

aaron@ccfeg.org
Thirteen Fish Passage De...

Submission Date
February 25, 2021 17:44

*Project Title	Thirteen Fish Passage Designs for Lower Chiwawa Tributaries
*Sponsor	Cascade Fisheries
*Primary Contact	Aaron Rosenblum
*E-Mail Address	aaron@ccfeg.org
*Anticipated Request - SRFB	115,500
*Anticipated Request - Tributary Committee	115,500
*Anticipated Other Funding	0
*Anticipated TOTAL Budget	231,000
*Other Funding Source(s)	n/a
*Briefly describe the location of the project	The project will occur at 13 fish passage barriers on 7 Lower Chiwawa Tributaries: Brush Creek, Gate Creek, Grouse Creek, Twin Creek, Goose Creek, Deep Creek, Pole Creek
*Latitude (decimal degrees)	47.869972222
*Longitude (decimal degrees)	-120.688525
*Project subbasin	Wenatchee
*Wenatchee Assessment Unit(s)	Lower Chiwawa River
*Reach(es) Name	Brush Creek RM 0.3 - 0.96; Gate Creek RM 0 - 1.33; Grouse Creek; Twin Creek; Pole Creek; Goose Creek; Deep Creek; Lower Chiwawa River RM RM 2.92-5.46; Lower Chiwawa River RM 5.46-7.15; Lower Chiwawa River RM 9.53-11.17; Lower Chiwawa River RM 11.17 - 13.1
1. *In one or two sentences, what do you propose to do?	This project will result in preliminary designs for correcting thirteen fish passage barriers on tributaries to the Lower Chiwawa River. The culvert barriers occur on Brush Creek (1),

Gate Creek (2), Grouse Creek (2), Twin Creek (2), Goose Creek (2), Pole Creek (1), and Deep Creek (3), and the correction of these barriers will improve connectivity to cold, clean, and complex habitat, while maintaining and improving ecosystem functionality vital to the persistence and recovery of ESA-listed species.

2. *What species will the project benefit?

Steelhead

Bull Trout

3. *Select the project's objectives and the associated tracking metrics

Fish Passage

Fish Passage: Reporting Code

Quantity of fish passage blockages removed or altered

Miles of upstream made accessible

4. *Does this project or any of its phases (e.g., design) already exist in Salmon Recovery Portal or PRISM?

No

5. *Has this project been submitted previously for funding through the SRFB and/or Targeted process(es)?

No

6. *What category is the project?

Design

7. *What project phase(s) are proposed for completion?

Preliminary Design

8. Is your project within a completed (or soon-to-be completed) Reach Assessment or other type of assessment (e.g., Rapid Site Assessment, other)?

Upper Wenatchee Pilot Project: Aquatic Habitat Assessment and Restoration Strategy Report (Cramer Fish Sciences)

9. *Which limiting factors does the project propose to address?

Off-Channel - Side-Channels

Temperature - Rearing

10. *Which life stages will the proposed project address?

Natal Rearing (Bull Trout)

Subadult Rearing (Bull Trout)

Fry

Summer Rearing

Winter Rearing

11. *Freshwater Benefits - To what extent will your project improve survival, capacity and/or distribution for target species at the project scale?

This project will primarily benefit steelhead (*Oncorhynchus mykiss*) and bull trout (*Salvelinus confluentus*), and to a lesser degree may benefit spring chinook (*Oncorhynchus tshawytscha*) as well. Each of the seven tributaries proposed contain intrinsic potential (IP) for steelhead, and six contain IP for bull trout. Cumulatively, the replacement of all proposed barriers would result in improved access to 6.02 miles of IP for steelhead and 4.84 miles for bull trout. Cramer Fish Science (2019) reports that the correction of the fish passage barriers

identified in this proposal on Gate Creek, Grouse Creek, Twin Creek, Goose Creek, and Deep Creek would result in a gain of 6.08 miles of fish habitat.

This project occurs in a Major Spawning area for spring Chinook and steelhead. The project addresses the limiting factor of fish passage in the Chiwawa River and provides additional benefits to other limiting factors. Step 1 of the recent prioritization effort (2020) identifies the Lower Chiwawa AU as a Tier 1 restoration priority for spring chinook, and a Tier 2 restoration priority for steelhead and bull trout. High priority life stages in the Lower Chiwawa that will benefit from this project (from Step 2) include summer rearing and winter rearing for spring chinook and winter rearing for steelhead. The Lower Chiwawa AU is noted in Step 2 as having limiting factors related to temperature and side channel/off-channel habitat. The goal of this project to provide improved access to thermal refuge and off-channel rearing habitat provided by tributaries, thus helping to address those limiting factors.

