

Priest Rapids Dam Adult Fishway PIT-tag Detection Annual Report 2008

Prepared for
The Public Utility District No. 2 of Grant County
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Executive Summary

The Priest Rapids Hydroelectric Project (Project) (FERC No.2114) is owned and operated by Public Utility District No. 2 of Grant County (Grant PUD). The Project includes two hydroelectric developments, Wanapum and Priest Rapids dams. Wanapum, the upstream development, consists of a 14,680-acre reservoir and an 8,637-foot-long by 186.5-foot-high dam spanning the 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 1,038 MW (FERC 2008). The Priest Rapids development consists of a 7,725-acre reservoir and a 10,103-foot-long by 179.5-foot-high dam spanning the 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; a powerhouse containing 10 vertical shaft integrated Kaplan turbine/generator sets with a total authorized capacity of 855 MW; and a fish hatchery (FERC 2008).

The Federal Energy Regulatory Commission (FERC) issued a license for the Project on April 17, 2008, which incorporated the terms and conditions of the National Marine Fisheries Service (NMFS) Biological Opinion (Biological Opinion). Terms and Conditions 1.19 of the Biological Opinion (adapted from Action 21 of NMFS 2004 Biological Opinion) specifically states:

FERC shall require Grant PUD to maintain and operate the PIT-tag detection system at Priest Rapids Dam. A PIT-tag detection system was established in the Priest Rapids Dam fishways in spring 2003. The system consists of two detection weirs in the non-overflow section of each fishway. Each detection weir has two submerged orifices, each equipped with a PIT-tag antenna (FERC, 2008, p. 170).

The Priest Rapids Dam PIT-tag detection system has 11 antennae. Four antennae are in each of two adult fishways and three are in the off-ladder adult fish trap. A total of 15,202 detections were recorded at Priest Rapids Dam in 2008, representing 4,134 unique tags within either Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), steelhead (*O. mykiss*), sockeye salmon (*O. nerka*), or northern pikeminnow (*Ptychocheilus oregonensis*). All detection data were automatically uploaded to the PIT-tag Information System database managed by the Pacific States Marine Fisheries Commission. The Priest Rapids detection system was monitored and maintained by Biomark, Inc. in coordination with Grant PUD. There were no detection system malfunctions experienced in 2008, and there are no anticipated changes to the system for 2009.

Table of Contents

1.0	Introduction.....	1
2.0	Site Description.....	1
3.0	2008 PIT-tag Detections Summary.....	4
4.0	2009 Operations	7

List of Figures

Figure 1	Plan view of upper regions of the fishways at Priest Rapids Dam showing location of PIT-tag detection antennae and associated identification numbers.....	2
Figure 2	PIT-tag antennae mounted to the upstream face of Weir 3 in the Priest Rapids Dam east-bank adult fishway.....	3
Figure 3	PIT-tag antenna mounted to the upstream side of the VFC box of Weir 7 in the Priest Rapids Dam east-bank adult fishway.....	3
Figure 4	Priest Rapids Dam OLAFT PIT-tag detection pipe with three antennae, prior to installation.....	4

List of Tables

Table 1	Summary of PIT-tag Detections at Priest Rapids Dam in 2008	4
Table 2	Summary of unique PIT-tag Detections by Array at Priest Rapids Dam in 2008 ..	5
Table 3	Summary of unique PIT-tag Detections by antenna at Priest Rapids Dam in 20085	
Table 4	PIT-tag detections at Priest Rapids Dam in 2008 by species and release location.	6

1.0 Introduction

The Priest Rapids Hydroelectric Project (Project) (FERC No.2114) is owned and operated by the Public Utility District No. 2 of Grant County (Grant PUD). The Project includes two hydroelectric developments, Wanapum and Priest Rapids dams. The Priest Rapids development consists of a 7,725-acre reservoir and a 10,103-foot-long by 179.5-foot-high dam spanning the 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; a powerhouse containing 10 vertical shaft integrated Kaplan turbine/generator sets with a total authorized capacity of 855 MW; and a fish hatchery (FERC, 2008).

