



Deer Creek: A Stage 0 Approach to River Restoration



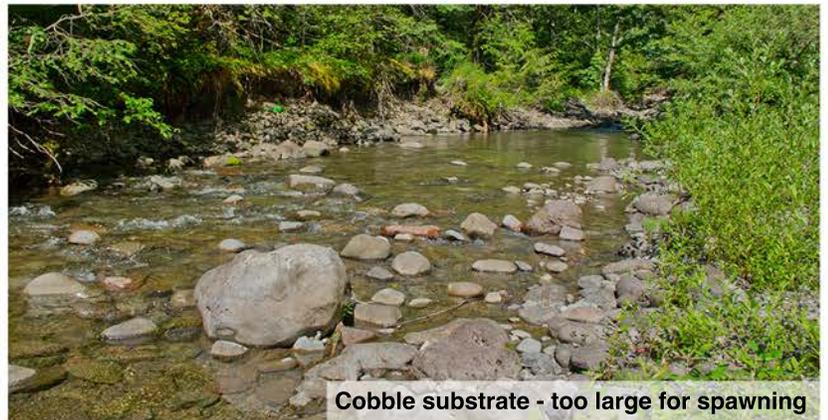
Background



Deer Creek is a tributary of McKenzie River located in western Oregon in the Cascade Mountains. The creek is 8.2 miles long and drains nearly 15,000 acres. Ownership within the Deer Creek watershed is almost entirely public lands managed by the US Forest Service (USFS).

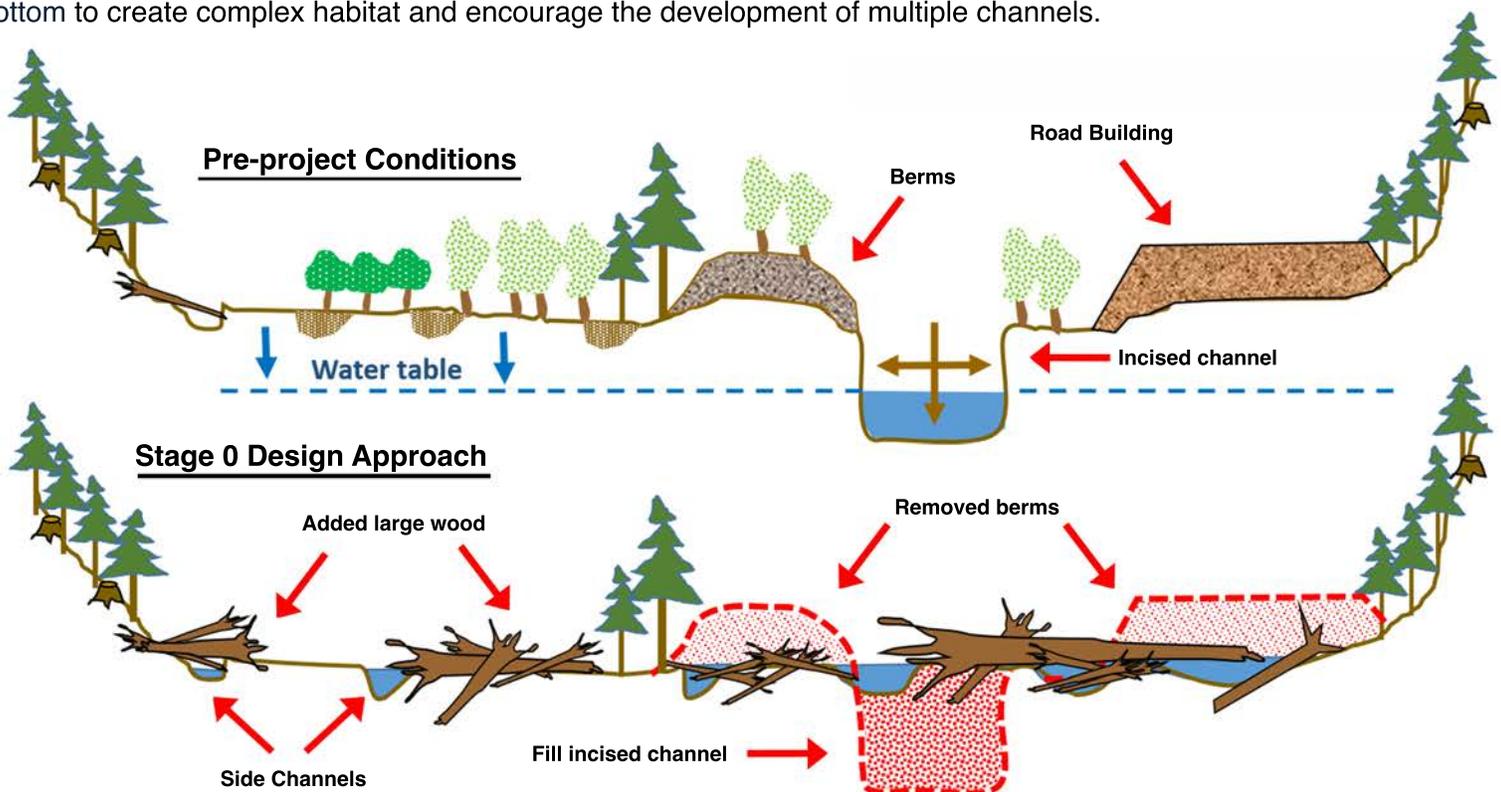
Historically, Deer Creek was a complex stream with a gravel-rich bottom. The lower portion of the creek flowed through a wide valley bottom as a braided system of channels that would move and change during periodic flooding. Fallen trees from the surrounding forest trapped sediment providing diverse habitat for native fish and wildlife including Chinook salmon, bull trout, and rainbow trout.

