2019 PROJECT PLAN

Priest River Coldwater Bypass Alternatives Assessment

Project Contact

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Project History

This is a continuing project, first approved for 2018. There are no changes to the budget. Reporting timelines have been updated for 2019.

The first phase of the project, contracted by the Kalispel Tribe with Bonneville Power Administration (BPA) funding, and completed in 2014, resulted in a stream temperature and flow model developed by the Water Quality Research Group at Portland State University (Berger et al. 2014). This hydrodynamic model predicted that replacing a portion of the epilimnetic water released from the Priest Lake Outlet Dam with cold water from the hypolimion would result in up to a 10°C decrease in late summer stream temperatures. Temperature reductions would primarily benefit the most stenothermic native salmonids in the Priest and Pend Oreille systems, namely migratory bull trout and westslope cutthroat trout (*Oncorhynchus clarkia lewisi*) which inhabit Lake Pend Oreille. The Idaho Department of Fish and Game alternatives analysis is needed to better assess bypass feasibility, cost, and public interest, and ultimately inform whether or not they will further pursue this potential project.

Background

Lower Priest River begins at the outlet of Priest Lake in northern Idaho. The stream flows 45 miles south to its confluence with the Pend Oreille River, upstream from Albeni Falls Dam (Figure 1). Priest River is hydrologically connected to Lake Pend Oreille with no barriers to fish movement, and like a number of other Idaho tributaries to the system, provides spawning and early rearing habitat for Lake Pend Oreille bull trout. Native westslope cutthroat trout also inhabit Lower Priest River.

Streamflow in Lower Priest River is regulated by the Priest Lake Outlet Dam, installed in 1950 and operated by the Idaho Department of Water Resources. This low-head dam is operated to maintain lake levels at 3.0 ft during summer recreation season (USGS gage no. 12393000) in accordance with Idaho Code §70-507. Dam operations target a discharge of at least 60 cfs to Lower Priest River during the recreation season.

Lower Priest River is characterized by high-quality structural fish habitat, consisting of a desirable balance of large wood, pools, and riffles. The entire 45 mile length is federally listed as critical habitat for bull trout. Furthermore, ample spawning and rearing habitat for native salmonids exists in the Priest River tributaries. Nonetheless, a comprehensive survey of the mainstem river found lower-than-expected salmonid densities given the habitat available (Fredericks et al. 2011). Average salmonid densities were less than one-tenth of the densities observed in the Coeur d'Alene River, a river of similar size and habitat complexity.

