
PACIFIC LAMPREY COMPREHENSIVE MANAGEMENT PLAN

First Draft

**ROCKY REACH HYDROELECTRIC PROJECT
FERC Project No. 2145**

October 11, 2004



**Public Utility District No. 1 of Chelan County
Wenatchee, Washington**

TABLE OF CONTENTS

SECTION 1: INTRODUCTION	1
SECTION 2: BIOLOGY AND ENHANCEMENT HISTORY	2
2.1 Life History	2
2.2 Species Status.....	2
2.3 Adult Fishway Counts.....	2
2.4 Spawning and Rearing	3
SECTION 3: EVALUATION OF PROJECT EFFECTS	4
SECTION 4: PROTECTION, MITIGATION, AND ENHANCEMENT MEASURES	5
4.1 Plan Goal.....	5
4.2 4.2 Findings to date.....	5
4.3 Pacific Lamprey Protection, Mitigation and Enhancement Measures.....	6
SECTION 5: LITERATURE CITED	9

SECTION 1: INTRODUCTION

As part of the relicensing of the Rocky Reach Hydroelectric Project, Chelan PUD and interested parties completed comprehensive review of current and future management priorities for fish resources potentially impacted by Project operations. Representatives from various organizations in the relicensing process formed the Natural Sciences Working Group (NSWG), principally U.S. Fish and Wildlife Service (USFWS), NOAA Fisheries (NOAA), Washington Department of Ecology (WDOE), Washington Department of Fish and Wildlife (WDFW), the U.S. Bureau of Land Management (BLM), U.S.D.A Forest Service (USFS), Colville Confederated Tribes (CCT), Yakama Nation (YN), Columbia River Intertribal Fish Commission (CRITFC), Chelan PUD, and other interested parties. As part of this process, the NSWG developed this Pacific Lamprey Comprehensive Management Plan (PLCMP) for Rocky Reach.

The PLCMP is designed to: 1) provide guidance for addressing ongoing project-related impacts on Pacific lamprey in Rocky Reach; 2) define specific management goals and objectives for the Rocky Reach Project area; and 3) develop a monitoring and evaluation program to assess the efficacy of management actions. The PLCMP will be reviewed on a periodic basis to allow for planning and future adjustments over the term of the license.

The overall goal of the PLCMP is to develop measures to address ongoing impacts on Pacific lamprey from Rocky Reach Project operations and facilities and monitor the effectiveness of these measures. The primary management objectives of the PLMP are to:

1. Address potential ongoing project-related impacts on upstream passage of adult Pacific lamprey;
2. Address potential ongoing project-related impacts on downstream passage of juvenile Pacific lamprey; and
3. Address potential ongoing project-related impacts on the current reservoir habitat regarding juvenile growth and abundance.

The following sections further describe specific strategies for achieving these objectives.

Following the effective date of the new license, the NSWG will continue to function as the Rocky Reach Fish Forum (RRFF). The RRFF shall be responsible for meeting to share information, coordinate efforts, and make recommendations regarding the implementation of the PLMP.

SECTION 2: BIOLOGY AND ENHANCEMENT HISTORY

2.1 Life History

The Pacific lamprey is a jawless anadromous fish widely distributed in western North America and eastern Asia. The fish are indigenous to the Columbia River system. In general, their historic distribution coincides with that of Pacific salmon. The current distribution in the Columbia River and tributaries extends to Chief Joseph Dam and to Hells Canyon Dam in the Snake River. The Pacific Lamprey is parasitic on various ocean fishes for 1 to 2 years. After maturing in the ocean, they migrate upstream in the Columbia in the summer/fall and spawn over a gravel nest, up to 2-ft in diameter, in shallow water the following spring. Adults die soon after spawning. Juveniles live in streams for 5 to 6 years before entering the ocean to become parasitic. They appear to have little impact on marine fish populations and do not feed when they move into streams to spawn.

2.2 Species Status

Conservation groups filed a lawsuit against USFWS to compel the agency to act on their January 27, 2003 petition to list four species of lamprey, including Pacific lamprey. On October 1, 2004, the USFWS initiated their 90-day finding process as part of the settlement with the conservation groups. It is currently unknown whether this will lead to ESA listing.

Over the past four years, Pacific lamprey adult counts at the mid-Columbia River dams have increased to levels similar to those observed in the 1960s. Counts from the 60s through the mid-70s showed a decrease with a leveling out of the counts through the 90s. Causes of population decline may include: 1) passage problems for adult and juvenile lamprey migrating past dams; 2) declining conditions of spawning and rearing habitat in freshwater; 3) a decline of the marine prey base; 4) industrial and agricultural pollution; 5) urbanization; 6) dewatering of streams; and 7) adult losses at sea (Close 2002, Moser and Close 2003).

