Grant County
PUBLIC UTILITY DISTRICT

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VIA ELECTRONIC FILING

January 21, 2019

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

RE: **Priest Rapids Hydroelectric Project No.2114-164**
License Compliance Filing – Article 401(a)(10) and (25) – 2018 Bull Trout Monitoring and Evaluation Plan Annual Report

Dear Ms. Bose,

Please find enclosed the 2018 Bull Trout Monitoring and Evaluation Annual Report consistent with the Requirements of Article 401(a)(10) and Article 401(a)(25) of the Priest Rapids Hydroelectric Project License, Washington Department of Ecology's (WDOE's) 401 Water Quality Certification Condition 6.2(5)(b), and U.S. Fish and Wildlife Service's (USFWS) Incidental Take Statement Term and Condition 2.

On June 4, 2009, the Federal Energy Regulatory Commission (FERC) issued an Order modifying and approving Public Utility District No. 2 of Grant County, Washington's (Grant PUD's) Bull Trout Monitoring and Evaluation Plan (BTMEP). Under this Order, Grant PUD is required to file annually with FERC by February 1, beginning 2010 and concluding 2014, an Annual Bull Trout Monitoring and Evaluation Report. On September 19, 2009, Grant PUD filed its Bull Trout Hydrologic and Water Quality Study Plan requesting that due to the similarities of Bull Trout Hydrologic and Water Quality Study Plan and the BTMEP that FERC consider Grant PUD combining the objectives of the Bull Trout Hydrologic Water Quality Study Plan with the approved Bull Trout Monitoring Plan. On February 17, 2010, FERC issued an Order modifying and approving Grant PUD's Bull Trout Hydrologic and Water Quality Study Plan. Under this Order, Grant PUD is required to include the water quality monitoring results with the Bull Trout Monitoring and Evaluation Annual Report. On April 10, 2014, Grant PUD submitted its updated BTMEP and on October 23, 2014, FERC issued an Order modifying and approving Grant PUD's updated BTMEP. Under this Order, Grant PUD is required to file annually with FERC by February 1, beginning 2015 and concluding 2019, an Annual Bull Trout Monitoring and Evaluation Report.

ADDRESS PO Box 878
Ephrata, WA 98823
PHONE 509 766 2505
FAX 509 754 6770
grantpud.org

This report includes monitoring results from the previous year including the number of bull trout observed or incidentally taken. On November 28, 2018, Grant PUD distributed this draft annual report for review and comment to the Priest Rapids Fish Forum including the WDOE, U.S. Fish & Wildlife Service (USFWS), Washington Department of Fish & Wildlife (WDFW), the Wanapum Indians, Colville Confederated Tribes, Yakama Nation, the Columbia River Inter-Tribal Fish Commission, Bureau of Indian Affairs, and the Confederated Tribes of the Umatilla Indian Reservation. No comments were received after a 30 day comment and review period. WDOE approved the BTMEP annual report on January 9, 2019 and is included in Appendix B.

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

Respectfully,

Ross Hendrick
Manager, License & Environmental Compliance

Enclosures: 2018 Bull Trout Monitoring and Evaluation Plan Annual Report

Cc WDOE Breean Zimmerman
USFWS permitsRIES@fws.gov
USFWS permitsWFWO@fws.gov

ADDRESS PO Box 878
Ephrata, WA 98823
PHONE 509 766 2505
FAX 509 754 6770
grantpud.org

2018 Bull Trout Monitoring and Evaluation Report for the Priest Rapids Project

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

January 2019

Executive Summary

The Public Utility District No. 2 of Grant County, Washington (Grant PUD) owns and operates Wanapum and Priest Rapids dams on the Columbia River, known collectively as the Priest Rapids Hydroelectric Project (Project), operated under the terms and conditions of the Federal Energy Regulatory Commission (FERC) Hydroelectric Project License No. 2114. The following report is in accordance with Grant PUD's requirements contained in the Bull Trout Monitoring and Evaluation Plan (BTMEP) and the Bull Trout Hydrologic and Water Quality Study Plan (BTWQP). Consistent with previous years, the reporting requirements for these plans have been combined into one report.

The goal of the BTMEP and BTWQP is to, on a yearly basis, monitor and evaluate bull trout (*Salvelinus confluentus*) presence in the Project and collect hydrologic and water quality data related to Project operations and acclimation activities. This information and these data are collected in order to evaluate the potential Project-related impacts on bull trout and to specify the basis for identifying measures Grant PUD will implement to address any Project-related impacts to bull trout.

The following summarizes results from 2018 efforts, followed by details in the main body of the document.

Bull Trout Observations

In 2018, one bull trout was observed passing the Priest Rapids Dam fish ladder count stations and two bull trout were observed passing the Wanapum fish ladder count stations between April 15 and November 15. No PIT-tagged bull trout were detected in 2018 at full duplex PIT tag detectors located in Priest Rapids Dam fish ladders. During spring Northern pikeminnow predator control program efforts, one bull trout was collected via set line as a mortality on May 14. It was scanned for a PIT tag and length was recorded. A brief explanation was provided via email to the USFWS office in Wenatchee, Washington concerning the incident and preventative measures taken to reduce the potential for mortality in the future. No other bull trout were observed during any other phase of juvenile bypass activities, turbine maintenance activities, fishway maintenance activities, White Sturgeon Program activities, Hanford Reach Fall Chinook Protection Program, hatchery activities, or any other activities in the Project. During screw trap operations in 2018, 21 bull trout were collected in the White River and no bull trout were collected in Nason Creek.

Hydrologic and Water Quality Monitoring

Grant PUD, in coordination with the Priest Rapids Fish Forum (PRFF) and U.S. Fish and Wildlife Service (USFWS) agreed to monitor and report daily averages of Project elevation (feet), discharge (thousand cubic feet per second (kcfs)), temperature (°Celsius) and total dissolved gas (TDG; percent saturation (%SAT)). Project operations/water quality daily averages are reported in Appendix A of this report.

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1.0 Introduction

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

Grant PUD operates the Project through the coordinated operation of a seven-dam system and other Columbia Basin entities with current operational agreements with the fishery agencies and other operators to provide protection and enhancement for a range of fisheries and other resources within and downstream of the project. These agreements include the Hanford Reach Fall Chinook Protection Program Agreement and the Priest Rapids Project Salmon and Steelhead Settlement Agreement. The Project is also subject to the provisions of the FERC license and related laws and regulations, as well as to the requirements (incorporated by reference in the license) of the Biological Opinion for the Priest Rapids Project issued by the National Marine Fisheries Service (NMFS) for its effects on anadromous salmon, the Clean Water Act Section 401 Water Quality Certification (WQC) issued by the Washington Department of Ecology (WDOE), and the Biological Opinion for the Project issued by the United States Fish and Wildlife Service (USFWS; 2007) regarding the effects of the Project on bull trout (*Salvelinus confluentus*).