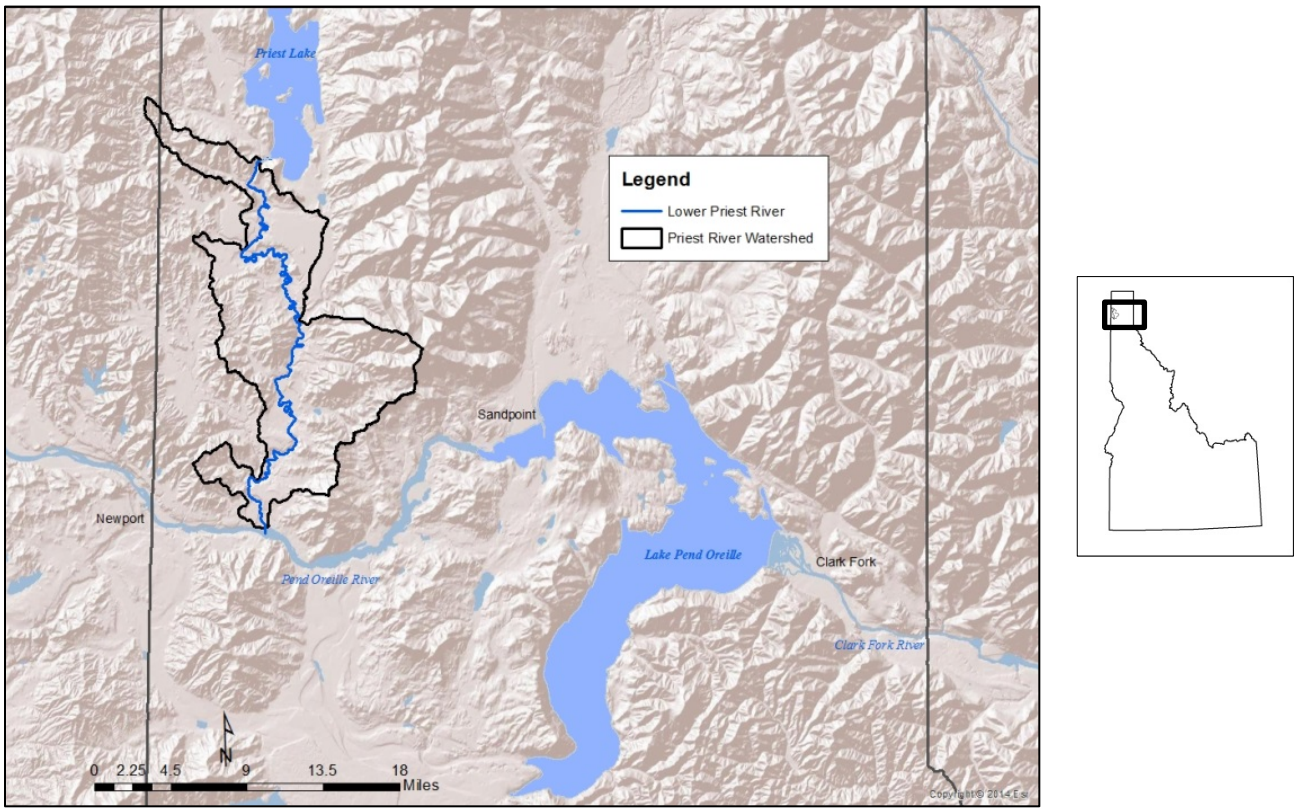

Figure 1. Lower Priest River watershed in context with the Idaho portion of the Pend Oreille Basin.

Coldwater habitat is maintained in the Lower Priest basin's high elevation tributaries draining the Selkirk Mountains, as evidenced by consistent bull trout occupancy in the East River. However, the surface waters of Priest Lake, and particularly Outlet Bay, result in elevated stream temperatures for a period of typically two to four weeks each summer. Lower Priest River is currently designated as "water quality impaired" by Idaho Department of Environmental Quality due to temperature and sediment pollutants. While a Total Maximum Daily Load (TMDL) has been developed for sediment (Rothrock 2003), no TMDL for temperature exists. Seasonal high temperatures are recognized as the limiting factor to Lower Priest River supporting healthy populations of bull trout, westslope cutthroat trout, and other cold water biota (Rothrock 2003).

The Idaho Department of Fish and Game (IDFG) currently manages Lower Priest River as a coldwater fishery, with catch-and-release only of cutthroat trout and bull trout. In the most recent survey, mountain whitefish were the most abundant game species in the mainstem river (Fredericks et al. 2011). Other species included westslope cutthroat trout, rainbow trout, bull trout, brook trout, largescale sucker, brown trout, smallmouth bass, northern pikeminnow, peamouth chub, longnose dace, and redside shiner. Low trout densities have been consistently observed since at least the 1970's (Irizarry 1974).

Elevated stream temperatures can negatively affect fish, particularly cold water-adapted, native salmonids like westslope cutthroat trout and bull trout. Fish residing in water outside their optimum temperature range are more prone to physiological stress, parasites, and disease. Under

extreme conditions, individual fish and even populations may be negatively affected when temperatures are consistently warmer and access to coldwater refugia is not available. Studies have found lethal temperatures for bull trout occur above 20°C (Selong et al. 2001) while westslope cutthrout trout incipient lethal temperature is 22°C (Bear et al. 2007**)**. The US EPA recommends a maximum seven day average no greater than 18°C for salmonid migration and non-core juvenile rearing, which encompasses the Lower Priest River (EPA 2003). Preferred temperatures for bull trout and westslope cutthroat trout are documented to be even cooler, between 6-16°C depending on species, life stage, and duration of exposure (see EPA 2003). Average daily August and September water temperatures in Lower Priest River ranged from 17-22°C (Berger et al. 2014, Isaak et al. 2017).

