



# WARM SPRINGS NFH LAMPREY PASSAGE SYSTEM



## 2017 Installation

The USFWS hatchery Review Team recommended an evaluation of the barrier dam and fish ladder at Warm Springs NFH. The subsequent evaluation identified several structural deficiencies and recommended a structure for Pacific Lamprey passage.

In this collaborative project with the Confederated Tribes of Warm Springs Reservation and US Fish and Wildlife Service, a Lamprey Passage Structure (LPS) was designed and installed.

This is the first LPS installation at USFWS Facility. Operation begins May 2018.



### Operations

#### 2014 - 2016 Design + Fabrication

Collaborating with lamprey experts, a LPS design was selected. Design and fabrication was completed for \$65,000.

#### 2017 Sept Installation

Contractors installed the LPS by bolting it to the fish ladder. Divers were used to attach the underwater entrance.

#### 2018 April Pump + Exit Pipe Install

75 gal/min of water will be pumped to the upwelling box. A short exit pipe drops lamprey into the forebay.

#### 2018 April Operation Begins

As in other LPSs, we expect the first year to be a "seasoning year". Lamprey use is expected to increase in 2019.

#### 2022 Review + Modify

We will adaptively manage the LPS by reviewing success and continually make improvements.

### Monitoring

#### 2016 Apr-Sept Pre-LPS Lamprey Tracking Year 1

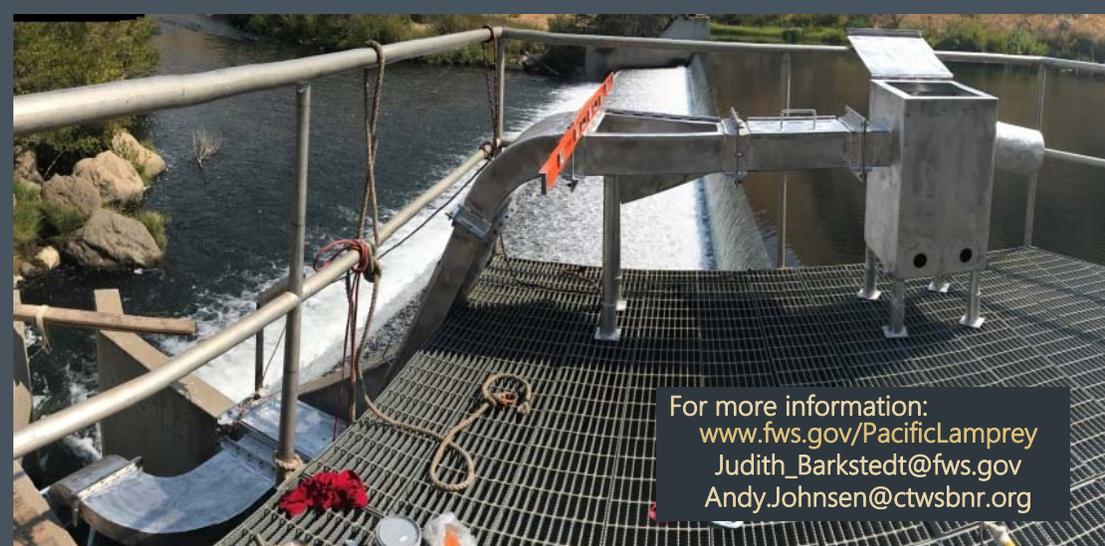
To determine if and how lamprey use the ladder before the LPS, we attempted to track movements. We set pot traps for 6 months to collect study fish. Only one lamprey was captured, PIT tagged, and released.

#### 2017 Apr-Sept Pre-LPS Lamprey Tracking Year 2

We captured 9 lamprey in pot traps and radio-tagged and tracked the movements of 6 lamprey.

#### 2018 & → Post-monitor

We plan to (1) count the number of lamprey moving through the LPS and (2) determine the % using the LPS vs. the ladder vs. not moving upstream.



For more information:  
[www.fws.gov/PacificLamprey](http://www.fws.gov/PacificLamprey)  
[Judith\\_Barkstedt@fws.gov](mailto:Judith_Barkstedt@fws.gov)  
[Andy.Johnsen@ctwsbnr.org](mailto:Andy.Johnsen@ctwsbnr.org)

## Project Goal

Increase lamprey passage at Warm Springs NFH

Does the LPS increase passage?  
How did lamprey use the ladder before the LPS?

**BEFORE** the LPS was installed, we answered the following questions:

Are lamprey **TRYING** to move **UPSTREAM**?

**YES.** We **TRAPPED** 9 lamprey in **JULY** to **SEPTEMBER** 2017 using pot traps at the entrance of the fish ladder.



What **ROUTE** is selected?

**3<sup>rd</sup> Turn Pool** This turning pool is the same elevation as the forebay and is the first feasible exit from the ladder.

How much **TIME** does it take to move through the ladder?

**< 1 HR** Lamprey spent little time in the raceway during successful upstream movements.

Is there a delay?

**9 HRS to 2.5 DAYS** Five lamprey attempted to enter the ladder the first night after their release. One lamprey took 2 days from its release before it moved into the ladder.



## LAMPREY PASSAGE SYSTEM

*PRE-MONITORING 2017*



**CAN** lamprey use the ladder?

**YES.** We **RADIO-TAGGED** 6 lamprey and tracked their movements.

Four lamprey moved upstream, we tracked 3 of those lamprey using the ladder.

**BUT** not all are successful.

Two lamprey tried to use the ladder, then remained **DOWNSTREAM**.



**3<sup>rd</sup> Turn Pool**

## Future Goals

**Determine** how many lamprey use the LPS.

We will count how many lamprey use the LPS by collecting lamprey in the holding box and monitoring with cameras.

**Estimate** the % of lamprey use the LPS.

We can compare how many fish use the LPS with how many fish use the ladder or did not move upstream.

**Identify** design improvements needed.

Do we need to modify the LPS entrance? Adjust the water flow? Add resting points?

**Assess** adverse effects on salmonids.

Using cameras, we can record if salmonids using the ladder are impacted by the in-water portion of the LPS.