# Faux Beaver Dam Installation and Evaluation in the Potlatch Watershed

During the summer of 2016, Latah Soil and Water Conservation District (LSWCD), Alta Science and Engineering, and other partners installed structures intended to mimic natural beaver dams (Faux Beaver Dams of FBDs) on two creeks on private properties in the Potlatch Watershed: Corral Creek and Big Bear Creek. The circumstances on these two creeks are different, so design, installation procedures, and outcomes also differ.

## 1 FBD Installation

Because of differences in the two sites, installation of FBDs was accomplished using two different methods. At Corral Creek, FBDs were installed by hand, at Big Bear Creek work was accomplished by machine.

### 1.1 Corral Creek

Corral Creek is a small, intermittent stream flowing through forest and wet meadows where many reaches are incised due to changes in hydrology, degradation of riparian vegetation, and channelization. The wet meadow ecosystems in the Potlatch Basin rely on flashy annual flooding, and even the most incised streams tend to run full for a few weeks in the springtime. The estimated annual peak flow in the project reach is 30-60 cubic feet per second (cfs). Corral Creek historically hosted steelhead, uniquely adapted to summer rearing in spring-fed pools. Removal of a passage barrier in 2007 allowed steelhead to begin repopulating the project reach. Evidence of significant historical beaver activity is found throughout the drainage, and, while still scarce, some beaver have returned through reintroduction and natural immigration. The purpose of this project is not specifically to attract beavers, but rather to improve hydraulic and riparian conditions to put the creek on a trajectory toward restored beaver and steelhead habitat. Specifically the objectives are to slow water velocities during spring runoff, introduce more water onto the floodplain, promote sedimentation in the incised channel, and increase the overall health of the riparian corridor.

**Figure 1.** Corral Creek FBD After Installation

FBD locations were chosen based on evidence of past dams and, where no such evidence exists, on opportunities to promote improved hydraulics in the context of the project objectives. We installed 23 FBDs on approximately 4000 feet of Corral Creek. All work on the Corral Creek FBDs was accomplished essentially by hand by a crew of about 9 people and primarily in dry stream conditions. The crew installed slightly staggered 4-inch cedar posts in the streambed using a hydraulic post pounder. Next they tamped a “wedge” of rock and mud along the upstream side of the post row. Slash and branches harvested from nearby pine, fir, and spruce trees were woven through the post row. In some cases, they placed rows of sticks on top of the slash parallel to flow and angled along both sides of the structure to help prevent scour around the posts (Figure 1).

### 1.2 Big Bear Creek

FBDs were installed on Big Bear Creek as part of a larger stream restoration project. The project reintroduced flow from a straight ditch back into an existing historical channel. The historical channel has a favorable planform, but completely lacks complexity, woody riparian vegetation, or the ability to retain wood despite being located immediately downstream from a wooded area. The objectives of the Big Bear project were to rehydrate the meadow by encouraging more floodplain access, to improve riparian conditions, and to introduce complexity in the form of bedform sinuosity, logjams, and FBDs. The estimated annual peak flow in this reach is about 500 cfs. Eight FBDs were placed in the historical channel, and work was done entirely in dry conditions. The FBDs were constructed using an excavator to drive 6-inch untreated wood stakes into the streambed and place slash, brush, and woody debris on and around the posts. A newly constructed FBD is shown in Figure 2.

**Figure 2.** New FBD in Big Bear Creek.

## 2 FBD Evaluation

During this first year after FBD installation, each structure was visited as close to the spring high flow event as possible and again during the summer to visually evaluate their performance. Some were visited on the receding limb of the peak flow.

### 2.1 Spring High Flow

At both sites the FBDs were largely submerged at high flow. As the flow started to recede, evidence of backwatering behind the structures was noted in some, but not all cases (Figure 3). In all cases fish passage routes were observed around or over FBDs. The structures were providing backwater and upstream flooding. The aerial photo in Figure 4 shows a FBD on Big Bear Creek during high flow. It is mostly submerged, and contributing to extensive meadow flooding.

**Figure 3.** FBD on Corral Creek during receding flood flow.

**Figure 4.** Aerial image of FBD on Big Bear Creek at high flow.

## 2.2 Summer Low Flow

We revisited every FBD again during the summer of 2017. Despite unusually high flows during the spring of 2017, none of the structures had blown out. One structure on Corral Creek was missing several posts at the thalweg, and one FBD had been flanked by high flow causing some bank erosion. Most of the fines installed as part of the "wedge" had washed out leaving only the rocks in place. Some structures showed signs of minor scour on the downstream side.

New sedimentation was noted at most structures, including the damaged FBD, and new beaver activity was discovered at two locations. In several cases, pools upstream of FBDs were holding water well into August. All the FBDs on Big Bear Creek had accumulated wood and sediment, and some were retaining water late in the summer.

**Figure 5.** Sediment accumulation at FBD

**Figure 6.** Pool created behind FBD

# 3 Conclusions

These structures are not intended to be permanent or even long lived features. Rather, they should induce sedimentation and enhance complexity such that natural processes can become reestablished and take over providing these functions. Therefore, we believe these construction techniques are providing the appropriate level of structural integrity. The structures are not "blowing out" but they are adjusting significantly with high flows.

Fish passage is often cited as a concern at both natural and artificial beaver dams. Our observations at every structure in this project indicated that fish passage is provided at all observed flows either over, around, or through the structures.

These structures provide several important functions: they rack wood that is being transported downstream during high flows; they cause backwater resulting in improved floodplain access and meadow hydration; and they cause extensive sedimentation in incised channels.

Over the several years we have built these structures we have developed, changed, and refined our design and techniques. These two projects have allowed us to evaluate and further refine these installations. We recommend the following improvements as a result of this evaluation:

1. Don't include the wedge of rock and soil.
2. In most situations, there is no need to extends the stakes up onto the bank. Extending the FBD only across the active channel width will suffice except in situations (such as outside bends) where erosion pressure might be high.

3. Always install angled sticks along the downstream side of the BFD to prevent scour. Beavers do in this area as shown in Figure 7.

**Figure 7.** Real Beaver Dam with Scour Protection