

# OVERVIEW

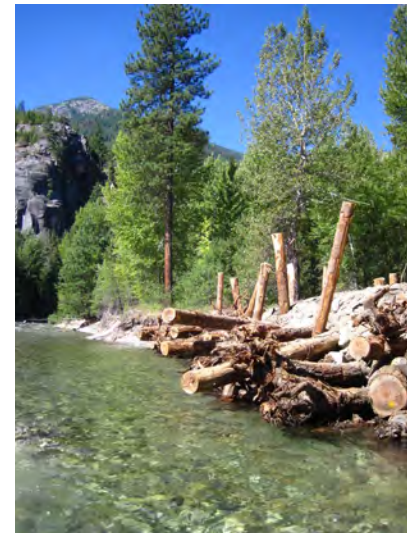
## Upper Columbia Habitat Restoration Project



The Yakama Nation Upper Columbia Habitat Restoration Project (YN UCHRP) is an established leader in salmon habitat restoration in the Upper Columbia Basin. Our prime objectives are to restore treaty resources, implement the Upper Columbia Salmon Recovery Plan, and help produce mitigation credits to the Bonneville Power Administration (BPA) under the on-going FCRPS BiOp. Since 2008, the YN UCHRP has been funded by BPA to implement high priority / high impact salmon habitat restoration projects in the Methow, Entiat, and Wenatchee Subbasins.



To support science based salmon recovery planning in the region, the YN UCHRP routinely conducts habitat condition reach assessments in all Subbasin Assessment Units identified as being in high need of restoration by the Upper Columbia Salmon Recovery Board Regional Technical Team. Based on reach assessment guidance and prioritization outputs, our staff biologists work directly with professional design firms to develop and implement site level restoration strategies to address the highest priority habitat impairments and ecological concerns limiting salmon production.





## PROJECTS

Over the past ten years the YN UCHRP has restored over a dozen miles of priority habitats in the Methow, Wenatchee, and Entiat Subbasins. YN UCHRP projects are geared towards providing as much habitat benefit to ESA listed fish stocks as possible. Most of our projects involve improving juvenile rearing habitat through reconnecting side channels or enhancing main channel complexity through the addition of large woody debris. We specialize in restoring perennial flow to disconnected side channel systems and restoring side channel rearing habitats using groundwater inputs. We also focus on re-creating biologically valuable complex large wood structures that engage the river at all flow conditions, especially during base flows.

Our projects have occurred in diverse ecological settings across the Upper Columbia Basin, and we've succeeded in implementing large scale restoration actions on diverse property interests including federal and state managed lands, private properties, DOT right of ways, and local government properties. We have developed a sophisticated knowledge and process on how to get high value restoration work completed in difficult areas with complex permitting requirements. Looking back at almost ten years of work and accomplishments, we believe the 2008 Fish Accords have created an unparalleled professional restoration program that clearly benefits the Yakama Nation, the Bonneville Power, and most importantly, the fisheries resources in the Columbia Basin.