Common methods to improve temperature regimes in coldwater fish habitat include increased riparian shading, flow augmentation, and increased groundwater connectivity. Unlike a smaller first or second order stream, the relative width of Lower Priest River and its floodplain limit the ability of riparian trees to completely shade the stream. The Priest River Temperature Model (Berget et al. 2014) predicted the upper third of the river to have some of the warmest water in the river during August and September (Figure 2), despite intact and mature riparian stocking on what is primarily state and federal timberland. Furthermore, Lower Priest River has a primarily southerly aspect which also limits the potential for using improved shade as a tool. Summer temperatures are warmest in the upper reaches due to the epilimnetic inputs at the Outlet Dam. This makes flow augmentation a less viable option for decreasing river temperatures, as inputs would come from the heated, upper layer of the lake as they do now.

Improved groundwater connectivity has been explored in large systems such as the Willamette River, Oregon (Seedang et al. 2008) and small, local systems such as Hughes Creek, in the Upper Priest River watershed. While legacy effects from land use practices have degraded short reaches of the Lower Priest River stream channel to some degree (Rothrock 2001), the floodplain and riparian areas are largely intact. Significant straightening, channelization, and floodplain disconnection are not ubiquitous to this system. The unique hydrology, land, and water management governing Priest River limits more traditional options for reducing temperature loads. A coldwater bypass has the potential to bring immediate improvements to over 30 miles of impaired salmonid habitat.

Cold water release systems have been successfully developed for hatcheries and tailwater fisheries below dams for many years. One example is found within the Pend Oreille watershed at Sullivan Lake, Washington. In this system, a 54” pipe collects cold water from the bottom of Sullivan Lake and routes the water through a dam similar in size to the Outlet Dam on Priest Lake. The total cost for this project was $4.1 million.

Water temperature modeling by Portland State University in 2014 predicted biologically-relevant temperature reductions were possible in Lower Priest River (Berger et al. 2014). The model examined scenarios from July 1 to September 24, when summer water temperatures have been observed at their highest in the river. Tributary contributions and stream flows were consistent with existing conditions for the 2013 water year and Priest Lake water levels remained at the three feet gage height at the outlet. The Priest Lake summer thermocline has been observed at a depth between 10 to 20 m and water temperatures at or below 8°C (Rothrock and Mosier 1997).

The amount of hypolimnetic water was varied from 25%, 50%, and 75%. The model predicted that replacing a portion of the epilimnetic water released from the Priest Lake Outlet Dam with cold water from the hypolimion would result in up to a 10°C decrease in late-summer stream temperatures (Figure 2). Improving the thermal regime in the Lower Priest River by replacing warm water outflow from Priest Lake with cold water outflow sould substantially improve cold water habitat and would be expected to significantly increase native salmonid abundance.