A 401 WQC was issued by the WDOE on April 3, 2007, and amended March 6, 2008, for the operation of the Project. A new license for the Project was issued by FERC on April 17, 2008 (FERC 2008). Under FERC License Article 401(a)(10) and the 401 WQC (Section 6.2 (5)(b)), Grant PUD was required, in consultation with the Priest Rapids Fish Forum (PRFF), to develop and submit for approval a Bull Trout Monitoring and Evaluation Plan (BTMEP) within one year of issuance of the license. The BTMEP was implemented upon FERC approval on June 4, 2009. In accordance with the BTMEP, Grant PUD monitored for bull trout during all Project related activities where bull trout could potentially be seen or encountered in 2017. In addition, in accordance with FERC License Article 401(a) (25) and Reasonable and Prudent Measure 2 of the USFWS Bull Trout Biological Opinion for the Project (USFWS 2007), Grant PUD, in consultation with the Priest Rapids Fish Forum (PRFF), developed the Bull Trout Hydrologic and Water Quality Study Plan (BTWQP). The BTWQP was implemented upon FERC approval on February 17, 2010. The goal of the BTMEP and BTWQP is to, on a yearly basis, monitor and evaluate bull trout presence in the Project and collect hydrologic and water quality data related to Project operations. This information and these data are collected in order to evaluate the potential Project-related impacts on bull trout and to specify the basis for identifying measures Grant PUD will implement to address any Project-related impacts to bull trout.

The following sections present a summary of the results from Grant PUD's 2018 monitoring efforts under the BTMEP and BTWQP (note that FERC approved the combination of both reporting requirements into a single report with approval of the BTWQP on February 17, 2010).

2.0 Bull Trout Observations at the Priest Rapids Project

Monitoring for bull trout at the Priest Rapids Project occurs annually through: video fish count system monitoring at each dam, juvenile fish bypass activities, fish collected as a result of fishway and turbine maintenance, gatewell dipping, Hanford Reach Fall Chinook Protection Program implementation, Off-Ladder Adult Fish Trap (OLAFT) operations, and Northern

Pikeminnow predator control program. Semi-annual programs like the resident fish monitoring and White Sturgeon Program may also provide an opportunity to collect information on incidentally collected bull trout during years those programs are implemented.

The primary means Grant PUD uses to monitor bull trout at the Project is through video fish count systems at fish ladders. Grant PUD monitors fish passage 24 hours a day using videotape imagery of passage in each ladder at Priest Rapids and Wanapum Dams between April 15 and November 15 of every year. Staff records and reports passage of: Chinook salmon (*Oncorhynchus tshawytscha*), Coho salmon (*Oncorhynchus kisutch*), Sockeye salmon (*Oncorhynchus nerka*), steelhead (*Oncorhynchus mykiss*), American Shad (*Alosa sapidissima*), White Sturgeon (*Acipenser transmontanus*), Pacific Lamprey (*Entosphenus tridentatus*) and bull trout.

One bull trout were counted passing through the Priest Rapids count stations in 2018. At Wanapum count stations a total of two bull trout were documented passing through the ladders between May and early-July 2018 (Table 1)

Table 1 Bull trout observations at Priest Rapids and Wanapum Dam Fish Count Station in 2018.

Date	Time	Location	Size
5/17/18	13:41:03	Priest Rapids (Left Bank)	20 inches
6/6/18	17:35:53	Wanapum Left Bank	15 inches
7/8/18	13:37:10	Wanapum Left Bank	12 inches

Table 2 Annual number of bull trout Passing Priest Rapids and Wanapum Dam's Fish Count Stations (2007 through 2018).

Year	Priest Rapids Dam		Wanapum Dam	
	Left Bank	Right Bank	Left Bank	Right Bank
2007	0	1	1	0
2008	2	3	0	0
2009	5	1	3	0
2010	5	2	5	2
2011	5	3	9	3
2012	4	1	2	1
2013	9	1	10	1
2014	1	2	Unknown*	Unknown*
2015	1	3	6	0
2016	3	0	6	0
2017	0	0	1	2
2018	1	0	2	0
Note:* The fish count station at Wanapum Dam was inoperable.				

During spring Northern pikeminnow predator control program efforts, one bull trout was collected via set line as a mortality on May 14. It was scanned for a PIT tag and length was recorded. A brief explanation was provided via email to the USFWS office in Wenatchee,

Washington concerning the incident and preventative measures taken to reduce the potential for mortality in the future. The adult bull trout was 47 cm in length (fork length) and was untagged (PIT tagged; Figure 1).

Figure 1 Bull trout measuring 47 cm collected on May 14, 2018 during Northern pikeminnow removal efforts.

No other bull trout were observed during any phase of juvenile salmonid bypass activities, gatewell dipping, fishway and turbine maintenance activities, OLAFT operation, Northern Pikeminnow predator control activities, White Sturgeon Program activities, Hanford Reach Fall Chinook Protection Program, hatchery activities, or any other activities in the Project in 2018.

Figure 2 through Figure 4 provide photographs, location and date of each bull trout observed passing the Wanapum Dam's fish count stations.

Daily fish passage through Priest Rapids and Wanapum dams can be viewed at the following link: http://www.grantpud.org/environment/fish-wildlife/fish-counts

Figure 2 **A bull trout with an estimated length of 20 inches passing Priest Rapids left bank count station on May 17, 2018.**

Figure 3 **A bull trout with an estimated length of 15 inches passing Wanapum left bank count station on June 6, 2018.**

Figure 4 A bull trout with an estimated length of 12 inches passing Wanapum left bank count station on July 8, 2018.

3.0 Bull Trout Observations and Handling on Nason Creek and White River

Bull trout observations are documented in White River and Nason Creek as part of Grant PUD's spring Chinook hatchery supplementation programs (Figure 5). Rotary screw traps are operated primarily for spring Chinook salmon; however, incidental collections of bull trout are also documented and included in this report.

During rotary screw trap operations in 2018, no bull trout were collected from Nason Creek, while 21 were collected from the White River (Table 3).

Table 3 Bull trout data from Nason Creek and White River screw taps.

Nason Creek	Date	Species	Fork Length (mm)	Stage
	N/A	Bull Trout	N/A	N/A
White River	**Date**	**Species**	**Fork Length (mm)**	**Stage**
Trap B	5/2/2018	Bull Trout	N/A	J
Trap B	6/28/2018	Bull Trout	N/A	J
Trap A	7/2/2018	Bull Trout	140	J
Trap B	7/12/2018	Bull Trout	N/A	J
Trap A	8/11/2018	Bull Trout	61	J
Trap A	8/13/2018	Bull Trout	100	J
Trap B	8/18/2018	Bull Trout	N/A	J
Trap B	8/18/2018	Bull Trout	N/A	J
Trap B	8/31/2018	Bull Trout	N/A	J
Trap B	9/2/2018	Bull Trout	N/A	J
Trap B	9/3/2018	Bull Trout	N/A	J
Trap B	9/8/2018	Bull Trout	N/A	J
Trap B	9/11/2018	Bull Trout	N/A	J
Trap B	9/11/2018	Bull Trout	N/A	J
Trap A	9/18/2018	Bull Trout	209	SA
Trap A	9/30/2018	Bull Trout	500	A
Trap B	10/4/2018	Bull Trout	N/A	J
Trap B	10/6/2018	Bull Trout	N/A	J
Trap A	10/11/2018	Bull Trout	248	SA
Trap A	10/21/2018	Bull Trout	300	SA
Trap A	10/23/2018	Bull Trout	200	SA

Note: An "A" is used denote adult life stage. "SA" is used to denote the sub-adult life stage, consistent with previous Grant PUD reports for fish between 127 and 330 mm. A "J" is used to denote juvenile life stage.