### UCHRP Program Details

- Upper Columbia Special Projects Manager – Brandon Rogers

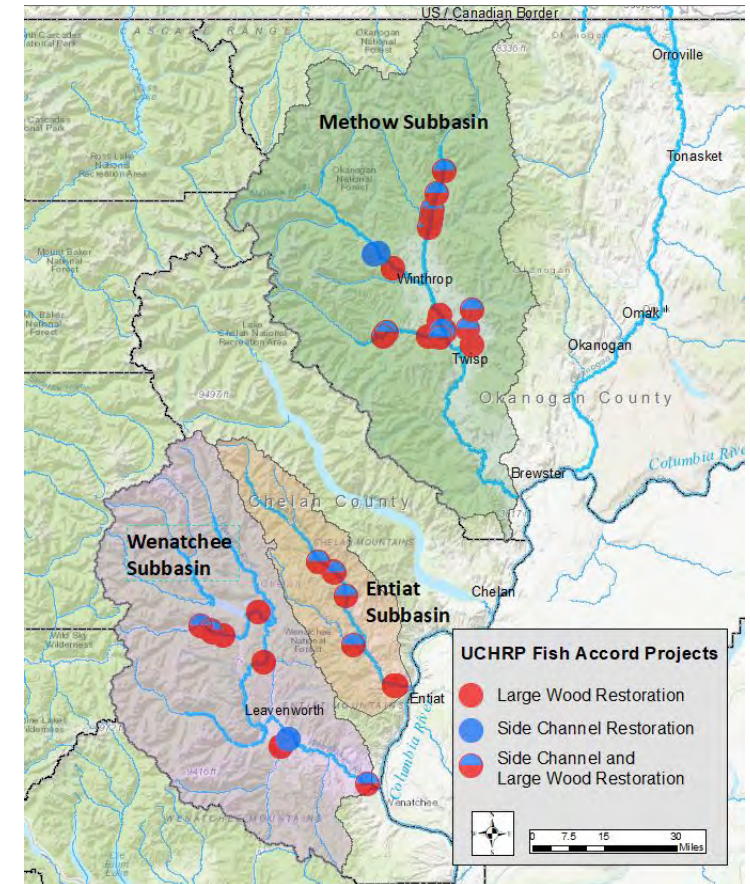
- UC Habitat Coordinator – Hans Smith

#### Methow Field Office Staff

- Chris Butler
- Jarred Johnson
- Madeleine Eckmann

#### Wenatchee/Entiat Field Office Staff

- Jason Breidert
- Chris Clemons
- Elizabeth Witkowski

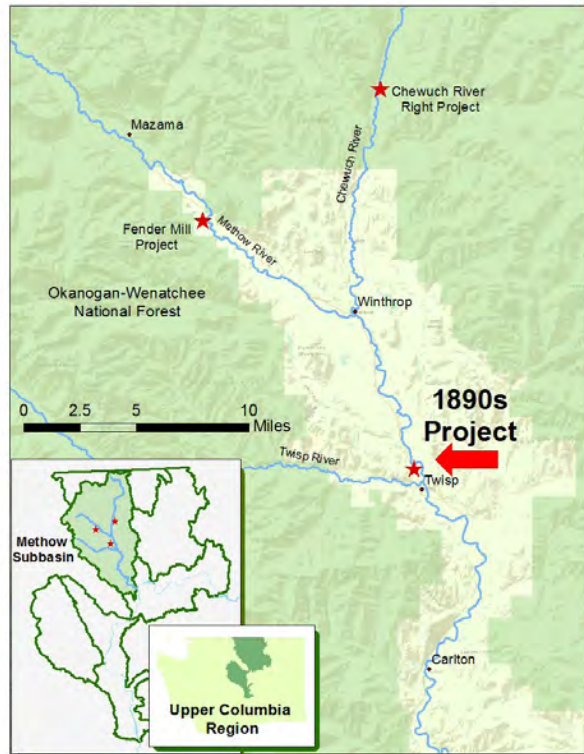


### UCHRP Accomplishments (2009 – 2019)

- 16 miles of mainstem complexity treatments
- 5.5 miles of side channel treatments
- 4,600 pieces of wood added as habitat
- 36 projects implemented
- 14 habitat assessments conducted



# 1890s Side Channel



## BACKGROUND

The 1890s Side Channel Project restored thousands of feet of perennial side channel habitat near the Town of Twisp in a side channel system that was once the main channel alignment of the Methow River. Levee, riprap, and highway system development starting from the early 1900s caused the river to disconnect from its old channel and become constrained on less than half of its original floodplain. This caused the river to downcut in the valley bottom and caused the 1890s Side Channel to become mostly a dry remnant channel feature that only a few old-timers remembered flowing with surface waters.

The 1890s Side Channel Project used a groundwater infiltration gallery to create a perennial spring creek in the disconnected remnant side channel, creating 4,000 linear feet of temperature optimized rearing habitat in an important winter rearing section of the Methow Subbasin. The restored alcove side channel now contains a complex mosaic of sinuous pool/riffle sequences with the pool and channel bank habitats enhanced with ample large wood cover and woody debris. The project also restored acres of floodplain wetlands within the remnant channel bottom.