Deer Creek has been significantly altered by human activities since the late 1800s. Logging and the removal of large wood from the creek simplified and narrowed the channel. Stream-side berms were constructed after the historic 1964 flood to keep the stream in a single channel disconnecting it from its natural valley bottom. These changes had a dramatic impact on the physical environment of the creek and drastically changed the habitat on which salmon and other native fish and wildlife depend.



Design

In 2016, the USFS and the McKenzie Watershed Council (MWC) began a project to restore habitat conditions on Deer Creek. The project followed a new design approach since termed "Stage 0", to restore natural processes that form and maintain complex in-stream and valley bottom habitat. The Stage 0 design approach removes berms or old roads that are preventing valley bottom connectivity. This material is then placed within incised portions of the stream channel to connect flows to side channels and large areas of the valley bottom. Large wood is then placed throughout the creek and valley bottom to create complex habitat and encourage the development of multiple channels.



Implementation

The Deer Creek Floodplain Enhancement Project was designed to restore habitat for native fish and wildlife in the lower 1.1 miles and 42 acres of Deer Creek. Work started in the summer of 2016 and was completed by two Oregon contractors, Haley Construction (Sweet Home) and Blue Ridge Timber Cutting (Coos Bay).



Decked logs prior to transport to project site



Diversion channel



Berm removal and channel fill



Large wood placement



Whole trees positioned in Deer Creek



Rewatered floodplain

The first step of the Project was to divert sections of Deer Creek so that berm removal, channel fill, and large wood placement could take place in dry conditions. A bulldozer and large excavator were used to construct small dams on Deer Creek, temporarily diverting stream flow into side channels. Small teams collected stranded fish from the dewatered channel and relocated them outside of the project area. Streamside berms were then removed and the material placed within incised portions of Deer Creek. Over 450 pieces of large wood were then distributed throughout the project area in various-sized log jams. The diversion dams were then removed allowing the creek to flow freely over the newly reconnected valley bottom and around the placed log jams, forming complex pools and braided channels.



Reconnected floodplain and log jams

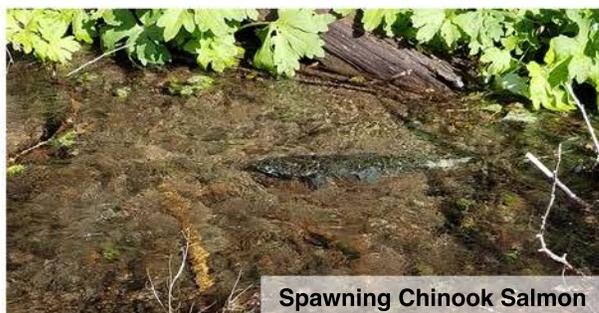
Project Cost

The project cost was \$466,000 and was funded by a variety of state, federal, and private foundation sources., including the USFS, Oregon Watershed Enhancement Board (OWEB), National Fish and Wildlife Foundation's Bring Back the Natives Program (NFWF), and the Western Native Trout Initiative (WNTI). Both the Eugene Water & Electric Board (EWEB) and the USFS provided personnel and material support. The project was managed by the MWC and Willamette National Forest McKenzie River Ranger District.

Funders	Amount
USFS	\$241,000
OWEB	\$142,000
NFWF	\$60,000
WNTI	\$17,000
EWEB	\$6,000
Total	\$466,000

Post-Project Results

Early results of the restoration are encouraging. Deer Creek changed from less than 30 pieces of large wood per mile to over 300. The previously constrained channel now connects to its valley bottom. Pre- and post-project photos show a dramatic difference in how the creek meanders through the valley bottom. Water flowing downstream is now slowed and redirected by complex log jams and islands, creating a diversity of habitats. As water flows over logs and a wider channel, it slows down allowing gravels to deposit and accumulate, creating spawning habitat. Before, a narrower channel with fast-flowing water would have carried those gravels downstream.



In 2017, biologists observed spring Chinook salmon spawning in Deer Creek, the first documented spawning since 1993! A summer snorkel survey also documented the presence of juvenile bull trout.

Aquatic insects are a critical part of the food web and an important monitoring tool. Analysis of macroinvertebrate samples collected in 2019 shows that the number of species present and their total biomass is significantly greater within the project area when compared to untreated sections of Deer Creek.



Project managers recognize the need for formal monitoring to measure the changes in Deer Creek over time. The USFS and MWC are currently working with a variety of scientists to design a monitoring program that will capture physical habitat changes and biological responses over time. Due to the large project area, partners are exploring the use of aerial imagery in combination with transect surveys across the valley bottom to efficiently track habitat complexity. This data will be assessed along with annual fish spawning and macroinvertebrate sampling.