2.3 Adult Fishway Counts

Pacific lamprey are observed in the adult and juvenile fish passage facilities of mid-Columbia River dams, with peak passage typically occurring between March and October. Mid-Columbia River populations of adult lamprey passing Rocky Reach dam ranged from about 1,000 to 17,000 from 1961 to 1969, then declined to less than 200 by 1976 (Mullan et al. 1986). The number of lamprey counted at Rock Island dam showed a similar decline, with counts stabilizing at about 400 per year from 1977 to 1982. However, over the past four years, lamprey adult counts at the mid-Columbia River dams have increased with Rocky Reach counts of 767, 805, 1,842, and 2,521 from migration years 2000 through 2003, respectively. Pacific lamprey adult counts at Rock Island dam were 822, 1,460, 4,878 and 5,000 for the same years.

2.4 Spawning and Rearing

There is no documentation that Pacific lamprey use the mainstem Columbia River for spawning. However, studies conducted in 2002 (Golder, unpublished), indicate that juvenile lamprey use the mainstem for rearing.

SECTION 3: EVALUATION OF PROJECT EFFECTS

Little specific information is known about the life history or status of lamprey in the Rocky Reach Project area. They are known to occur in the Wenatchee, Entiat and Methow rivers, and they migrate through the mainstem Columbia River. Adult passage is documented at the Rocky Reach and Rock Island fishways. It is unknown whether lamprey use the mainstem Columbia for spawning.

[Fill in after adult telemetry study is completed.]

SECTION 4: PROTECTION, MITIGATION, AND ENHANCEMENT MEASURES

4.1 Plan Goal

The goal of the PLCMP is to *develop measures to address ongoing impacts on Pacific lamprey from Rocky Reach Project operations and facilities and monitor the effectiveness of these measures*. The PLMP is intended to be an adaptive management approach where strategies for meeting the goals and objectives may be adjusted through a collaborative effort with the relicensing stakeholders based on new information and ongoing monitoring results. The plan is also intended to be consistent with other management plans in the mid-Columbia region.

The information in this section outlines the proposed protection, mitigation, and enhancement (PME) measures for Pacific lamprey through the life of new Rocky Reach license. The measures described below identify objectives and strategies for addressing ongoing project-related impacts on Pacific lamprey in the Rocky Reach reservoir.

4.2 Findings to date

The following key findings were obtained through Pacific lamprey observations in the Rocky Reach reservoir and tributaries as well as from other information sources.

- Lamprey use the adult fishways.
- Lamprey spawn in the tributaries.
- Juvenile rearing occurs in the tributaries, with juveniles also observed in the project area.
- Since the early 1990s, the total number of adults observed passing the project has increased.
- Lamprey (< 20 per year) have been found in the fishways during winter maintenance.
- Macrophthalmia (juvenile lamprey) are observed in the juvenile fish bypass.
- Most macrophthalmia that pass through the turbine intake are within 21 feet of the bottom (fyke net studies), and below the screens on units one and two.
- Studies indicate that because lamprey do not have a swim bladder and a flexible body shape, with no operculum, effects of two mechanisms that cause mortality to salmonids during turbine passage are minimal to lamprey.¹

¹ Tests at the Battelle PNNL showed no immediate external injuries or mortalities for lamprey exposed to rapid changes in pressure and lamprey did not suffer any ill effects at exposure to levels of high differential velocity that injured and/or killed juvenile salmon and shad. Thus, the effects of turbine passage induced pressure change and fluid shear do not appear to cause injury or mortality to juvenile lamprey. The effects of blade strike or indirect effects, such as increased vulnerability to predation following turbine passage, have not been tested. In studies of mortality to fish volitionally passing through a STRAFLO turbine (Annapolis Tidal Generating Station, head range from 1.4-6.8 m), no mortality or injury was observed in 20 sea lamprey captured in nets deployed in the turbine discharge (Gibson and Myers, 2002. Trans. Am. Fish. Soc. 131:623-633).

4.3 Pacific Lamprey Protection, Mitigation and Enhancement Measures

4.3.1 Objective 1

Address potential ongoing project-related impacts on upstream passage of adult Pacific lamprey.