## QUICK FACTS

- Implementation: Aug. 5 - Nov. 1, 2014
- Cost: \$1.4 million
- Large Wood Procurement & Delivery Cost: \$200,000
- Vegetation Restoration: \$330,000
- Design Firm: Inter-Fluve
- Land Ownership: Town of Twisp, Washington Department of Transportation, and eight private landowners

## HABITAT SPECS

- Spring fed channel length: 4,060 feet
- Spring fed channel width: 10 to 14 feet
- Sinuosity : 1.01 to 1.34 feet
- Slope: 0.2% - 0.33%
- Baseflow discharge: 2 to 4 CFS



## HOW IT WORKS



The infiltration gallery is a slotted PVC pipe placed horizontally in the ground that intercepts shallow groundwater up-valley (“up hill”) of the discharge location. The pipe system uses gravity produced by the down valley gradient to direct flows toward the discharge location. Past the discharge location, the relic side channel is excavated and recontoured to receive the gallery flows and provide complex fish habitat. Because the restored surface flows come directly from groundwater, the water temperatures in the restored side channel are buffered from extreme heating and cooling events that impact the main river channel.”

## MATERIALS

- 40,000 cubic yards of excavated floodplain alluvium to create channel prism and reach static groundwater elevations
- 2,000 cubic yards of wetland sod/soil salvage and transfer
- 340 imported logs, logs with root wads, and salvaged trees incorporated into Side Channel
- Groundwater collection system composed of slotted PVC: six 100’ long segments of 17” diameter; 2,260’ of 30” diameter, 680’ of 24” diameter, and 240’ of 18” diameter dual wall HDPE

## PERMITTING PATHWAYS

- NEPA – BPA Programmatic
- SEPA – Okanogan County DNS
- Section 7 – US Army Corps SPIF
- Section 106 – BPA/YN
- Section 404/401 - US Army Corps NWP 27 and 33
- WA State Shorelines – Okanogan County Permit
- Groundwater Withdrawal – Department of Ecology Water Right Permit
- Highway Infrastructure – WSDOT General Permit
- DNR Aquatic Lands License – Determined not necessary due to no permanent structure on State Aquatic Lands

## PROJECT CHALLENGES & SOLUTIONS

Obtaining access to eight private properties required multiple strategies. We purchased one property in partnership with the Methow Salmon Recovery Foundation to secure the location of the groundwater infiltration galleries. For some of the other properties we paid for temporary construction licenses to gain construction and maintenance access to affected portions of the properties.

Collection of groundwater in the infiltration gallery required a Washington State Water Right Permit, provided by the Department of Ecology. The 1890s Channel water right application was processed under the Hillis Rule as a non-consumptive “run of the river” use.

We had to obtain a WSDOT General Permit to regrade the alcove channel under a highway bridge, and to install the gallery conveyance pipe under another highway bridge.

To reduce traffic impacts to the adjacent residential neighborhoods, and to save costs on hauling materials, we were able to place all 40,000 cubic yards of excavated alluvium under an irrigated horse pasture adjacent to the side channel system.

The 2014 Carlton Complex Fire occurred just prior to our implementation of this project. We were extremely fortunate that the prevailing winds kept the fire moving away from the project site and we were able to operate without IFPL Level IV shutdowns.





# Chewuch River Right Side Channel



## QUICK FACTS

- Implementation: July-November 2015
- Cost: \$1.2 million
- Large Wood Procurement & Delivery Cost: \$250,000
- Vegetation Restoration: \$155,000
- Design Firm: Inter-Fluve
- Land Ownership: WDFW

## HABITAT SPECS

- Side Channel Length: 2,700 feet
- Side Channel Width: 8 to 10 feet
- Base Flow Discharge: 5 CFS
- Sinuosity: 1.1
- Slope: 0.25%
- Number of Pools: 48
- Substrate: Sand, Gravel, Cobble
- Number of Large Wood Structures: 48

