

Project Completion Report for OWEB Grant 218-6027-16015

Final Completion Summary

This project is located on Bear Creek, a tributary to Bridge Creek which ultimately empties into the Lower John Day River in Wheeler County, Oregon. Many sections of Bear Creek have been channelized, straightened, and confined to valley margins in order to increase the amount of area that is agriculturally viable. In these locations, this has resulted in channels becoming deeply incised, and lacking complexity due to high-stream power. This has degraded habitat in quantity and quality of this important spawning tributary for the steelhead summer run in the John Day Basin. In addition, certain reaches within the project area experience low baseflow and intermittency. This project funded the construction of 25 beaver dam analog (BDA) structures on 600 meters of the "Beaver" Reach on Bear Creek that dewater annually. Constructed 10 BDAs on 300 meters of Spring Gulch, a tributary to Bear Creek, with the intent of increasing surface flow duration both in the tributary and in the downstream portions of Bear Creek. Installed 24 BDAs on 400 meters of the "Rancher" reach of Bear Creek to increase the development of inset floodplains and facilitate the formation of scour pools and lateral and mid-channel bars. Project partners include Wheeler SWCD, OWEB, CTWS, ODF&W, and the landowner.

Background

Bear Creek occupies a relatively small watershed (209 km²) in Wheeler County, Oregon and flows into Bridge Creek roughly 8 km above its confluence with the lower John Day River. Being the largest tributary of Bridge Creek, Bear Creek represents an important spawning tributary for the summer run steelhead that utilize the watershed (Oregon Department of Fish and Wildlife, personal communication). However, much of the main channel on Bear Creek is subject to low and often intermittent surface flow during summer, a period critical to the survival of rearing juvenile steelhead following emergence from gravel during spring. Low and non-existent surface flow also contribute to high summer stream temperatures and reduced riparian vegetation abundance and extent. In addition, much of the channel on Bear Creek has been channelized against valley walls resulting in a high degree of channel incision and low habitat complexity. These conditions render the Bear Creek watershed a population sink for threatened steelhead, in which a high rate of returning adult steelhead produce few eggs and surviving juveniles capable of completing their life cycle.

Wheeler SWCD has been working with this landowner for a number of years on multiple conservation practices that overall benefit the summer steelhead population in Bear Creek. In 2017, the District completed a "pilot" beaver dam analog installation project in which 21 BDAs were install in the "Grizzly" reach of Bear Creek. That project showed success in reconnecting side channels and increasing the groundwater connectivity and prompted the District to develop this project to install structures on two more reaches of Bear Creek and a small tributary.

Work Done

The restoration project included installation of BDA structures in the Bear Creek watershed within the boundaries of the Canyon Creek Ranch. The project was sponsored by the Oregon Watershed Enhancement Board and managed by the Wheeler Soil and Water Conservation District and Mid John

Day-Bridge Creek Watershed Council. Implementation included the construction of 59 restoration structures and adaptive management between 2018 and 2020. The project focused on two reaches on Bear Creek and a small tributary called Spring Gulch. The Rancher reach is an incised stretch of Bear Creek approximately .12 miles long. Twenty five structures were built and managed in that reach. The Beaver reach is a .18 mile stretch that regularly dewateres in certain areas. Spring Gulch is a small tributary with approximately .07 miles of treatment area, that connects to Bear Creek and the downstream end of Beaver reach. Twenty four structures were built and managed in the Beaver Reach and 10 were built in Spring Gulch.

Several complementary conservation and monitoring initiatives are also underway within the project area. The Canyon Creek Ranch is the location of multiple conservation practices implemented over the last 14 years. These practices include juniper removal, weed treatment, reseeding, cross fencing and a previous OWEB funded beaver dam analog project. With funding from OWEB and USDA Natural Resources Conservation Service, the Blue Mountain Land Trust has recently worked with the landowners of the Canyon Creek Ranch to ensure its long-term protection through a conservation easement. As part of the conservation easement, the Confederated Tribes of the Warm Springs are collecting stream temperature information that will inform how management actions are resulting in improvements to water quality parameters. Monitoring of restoration effectiveness, including an assessment of the steelhead population in response to the restoration treatments will be conducted in 2021 as a project funded by OWEB, managed by the Mid John Day-Bridge Creek Watershed Council, and implemented by Eco Logical Research.

Changes from Proposed

The number of structures is lower than originally expected. This is mostly due to Spring Gulch having very little above ground flow since the beginning of this project. Instead of adding structures in that area in 2019 and 2020, efforts were increased in the Beaver and Rancher reaches. Decisions were made using adaptive management to extend or add on to structures in those reaches to help extend the effects onto the inset floodplains.

