# ET-AL FACTSHEET

## Bridge Creek Intensively Monitored Watershed

## Partnering with Beaver in Restoration

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## THE ISSUE

The incised and degraded habitat of Bridge Creek is thought to be limiting a population of steelhead (*Oncorhynchus mykiss*) listed as threatened under the U.S. Endangered Species Act. Reconnecting Bridge Creek to its former floodplain (now terraces) would increase stream and riparian habitat complexity , but using conventional stream restoration techniques would be costly and destructive to the area, as well as require extensive revegetation efforts. This project seeks to find a cost-effective, process-based approach to restore and maintain higher stream function by helping a small population of beaver (*Castor canadensis*) build longer-living dams.

## KEY QUESTION

•Given enough time, could beaver populations reconnect incised streams to their floodplain?

## BACKGROUND

Beaver populations in Bridge Creek are limited because their dams are short-lived. Most dams are constructed within the incised trench, and during high discharge events, are blown out due to the concentration of flood waters rather than their dissipation across floodplains. By assisting beaver in the creation of stable dams and colonies we hope that it will promote enough aggradation to reverse channel incision and reap a number of documented ecosystem benefits associated with dynamic beaver dam complexes that will benefit steelhead and other species.

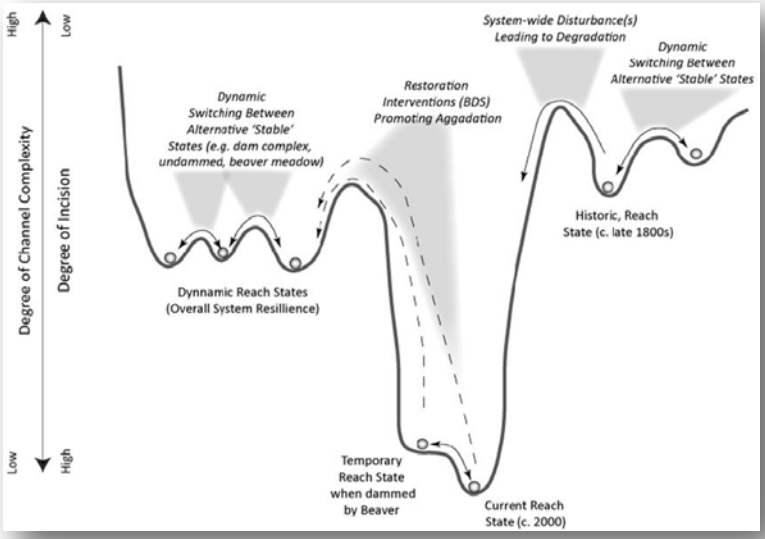


Figure 2 (above): conceptual model of changes between dfferenent dynamic stable states.

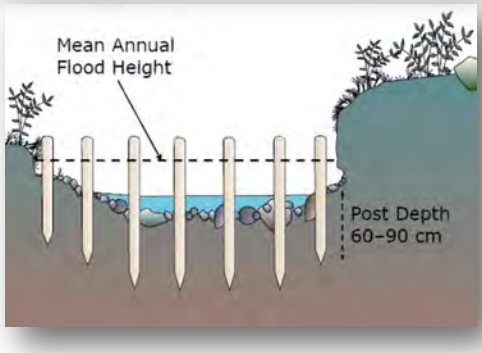


Figure 3 (right): Post placement design method.

Figure 1: Incision up to 7 meters occured in some areas on Bridge Creek.

## APPROACH

We are assisting beaver using an extremely simple and cost-effective restoration treatment. The treatment involves installing round wooden fence posts approximately 0.5 to 1 meter apart across potential floodplain surfaces (now terraces) and the channel at a height intended to act as the crest elevation of an active beaver dam. There were 85 beaver dam support (BDS) structures installed in four reaches in 2009. There were five variants of the treatment: post lines, post lines with wicker weaves, construction of starter dams, reinforcement of existing active dams, and reinforcement of abandoned dams. The biodegradable posts are intended to buy enough time for 1) beaver to occupy the structures and build on or maintain the structures as their own dams and 2) aggradation to take place in the slack waters of the pond from the dam and promote reconnection with a floodplain. The treatment design is geared to saturate four distinct reaches of Bridge Creek with BDS structures so that enough potential dams are available to the current beaver population that they can pick and choose the best sites to establish stable, multi-dam complexes to support healthy and persistent colonies.


Fig. 4

Fig. 5


Fig. 6

4) **Post Line Only (PL)**: placed in sites where a future beaver dam was desired and where geomorphic conditions were suitable for a dam, but were not intended to be functional unless beaver utilized them to build a dam. 21 installed.
5) **Post Line Wicker-Weave (PLWW)**: most common type installed, it acts like a weir as water is allowed to flow through. These may naturally seal up with sediment or become utilized by beaver. 44 installed.
6) **Starter Dam (SD)**: intended to mimick a stable beaver dam, it generally had the most criteria for siting, and could become utilized by beaver. 11 installed.
7) **Reinforced Existing Dam (RED)**: all active dams were stabilized with posts to lengthen their functional life. 5 reinforced.
8A) **Reinforced Abandoned Dam (RAD)**: similar to REDs, any abandoned dams with enough structure remaining were reinforced, these could become utilized by beaver. Figure 8A shows a blown-out RAD. 4 reinforced.
8B) Starter Dam


Fig. 7

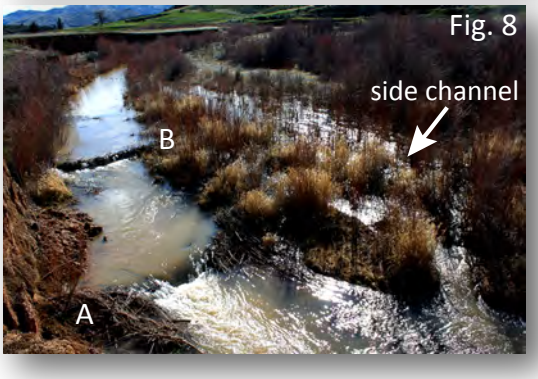

Fig. 8

## Conclusions

The incised and degraded habitat of Bridge Creek is thought to be limiting the population of ESA-listed steelhead. We are assisting a small, extant beaver population to restore geomorphic, hydrologic, and ecological functions in this system.The primary hypothesis we are testing is that by working with beaver to create stable colonies and aggrade incised reaches of Bridge Creek, there will be measurable improvements in riparian and stream habitat conditions, which will translate to increased abundance of steelhead. Geomorphic and biological changes are assessed by continued monitoring at individual structures (PLs, PLWWs, SDs, REDs and RADs) and to the treatment reaches as a whole. Ongoing monitoring will also allow us to modify structural designs as needed for the purposes of achieving the overarching goal of improving stream and riparian habitat.

## TAKE AWAY

- Beaver naturally promote the aggradation of incised streams and reconnect them with their historic floodplains.
- Using beaver as a 'Cheap and Cheerful' restoration tool could help to minimize traditional restoration impacts and reduce costs.
- By helping beaver build long-lasting dams, we hypothesize that Bridge Creek will regain its floodplain terraces, which will bolster riparian growth and create more habitat for endangered steelhead.
- These feedbacks will also lead to increased beaver health and abundance.

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The mission of the ET-AL lab is to illuminate and understand ecogeomorphic feedbacks and dynamics in rivers and streams through state-of-the-art monitoring and modeling analyses. To learn more about us, visit etal.joewheaton.org

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