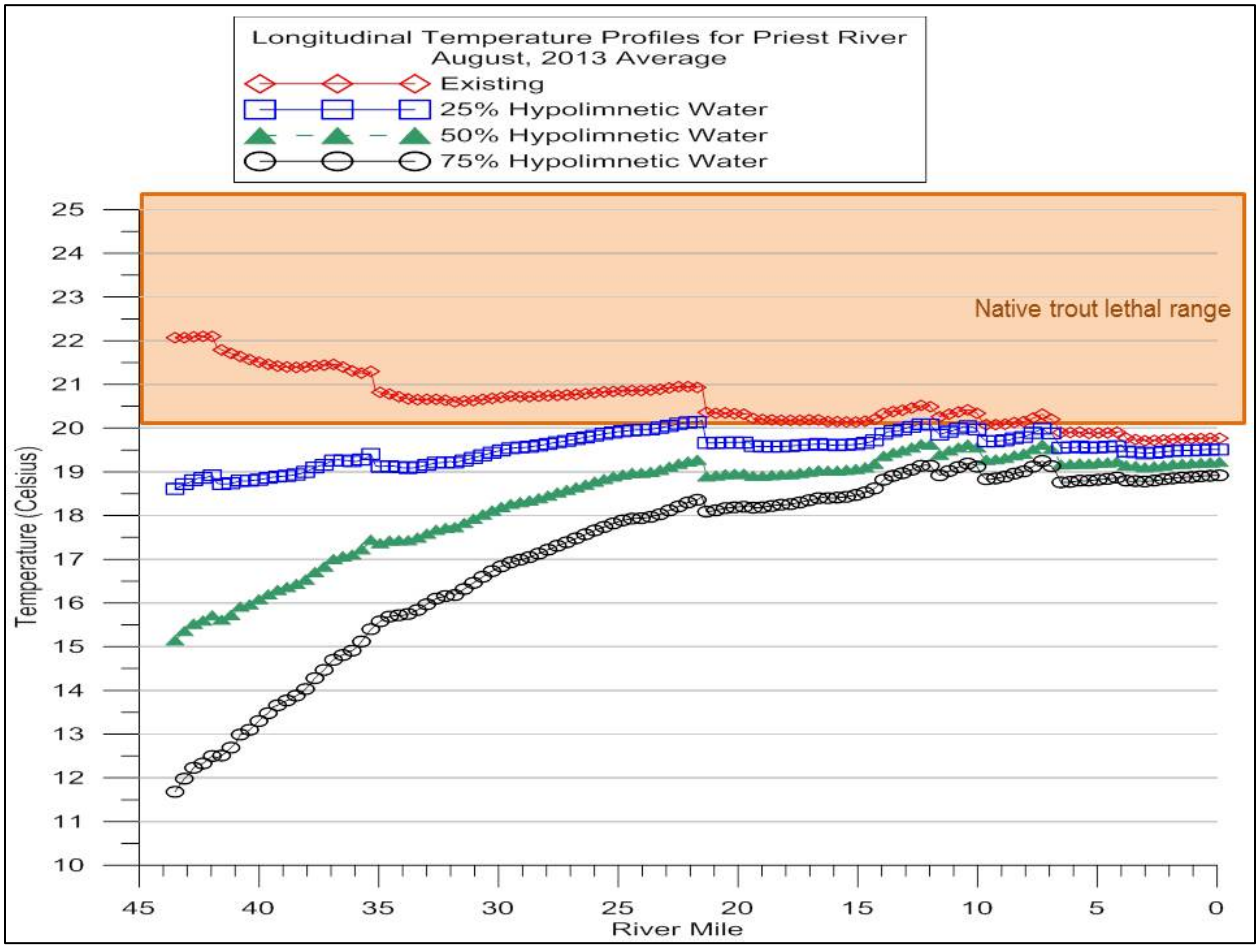

Figure 2. Priest River Model with existing temperatures (red) and three cold water bypass scenarios (blue, green, black) (Berger et al. 2014). Incipient lethal temperature maxima range is depicted in orange for bull trout (Selong et al. 2001) and westslope cutthroat trout (Bear et al. 2005).

Improvements to the coldwater fishery would offer economic as well as social and ecological benefits. Recreational fishing attracts tourism dollars, as documented in Priest Lake, Lake Pend Oreille, Coeur d'Alene River, and St. Joe River. Hotels, gas stations, restaurants, grocery stores and sporting good retail stores all directly benefit from productive trout fisheries. In 2003, IDFG estimated the economic value of sport fishing on the similar sized Coeur d'Alene and St. Joe Rivers to be $3.1 million and $4.1 million respectively. We anticipate a restored/enhanced cold water fishery on Priest River would approach similar economic activity as that observed on the Coeur d'Alene and St. Joe rivers, given Priest River's proximity to the urban centers of Spokane

and Coeur d'Alene, and the area's draw for tourism. A cost-benefit analysis of a coldwater bypass is needed to compare the up-front cost of construction with the expected annual benefits of a productive fishery.

Goal

Explore the possibility of increasing amount and quality of the Upper Priest River's coldwater salmonid habitat.