All culverts proposed for correction in this proposal have been surveyed and identified as fish passage barriers based on WDFD protocols. The barriers have been run through the Upper Columbia Fish Passage Barrier Removal Prioritization and scored based on metrics developed by the barrier sub-group and approved by the RTT. Ten of the barriers (Brush Creek, both Gate Creek, both Twin Creek*, both Goose Creek*, and Pole Creek (*see note on scoring in summary table below)) are currently scored as Tier 3 Priorities. The Deep Creek barriers are Tier 4 priorities, scoring lower because they only benefit steelhead based on model parameters. One thing the model does not account for well is how to score barriers that are addressed as a group, where all barriers in one creek are corrected as one project, as the eventual implementation of this proposal would do. A summary table of barrier scores and notes on scoring is provided at the end of this section.

O.mykiss have been confirmed in all of the tributaries identified in this proposal (Cramer Fish Science 2019; T.Hillman, personal comms; US Forest Service fish data), except for Pole Creek where they are likely to be present. A 2002 survey documented steelhead redds in the lower 1.6 Rkm of Twin Creek (US Forest Service fish data). Juvenile spring chinook have been documented in the lower reaches of Brush Creek (T.Hillman, personal comms) and have a presumed presence in Goose Creek (WDFW fish distribution layer) up to the first culvert barrier. Quantile regression forest capacity estimates (QRF), based on CHaMP monitoring sites, suggest habitat capacity for redds, summer rearing, and winter rearing for both steelhead and spring chinook in the tributaries identified in this proposal (UCSRB webmap).

The tributaries in the Lower Chiwawa identified in this proposal provide a cold-water input and refugia for ESA fish during warm months. Water temperatures are projected to continually warm over the coming decades. The NorWest Steam Temperature Model (2017) shows temperatures in the Upper Wenatchee River and Lower Chiwawa River ranging from 15.5°C to 20.8°C in 2080 (under scenario A1B). ESA species will be seeking cold water refugia to escape these near lethal temperatures. The same NorWest model projects colder, tolerable temperatures in 2080 for all of the tributaries at the culvert locations identified in this proposal: Brush Creek 13.5°C, Gate Creek 13.59°C, Grouse Creek 12.35°C, Twin Creek 12.34°C, Pole Creek 13.37°C, Goose

Creek 13.85°C, and Deep Creek 14.7°C. Increasing connectivity to cold water refugia can improve the Viable Salmonid Populations (VSP) parameters abundance, productivity and spatial structure for ESA-listed species in the Wenatchee Basin.

The tributaries in the Lower Chiwawa identified in this proposal provide important habitat for fish. The mainstem of the Lower Chiwawa is lacking in habitat features such as side channels, large wood, cover, and diverse substrate. Tributaries of the mainstem can act akin to side channels in that they provide slower, shallower water with abundant cover. These attributes are especially important for rearing fry and parr salmonids. The tributaries identified in this proposal occur within largely intact, functioning and protected sub-watersheds, and quality rearing habitat can be projected to persist into the future. Providing improved access to high quality rearing habitat can improve the VSP parameters abundance and productivity for ESA-listed species in the Wenatchee Basin.

The tributaries identified in this proposal provide genetic refuge and contributions for upper Wenatchee steelhead. *O. mykiss* have a highly complex and adaptable life history. McMillan, Katz and Pess (2007), documented resident male *O. mykiss* spawning with female anadromous steelhead in rivers on the Olympic Peninsula. A 2016 study conducted in Big Bear Creek, Idaho, “identified evidence of limited downstream gene flow [over a partial natural fall barrier], suggesting that resident [*O. mykiss*] fish contributed genetic material to the downstream anadromous population” (Bowersox, Wickersham, Redfield and Ackerman). Thrower et al. (2004) found that resident fish that had been isolated from anadromy for 80 years still smolted and returned to the ocean under experimental conditions. A 2013 study in the Yakima Basin, Washington, concluded that, “Basin-wide, 20% and 7% of steelhead collected in 2010 and 2011, respectively, had resident maternal life histories” (Courter et al.). These authors go on to conclude that, “Cross-life-history form production may be critical to persistence of anadromous life histories within partially anadromous salmonid populations, particularly in areas where anadromous fish abundance is low due to natural or anthropogenic influences” (ibid). Indeed, many authors have concluded that the resident life history form can be viewed as a genetic cache to be considered in steelhead conservation (Hayes et al., 2012; Holecek & Scarnecchia, 2013; McPhee et al., 2007; Van Doornik, Berejikian, et al., 2013; Van Doornik, Eddy, et al., 2013; Weigel, Connolly, & Powell, 2014). Therefore, correcting these barriers and improving the connectivity of headwaters to the ocean can improve the VSP parameter Diversity for ESA-listed steelhead in the Wenatchee Basin.