## BACKGROUND

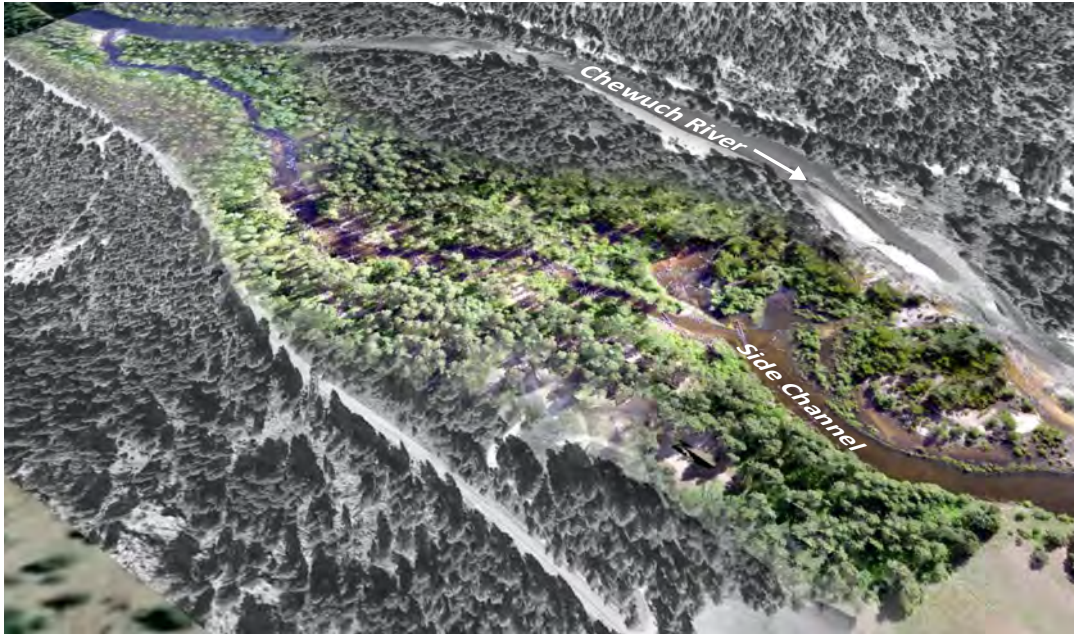
The Chewuch River Right Fish Enhancement Project restored thousands of feet of side channel habitat in an important spring Chinook and steelhead spawning and rearing area of the Chewuch River. The project took place in an area of the Chewuch River where historic removal of large wood structures simplified the river channel and disconnected the river's connectivity with the adjacent floodplain. This project restored productive salmonid rearing habitat through a complex "inside-out" channel construction method that left most of the adjacent floodplain habitats undisturbed by the major construction effort.

To reconnect the River Right Side Channel, a large apex wood structure was created at the head of the channel inlet that extended into the Chewuch River 20 feet in order to split the mainstem flow. Grade control for the side channel inlet was created by burying a large tree at a pre-calculated invert depth to prevent vertical erosion. This helps control how much water is diverted from the main channel into the side channel system.

To ensure the diverted flow produced a perennial surface water connection throughout the restored side channel length roughly 18,000 cubic yards of alluvial material was excavated from the floodplain. Within the excavated channel alignment, 466 large wood pieces were used to construct 48 log structures for habitat complexity and hydraulic roughness.

The project also included creation of a new Category 1 forested wetland in an area that had previously been used as a parking lot and campground.





## MATERIALS

- 18,000 cubic yards of excavated floodplain alluvium to create channel prism
- 466 imported logs, logs with root wads, and salvaged trees incorporated into Side Channel
- 24,850 plants were propagated and planted to restore riparian areas and create new Category I wetlands

## PERMITTING PATHWAYS

- NEPA – BPA Programmatic
- SEPA – WDFW
- Hydraulic Permit Approval – WDFW
- Section 7 – US Army Corps SPIF
- Section 106 – BPA/YN
- Section 404/401 - US Army Corps NWP 27 and 33
- WA State Shorelines – Okanogan County Permit
- Forest Practices Approval - DNR

## PROJECT CHALLENGES & SOLUTIONS

- We have an MOU with WDFW for implementing salmon habitat restoration projects on their lands. After following the MOU process for over 2 years with WDFW staff we identified the side channel alignment as the best restoration alternative for the site. Through the MOU process we obtained a Right of Entry Agreement for the Chewuch River Right Project, which required a three year Adaptive Management Plan. So far, no action thresholds in the Adaptive Management Plan have been exceeded by the project.
- During project planning, populations of rare plants were identified within the project area. We mapped the locations of each population, and one year before project implementation, we physically transplanted the rare plants to areas outside of the project disturbance zone.
- The identification of critical habitat elements within the project site, such as large cottonwood trees, aspen stands, and Category 1 wetlands required the side channel alignment to be changed multiple times during project planning. In some cases the new channel alignment was required to diverge from the remnant side channel depression in order to protect WDFW priority habitats.