Public Awareness or Education

This project will be included in Wheeler SWCD's 2020-2021 Annual Report. The pilot phase, funded by OWEB Grant #217-6044, kicked off several public awareness activities that include the two BDA implementation projects, OWEB Grant #218-6044, the BDA Monitoring Protocol project and related monitoring activities on Bear Creek.

- Gilliam County Soil and Water Conservation District 2018 Annual Meeting and Prime Rib Dinner. Application of Process Based Restoration within the John Day Basin. presented by Nick Weber. March 12th, 2019. Condon, OR.
- Wheeler Soil and Water Conservation District 2019 Annual Meeting and Prime Rib Dinner. Application of Process Based Restoration within the John Day Basin. presented by Nick Weber. December 11th, 2019. Spray, OR.
- A Fight for Survival in Intermittent Streams: A Case Study for Threatened Steelhead in the John Day

Basin. Oregon Chapter American Fisheries Society Annual Meeting. Gus Wathen, Nick Weber, Joe Lemanski, Debra Bunch, Amy Charette. March, 6th 2019. Bend, OR.

- Evaluation of Steelhead Responses to Implementation of Beaver Dam Analogs in Bear Creek, OR. 2018 Year End Monitoring Report. Eco Logical Research and the Confederated Tribes of the Warm Springs. DOI: 10.13140/RG.2.2.35868.95363
- Bear Creek BDA Restoration – 2017 End of Year Report. Wheeler County Soil and Water Conservation District and Eco Logical Research. DOI: 10.13140/RG.2.2.28075.95523
- Middle Bear Creek Story Map – Collaboration and Education in Beaver Based Restoration. Available at: <https://arcg.is/1HT4Pz>
- John Day, Oregon 2018 Beaver Based Restoration Workshop.

Links are included in the uploaded Bear Creek Riverscape Restoration document.

Lessons Learned

MATERIALS – Juniper were ideal as fill material for BDA structures. The branches greatly enhanced the efficiency of building large structures relative to the use of willow and other deciduous vegetation as fill.

IMMEDIATE PONDING – It was difficult to cause immediate pond creation regardless of the amount of sediment and woody vegetation added to dams. Large amount of time and effort were needed in order to raise water surface elevations even several inches during installation. This difficulty is due to the consistency of sediment available within the project area which is extremely fine. The extremely low surface discharge during which implementation period occurred also limited the rate at which impoundments would fill with surface water.

POST – DEPTH – The composition of the bed, which consisted of cobble and clay within interstitial spaces and a network of willow roots, prevented posts from being driven deeper than ~ 6” during implementation (despite the use of a hydraulic post - pounder). Regardless of depth, posts driven into the stream channel a depth of only several inches were extremely sturdy and post loss during high flows was uncommon.

SLOW AGGRADATION RATES – Sediment deposition and aggradation behind BDA structures happened slowly. The small amount of sediment deposition prevented structures from naturally filling and becoming less permeable over time. The slow aggradation rates prevented structures from creating large ponds during periods of low surface flow, and also increased the time over which floodplain connectivity was enhanced.

LOW EROSION RATES – A number of structures were designed to enhance erosion of terrace (i.e., incision trench) walls during high flows. Despite a high degree of channel incision and at least one annual high-flow year, little to no erosion and incision trench widening was observed at structures. Lack of head-cutting and structure undermining were also a result of the low erosivity of the bed, banks, and terraces within the project area.

POOL FORMATION AND BAR DEPOSITION – Low erosivity of the bed also prevented structures from scouring the bed and creating pools. Deposition and sorting of sediment was also uncommon in the vicinity of restoration structures.

Preliminary investigations concerning the ability of BDA structures to increase habitat quality for rearing

juvenile steelhead were undertaken as part of the pilot level project implementation in 2017. Similar steelhead monitoring efforts have been attempted during other years (e.g., 2018 and 2020), however a complete lack of surface flow within project area has made monitoring difficult. A proximate measure of habitat quality (i.e., fish growth) was inferred through evaluation of juvenile steelhead growth rates at a treatment and also control reach within the project area during 2017. Growth was measured through the capture and tagging of individual steelhead in the early summer and again in early fall.

Results of the investigation of individual juvenile steelhead growth suggested that the BDA treatments can support increased summer growth rates. These results would suggest that BDA structures can increase the habitat quality and/or quantity of rearing habitat. This may be especially true in streams such as Bear Creek where seasonally intermittent surface flow severely limits the availability of rearing habitat.