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

2.0 Site Description

Priest Rapids Dam is located at Columbia River kilometer 638.9 and is the first dam upstream of the confluence of the Snake and Columbia rivers. The dam has two adult fishways, each with multiple non-overflow weirs in the uppermost sections. The adult PIT-tag detection system at Priest Rapids Dam is designed to detect upstream migrating fish bearing an ISO FDX-B PIT-tag (134.2 kHz). The PIT-tag detection system plans and specification document states the system is designed to be 95% efficient for the detection of Digital Angel's PIT-tag model TX1400ST or "supertag." Each fishway has two detection weirs located within the non-overflow sections (Figure 1). Each detection weir has two completely submerged orifices for fish passage equipped with PIT-tag antennae mounted to the upstream face of each orifice. Each antenna is controlled by a Digital Angel FS1001A Stationary Transceiver (Richmond & Anglea, 2008).



Figure 1 Plan view of upper regions of the fishways at Priest Rapids Dam showing location of PIT-tag detection antennae and associated identification numbers

The east-bank fishway detection antennae are located at weirs 3 and 7. The antennae at Weir 3 are mounted directly to the upstream face of the weir wall and are 0.61 m wide and 1.4 m high (Figure 2). The Weir 7 antennae are mounted to the upstream side of a video fish-counting (VFC) box that is attached to the upstream side of the weir wall (Figure 3). An aluminum transition piece separates the antennae from the steel surface of the VFC box. The inside dimensions of the antennae are 0.62 m wide and 1.14 m high.

The west-bank fishway detection weirs are located at weirs 3 and 5. Antennae at Weir 3 are mounted to a VFC box and are 0.57 m wide and 1.09 m high. Weir 5 antennae are mounted to the upstream face of the weir wall and are 0.56 m wide and 1.27 m high.



Figure 2 PIT-tag antennae mounted to the upstream face of Weir 3 in the Priest Rapids Dam east-bank adult fishway.



Figure 3 PIT-tag antenna mounted to the upstream side of the VFC box of Weir 7 in the Priest Rapids Dam east-bank adult fishway.

The Priest Rapid Dam OLAFT is located adjacent to the east-bank fishway. Fish enter the facility via an entrance channel located at the uppermost turning pool in the east-bank fishway. Fish ascend a steep pass ladder to enter the facility and pass through the OLAFT's PIT-tag detection system. The OLAFT PIT-tag detection system consists of three antennae (Figure 4). Each antenna has an inner diameter of 50.8 cm. The three antennae are identified as A1, A2, and A3, with antenna A1 being the first antenna through which fish pass.

Figure 4 Priest Rapids Dam OLAFT PIT-tag detection pipe with three antennae, prior to installation.

3.0 2008 PIT-tag Detections Summary

A total of 15,202 PIT-tag detections were observed at Priest Rapids Dam in 2008. Of these detections, 4,134 were from unique tags within five species of fish. Species of fish carrying PIT tags identified at Priest Rapids Dam in 2008 were Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), steelhead (*O. mykiss*), sockeye salmon (*O. nerka*), and northern pikeminnow (*Ptychocheilus oregonensis*). All detections and associated fish species are summarized in Table 1. A summary of unique detections by species and antenna array is presented in Table 2. Numbers of detections by species and release location are presented in Table 4.

Table 1 Summary of PIT-tag Detections at Priest Rapids Dam in 2008

Species	Unique Tag Codes	Number of Observations
Chinook	1,275	4,865
coho	84	401
steelhead	1,870	6,383
sockeye	903	3,535
northern pikeminnow	2	18
Totals	4,134	15,202

Table 2 Summary of unique PIT-tag Detections by Array at Priest Rapids Dam in 2008

Species	Detection Array		
	East Bank Fishway	West Bank Fishway	OLAFT
Chinook	1128	172	95
coho	47	26	11
steelhead	1699	186	51
sockeye	804	103	9
n. pikeminnow	0	2	0

Table 3 Summary of unique PIT-tag Detections by antenna at Priest Rapids Dam in 2008

Species	Antenna Number										
	1	2	3	4	5	6	7	8	A1	A2	A3
Chinook	374	708	580	618	123	49	108	88	86	91	91
coho	19	28	28	23	25	15	27	10	10	11	11
steelhead	753	915	975	811	111	74	127	70	47	49	51
sockeye	324	357	440	427	50	52	75	33	8	8	9
n. pikemnw.	0	0	0	0	1	2	1	2	0	0	0

Table 4 PIT-tag detections at Priest Rapids Dam in 2008 by species and release location

