Yakima Basin Beaver Reintroduction Project

2011- 2015 Progress Report

Ellensburg, Washington

Prepared by:

Melissa Babik
Project Manager/ Wildlife Biologist
Mid-Columbia Fisheries Enhancement Group

&

William Meyer
Habitat Biologist
Yakima Basin Integrated Water Resources Plan
Washington Department of Fish and Wildlife

Abstract

An effort was made to inform over 33,000 local residents about the benefits of beavers via presentations, festivals, newsletters, and interviews with media. Between 2011 and 2015 this project has acquired $358,139 in grant funding and has acquired $292,986 in match with over 4,820 volunteer hours. To track nuisance complaints, a spread sheet was constructed logging communication with over 150 land owners and managers. The installation of 3 pond levelers, 2 beaver deceivers, 2 beaver dam analogues, and fencing around dozens of trees occurred on multiple properties in Kittitas and Yakima counties. Four holding tanks were assembled on Yakama Nation property complete with cinderblock lodges, flowing water, and shade for the beavers. Protocols were established and improved for trapping, transporting, safe handling, equipment and facility sterilization, disease prevention, sexing, ear tagging, PIT tagging, feeding, and relocating beavers. Relocation sites were evaluated for food availability, cover, stream gradient, water flow, and resident beaver populations. Snares and Hancock traps were modified for better success and safety of captured animals. Beaver reintroductions were monitored for success and found that 16 of the 45 colonies were successfully established between 2011 and 2014. PIT tag arrays detected 17 of the 161 relocated beavers moving to different regions of the watershed. PIT tags are not an effective tool for monitoring beaver movement but they are able to suggest that beaver that leave a reintroduction site may still be performing ecological restoration on the landscape years later. This project documented 26 new dams, 24 pools, and 24.6 million gallons of water stored in 2015. Data suggests the longer a beaver colony persists the more stream complexity they create.

Project Area

Target watersheds include: the Teanaway River, Swauk Creek, Manastash Creek, Taneum Creek, Yakima River, and their tributaries (figure 1).

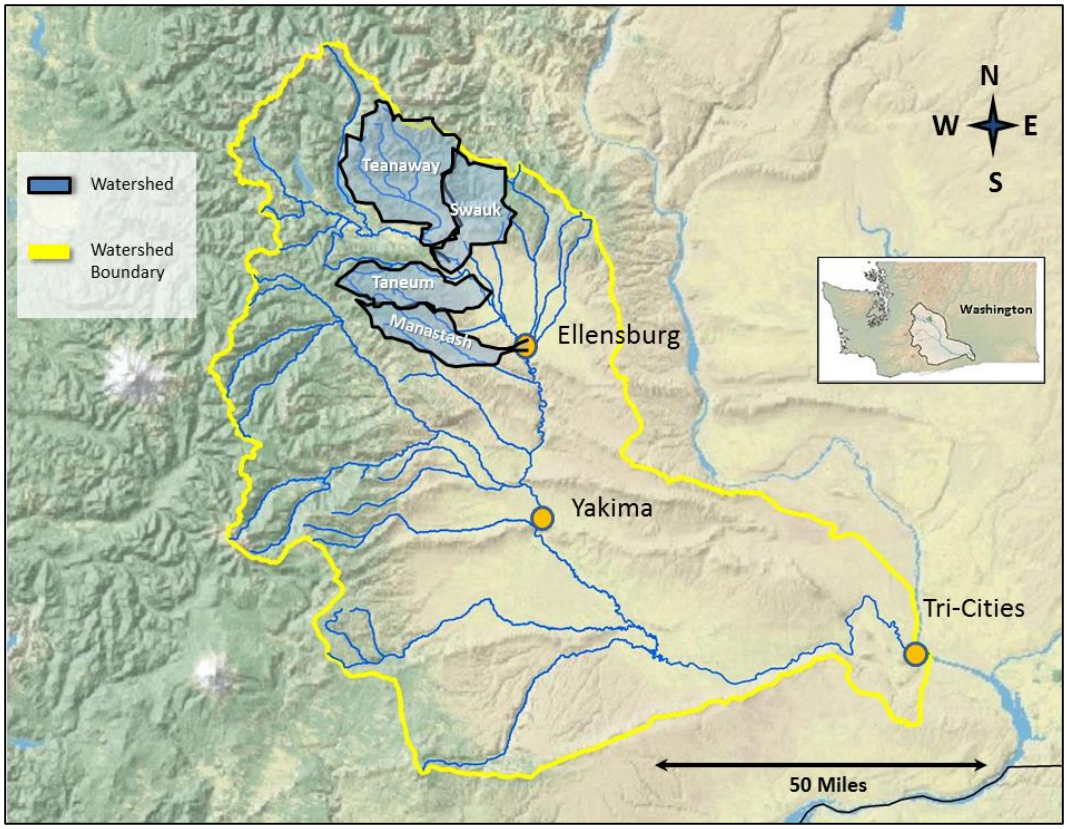

Figure 1: Map of the Upper Yakima Focus Watersheds

Work Description

The goals of the Yakima Basin Beaver Reintroduction Project are to relocate ‘‘problem beavers’’ from urban and agricultural areas in the lower and mid Yakima Basin, where they are currently being lethally removed, and re-establish them in upper Yakima River tributaries to enhance watershed function. Nuisance beavers will be used as a tool to restore riparian habitat, increase stream complexity, attenuate flows, recharge underground aquifers, and adapt to climate change impacts.