The correction of the undersized culverts that are identified in this proposal will improve the function of natural watershed processes. Undersized culverts restrict the flow of water, wood, and streambed substrate, and the associated flow of nutrients, in addition to fish movement. The design of replacement structures will allow high volume flows and associated wood and streambed substrate to pass freely through the structure and feed downstream habitat without causing backwatering, restrictions, or blockages. These blockages can cause damage to instream habitat via rapid, catastrophic erosional events. Allowing natural substrate transport and sorting to occur can potentially improve spawning conditions in these tributaries. The Lower Chiwawa River is somewhat starved of wood and diverse sediment classes. If future restoration actions in the

Lower Chiwawa provide the needed structure, the natural sediment and wood input regimes of tributaries, restored by the barrier corrections identified in this proposal, would have a higher potential to remain in the system and could contribute to the long-term maintenance and functionality of engineered structures. Restoring natural watershed function can improve the VSP parameters abundance, productivity and spatial structure for ESA-listed species in the Wenatchee Basin.

The Lower Chiwawa mainstem is one of only a few remaining strongholds for Wenatchee steelhead. The correction of the 13 fish passage barriers in this proposal will improve connectivity to cold, clean and complex habitat, addressing all four VSP parameters required for recovery, and helping to improve the likelihood of the continued survival of this ESA species.

Barrier ID	Stream	Barrier	Prioritization Score	Note on score
603117	Brush Creek		123	
603259	Gate Creek		126	
603260	Gate Creek		116	
603275	Twin Creek		126	
603124	Twin Creek	0*		This barrier should have a score. The 0 is a QA/QC error as the model thinks the barrier is "not on stream network"
40080	Goose Creek	0*		This barrier will have a score based on new scoring criteria proposed by the barrier sub-group in which all upstream IP gets counted
40081	Goose Creek		112	
603902	Pole Creek		99	
40058	Deep Creek	44		Steelhead only
40059	Deep Creek	48		Steelhead only
40057	Deep Creek	61		Steelhead only
603262	Grouse Creek	0		Although no upstream IP (hence 0 score), Cramer Fish Science notes 1.43 miles of fish habitat upstream
603261	Grouse Creek	0*		This barrier will have a score based on new scoring criteria proposed by the barrier sub-group in which all upstream IP gets counted

12. *Temporal Effect - Briefly describe how and to what extent the project would promote natural stream/watershed process consistent with reach-scale geomorphology?

The replacement structures for the 13 barrier culverts in question will be engineered and designed to specifications described in WDFW's Water Crossing Design Guidelines (2013) and the USFS' Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings (2008). These approaches require that project design and structure specifications, including span, height, channel bankfull width, slope, and channel bed size class, are based on upstream geomorphology and natural watershed processes. Along with fish movement and the associated flow of nutrients, barriers restrict the downstream flow of water, wood, and streambed substrate. The design of replacement structures would allow for high volume flows and associated wood and streambed substrate to pass freely through the structure and feed downstream habitat without causing backwatering, restrictions, or blockages, which often cause damage to instream habitat.

13. Temporal Effect - How long will it take for the

1-10 years

benefits of the project to be realized?

14. Temporal Effect - How long will the restoration action and its benefits persist?

50+ years

1. *What is the landownership?

United States Forest Service

2. *Have you secured landowner participation in or acceptance for this project?

Yes

*Please explain

Cascade Fisheries has discussed the proposed project with the Zone Fisheries Biologist and the District Ranger. All proposed culverts fall within the Upper Wenatchee Pilot Project Area. A Decision Notice (DN) is expected for this programmatic NEPA in the summer of 2021. After the DN is issued, implementing projects that fall within this planning process will be a priority for the district.