

Final Study Plan

Klamath Hydroelectric Project

Interim Measures 7 Study Activities for 2023

July 18, 2023

Introduction

The Klamath Hydroelectric Settlement Agreement (KHSAs; as amended on November 30, 2016) includes Interim Measure 7 which requires PacifiCorp to provide \$150,000 of funding per year (as adjusted for inflation) for the placement of gravel into the Klamath River upstream of Copco Reservoir or "... other habitat enhancement projects that provide equivalent fishery benefits in the Klamath River above Copco Reservoir."

In 2021, PacifiCorp, with the support of the Interim Measures Implementation Committee (IMIC), adjusted the approach to the IM 7 funded projects to include work that may have a direct benefit to returning salmonids when dam removal occurs. In April 2023, PacifiCorp circulated the scopes of work for three proposed studies to the IMIC and solicited feedback on the IMIC's funding priorities. Based on the received feedback and the available 2023 budget, two project have been selected for funding. The two 2023 activities selected for funding in 2023 are Spencer Creek Exclusion Fencing and Part 3 of the Bypass Reach Fish Health Studies. Each of these are discussed briefly on the following pages.

1: Spencer Creek Exclusion Fencing

Submitted by: PacifiCorp

Funding source: IM 7

Purpose and Objectives

Late in the summer of 2021, a survey was completed of the exclusion fencing on PacifiCorp and Green Diamond property along the downstream-most 8 miles of Spencer Creek. This survey documented the location and condition of about 5 miles of fence in four main areas along Spencer Creek. The survey provided data on the type of fence and location of areas in poor condition or where animals were passing through the fence. In November 2021, PacifiCorp met with Green Diamond, Oregon Department of Fish and Wildlife (ODFW), and National Marine Fisheries Service (NMFS) to discuss the results of the fence survey and possible next steps. PacifiCorp proposed work on the three areas where existing fence completely enclosed areas of the creek. Together these three areas amount to just over 4 miles of fence. At the time, Green Diamond wanted to wait for the conclusion of the Reservoir Reach Tributary Assessment project that NMFS was leading before taking any additional actions. NMFS met with Green Diamond in February 2022 and Green Diamond was willing to support the repair of existing exclusion fencing on their property in 2023. In May 2023, PacifiCorp and Green Diamond met with three prospective fencing contractors for a pre-bid site visit. Bids were received from all three and Hepper Construction was selected as the winning bid.

Tasks and Work Elements

The work to be completed would include the repair of existing fence line. Hepper Construction (Contractor) will repair the roughly 4.1 miles of fence in the three identified areas. The goal of this work would be to create fences that are not permeable to cattle, thereby protecting the Spencer Creek riparian area from grazing impacts.

Task 1. Mobilization. The Contractor will work in conjunction with PacifiCorp and Green Diamond to identify the appropriate access routes and staging and storage areas that do not conflict with Green Diamond activities. Staging and storage areas and access routes may be different for each area in which work is occurring. Once staging areas have been identified, the Contractor will mobilize to the site.

Task 2. Exclusion fencing. The Contractor will construct or repair cattle exclusion fencing at the Designated Areas along Spencer Creek according to detailed standard design specifications developed in discussion with Green Diamond and ODFW. The Contractor will repair and re-tension fencing where possible. When repair is not possible, fence will be replaced with 4-strand cattle exclusion fencing per the established standard design. All replacement segments will be in the same location as the existing fence. Vegetation clearing will be limited to the absolute minimum necessary to safely install or repair the existing fence. No trees will be cut without prior written authorization from PacifiCorp or Green Diamond (on their respective properties). Fencing will not be attached to trees or other vegetation and any existing fencing on a tree will be removed and attached to an adjacent post. Excess spoils from post holes will be distributed evenly in the immediate vicinity of the post following post installation.

Task 3. Demobilization. Upon completion of fencing work, the Contractor will remove all debris, trash, and extra materials from the work area. This includes all removed fencing and posts. Staging areas will be clean and undamaged at the conclusion of the work.