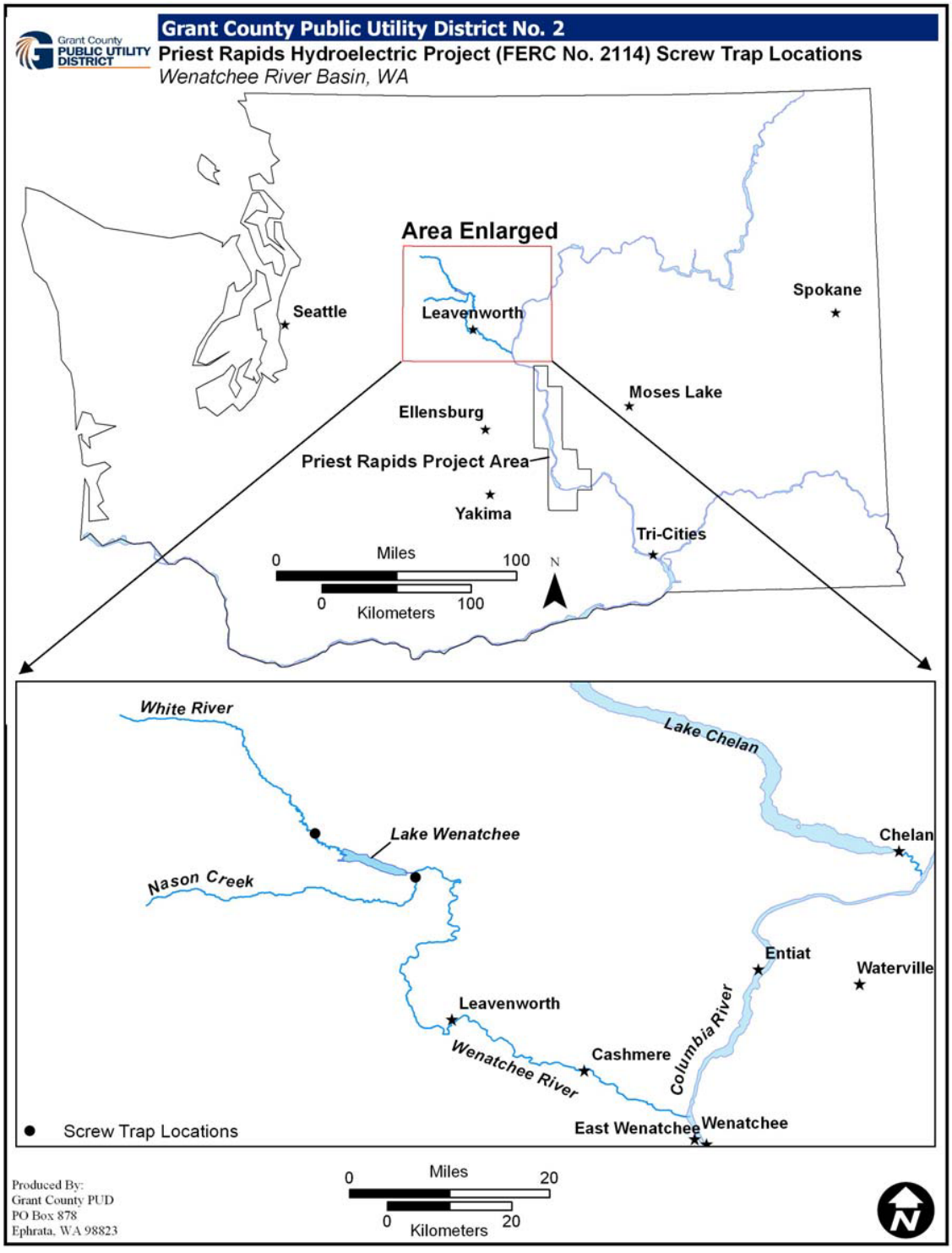

Figure 5 Screw Trap Locations on the White River and Nason Creek, Washington.

4.0 Hydrologic and Water Quality Monitoring

Per the 5-year Bull Trout Monitoring and Evaluation Plan (2014), Grant PUD monitors changes in Project elevation, discharge, temperature and total dissolved gas and report daily average values. Appendix A contains a listing of daily averages as recorded throughout the Project (Keeler 2018).

5.0 Summary

In 2018, bull trout monitoring occurred throughout all Grant PUD programs in accordance with the BTMEP, BTWQP, and Bull Trout Biological Opinion for the Project (USFWS 2007). Based on the number of bull trout encountered, Grant PUD did not exceed the total annual "take" limits based on the Biological Opinion for the Project (USFWS 2007), and a single lethal take was documented as a result of Grant PUD's 2018 operations. Table 4 below provides a summary of bull trout "take" in 2018 as defined by the Biological Opinion (USFWS 2007).

Table 4 Summary of 2018 reporting period take on bull trout.

Project Element	Type of Take	Lethal Take		Non-lethal Take	
		Adult	Juvenile/Sub-Adult	Adult	Juvenile/Sub-Adult
Turbine Operations	Harm or Harass	0	0	0	0
Juvenile Fish Bypass	Harm or Harass	0	0	0	0
Spill Operations	Harm or Harass	0	0	0	0
Adult Fishways	Harass	0	0	3	0
Hydrograph Variation	Harm or Harass	0	0	0	0
Predator Control	Harm or Harass	1	0	0	0
Nason Creek Smolt Trap	Harm or Harass	0	0	0	0
White River Smolt Trap	Harm or Harass	0	0	0	21
	TOTAL	1	0	3	21

List of Literature

Federal Energy Regulatory Commission, Order Issuing New License for Public Utility District No. 2 of Grant County, Docket Number P-2114-116 (April 17, 2008).

Keeler, C. 2018. Summary of 2018 Annual Fish-Spill Season and Total Dissolved Gas Monitoring. Prepared for Public Utility District No. 2 of Grant County, Washington. October, 2018.

National Marine Fisheries Service (NMFS). 2008. Endangered Species Act – Section 7 Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Consultation for the New License for the Priest Rapids Hydroelectric Project, FERC Project No. 2114. Portland, Oregon.

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

Appendix A
Project Operations/Water Quality Daily Average Data.

Table A-1 Wanapum Daily Averages.

Date	WAN Forebay			WAN Tailrace			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
4/15/2018	570.01	108.0	6.4	492.07	0.0	107.8	6.4
4/16/2018	570.01	108.2	6.5	492.07	0.0	107.7	6.5
4/17/2018	570.64	106.3	6.6	492.1	37.2	108.6	6.6
4/18/2018	570.78	106.1	6.7	492.96	61.8	112.0	6.7
4/19/2018	570.11	108.9	7.0	493.1	60.2	112.1	6.9
4/20/2018	570.82	110.8	7.1	493.26	52.0	113.4	7.1
4/21/2018	570.91	110.9	7.3	492.87	46.4	112.2	7.3
4/22/2018	570.99	110.7	7.5	492.85	55.8	111.9	7.4
4/23/2018	570.97	110.6	7.5	493.64	63.6	113.3	7.5
4/24/2018	570.81	112.7	7.9	493.07	41.6	111.8	7.7
4/25/2018	571.12	113.7	8.2	493.09	42.6	112.5	7.9
4/26/2018	571.23	113.8	8.4	493.26	55.9	113.7	8.1
4/27/2018	571.29	114.1	8.5	493.74	75.1	117.1	8.3
4/28/2018	571.22	112.4	8.5	493.92	78.7	117.2	8.6
4/29/2018	571.03	112.4	8.7	493.8	91.5	119.1	8.8
4/30/2018	570.79	113.2	8.9	494.55	70.2	116.1	8.9
5/1/2018	570.99	115.0	9.1	493.7	93.0	119.5	8.9
5/2/2018	571.16	115.1	9.0	494.91	101.9	120.8	8.9
5/3/2018	571.18	117.4	9.1	495.46	104.0	121.9	9.0
5/4/2018	571.03	118.5	9.2	495.32	94.8	120.6	9.2
5/5/2018	571.2	118.5	9.4	495.18	123.4	123.4	9.3
5/6/2018	571.37	119.7	9.4	496.99	98.6	121.2	9.4
5/7/2018	570.96	120.0	9.7	495.78	137.5	125.3	9.6
5/8/2018	571.18	122.1	9.8	497.53	127.9	124.8	9.7
5/9/2018	571.17	121.7	10.0	497.01	156.2	129.5	10.1
5/10/2018	571.06	119.7	10.1	497.71	139.4	125.9	10.2
5/11/2018	571.13	121.1	10.2	497.51	175.8	129.6	10.2
5/12/2018	571.12	125.4	10.6	499.14	216.9	136.6	10.5
5/13/2018	571.3	130.3	11.0	500.73	245.2	140.9	10.8
5/14/2018	571.28	132.0	11.1	501.26	249.7	141.0	11.0
5/15/2018	571.16	134.3	11.2	501.75	241.7	142.3	11.2
5/16/2018	570.99	133.6	11.4	501.36	227.9	141.9	11.4
5/17/2018	571.03	131.8	11.7	500.93	229.1	140.5	11.7
5/18/2018	571.09	130.2	11.9	500.23	239.1	139.3	11.9
5/19/2018	571.15	131.8	12.0	501.36	201.6	136.8	12.0
5/20/2018	571.22	132.0	11.9	500.44	214.4	138.8	11.9
5/21/2018	571.24	131.6	12.1	500.88	208.6	138.3	12.0