Objective 1: Provide outreach and education to local school districts, communities, private landowners, and local agencies on ways beavers restore riparian function and are an essential keystone species.

An effort was made to inform over 33,000 local residents about the benefits of beavers via presentations, festivals, newsletters, and interviews with the media. The project has been documented by a free-lance videographer, a web designer, and public broadcasting organizations. The project was featured on the Canadian Broadcast Corporation, National Public Radio, the Associated Press, and in several local papers. This project has presented at the Washington State Beaver Workshop, The Methow Beaver Relocation Workshop, The Salmon

Recovery Conference, The Yakima Basin Science and Management Conference, and hosts the Washington Beaver Working Group meetings. In November 2012, Washington Department of Fish and Wildlife and Mid-Columbia Fisheries hosted a stake holder's meeting to discuss new legislation, integrate beaver relocation projects with interested parties, and to discuss ways to streamline permitting .

Figure 2: Melissa Babik performing outreach at Yakima Arboretum Children's Camp.

Figure 3: Melissa Babik hosting a field trip to the captive beaver facility.

Objective 2: Hire a crew to track and respond to nuisance beaver reports.

A spreadsheet was compiled with over 150 land owners and managers experiencing problems with resident beaver populations. Concerns included cutting down trees, blocking culverts, flooding adjacent property, and damming of irrigation water. A crew of 2-3 seasonal biologists and a project manager responded to nuisance complaints between June and October from 2011-2015.

Objective 3: Set up a holding facility and care for captive beavers.

The Yakama Nation donated four large metal fish tanks to the project to serve as a captive holding facility for nuisance beavers prior to their reintroduction. The tanks were positioned on Yakama Nation property and were outfitted with A-frame metal shade canopies, cinder block / plywood lodges, food dishes, and irrigation plumbing (figures 4-6). Water level was kept at approximately 3 – 3.5 feet deep with artificial lodges elevated above the water mimicking a dry beaver lodge. Crews worked to minimize weight loss by modifying housing and feeding techniques. Beavers were fed dry rodent pellets, apples, and aspen cuttings.

Figure 4: Captive Holding Facility

Figure 5: Kit leaving lodge

Figure 6: Lodge with rodent pellets

Objective 4: Purchase and modifying live traps, transport cages, and snares.

Crews gathered 11 Handcock traps and replaced the springs as they weakened. They outfitted three Havahart traps with plywood bottoms. They modified snares by placing deer stops, larger swivels, and thicker diameter cable to reduce injury to animals.

Figure 7: Beaver in Hancock live trap

Figure 8: Beaver in Havahart trap.

Figure 9: Kevlar bag for safely handling beavers.

Figure 10: Snares (upper snare is old version with smaller clasp; lower snare is modified with a larger clasp.)

Objective 5: Evaluate relocation sites for food availability, cover, stream gradient, water flow, and resident beaver populations.

Tributaries were assessed by walking stretches of river noting beaver presence, abiotic and biotic characterizes. Criteria for a suitable relocation site required a surplus of deciduous vegetation, low in-stream gradient, continuous flow, presence of deep pools, a wide floodplain, permission from the land owner, and a lack of resident beavers. Each potential site was scored with a numerical value representing its suitability for beaver reintroduction.

Objective 6: Develop and improve protocols for trapping, transporting, safe handling, sexing, ear tagging, PIT tagging, feeding, temporary lodge construction, and relocating beavers.

PIT tags are inserted into the upper left rear thigh of the beaver to detect movement throughout the watershed. Silver metal ear tags were used to detect recapture. Safe Handling procedures and protocols were established for equipment sterilization and disease prevention.

Objective 7: Work with landowner to mitigate threats to property by managing beavers in place or trapping.

Beavers often become problematic in urban and agricultural areas. Typically these problems can be addressed by installing a pond leveler (figure 10), beaver deceiver (figure 11), or by protecting vegetation with fencing or a sand/paint mixture (figure 12). Land managers are briefed on the various tools used to manage beaver populations on-site and the required maintenance of each tool. This project has installed three pond levelers, two beaver deceivers, and painted dozens of trees in Kittitas and Yakima counties.

Figure 10: Flexible Pond Leveler,

Figure 11: Beaver Deceiver

Figure 12: Protecting trees

Objective 8: Relocate Nuisance Beaver.