2: Bypass Reach Fish Health Studies – Part 3

Submitted by: Oregon State University

Funding source: IM 7

Purpose and Objectives

Dam removal and fish repopulation will affect the distribution and abundance of both pathogens and their fish hosts and thereby alter pathogen effects. Exposures will occur via two pathways: 1) Both adult and juvenile salmonids will be exposed to novel pathogens in the Upper Basin (upstream of Iron Gate Dam); and, 2) resident Upper Basin fishes will be exposed to pathogens associated with the new in-migrants. Pathogen data are lacking in the Upper Basin as ODFW fish health assessments have been opportunistic and not comprehensive. This project continues to address this knowledge gap, aid in understanding the current pathogen distribution, and if appropriate, allow for proactive management of potential effects of pathogens on salmonids after dam removal.

Tasks and Work Elements

This project will add data to an existing research effort led by Oregon State University that will: 1) Aid in the quantification of waterborne parasite densities to document parasite spatial and temporal distribution (Task 1); and, 2) Conduct invertebrate host (annelid) studies to document host density and infection (Task 2) in the Klamath River hydroelectric reach from Keno Dam downstream to Copco Reservoir (the Project Reach). These data will inform reintroduction and restoration efforts by laying the groundwork for development of a disease risk assessment (Task 3) for Steelhead, Coho, and fall and spring-run Chinook Salmon that are expected to reestablish in the upper basin following dam removal. These funds support a third year of data collection, sample processing, and data analysis for the following tasks.

Task 1: Determine the spatial and temporal distribution and density of salmon parasites in the Project Reach.

Project funds will be used to quantify waterborne parasite densities to document parasite spatial and temporal distribution and to conduct invertebrate host (annelid) studies to document host density and infection in the Project Reach. These data will inform reintroduction and restoration efforts by laying the groundwork for development of a disease risk assessment for Steelhead, Coho, and fall and spring-run Chinook Salmon that are expected to reestablish in the upper basin following dam removal. The sites to be sampled in 2023 are the same as those sampled in 2021 and 2022:

1. Klamath mainstem at Keno Eddy (lower Keno Reach)
2. Lower Spencer Creek
3. Klamath mainstem below J.C. Boyle Dam
4. Klamath mainstem above J.C. Boyle Powerhouse
5. Klamath mainstem Frain Ranch (Peaking Reach above Caldera Rapid)
6. Klamath mainstem below Shovel Creek

Site selection was based on predicted migration routes after reintroduction, available spawning/rearing habitat, and longitudinal water sampling conducted in 2018 - 2020 that measured *Ceratonova shasta* density. All sites will be sampled one each month (May-Oct 2023). Water samples will be filtered for parasite quantification and environmental DNA quantification.

This data will provide information relevant for Coho Salmon, which are predicted to repopulate the Klamath River up to and including Spencer Creek, spring and fall-run Chinook Salmon, and Steelhead, which are expected

to congregate just upstream of Keno Eddy before migrating further. Chinook are expected to spawn in the mainstem near these sites.

Task 2. Determine the pre-dam removal distribution and infection prevalence of salmon parasites in annelid hosts in the Project Reach. Annelid host distribution and infection dynamics within the Project Reach are not well understood, but will directly impact salmonid reestablishment as salmonids will pass through, if not spawn within this river section following dam removal. Work in this task will lead to the collection, processing, and analysis of benthic invertebrate samples to measure habitat use and relative density of *Manayunkia occidentalis*, the benthic invertebrate host in the *Ceratonova shasta* life cycle. More specifically, this task will investigate how the distribution of *M. occidentalis* correlates with current and future *C. shasta* and *Parvicapsula minibicornis* densities and genotypes in water samples (measured in Task 1). The goal of this task is to lay the foundation to be able to evaluate the effects of dam removal on the spatial distribution of hosts within the Project Reach as well as evaluate before and after effects by examining changes over time at established index sites within the Project Reach.

Task 3. Produce risk maps for infectious disease in salmonids utilizing the Project Reach. Data from Tasks 1 and 2 collected across different water years will be used to produce risk maps that delineate areas of the Project Reach where high densities of annelids, infected annelids, waterborne parasites, and predicted salmonid spawning/outmigration/rearing overlap. These will be used to inform the planning of habitat restoration projects.