Date	WAN Forebay			WAN Tailrace			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
5/22/2018	571.23	133.6	12.3	500.51	219.2	139.5	12.2
5/23/2018	571.17	134.2	12.5	501.03	221.7	140.0	12.4
5/24/2018	571.09	132.2	12.7	500.8	231.0	139.5	12.6
5/25/2018	570.83	130.8	12.8	500.55	190.4	137.1	12.8
5/26/2018	571.14	124.8	12.9	499.6	174.9	133.7	13.0
5/27/2018	571.14	126.3	13.2	499.35	163.1	132.8	13.1
5/28/2018	570.89	125.3	13.3	498.74	172.7	134.0	13.3
5/29/2018	571.02	124.1	13.3	498.49	170.5	132.7	13.3
5/30/2018	570.57	125.0	13.4	498.95	146.4	130.3	13.2
5/31/2018	570.25	125.8	13.1	497.58	135.3	130.4	13.1
6/1/2018	570.48	121.8	12.9	496.21	150.4	130.0	12.8
6/2/2018	570.3	123.8	13.1	497.46	122.9	126.6	12.9
6/3/2018	570.82	126.0	13.1	496.98	123.3	127.7	13.0
6/4/2018	570.95	122.8	13.1	496.73	101.5	124.1	13.1
6/5/2018	570.76	123.1	13.5	495.62	109.6	125.5	13.3
6/6/2018	570.77	124.4	13.7	496.12	87.1	122.2	13.5
6/7/2018	570.75	123.8	13.8	495.4	74.5	121.4	13.7
6/8/2018	570.96	121.6	14.0	494.83	73.6	120.8	13.9
6/9/2018	571.05	118.7	14.0	494.56	75.1	119.4	13.9
6/10/2018	570.97	116.5	13.8	494.44	70.0	117.3	13.8
6/11/2018	569.01	116.3	14.0	494.43	64.3	116.5	13.8
6/12/2018	566.7	116.8	14.2	494.51	46.3	116.2	14.0
6/13/2018	565.83	117.5	14.3	493.54	38.3	115.9	14.2
6/14/2018	568.25	115.0	14.5	492.68	43.1	114.4	14.2
6/15/2018	570.11	115.7	14.6	492.92	47.4	115.8	14.4
6/16/2018	570.75	115.7	14.7	493.39	24.7	115.4	14.5
6/17/2018	570.63	116.1	14.9	492.65	18.6	115.3	14.7
6/18/2018	568.23	115.9	15.1	491.95	25.6	115.3	14.8
6/19/2018	568.29	117.1	16.0	492.26	19.2	115.1	15.2
6/20/2018	569.17	N/A	15.8	492.44	19.8	115.8	15.6
6/21/2018	570.05	108.4	16.1	492.33	19.9	115.9	15.9
6/22/2018	570.23	114.3	15.9	491.65	37.5	114.1	16.0
6/23/2018	571.03	112.7	16.4	492.86	31.9	112.9	16.1
6/24/2018	570.93	114.9	16.9	492.27	39.8	114.2	16.4
6/25/2018	571.17	113.2	16.6	493.4	60.4	117.4	16.6
6/26/2018	571.21	112.7	16.6	493.61	69.0	117.3	16.5
6/27/2018	571.13	115.0	16.5	494.13	81.9	119.7	16.5
6/28/2018	571.25	114.9	16.3	494.5	91.2	122.0	16.4

Date	WAN Forebay			WAN Tailrace			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
6/29/2018	571.04	113.7	16.1	494.44	52.4	115.7	16.1
6/30/2018	571.14	114.3	16.0	493.75	52.5	117.1	16.1
7/1/2018	571.18	112.7	15.9	493.33	20.2	113.1	15.9
7/2/2018	570.55	110.6	15.5	491.85	26.9	111.6	15.6
7/3/2018	570.23	112.4	16.3	492.34	18.8	112.0	15.7
7/4/2018	568.52	113.6	16.5	490.49	18.8	113.4	16.0
7/5/2018	568.52	114.4	16.9	489.99	18.7	113.4	16.2
7/6/2018	568.41	112.6	16.6	490.41	18.4	113.1	16.4
7/7/2018	568	112.5	17.0	490.14	20.0	113.3	16.6
7/8/2018	570.36	113.6	16.9	490.77	19.5	113.1	16.8
7/9/2018	569.55	114.0	17.4	490.51	20.2	114.2	17.1
7/10/2018	569.22	110.6	17.2	489.57	22.8	112.0	17.2
7/11/2018	570.11	111.8	18.0	492.1	18.9	112.3	17.3
7/12/2018	568.77	113.7	18.2	491.96	18.4	113.3	17.5
7/13/2018	567.9	114.3	18.5	491.53	19.2	114.1	17.8
7/14/2018	569.21	112.0	18.6	491.5	20.30	113.4	18.1
7/15/2018	570.8	113.2	18.8	491.19	19.7	113.9	18.2
7/16/2018	569.89	114.4	19.1	490.83	26.9	114.7	18.2
7/17/2018	570.94	114.1	19.1	491.55	20.1	114.3	18.4
7/18/2018	570.56	111.6	18.6	491.67	20.2	113.1	18.7
7/19/2018	570.56	111.3	18.7	491.02	19.5	112.7	18.7
7/20/2018	569.55	110.1	18.8	490.66	19.7	112.0	18.6
7/21/2018	569.92	110.5	18.9	490.96	19.9	112.1	18.6
7/22/2018	570.24	111.8	19.3	491.31	21.6	113.6	18.6
7/23/2018	570.33	113.6	19.5	489.73	33.5	113.9	18.6
7/24/2018	571.23	114.1	19.5	492.02	28.4	113.9	18.9
7/25/2018	569.38	114.0	19.8	491.44	22.4	113.5	19.2
7/26/2018	568.5	114.3	19.7	491.2	18.7	114.0	19.3
7/27/2018	568.37	115.8	20.0	490.83	18.9	114.7	19.2
7/28/2018	568.73	116.1	20.1	491.24	18.6	114.6	19.2
7/29/2018	568.23	115.9	20.0	490.93	18.7	114.5	19.3
7/30/2018	568.46	115.8	20.1	491.38	17.5	114.4	19.3
7/31/2018	566.63	116.1	20.3	491.15	18.4	114.6	19.3
8/1/2018	567.97	111.3	19.4	490.73	18.6	112.9	19.4
8/2/2018	568.26	109.9	19.5	490.32	17.7	112.4	19.4
8/3/2018	566.98	106.1	19.4	488.03	19.6	112.1	19.3
8/4/2018	568.3	108.4	20.0	487.07	30.0	112.8	19.5
8/5/2018	569.69	110.8	20.5	490.27	24.5	113.4	19.7