We also employed inside-out construction methods to help protect other priority habitats. In this case the new side channel itself became the only access for construction materials and activities.

- Project impacts to Category 1 forested wetlands required us to mitigate wetland losses with the Department of Ecology. 1.55 acres of Category 1 forested wetland were created on site as mitigation credits. We created the new wetland system by decommissioning a parking lot and campsite that were within the project footprint. Wetland mitigation requires a 10 year period of post-project monitoring and reporting to the Department of Ecology.
- Reconnecting the side channel system required the removal of 4 camp sites from the WDFW recreation access area. We replaced the camp sites and the required access road in upland areas away from the restoration project.
- The 2015 Twisp River Fire and Falls Creek fire occurred during the project and required a full evacuation of all personnel and equipment from the project site. The site was closed during an IFPL Level IV shut down for a period of 3 weeks.



# Fender Mill Side Channel



## QUICK FACTS

- Implementation: July-November 2015
- Cost: \$1 million
- Large Wood Procurement & Delivery Cost: \$170,000
- Vegetation Restoration: \$280,000
- Design Firm: Inter-Fluve
- Land Ownership: WDFW/USFS

## HABITAT SPECS

- Spring fed channel length: 2,200 feet
- Spring fed channel width: 10 to 14 feet
- Sinuosity : 1.21
- Base Flow Discharge: 4 to 7 CFS
- Number of Pools: 21
- Pool Depths – 2 to 4 feet
- Number of Large Wood Structures – 21
- Slope: 0.26%
- Substrate: Sand, gravel and cobble

## BACKGROUND

The Fender Mill Side Channel Project restored thousands of feet of side channel habitat in an important spring Chinook and steelhead spawning area of the Methow River that had become impaired due to bridge, levee, and riprap development starting nearly 100 years ago. Since the most recent large scale levee and riprap installations in the 1970s, the Methow River stopped laterally migrating in the Fender Mill area and relic side channels that once provided high quality rearing habitat began to fill in and disconnect from the river.

The Fender Mill Side Channel project uses a groundwater infiltration gallery to create a perennial spring creek in the Methow River floodplain that provides ESA listed fish with high quality spawning and rearing habitat that is thermally buffered against extreme winter and summer temperatures. The infiltration gallery collects shallow groundwater near the river and transports that water using a solid wall pipe to an outlet at the head of a habitat enhanced alcove side channel.

We've created a complex mosaic of sinuous pool/riffle sequences throughout the alcove side channel length, and enhanced the pool and channel banks with large wood cover and woody debris. The old Fender Mill Side Channel was deficient in pools, wood cover, and was dry for most months of the year.





## MATERIALS

- 32,000 cubic yards of excavated floodplain alluvium to create channel prism and reach static groundwater elevations
- 250 imported logs, logs with root wads, and salvaged trees incorporated into Side Channel
- Groundwater collection system composed of slotted PVC: six 80' long segments of 16" diameter; 780' of 30" diameter, 420' of 24" diameter, and 160' of 18" diameter dual wall HDPE

## PERMITTING PATHWAYS

- NEPA – BPA Programmatic
- SEPA – WDFW
- Section 7 – US Army Corps SPIF
- Section 106 – BPA/YN
- Section 404/401 - US Army Corps NWP 27 and 33
- WA State Shorelines – Okanogan County Permit
- Groundwater Withdrawal – Department of Ecology Water Right Permit
- DNR Aquatic Lands License – Determined not necessary due to no permanent structure on State Aquatic Lands

