Using the Umatilla Tribe's *River Vision* to Implement Process-Based Restoration on the Tucannon River

Kris Fischer and Zach Seilo
Tucannon Basin Fisheries Habitat Enhancement Project
Confederated Tribes of the Umatilla Indian Reservation

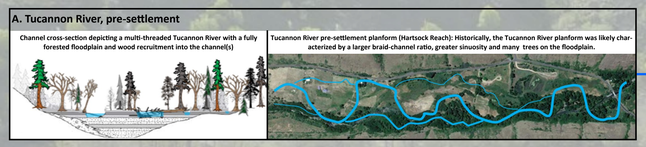
PARTNERS:

1) Context

Historically the Tucannon River (a tributary to the Snake River in southeast Washington) was a multi-threaded channel with a mature, late stage riparian forest across the entire valley bottom. The mature riparian forest, which included live and dead wood on the floodplain and in the stream channel, helped to facilitate the formation of multithreaded channels and maintain dynamic habitat heterogeneity and geomorphic complexity. This diversity of structural forms and habitat niches supported a diversity of native aquatic biota.

Heterogenous Floodplain Habitat

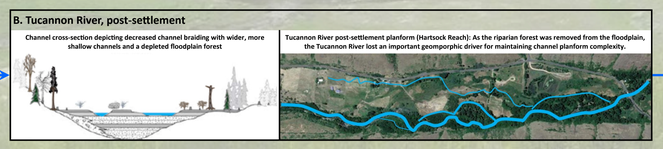
A. Tucannon River, pre-settlement



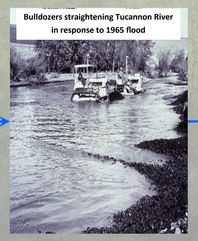
A trend toward homogenization of the stream channel and floodplain commenced

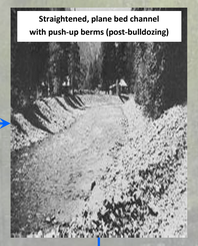
Euro-American settlement during the 1800's led to clearing of the floodplain forest

B. Tucannon River, post-settlement



Large floods in the first half of the 1900's resulted in a community-based desire for "flood control". The solution on the Tucannon River was to bulldoze the channel straight and confine it to a single thread with push-up berms.

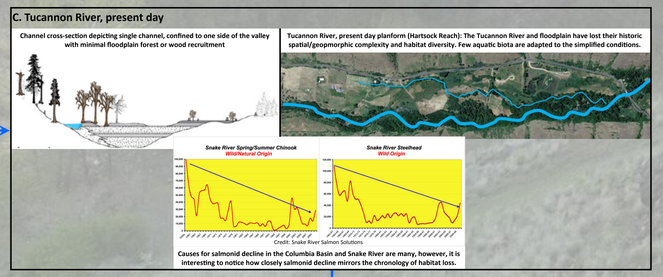




The legacy of floodplain forest removal and straightening/confining the Tucannon River has created an oversimplified, plane bed channel which can no longer support the historic diversity of native aquatic biota.

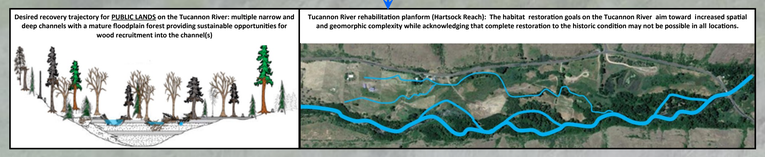
Homogenous Floodplain Habitat

C. Tucannon River, present day



Habitat Recovery Goals

Semi-heterogenous



2) River Vision

Watersheds within the CTUIR aboriginal title lands shall include a healthy river capable of providing First Foods that sustain the continuity of the Tribe's culture. This vision requires a river that is dynamic, and shaped not only by physical and biological processes, but the interactions and interconnections between those processes.