Date	WAN Forebay			WAN Tailrace			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
8/6/2018	570.18	110.7	20.7	490.15	18.6	112.7	19.8
8/7/2018	568.36	112.5	20.9	489.62	18.6	113.4	20.0
8/8/2018	568.23	113.1	20.9	489.35	18.9	113.5	20.1
8/9/2018	568.66	114.3	20.7	490.59	18.3	113.8	20.3
8/10/2018	567.88	113.8	20.7	490.85	19.1	113.6	20.4
8/11/2018	569.03	109.0	20.2	490.58	18.9	112.1	20.2
8/12/2018	568.75	106.9	20.2	487.85	19.3	111.3	19.8
8/13/2018	569.37	109.2	20.3	488.71	19.8	111.7	19.7
8/14/2018	570.03	112.5	20.1	489.79	18.2	112.2	19.7
8/15/2018	567.68	112.9	20.2	490.22	17.0	112.2	19.6
8/16/2018	565.94	111.6	20.2	489.59	16.8	111.1	19.7
8/17/2018	565.62	107.7	19.7	489.21	7.3	107.5	19.6
8/18/2018	566.71	107.2	20.2	487.77	1.7	104.1	19.7
8/19/2018	569.31	107.0	20.4	488.81	2.9	104.3	19.8
8/20/2018	570.33	105.7	19.9	488.58	11.4	106.6	19.8
8/21/2018	570.36	105.6	20.0	490.65	1.9	104.1	19.7
8/22/2018	569.98	106.3	19.6	490.79	1.3	105.0	19.4
8/23/2018	567.57	105.9	19.4	490.73	1.6	104.7	19.4
8/24/2018	568.91	103.7	19.3	490.4	2.0	102.9	19.2
8/25/2018	570.39	104.1	19.2	489.72	1.6	103.3	19.2
8/26/2018	568.69	102.1	19.0	491.27	1.2	101.3	19.0
8/27/2018	567.3	101.6	19.0	488.38	1.1	100.8	18.8
8/28/2018	567	103.0	19.1	489.8	1.2	102.4	18.9
8/29/2018	567.41	104.0	19.3	490.78	0.7	102.4	19.0
8/30/2018	565.93	101.5	19.2	489.44	1.0	100.9	19.1
8/31/2018	566.82	101.9	19.4	487.37	1.7	101.0	19.2
9/1/2018	569.07	101.5	19.5	488.78	1.8	100.0	19.2
9/2/2018	569.53	101.9	19.4	487.73	2.0	100.6	19.3
9/3/2018	570.15	101.4	19.8	489.01	1.5	100.2	19.4
9/4/2018	568.51	102.3	20.0	487.85	1.6	100.7	19.6
9/5/2018	568.88	103.5	20.1	488.42	1.6	101.2	19.6
9/6/2018	569.05	103.0	20.0	488.69	1.2	101.6	19.5
9/7/2018	567.41	101.1	19.6	488.55	0.9	101.6	19.5
9/8/2018	566.6	98.2	19.6	487.67	1.1	100.8	19.4
9/9/2018	567.34	101.6	19.7	486.52	1.5	101.1	19.5
9/10/2018	568.38	100.6	19.5	487.72	1.4	100.9	19.5
9/11/2018	568.16	100.3	19.5	487.91	1.3	100.2	19.3
9/12/2018	567.82	99.4	19.3	486.89	1.1	99.7	19.2

Date	WAN Forebay			WAN Tailrace			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
9/13/2018	567.25	100.2	19.1	486.81	1.1	99.9	19.0
9/14/2018	567.1	100.8	19.4	488.18	0.9	100.2	19.1
9/15/2018	566.55	101.4	19.1	487.55	1.0	100.5	19.1
9/16/2018	566.8	100.0	19.0	487.32	1.1	N/A	N/A
9/17/2018	567.11	100.6	18.9	486.1	0.9	102.1	18.7
9/18/2018	566.64	100.9	19.0	487.98	0.8	102.0	18.7
9/19/2018	566.11	100.7	18.7	487.1	0.7	102.0	18.6
9/20/2018	565.78	98.5	18.5	486.47	0.8	101.2	18.3
9/21/2018	566.28	99.8	18.5	485.89	1.0	101.0	18.3
9/22/2018	566.75	98.5	18.4	486.66	1.4	101.0	18.4
9/23/2018	568.09	98.8	18.2	486.37	1.6	100.4	18.1
9/24/2018	569.05	99.3	18.3	486.61	1.8	99.7	18.0
9/25/2018	569.57	100.8	18.4	488.75	1.4	100.2	18.2
9/26/2018	568.39	101.5	18.3	488.32	1.1	101.6	18.1
9/27/2018	567.01	103.9	18.3	488.47	0.6	102.8	18.0
9/28/2018	565.63	104.1	18.3	487.26	0.8	103.3	18.1
9/29/2018	566.24	103.6	18.1	487.47	0.9	103.1	18.1
9/30/2018	566.39	102.7	17.9	486.24	1.2	102.3	17.9
10/1/2018	567.71	103.0	17.8	487.01	1.0	102.4	17.7
10/2/2018	566.99	102.7	17.7	487.48	7.7	106.7	17.7
10/3/2018	567.5	101.2	17.5	487.85	0.9	100.9	17.4
10/4/2018	566.48	101.3	17.4	489.8	0.2	100.9	17.4
10/5/2018	564.12	99.9	17.1	488.35	0.2	100.2	17.1
10/6/2018	564	100.2	16.9	485.73	0.4	100.0	16.9
10/7/2018	564.75	99.2	16.8	487.56	0.3	99.4	16.8
10/8/2018	564.59	99.8	16.6	486.32	0.8	99.8	16.7
10/9/2018	566.06	99.7	16.5	488.57	1.0	99.9	16.5
10/10/2018	566.87	99.4	16.4	488.08	1.0	99.3	16.3
10/11/2018	566.74	98.7	16.2	490.01	0.5	98.6	16.2
10/12/2018	565.25	98.9	16.1	488.88	1.0	99.0	16.2
10/13/2018	566.72	98.0	16.0	488.9	0.9	98.2	16.0
10/14/2018	566.73	97.5	15.8	488.8	0.6	97.6	15.8
10/15/2018	565.51	98.2	15.8	487.13	0.7	97.7	15.8
10/16/2018	565.87	98.5	15.7	487.57	0.9	97.8	15.7
10/17/2018	566.61	98.7	15.6	487.01	0.8	98.2	15.6
10/18/2018	566.24	99.5	15.6	487.23	0.9	98.6	15.5
10/19/2018	566.56	98.7	15.5	487.29	0.7	98.6	15.5
10/20/2018	565.97	99.7	15.5	487.99	0.6	98.9	15.5