Objectives

1. Obtain conceptual alternatives and associated rough costs for a coldwater bypass system from Priest Lake to Lower Priest River

2. Assess public interest and interagency support for proposed system

Tasks

1. **Alternatives Assessment**: In order to assess the economic and structural feasibility of a coldwater bypass system, alternative feasibility must be completed. IDFG will develop a Request for Proposals (RFP) and hire a consultant to complete this task. The RFP will include the following considerations:
   - Discharge control
   - Outlet dam structure
   - Siting
   - Lake level management
   - Navigability
   - Intake screening
   - Aesthetics

   Alternatives must not infringe upon existing water rights, including lake level and flow management administered by the Idaho Department of Water Resources. Preliminary design work will be based on the hydraulic parameters identified in the Priest River Temperature model developed by Berger et al. 2014, including existing lake levels and outflows.

   The level of Priest Lake, and dam outflow, fluctuates seasonally, which will require bypass designs capable of adjusting for variable hydraulic head and outflow. IDWR owns and operates the Outlet Dam, used to maintain water levels for the summer recreation season (3 ft gage height at Priest Lake Outlet, USGS gage 12393000). Typically, dam releases begin after Labor Day weekend, with a goal to reach low pool by November 1st.

2. **Scoping:** Conceptual information will be shared with the public and interagency partners. Input will be sought to better assess cost:benefit ratio, risk, permitting requirements, and overall public interest and support. Scoping will be led by IDFG but may require facilitation and/or conference services.

Work Products

- Alternatives Analysis; includes conceptual design for at least three alternatives based on existing data, and evaluation matrix with pros and cons, engineering cost estimates, and

access and easement requirements; due May 30, 2019
- Annual Work Summary; due December 1, 2019

Permitting Requirements
None

Cultural/Historic Resource Review
The proposed project does not involve any ground disturbing activities or impact historic resources.

Relation to the CFSA and Benefit to the Resource
The primary focus of fisheries protection, mitigation, and enhancement measures (PMEs) associated with the Clark Fork Settlement Agreement is maintenance and improvement of native migratory salmonid fish populations, principally bull and westslope cutthroat trout, in the Lake Pend Oreille/lower Clark Fork River system. Like other Idaho tributaries in this system (e.g. Trestle Creek), Lower Priest River and its tributaries contribute to the long term population viability of the Lake Pend Oreille native fish populations. With no barrier at the mouth of Lower Priest River, fluvial and adfluvial migrants of both bull and westslope cutthroat trout are expected to move between the Priest River and Pend Oreille systems. Dupont et al. (2007) observed adult bull trout moving 36 miles between the East River in the Lower Priest River watershed in to Lake Pend Oreille upstream of the Long Bridge.

Decreasing summer stream temperatures in Lower Priest River is expected to improve occupancy and connectivity between tributaries and the Pend Oreille River, allowing fish to move and exploit a wider range of habitats. Improved connectivity and coldwater habitat availability is expected to enhance genetic diversity and resilience of salmonid stocks impacted by altered regimes and a changing climate (Haak et al. 2010). A coldwater bypass will ultimately contribute to the long-term maintenance of the migratory Lake Pend Oreille native fisheries populations, the primary focus of fisheries protection, mitigation and enhancement measures associated with the CFSA.

This proposal supports the following federal and state management plans by addressing limiting factors to coldwater fish populations:
- *Columbia Headwaters Recovery Unit Implementation Plan for Bull Trout* (USFWS 2015)
    - LPO-B Conservation Recommendation 1.3.3. Maintain and supplement sources of cold water
- *Statewide Fisheries Management Plan 2013-2018* (IDFG 2012)
- *Management Plan for the Conservation of Westslope Cutthroat Trout in Idaho* (IDFG 2013), Conservation actions for WCT in Priest River-Lakes GMU

Budget

Item	Estimated Carryover	2019 Budget Request
Alternatives Assessment	$60,519	$0
Scoping	$5,000	$0
Total	$65,519	$0
Anticipated 2019 Expenditures		$65,519

*One element of the Appendix T funding is that the projects meet the requirement that the costs can be capitalized. Depending on the outcome of the Alternatives Assessment, this may or may not be the case. If after the Alternatives Assessment is complete it is determined that these cost cannot be capitalized, these costs will be transferred to Appendix A.

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