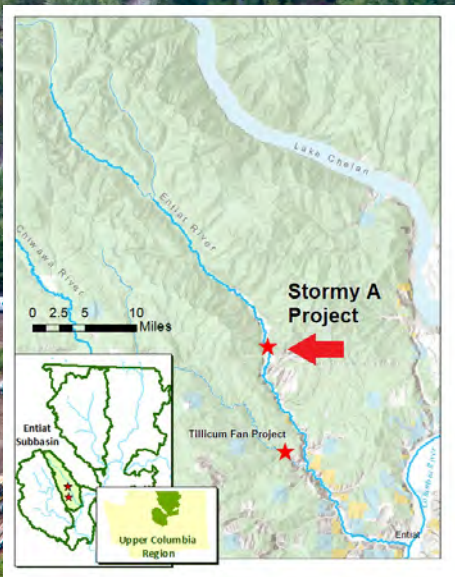
## PROJECT CHALLENGES & SOLUTIONS

- We have an MOU with WDFW for implementing salmon habitat restoration projects on their lands. After following the MOU process over 2 years with WDFW staff to identify the groundwater gallery project as the best restoration alternative for the site we obtained a Right of Entry Agreement for the Fender Mill Project, which required a three year Adaptive Management Plan. So far, no action thresholds in the Adaptive Management Plan have been exceeded by the project.
- On the USFS land, we have a 10 year Special Use Permit which allowed us to install the infiltration gallery and conveyance pipe. If we need to conduct maintenance on the pipe, we can enter the USFS lands under the Special Use Permit.
- Collection of groundwater in the infiltration gallery requires a Washington State Water Right Permit, provided by the Department of Ecology. The Fender Mill Side Channel water right application was processed under the Hillis Rule as a non-consumptive beneficial use.
- The 2015 Twisp River Fire occurred during the project and required a full evacuation of all personnel and equipment from the project site. The site was closed during an IFPL Level IV shutdown for over 2 weeks.





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## QUICK FACTS

- Implementation: July-November 201
- Cost: \$ million hk## u #
- Large Wood Procurement & Delivery Cost: \$ 0,000
- Vegetation Restoration: \$ ,000
- Design Firm: Inter-Fluve
- Land Ownership: yo7o #) Qu

## HABITAT SPECS

- Side Channel Length: 2, 0 feet
- Side Channel Width: feet
- Base Flow Discharge: CFS
- Sinuosity: 1.
- Slope: 0.2 %
- Number of V ‡ o
- V V Pools:
- U o u

## BACKGROUND







## MATERIALS

- 19,000 cubic yards of excavated floodplain alluvium to create side channels
- 105 imported logs, logs with root wads, and salvaged trees incorporated into Side Channel
- 81 imported logs, logs with root wads, and salvaged trees incorporated into Main Channel
- one 90 foot spanning temporary bridge

## PERMITTING PATHWAYS

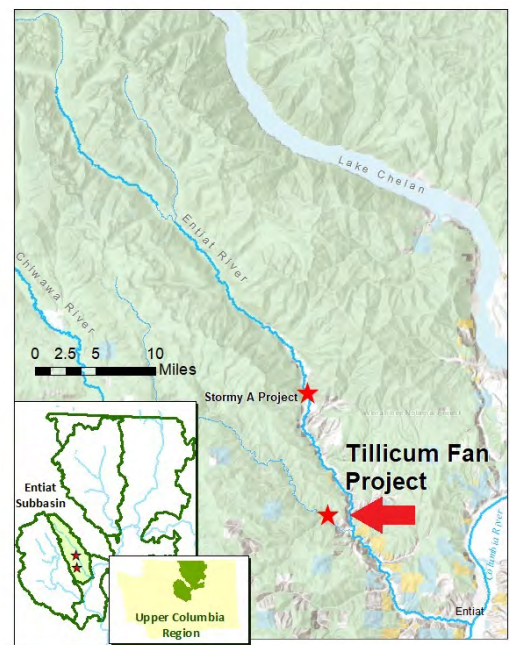
- NEPA – USFS Cat. Ex.
- SEPA – Chelan County Exempt
- Hydraulic Permit Approval – WDFW
- Section 7 – USFS ARBO II
- Section 106 – USFS/YN
- Section 404/401 - USFS RPG-8
- WA State Shorelines – Chelan County Exempt
- USFS approvals applied to CDLT lands through Good