Date	WAN Forebay			WAN Tailrace			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
10/21/2018	565.39	99.2	15.5	487.02	1.2	99.0	15.4
10/22/2018	567.49	99.2	15.4	487.67	1.9	99.1	15.4
10/23/2018	569.89	99.2	15.3	488.72	2.4	99.8	15.3
10/24/2018	570.11	98.8	15.2	489.42	1.1	99.2	15.2
10/25/2018	567.37	98.4	15.1	487.71	0.8	98.5	15.2
10/26/2018	566.26	98.2	15.0	488.87	0.8	98.3	15.1
10/27/2018	566.36	98.4	15.0	488.52	0.8	97.9	15.0
10/28/2018	566.1	98.3	14.9	488.88	0.8	98.1	14.9
10/29/2018	566.24	97.3	14.8	487.99	0.8	97.5	14.8
10/30/2018	566.2	97.6	14.7	487.51	1.2	97.4	14.7
10/31/2018	567.64	98.0	14.7	489.58	1.3	98.2	14.7
11/1/2018	567.94	98.0	14.6	489.17	1.2	98.2	14.7
11/2/2018	567.69	98.6	14.4	488.54	1.2	98.3	14.5
11/3/2018	567.67	98.3	14.2	488.09	1.8	97.8	14.3
11/4/2018	569.75	98.8	14.2	488.76	10.5	100.4	14.3
11/5/2018	570.19	98.3	14.1	489.66	1.7	97.9	14.1
11/6/2018	569.26	97.8	13.8	489.17	1.8	97.5	13.8
11/7/2018	569.76	97.1	13.6	489.29	4.9	97.5	13.6
11/8/2018	570.29	96.1	13.5	490.82	8.8	97.0	13.6
11/9/2018	569.12	96.6	13.1	490.72	7.6	98.0	13.2
11/10/2018	569.66	96.5	12.9	491.07	7.8	97.2	12.9
11/11/2018	568.52	95.6	12.6	491.09	1.8	95.7	12.7
11/12/2018	568.04	96.1	12.3	490.3	1.6	95.9	12.3
11/13/2018	568.79	96.4	12.0	490.7	1.6	96.2	12.1
11/14/2018	568.86	96.3	11.7	489.26	1.7	96.0	11.8
11/15/2018	569.32	95.9	11.5	489.88	0.6	95.8	11.6

Table A-2 Priest Rapids Daily Averages.

Date	PRD Forebay			PRD Tailrace			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
4/15/2018	483.87	108.0	6.6	411.89	0.0	108.1	6.7
4/16/2018	483.87	106.4	6.6	411.89	0.0	106.5	6.7
4/17/2018	483.92	106.0	6.7	411.77	21.8	107.8	6.8
4/18/2018	483.7	112.3	6.7	413.35	42.8	112.4	6.8
4/19/2018	483.32	109.9	6.8	413.7	43.2	111.9	6.9
4/20/2018	483.68	113.4	7.1	413.26	39.1	113.3	7.2
4/21/2018	483.47	113.3	7.2	413.12	47.2	114.4	7.3

Date	**PRD Forebay**			**PRD Tailrace**			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
4/22/2018	483.39	110.9	7.3	413.26	60.0	113.8	7.4
4/23/2018	483.58	112.9	7.5	413.81	36.0	113.2	7.6
4/24/2018	483.47	112.6	7.6	413.5	49.7	114.5	7.8
4/25/2018	483.75	112.3	7.8	412.79	58.4	115.6	8.0
4/26/2018	483.7	113.3	8.0	413.27	60.7	115.6	8.2
4/27/2018	483.93	114.7	8.3	413.91	80.0	117.5	8.5
4/28/2018	483.78	115.9	8.5	414.41	85.5	117.5	8.6
4/29/2018	483.93	116.6	8.7	414.05	117.8	118.7	8.8
4/30/2018	483.67	116.1	8.8	415.25	77.3	117.6	9.0
5/1/2018	483.74	116.4	8.9	413.99	101.4	118.3	9.0
5/2/2018	483.71	119.7	8.9	415.78	120.7	120.1	9.1
5/3/2018	483.7	120.7	9.0	416.7	100.3	120.8	9.2
5/4/2018	483.41	119.3	9.1	416.8	117.8	120.5	9.3
5/5/2018	483.8	121.2	9.3	416.01	144.6	122.0	9.4
5/6/2018	483.65	121.9	9.3	418.53	127.7	122.1	9.5
5/7/2018	483.76	122.3	9.6	416.93	156.9	122.5	9.7
5/8/2018	483.85	124.2	9.6	419.19	145.1	123.8	9.8
5/9/2018	482.72	126.8	9.9	418.8	145.7	124.6	10.0
5/10/2018	483.51	124.6	10.1	419.31	170.9	123.8	10.2
5/11/2018	483.73	123.9	10.1	419.1	186.1	123.5	10.2
5/12/2018	483.73	131.8	10.4	420.69	207.5	128.1	10.5
5/13/2018	484.03	136.8	10.7	423.01	231.6	130.4	10.8
5/14/2018	484.23	137.9	10.9	424.26	241.7	131.6	11.0
5/15/2018	484.02	139.5	11.1	425.23	231.0	133.8	11.2
5/16/2018	483.77	138.0	11.4	424.77	237.7	132.0	11.5
5/17/2018	483.46	137.1	11.6	424.33	205.2	130.4	11.7
5/18/2018	483.76	136.4	11.8	423.34	213.1	130.6	11.9
5/19/2018	484.06	134.7	11.9	424.7	197.9	129.3	12.0
5/20/2018	484.03	136.0	11.9	423.43	210.5	130.2	12.0
5/21/2018	484.06	134.9	11.9	424.25	201.4	129.6	12.0
5/22/2018	483.72	137.2	12.1	423.77	204.7	131.0	12.2
5/23/2018	484.02	137.8	12.3	424.32	208.4	131.7	12.4
5/24/2018	483.93	135.9	12.6	424.28	213.7	130.1	12.7
5/25/2018	483.93	133.9	12.7	423.92	200.3	128.4	12.8
5/26/2018	483.99	128.0	12.9	422.14	201.8	126.1	12.9
5/27/2018	483.83	129.7	13.1	421.96	184.7	126.1	13.1
5/28/2018	483.61	128.2	13.3	421.3	182.2	125.7	13.4
5/29/2018	483.74	127.4	13.3	420.85	202.1	125.6	13.4