Strategies for Objective 1

Strategy 1.1: *Active tag adult lamprey to determine the effectiveness of upstream passage facilities within three years of license acceptance.*²

- *Chelan PUD shall implement an adult lamprey telemetry study to identify potential upstream passage impediments in the Rocky Reach fishway.*

Chelan PUD shall:

- 1) Capture and insert active radio tags (2 month tags) in 150 adult lamprey (represents approximately 10% of the average annual ladder count, 2000-2004) from August through September, 2004;*
- 2) Install and maintain receiver arrays necessary to adequately monitor upstream passage through Rocky Reach;*
- 3) Track and monitor daily movements of tagged fish while in the Project area (dam and reservoir). Fixed receiver sites will be operational for monitoring upstream passage through the fishway and for evaluating the frequency of fallback at the dam. Mobile tracking via boat will be used for tracking in the Rock Island and Rocky Reach reservoirs;*
- 4) Compile tracking data to adequately determine fish locations and tag status. Prepare draft report for review by the RRF by the end of 2004.*
- 5) Coordinate telemetry monitoring with Mid-Columbia PUDs and applicable state and federal agencies.*

Strategy 1.2: *If significant upstream impediments are identified, Chelan PUD shall research and modify adult fishways, to enhance passage within 5 years of the effective date of the license.*

- Investigate technologies that have been implemented at other dams to address lamprey passage issues.

Chelan PUD shall:

- 1) Complete a literature investigation that evaluates the effectiveness of measures implemented at other hydroelectric projects for addressing lamprey passage;*
- 2) Evaluate feasibility of implementing lamprey passage improvement measures at Rocky Reach dam;*
- 3) If reasonable and feasible methodologies are identified, Chelan PUD will, in conjunction with the RRF, implement passage improvements at Rocky Reach dam;*

² An adult lamprey telemetry study was initiated at Rocky Reach in 2004. Additional telemetry may not be required at the time of license issuance.

- 4) Within one year following completion of upstream passage improvements, initiate a one-year program to monitor effectiveness of fish way modifications using methods described in Strategy 1.1; and
- 5) If monitoring results indicate that passage has not improved, Chelan PUD will work with stakeholders to develop a collaborative plan to determine the appropriate next-steps.

Strategy 1.3: *Chelan PUD shall implement an adult Pacific lamprey telemetry program to monitor adult upstream and downstream passage in the Project Area.*

- Every ten years for the term of the license (i.e. years 2020, 2030, 2040, etc.), Chelan PUD shall implement the monitoring program similar to that described in Strategy 1.1 for a one-year period. If passage issues are identified, Chelan PUD will work with stakeholders to develop a collaborative plan to address the identified problem.

4.3.2 Objective 2

Address potential project-related impacts on downstream passage of juvenile Pacific lamprey.

Strategies for Objective 2

Strategy 2.1: *Continue monitoring potential impingement of lamprey on turbine intake screens during the juvenile migration period to assure impingement remains negligible*

- Continue to use video equipment during weekly intake screen cleaning operations at turbine units 1 and 2. Evaluate videos taken during the downstream migration season.

Chelan PUD shall:

- 1) Videotape surface of vertical barrier and diversion screens during every deployment of the brush car. Label video tapes and maintain in a library at Rocky Reach;
- 2) Watch the real time video as the brush car is deployed and record and report any lamprey impingement;
- 3) Provide an annual report to the RRF summarizing all lamprey impingements observed in the videos.

Strategy 2.3 *Support regional research on assessing project effects on juvenile downstream migration.*

- During the term of the new license, Chelan PUD shall participate in information exchanges and regional efforts to explore methods to monitor downstream movement of juvenile lamprey through the project. If methodologies become available, Chelan PUD will, in conjunction with the RRF, evaluate and implement those methods as appropriate, for monitoring lamprey at Rocky Reach.

4.3.3 Objective 3

Address potential ongoing project-related impacts on reservoir habitat regarding juvenile growth and abundance

Strategies for Objective 3

- Strategy 3.1: Determine juvenile lamprey presence/absence and density in areas that may be affected by ongoing project operations within three years following acceptance of the new license.

Chelan PUD shall:

- 1) Use existing aerial photographs, bathymetry, shoreline slope, velocity, and substrate characteristics to segregate habitat types into those areas with high, medium, and low potential for use by juvenile lamprey;
 - 2) Assess presence/absence in areas that may be affected by project operations using electroshocking sampling (if permitted). If electroshocking is not permitted, alternative measures will be evaluated (Moser and Close, 2003. BPA Report DOE/BP-00005455-5);
- Evaluate the overall project impact. If significant project effects are identified, Chelan PUD shall work with stakeholders to develop a collaborative plan to address potential effects of ongoing project operations.

SECTION 5: LITERATURE CITED

Dauble, D.D., R.P. Mueller, T.P. Hanrahan, and D.A. Close. 2003. Use of Mainstem Habitats by Juvenile Pacific Lamprey. Bonneville Power Administration, FY 2003 Provincial Project Review; Project ID: 35006.