One of the primary design objectives of the restoration treatments was to attenuate flow such that the duration and extent of continuous perennial surface flow is increased within the project area. Project monitoring included mapping surface flow extents and the presence of isolated pools throughout the Canyon Creek Ranch and extending to control monitoring areas on BLM lands (i.e., the project area). The flow extent surveys occurred in late summer in 2018 and again in 2020.

Surface flow extent surveys suggest that the restoration treatments is contributing to an increase in habitat availability within the project area. This is indicated by an increase in the length of channel featuring surface flow in late – summer below the restoration treatments. Although observed increase may be small, 2020 was also a more dry year than the summer of 2018, and also came after 2019 which was also a year with low amounts of precipitation.

Aquatic Habitat

Wheeler SWCD has read and reviewed the Oregon Aquatic Habitat Restoration and Enhancement Guide, and all project components are within compliance with said document.

Special Conditions

Special conditions were completed in the course of this project and in previous sections of this report.

Funding Sources

Source	Identifier	Cash	InKind Type	Inkind
Confed Tribes Warm Springs (CTWS)		\$50,000.00		\$0.00
OWEB	218-6027-16015	\$104,785.00		\$0.00
Wheeler SWCD		\$248.39		\$0.00

Totals

OWEB Amount	Non OWEB Cash	Inkind Total	Non OWEB Amount	OWEB Match	Total Project Cost
\$104,785.00	\$50,248.39	\$0.00	\$50,248.39	48.0%	\$155,033.39

Uploaded Files

Image Type	File Name	Description
Photo Point	Spring Gulch 1 Before_HW.JPG	Spring Gulch 1 before
Photo Point	Spring Gulch 1 After_DB.jpg	Spring Gulch 1 after
Photo Point	Spring Gulch 2 Before-HW.JPG	Spring Gulch 2 before
Photo Point	Spring Gulch 2 After-DB.jpg	Spring Gulch 2 after
Photo Point	Spring Gulch 3 Before-HW.JPG	Spring Gulch 3 before
Photo Point	Spring Gulch 3 After-DB.jpg	Spring Gulch 3 after
Photo Point	Spring Gulch 4 Before HW.JPG	Spring Gulch 4 before
Photo Point	Spring Gulch 4 After-DB.jpg	Spring Gulch 4 after
Photo Point	Beaver 1 Before.JPG	Beaver 1 Before
Photo Point	Beaver 1 After.jpg	Beaver 1 After
Photo Point	Beaver 2 Before-HW.JPG	Beaver 2 Before
Photo Point	Beaver 2 After-DB.jpg	Beaver 2 After
Photo Point	Beaver 3 Before -HW .JPG	Beaver 3 Before
Photo Point	Beaver 3 After-DB.jpg	Beaver 3 After
Photo Point	Beaver 4 Before-HW.JPG	Beaver 4 Before
Photo Point	Beaver 4 After-DB.jpg	Beaver 4 After
Photo Point	Beaver 5 Before.JPG	Beaver 5 Before
Photo Point	Beaver 5 After.jpg	Beaver 5 After

Photo Point	Rancher 1 Before-HW.JPG	Rancher 1 Before
Photo Point	Rancher 1 After-DB.jpg	Rancher 1 After
Photo Point	Rancher 2 Before-HW.JPG	Rancher 2 Before
Photo Point	Rancher 2 After-DB.jpg	Rancher 2 After
Photo Point	Rancher 3 Before-HW.JPG	Rancher 3 Before
Photo Point	Rancher 3 After-DB.jpg	Rancher 3 After
Photo Point	Rancher 4 Before-HW.JPG	Rancher 4 Before
Photo Point	Rancher 4 After-DB.jpg	Rancher 4 After
Photo Point	Rancher-20180523.png	Aerial of Rancher Reach, Before
Photo Point	Rancher-20200506.png	Aerial of Rancher Reach, After
Photo Point	Beaver_20180523.png	Aerial of Beaver Reach, Before
Photo Point	Beaver_20200506.png	Aerial of Beaver Reach, After
Photo Point	Spring_20180523.png	Aerial of Spring Gulch, Before
Photo Point	Spring_20200506.png	Aerial of Spring Gulch, After
Map	Beaver-Spring Gulch_Completion Map.pdf	Map of completed structures on Beaver and Spring Gulch Reaches
Map	Rancher_Completion Map.pdf	Map of completed structures on Rancher Reach
Map	Photopoints map.pdf	map of photopoints
Federal Lobbying Certificate	Federal Lobbying Certificate.Signed.pdf	Federal Lobbying Certificate
Informational Materials	Bear- Completion_ABS_20201230.pdf	Supplemental information from the contractor Anabranch Solutions, LLC
Exhibit B	218-6027 EXHIBIT B Final.pdf	