Date	**PRD Forebay**			**PRD Tailrace**			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
5/30/2018	483.97	128.2	13.2	421.52	153.9	125.1	13.2
5/31/2018	483.83	127.0	13.2	419.66	123.6	124.6	13.2
6/1/2018	484.08	126.7	13.0	417.51	146.3	124.1	13.0
6/2/2018	483.83	125.4	13.1	419.16	138.6	124.3	13.1
6/3/2018	483.65	125.5	13.2	418.81	136.4	124.0	13.2
6/4/2018	483.86	123.6	13.3	418.25	132.8	122.5	13.2
6/5/2018	483.87	122.6	13.4	417.19	129.4	122.1	13.4
6/6/2018	483.91	122.4	13.6	417.38	109.0	122.2	13.6
6/7/2018	483.71	121.2	13.9	416.73	102.8	121.2	13.8
6/8/2018	483.99	118.8	14.1	415.7	99.1	119.5	14.0
6/9/2018	484.01	117.5	14.0	415.22	108.7	119.7	14.0
6/10/2018	483.69	115.4	13.9	415.27	113.1	118.4	13.9
6/11/2018	483.91	115.4	13.9	414.92	86.9	117.8	13.9
6/12/2018	483.44	116.0	14.2	415.34	44.1	116.2	14.1
6/13/2018	483.66	115.6	14.4	413.55	39.8	115.3	14.4
6/14/2018	483.69	112.7	14.4	412.6	47.2	113.8	14.4
6/15/2018	483.72	113.1	14.5	412.67	56.4	114.7	14.6
6/16/2018	483.94	113.9	14.7	413.25	49.0	115.3	14.6
6/17/2018	483.64	114.2	14.9	412.54	19.7	113.2	14.8
6/18/2018	483.7	114.3	15.1	411.13	27.6	113.8	15.0
6/19/2018	483.45	114.3	15.4	411.82	19.1	113.4	15.3
6/20/2018	483.43	115.4	15.9	411.9	18.6	114.2	15.8
6/21/2018	483.21	114.6	16.1	411.84	19.6	113.6	16.1
6/22/2018	483.67	112.5	16.3	410.82	30.0	112.5	16.2
6/23/2018	483.99	110.7	16.4	412.42	21.3	110.9	16.3
6/24/2018	483.78	112.4	16.6	411.87	48.5	113.2	16.6
6/25/2018	483.97	113.1	16.8	413.18	63.4	114.8	16.8
6/26/2018	483.83	114.7	16.7	413.72	63.7	115.6	16.7
6/27/2018	484.27	115.7	16.7	414.63	87.5	117.7	16.7
6/28/2018	484.28	116.2	16.6	415.46	74.4	117.9	16.6
6/29/2018	483.89	115.6	16.4	415.79	66.7	116.4	16.4
6/30/2018	484.01	114.0	16.3	414.04	56.1	115.1	16.3
7/1/2018	483.92	112.6	16.3	413.52	22.8	112.9	16.3
7/2/2018	483.68	109.5	16.0	411.13	18.2	110.7	16.0
7/3/2018	484.02	108.0	15.8	412.2	12.1	109.1	15.7
7/4/2018	483.6	111.0	16.2	409.75	19.6	111.3	16.1
7/5/2018	483.68	112.6	16.5	408.61	19.7	112.2	16.4
7/6/2018	483.71	111.7	16.8	409.07	19.7	111.8	16.7

Date	**PRD Forebay**			**PRD Tailrace**			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
7/7/2018	483.73	110.9	16.9	408.89	20.0	111.2	16.8
7/8/2018	483.83	112.4	17.2	409.53	19.9	111.6	17.0
7/9/2018	483.8	112.6	17.5	409.4	21.5	111.8	17.3
7/10/2018	483.61	110.8	17.5	407.83	45.7	112.3	17.5
7/11/2018	483.75	110.1	17.6	411.45	18.8	109.9	17.5
7/12/2018	483.31	112.0	17.8	411.37	19.7	111.5	17.8
7/13/2018	483.74	113.0	18.0	410.68	19.7	112.2	18.0
7/14/2018	483.74	111.7	18.3	410.73	19.6	111.1	18.2
7/15/2018	483.67	112.2	18.5	410.15	19.5	111.3	18.5
7/16/2018	483.64	113.5	18.7	409.88	25.5	112.9	18.6
7/17/2018	483	113.5	18.7	411.14	19.3	112.5	18.7
7/18/2018	483.52	112.1	19.0	410.97	12.6	111.2	18.8
7/19/2018	483.06	110.9	19.0	410.66	13.6	110.6	18.8
7/20/2018	482.69	108.9	18.7	409.94	18.1	109.5	18.6
7/21/2018	482.97	109.5	18.7	410.05	19.0	110.0	18.5
7/22/2018	483.4	110.5	18.9	410.52	23.1	111.0	18.8
7/23/2018	483.94	113.3	19.0	407.92	34.7	113.5	18.9
7/24/2018	483.78	113.0	19.1	411.41	23.6	113.2	19.0
7/25/2018	483.39	112.8	19.3	410.97	19.1	112.4	19.3
7/26/2018	483.42	112.4	19.6	410.25	20.4	112.3	19.5
7/27/2018	483.98	113.3	19.6	409.6	19.9	113.2	19.6
7/28/2018	483.76	113.8	19.5	410.37	19.0	113.2	19.5
7/29/2018	483.37	113.4	19.6	409.94	18.8	113.0	19.6
7/30/2018	483.31	113.9	19.6	410.42	19.6	113.6	19.6
7/31/2018	483.63	114.3	19.7	410.1	19.9	113.8	19.7
8/1/2018	483.77	112.2	19.7	409.68	19.8	112.3	19.7
8/2/2018	483.73	109.4	19.7	408.92	19.3	110.8	19.6
8/3/2018	483.52	106.8	19.6	406.03	20.3	111.3	19.4
8/4/2018	483.94	108.5	19.5	403.84	22.5	111.2	19.4
8/5/2018	483.83	110.8	19.8	408.96	19.9	111.7	19.7
8/6/2018	483.76	112.2	20.1	408.57	19.0	112.7	20.0
8/7/2018	483.39	111.8	20.2	408.21	18.7	112.7	20.2
8/8/2018	483.25	112.7	20.4	407.51	19.0	112.9	20.3
8/9/2018	483.4	112.6	20.5	409.34	19.6	112.9	20.4
8/10/2018	483.64	113.0	20.7	409.45	19.8	113.2	20.7
8/11/2018	483.74	110.5	20.8	409.32	19.4	111.8	20.7
8/12/2018	483.57	108.0	20.3	405.53	20.0	111.2	20.3
8/13/2018	483.82	110.9	20.0	406.44	19.2	112.0	19.9

Date	**PRD Forebay**			**PRD Tailrace**			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
8/14/2018	483.46	111.2	19.9	407.9	19.5	112.0	19.9
8/15/2018	483.6	111.8	19.9	408.91	18.8	112.4	19.8
8/16/2018	483.31	111.8	19.9	407.92	19.4	112.6	19.8
8/17/2018	483.56	109.2	19.9	407.31	19.8	111.6	19.8
8/18/2018	483.75	106.7	19.7	405.07	6.5	109.7	19.6
8/19/2018	483.35	105.6	19.9	406.65	2.7	106.5	19.8
8/20/2018	483.74	105.9	19.9	406.68	21.7	109.1	19.8
8/21/2018	483.94	105.2	20.1	409.88	1.7	105.8	19.9
8/22/2018	483.67	106.0	19.8	409.78	1.3	106.3	19.7
8/23/2018	483.63	106.3	19.5	409.99	1.5	106.1	19.5
8/24/2018	483.67	104.2	19.2	409.44	1.7	103.9	19.1
8/25/2018	483.68	103.8	19.0	408.13	1.7	103.5	18.9
8/26/2018	483.63	103.2	18.8	410.66	1.7	103.1	18.8
8/27/2018	483.72	102.2	18.7	406.5	1.7	102.1	18.7
8/28/2018	483.49	103.2	19.0	408.6	1.7	102.7	18.8
8/29/2018	483.7	105.1	19.2	409.76	1.7	104.6	19.0
8/30/2018	483.67	103.9	19.0	408.4	1.7	103.7	19.0
8/31/2018	483.49	102.9	19.0	405.07	1.7	102.8	18.9
9/1/2018	483.53	102.7	19.1	406.9	1.8	102.5	19.0
9/2/2018	483.92	102.1	19.1	405.26	1.8	102.2	19.0
9/3/2018	483.8	101.8	19.2	407.28	1.8	101.9	19.1
9/4/2018	483.82	101.5	19.4	405.66	1.8	101.8	19.3
9/5/2018	483.87	102.1	19.6	406.38	1.7	102.4	19.5
9/6/2018	483.71	102.5	19.6	406.85	1.7	102.9	19.6
9/7/2018	483.65	102.6	19.6	406.76	1.7	103.0	19.6
9/8/2018	483.5	102.0	19.5	405.46	1.7	102.4	19.4
9/9/2018	483.58	101.5	19.3	403.45	1.8	102.4	19.3
9/10/2018	484.05	101.2	19.4	405.23	1.6	102.3	19.3
9/11/2018	483.45	99.3	19.1	405.99	0.9	101.7	19.0
9/12/2018	482.89	98.0	19.0	404.47	1.0	101.3	18.9
9/13/2018	483.4	98.8	18.8	404.22	0.9	100.8	18.8
9/14/2018	483.39	99.3	18.9	406.26	1.0	100.7	18.8
9/15/2018	483.37	101.0	18.8	405.34	1.8	101.3	18.7
9/16/2018	483.87	100.0	18.6	404.86	1.7	100.9	18.6
9/17/2018	483.54	100.0	18.6	402.9	1.1	100.5	18.5
9/18/2018	483.21	100.6	18.6	406.23	0.9	101.1	18.5
9/19/2018	483.18	101.2	18.6	404.91	0.9	101.5	18.5
9/20/2018	483.08	100.8	18.4	404.25	1.0	101.0	18.3