## PROJECT CHALLENGES & SOLUTIONS

- Project was originally planned to be designed/implemented under the BOR led Stormy Reach restoration effort using BPA Targeted funding. This design/funding effort fell through so YN UCHRP finished designs using Fish Accord funding.
- BOR led designs had negative flood rise implications on adjacent private lands that precluded the project from being included in the 2017 USFS NEPA decision that included the Upper Stillwaters Project Areas.
- 2018 Redesign effort under the Fish Accords resolved the flood rise issues and identified the most effective floodplain reconnection strategies using targeted excavation in the disconnected floodplain.
- Early wetland identification was used to inform wetland avoidance strategies keeping the project wetland impacts to less than 1/2 acre of impact
- We also employed inside-out construction methods to help protect other priority habitats. The new west side channel itself became the only access for construction materials and activities.
- YN had to negotiate an extensive land access agreement with the Chelan/Douglas Land Trust (CDLT) to be able to construct the project. The negotiation also included Chelan County as the project steward during the adaptive management phase.
- YN provided \$50,000 to a temporary escrow account to allow for property access to the CDLT Lands
- Site access to the disconnected west floodplain was only made possible using a modular 90 foot spanning steel bridge that is constructible using only an excavator.



# Tillicum Fan Restoration



## BACKGROUND

The Tillicum Fan Restoration Project restored aquatic habitat, hydraulic complexity, coarse woody debris, and native riparian forest conditions to a denuded alluvial fan at the intersection of Tillicum Creek and the Mad River. The alluvial fan had a history of disturbance ranging from homesteading, orcharding, sheep grazing, and extensive debris flows following large fire events. This area of the Mad River supports ESA listed spring Chinook salmon and steelhead, and the area was identified by the USFS as a priority site for fish habitat restoration on the Okanogan Wenatchee National Forest.

This project both restored alluvial fan function and created a new perennial side channel to the Mad River to enhance the availability of complex rearing habitat for juvenile salmonids. The project was designed to connect aquatic habitats with groundwater elevations within the alluvial fan.

In 2020 the constructed new Tillicum Creek channel will be re-wetted to further restore hydraulic complexity and aquatic habitat conditions upon the alluvial fan.

## QUICK FACTS

- Implementation: July-November 2018
- Cost: \$400,000
- Large Wood Procurement & Delivery Cost: \$50,000
- Vegetation Restoration: \$120,000
- Design Firm: Inter-Fluve
- Land Ownership: USFS

## HABITAT SPECS

- Alluvial fan acreage: 3.5
- Side channel length: 400 feet
- Side channel slope: 1.6%
- New creek channel length: 550 feet
- New creek channel slope: 3.3%
- Number of mainstem structures: 1







## MATERIALS

- 9,300 cubic yards of excavated alluvium to create new channels and reach static groundwater elevations
- 100 imported logs, logs with root wads, and salvaged trees incorporated into the restored fan
- 800 woody stemmed trees/shrubs planted into the restoration area to recreate forested conditions

## PERMITTING PATHWAYS

- NEPA – USFS EA
- SEPA – Chelan County Exempt
- Section 7 – USFS ARBO II
- Section 106 – USFS/YN
- Section 404/401 - USFS RPG-8
- WA State Shorelines – Chelan County Exempt

## PROJECT CHALLENGES & SOLUTIONS

- Alluvial fan restoration was identified as a high priority by the USFS, and they sought the assistance of YN UCHRP to develop a restoration plan for the site.
- Dewatering of the Tillicum Creek channel due to highly permeable sediments in the alluvial fan was a concern that required groundwater elevation assessments and monitoring to inform the restoration designs. The project was then developed to be in contact with groundwater elevations within the fan.
- Due to the historic impacts of sheep grazing on vegetation conditions on the fan, extensive vegetation restoration was required to develop a new riparian and upland forest zone around the constructed channels.
- There was concern that immediate creek flows interacting with the newly planted vegetation on the alluvial fan could destabilize the plantings and cause erosion. In response, we set the project up to include future strategic log placements, to be positioned by hand, in the old Tillicum Creek channel to divert flows into the restored fan area once the vegetation root strength becomes established.
- Most of the riparian vegetation is in adequate contact with groundwater elevations in the alluvial fan, negating the need to provide overhead watering during the summer.
- All excavated material was kept on-site to significantly reduce project costs.

TILLICUM CREEK CONCEPTUAL RENDERING:  
ALTERNATIVE THREE

