't come through. Ideally, MDSF would be working as early as possible. Lenz has provided genetics information to the LRTB team. WDFW must be in full support of LRTB fish, stated Lenz.

Lewis questioned when Grant PUD will get a request of concurrence for ESA and permitting processes. Lewis explained that sturgeon weren't covered in the Biological Opinion, and because fish are being added to an eco system that bull trout exist, Grant PUD will have to consult with the USFWS. Grant PUD possibly needs to do a Biological Assessment and submit it to USFWS. Lewis thought they would most likely give a concurrence. The question was raised as to whether or not there is a provision in the Section 10 permit for aquaculture practices? That's frowned upon stated Lewis. Lenz, Clement, and Garner will determine if releasing juvenile sturgeon, the action of concern to bull trout, in the Priest Rapids Project is covered by Grant PUD's Section 10 permit, bull trout BiOp, and if it is necessary to file with USFWS. It could be as simple as responding to the Corps for the Section 10 permit, stated Lewis. USFWS have a series of public meetings regarding BT critical habitat, noted Lewis.

- IX. **Next Meeting:** A place holder for the next meeting will be held for March 03, 2010. It will be determined at a later date if a conference call or meeting will be held.

Appendix B
Summary Table of Agency Comments to Grant PUD's Draft Shallow Water Habitat Water Quality Monitoring Plan

SUMMARY TABLE OF AGENCY COMMENTS AND GRANT PUD RESPONSES FOR THE TOTAL DISSOLVED GAS ABATEMENT PLAN (LA 401).

Submitting Entity	Date Received	Paragraph #	Agency Comment	Grant PUD Response
USFWS	25-Jan-2010 (e-mail)	1	Excuse me for this as I know it may largely be a subjective matter but I am having a little difficulty in resolving what constitutes "shallow water habitats" and whether or not this draft plan will completely meet the full intention of the 401 Water Quality Certification (WQC) requirement. For example, in several places the draft plan paraphrases what the WQC requires regarding this plan (i.e. "conduct a short-term study to evaluate DO, pH, and water temperature values in shallow water habitats"). But the WQC (Section 6.6.1(b)) actually goes a bit further requiring that this study include areas containing macrophyte beds. The last part of the WQC requirement regarding inclusion of areas containing macrophyte beds is missing from the draft plan and it is not clear if any of the monitoring sites will attempt to sample the water column over macrophyte bed areas. While the draft plan calls for sampling of shallow waters (e.g. data will be collected from the thalweg, right bank, and left bank locations every 1 m in depth down to 10 m, and then every 5 m thereafter) it seems clear most measurements will come from deeper water areas. When I think of shallow water habitats in a reservoir I do not think of 1 m deep in the mid-channel - I think of the littoral or edge habitats where water depth is usually shallow enough for light penetration and macrophyte growth. The draft plan also makes reference of the need to develop a study that is consistent with WDOE's water quality standards which are paraphrased as meaning samples must be taken in the dominant aquatic habitat, in well-mixed portions of the water body, and not in shallow, stagnant backwater areas. Those technical requirements make obvious sense and this draft plan should clearly meet that guidance but in meeting that standard is the WQC requirement for sampling over macrophyte beds being subordinated? There seems to be a bit of a paradox between the requirement of the WQC and DOE's own water quality standards. Perhaps this is simply a matter for DOE to clarify.	<p>The monitoring plan describes eight monitoring transects throughout the Wanapum and Priest Rapids reservoirs; at each transect samples will be collected at the thalweg (mid-channel) and near the left and right banks. These locations were selected for the following reasons: (1) Allows for direct comparisons with historical data, (2) are generally well-mixed, non-backwater areas, and (3) the thalweg locations, although not required as part of 401 WQC requirements, are helpful for comparisons with shallow locations (the thalweg is the typical location of measurement for water quality standards).</p> <p>The transect sites selected are within well-mixed areas of the river (e.g. no backwater eddies, stagnate water, etc) and thus are intended to meet both the requirements of the 401 WQC (monitoring in shallow waters) and WDOE's water quality standards (monitor in well-mixed, non-stagnant areas). Additional language was added to Section 3.2.2 to describe that the left and right bank monitoring locations will be done within littoral or edge habitats where water depth is shallow enough for light penetration and macrophyte growth.</p>
		2	Section 2.0 subsection 3. (d): Perkins et al. 2002 is not listed in literature cited section.	The Perkins et al. 2002 reference was added to the literature cited section.
		3	Section 3.1: draft report states that monitoring locations will be at the same locations used during the previous studies (1999 - 2001)	The monitoring locations for this plan will be the same as those used during the previous studies,

			and that may be the case but there are some differences between locations given in Figure 4 and Table 1. Granted most sample locations are similar and differences do not exceed 1.5 river miles but there are some differences in name and location.	with the exception of the left-bank location at the Hanson Creek transect (see footnote in Table 1). Figure 4 has been updated to accurately reflect the river miles and location titles listed in Table 1.
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