Release Location	Location name	Chinook	Coho	Steelhead	Sockeye	NPM
BEAV2C	Beaver Creek, Methow River			4		
BO2BYP	Bonnevillle Cascades Is. Ladder	3				
BONAFF	BON - Adult Fish Facility	788			862	
BUTCHP	Butcher Creek Acclimation Pond, Wenatchee River Basin		1			
CAMASC	Camas Creek, Middle Fork Salmon River			1		
CHEWUR	Chewuch River			2		
CHIP	Chiwawa Rearing Pond	19				
CHIWAR	Chiwawa River	1		39		
CHIWAT	Chiwawa River Trap, 0.5 km below CHIP acclimation pond	12		2		
CLARFP	Clark Flat Acclimation Pond	3				
COLR1	Columbia River - mouth to Three Tree Point, WA (km 0-49)	1				
COLR4	Columbia River - Bonneville Dam to John Day Dam (km 234-347)	1				
COLR5	Columbia River - John Day Dam to Snake River (km 347-522)	2				
COLR6	Columbia River - Snake River to Lower Crab Creek (km 522-661)					2
CROTRP	Crooked River Trap	1				
DAYP	Dayton Acclimation Pond			2		
DWORNF	Dworshak NFH, release into North Fork Clearwater River	1				
ENTH	Entiat NFH	5				
ENTIAR	Entiat River	6		7		
HATRCK	Hard Creek	1		2		
JDARFM	Middle Fork John Day River			1		
KNOXB	Knox Bridge	1				
LEAV	Leavenworth National Fish Hatchery	70	28			
LGRRBR	Lower Granite Dam			11		
LGRRBR	Lower Granite Dam			1		
LGRRBR	Lower Granite Dam	5				
LMNBYP	Lower Monumental Dam			1		
LOSTIR	Lostine River			1		
LSALR	Little Salmon River			1		
MCNGWL	McNary Dam	1				
MCNRRR	McNary Dam	1				
MCNTAL	McNary Dam	1				
METHR	Methow River	2		13		
METTRP	King County/Metro Environmental Lab			3		
NASONC	Nason Creek (tributary to Wenatchee River)		25	54		
NATCHR	Natches River		1			
OKANR	Okanogan River			2		
OMAKC	Omak Creek (tributary to Okanogan River)			6		
PAHP	Pahsimeroi Pond	1				
PESHAR	Peshastin River	1				
PLAP	Pittsburg Landing Acclimation Facility	1				
PRDH	Priest Rapids Hatchery	3				
PRDL1	Priest Rapids Hatchery			1367		
PRDTAL	Priest Rapids Dam	131				
RAPH	Rapid River Hatchery	1				
REDP	Red River Rearing Pond	1		2		
RI2BYP	RI2BYP	11		28	35	
RINH	Ringold Hatchery			2		
RISTAL	Rock Island Dam	113				
ROLFIP	Rolfing Acclimation Pond, Wenatchee River Basin		2			
ROZTAL	Roza Dam	1				
RRE	Rocky Reach Dam	1				
RRETAL	Rocky Reach Dam	16		1		
SATUSC	Satus Creek, Yakima River			3		
SNAKE3	Snake River - Clearwater River to Salmon River (km 224-303)	1				
STAPAC	Stapaloop Creek, in Okanogan River basin			6		
TOPPEC	Toppenish Creek			1		
TOUCHR	Touchet River			3		
TUCR	Tucannon River			4		
TUMFBY	Tumwater Dam	1		15		
TWIS2P	Twisp Acclimation Pond (Methow Salmon Recovery Foundation)			1		
TWISPR	Twisp River	4		15		
UMAR	Umatilla River			1		
unknown	unknown	1		1		
WALLAR	Walla Walla River			2		
WANTAL	Wannapum Dam	26				
WELH	Wells Hatchery	5				
WELTAL	WEL - Release into the Tailrace within 0.5 km downstream of Dam	18				
WENATL	Lake Wenatchee					6
WENATR	Wenatchee River		23	262		
WENATT	Wenatchee River Trap at West Monitor Bridge	7		3		
WINT	Winthrop National Fish Hatchery	6	4			

4.0 2009 Operations

There are no anticipated changes in the adult PIT-tag detection system at Priest Rapids Dam for 2009. Detection system components, configuration, operation, and maintenance will be the same as in previous years. In coordination with Grant PUD, Biomark, Inc. will continue to remotely monitor the detection system and will trouble shoot any problems that arise.

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Literature Cited

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

Richmond, R. J., & Anglea, S. M. (2008). *Priest Rapids Dam Adult Fishway PIT-Tag Detection Efficiency and Characterization of PIT-tagged Fish Passage in 2007*. Prepared for Public Utility District No. 2 of Grant County. Ephrata, WA.

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