Date	**PRD Forebay**			**PRD Tailrace**			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
9/21/2018	483	100.9	18.2	403.04	1.6	101.4	18.2
9/22/2018	483.28	100.2	18.0	404.07	1.7	101.0	18.0
9/23/2018	483.41	99.3	17.8	403.18	1.7	100.1	17.8
9/24/2018	483.41	99.0	17.7	403.83	1.6	99.6	17.6
9/25/2018	483.31	99.8	17.9	407.17	1.6	99.9	17.8
9/26/2018	483.2	101.3	18.2	406.8	1.7	101.3	18.1
9/27/2018	483.63	102.2	18.2	406.41	1.6	102.3	18.2
9/28/2018	483.33	103.4	18.2	405.15	1.7	103.2	18.2
9/29/2018	483.49	103.6	18.1	405.04	1.7	103.5	18.1
9/30/2018	483.41	102.7	17.9	403.54	1.7	102.5	17.9
10/1/2018	483.46	102.4	17.7	404.21	1.7	102.5	17.7
10/2/2018	483.61	102.1	17.6	405.17	2.2	102.4	17.6
10/3/2018	485.06	101.4	17.4	403.9	2.8	101.4	17.3
10/4/2018	486.5	101.5	17.2	406.31	2.3	101.8	17.1
10/5/2018	485.29	100.0	17.0	405.84	2.3	100.6	16.9
10/6/2018	483.99	99.9	17.0	402.46	2.2	100.3	16.9
10/7/2018	484.9	99.2	16.7	403.21	2.1	100.2	16.7
10/8/2018	484.63	100.3	16.7	402.04	2.3	100.5	16.6
10/9/2018	485.29	99.8	16.5	405.04	2.4	100.4	16.5
10/10/2018	485.58	99.2	16.4	404.33	2.7	99.7	16.4
10/11/2018	486.24	98.8	16.3	406.86	2.5	99.5	16.3
10/12/2018	485.69	99.0	16.1	405.96	2.6	99.8	16.2
10/13/2018	485.99	97.9	15.9	405.61	2.5	98.9	15.9
10/14/2018	485.62	97.3	15.8	405.81	2.1	N/A	N/A
10/15/2018	484.63	97.6	15.7	404.03	1.8	98.3	15.6
10/16/2018	483.88	97.8	15.7	405.21	1.7	98.3	15.6
10/17/2018	483.45	98.1	15.6	404.46	2.0	98.8	15.6
10/18/2018	484.47	98.3	15.5	404.34	1.8	98.9	15.5
10/19/2018	483.76	98.2	15.5	404.52	2.1	98.7	15.4
10/20/2018	484.84	99.0	15.4	404.9	1.8	99.3	15.4
10/21/2018	483.95	99.2	15.4	404.36	2.1	99.8	15.3
10/22/2018	484.79	99.4	15.4	404.2	5.3	99.8	15.3
10/23/2018	485.36	99.4	15.3	405.69	2.9	100.6	15.3
10/24/2018	485.81	99.1	15.2	406.71	1.9	99.2	15.2
10/25/2018	484.03	98.7	15.1	405.75	2.0	98.6	15.1
10/26/2018	485.17	98.4	15.1	405.89	2.1	98.7	15.1
10/27/2018	484.75	97.8	15.0	406.11	2.1	98.4	15.0
10/28/2018	484.68	98.2	14.9	406.17	2.1	98.8	14.9

Date	**PRD Forebay**			**PRD Tailrace**			
	Elevation (ft)	TDG (%SAT)	Temp (°C)	Elevation (ft)	Discharge (kcfs)	TDG (%SAT)	Temp (°C)
10/29/2018	484.75	97.5	14.8	404.99	1.8	98.0	14.8
10/30/2018	484.17	96.9	14.5	404.76	3.8	98.3	14.5
10/31/2018	485.95	98.2	14.5	406.33	2.4	98.8	14.5
11/1/2018	485.5	97.9	14.6	406.73	2.1	98.4	14.6
11/2/2018	484.61	98.5	14.6	406.02	1.5	99.0	14.6
11/3/2018	484.23	97.8	14.4	405.71	1.9	98.6	14.4
11/4/2018	484.31	98.6	14.1	406.2	22.0	102.7	14.2
11/5/2018	485.1	100.6	14.1	407.03	9.6	102.9	14.1
11/6/2018	484.87	97.8	13.8	407.34	1.9	98.8	13.8
11/7/2018	485.19	97.0	13.5	406.56	15.1	99.6	13.6
11/8/2018	486.13	96.5	13.4	408.07	17.7	101.4	13.4
11/9/2018	485.97	98.2	13.2	408.24	28.1	102.9	13.2
11/10/2018	485.77	97.4	12.9	408.57	35.3	103.2	12.9
11/11/2018	485.44	95.9	12.6	408.99	25.3	101.5	12.6
11/12/2018	484.69	95.3	12.3	408.39	20.0	100.3	12.3
11/13/2018	485.18	96.0	12.0	408.42	1.8	97.6	12.1
11/14/2018	483.87	96.4	11.7	407.45	7.1	97.9	11.8
11/15/2018	484.28	96.0	11.5	408.21	15.1	98.4	11.6

Appendix B
Washington Department of Ecology Approval Letter

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
1250 W Alder St • Union Gap, WA 98903-0009 • (509) 575-2490

January 9, 2019

Mr. Tom Dresser
Fish, Wildlife, Water Quality Manager
Grant County PUD
PO Box 878
Ephrata, WA 98823

RE: Request for Ecology Review and Comment – *Draft 2018 Bull Trout Monitoring and Evaluation Report for the Priest Rapids Project.*
Priest Rapids Hydroelectric Project, FERC No. 2114

Dear Tom Dresser:

The Department of Ecology (Ecology) has reviewed the draft *2018 Bull Trout Monitoring and Evaluation Report for the Priest Rapids Project* sent via email to Ecology and the Priest Rapids Fish Forum group on November 28, 2018. The Report was developed in accordance with the *Bull Trout Monitoring and Evaluation Plan* and the *Bull Trout Hydrologic and Water Quality Study Plan*. The requirements are found in Appendix C, "Biological Objectives and Implementation Measures", of the 401 Certification.

Ecology has no comment on the draft *2018 Bull Trout Monitoring and Evaluation Report for the Priest Rapids Project.*

Please contact me at (509) 575-2808 or breean.zimmerman@ecy.wa.gov if you have any questions.

Sincerely,

Breean Zimmerman

Breean Zimmerman
Central Region Hydropower Projects Manager
Water Quality Program

cc: Debbie Firestone, Grant County PUD