Diagraming the relationship between the CTUIR First Foods policy and the River Vision guidance framework for the Fisheries Habitat Program

CTUIR Fisheries Habitat Enhancement Program

Mission Statement: *To protect, enhance, and restore functional floodplain, channel, and watershed processes to provide sustainable and healthy habitat for aquatic species of the First Foods order.*

In 2008 the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) developed programmatic guidance titled "River Vision" (Jones et al. 2008) which establishes process-based restoration as the primary objective for the CTUIR Fisheries Habitat Enhancement Program. River Vision provides a holistic framework for river restoration by identifying five "Primary Touchstones" of river systems. The Primary Touchstones are ecological and physical processes that are critical to support the sustainability of aquatic First Foods. The goal of CTUIR Fisheries Habitat Enhancement Program is to ensure that every CTUIR-sponsored river restoration project enhances all five of the Primary Touchstones to the maximum extent possible.

Primary Touchstone	Secondary Touchstone	Restoration Action
HYDROLOGY	Aquatic Biota	• Increase water residence time • Decrease water velocity
GEOMORPHOLOGY	Connectivity Riparian Veg.	• Increase in-stream roughness • Improve width to depth ratio • Improve braid-channel ratio • Improve sediment sorting
CONNECTIVITY	Geomorphology Aquatic Biota	• Paleochannel re-connection • Levee removal • Address channel incision
RIPARIAN VEGETATION	Geomorphology Hydrology	• Plant native vegetation • Control noxious weeds • Raise water table elevation
AQUATIC BIOTA	Geomorphology	• Increase available refugia and food • Improve temperature regimes • Improve biogeochemical exchange





3) Application

Existing Problem

The Hartsock Reach of the Tucannon River, had been an old homestead since the early 1900's until WDFW purchased it as part of the W.T. Wooten Wildlife Area. In this reach the river channel had been pushed to the east hill slope, straightened and leveed in place to allow for agriculture production. Once the river was confined on the east side of the valley, the river straightened, water velocities increased, habitat simplified and the river dug itself into a trench (incised) removing all the small gravel from the reach. This removed all the gravel that formed pools for adult holding and gravel bars for spawning, providing limited aquatic habitat diversity.

Goal

CTUIR sought to enhance the Primary Touchstones of River Vision (process-based restoration), within the Hartsock Reach, to the maximum extent possible. The goals of the Southeast Washington Salmon Recovery Plan included instream wood replenishment, increasing channel complexity, and reconnecting the river to its floodplain.

Objectives

1) Replenish instream wood to two key pieces of wood per channel width.
2) Design large wood structures to:
   - Raise the bed elevation by removing levees in confined areas and decreasing incision throughout the project area, reconnecting the river and floodplain
   - Decrease stream velocities and increase sediment deposition throughout the reach
   - Increase connectivity using old side-channels throughout the reach
   - Increase the local water table through hyporheic exchange with the alluvial aquifer
3) Replenish the floodplain forest with native tree plantings.

Picture Key
BEFORE: Examples of pre-treatment plane bed channel in the Hartsock Reach
AFTER: Examples of plane bed channel, post-treatment with heavy wood loading (same location)

Lessons Learned

- Large wood is and always has been an important driver of physical and ecological processes in the Tucannon River – (Primary Touchstones of River Vision)
- When trying to restore natural processes on rural, non-navigable streams, it is difficult for restoration implementers to be TOO aggressive with wood loading; for this project, time and resources were more of a limiting factor on large wood quantities than the capacity of the Tucannon River to hold the wood.
- Large wood restoration projects should be designed with an acknowledgement of the potential for rivers to change and alter the original function of a given large wood structure – but that's OK and should be considered a success since rivers that freely move material laterally and longitudinally are healthy, self-sustaining rivers.
- When the focus is on reversing past land use practices (channel straightening and the associated incision), large wood can greatly increase the rate at which rivers rehabilitate (aggrade) themselves.