One hundred and sixty one beavers were relocated to headwater tributaries between 2011 and 2015. Beaver families and single beavers paired up with an unrelated mate were transported to headwater relocation sites (figure 13). In efforts to ease predation pressures, a temporary lodge was constructed out of logs, branches, and mud (figure 14). The beavers' nest box chips were added to initiate a homing instinct. A deciduous food cache was left to ease predation pressures as the beavers explore their new surroundings in search of food sources.

Figure 13: Relocating a beaver

Figure 14: Temporary Lodge

Figure 15 depicts areas were beavers were trapped and relocated. Notice the hot spots for beaver conflicts are in urban areas.

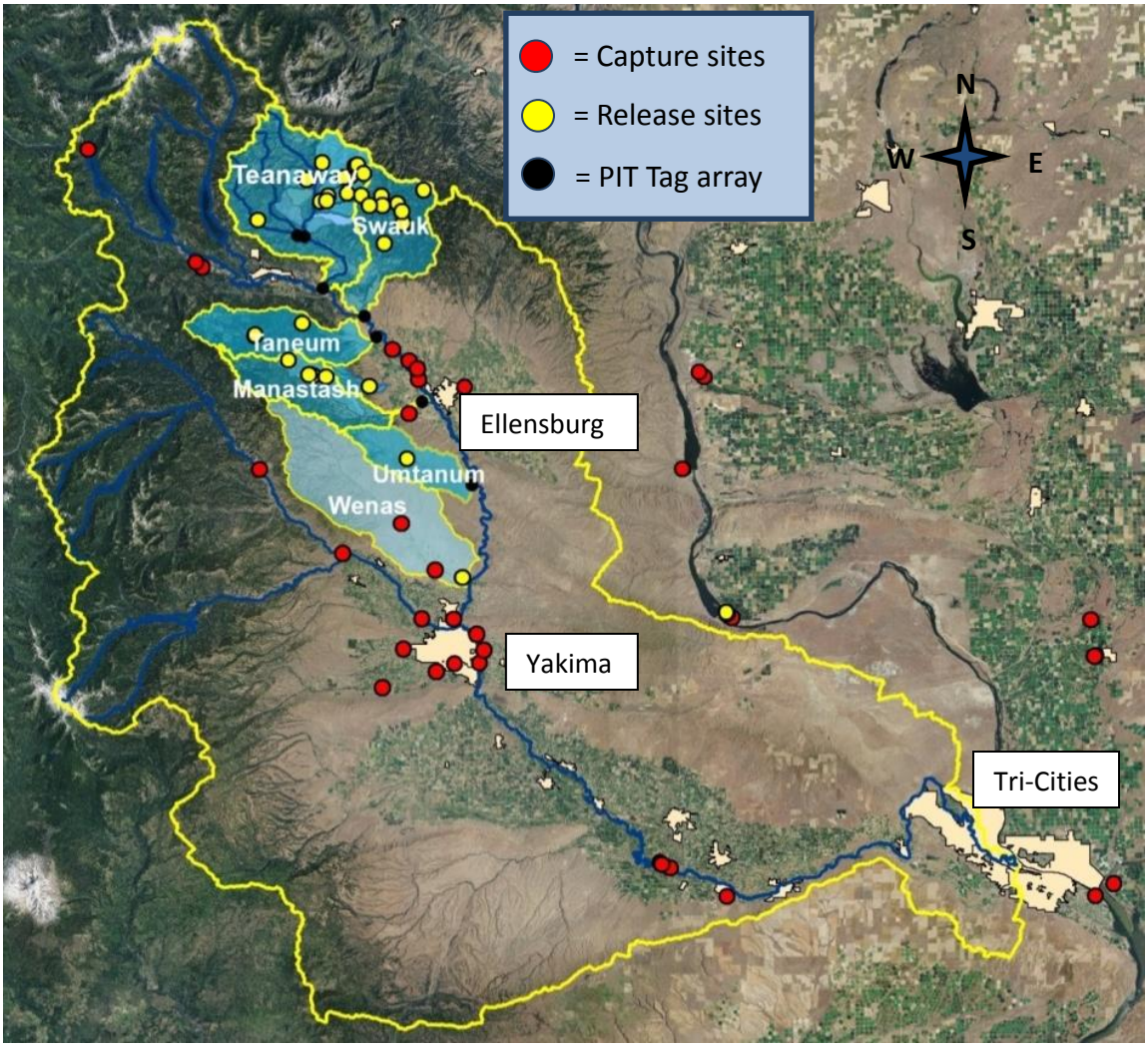

Figure 15: Trap and release locations as well as PIT tag array placement.

Objective 9: Monitor relocated beaver colonies.

Success

This project conservatively identifies success by demonstrating that relocated beavers remain at or near a location for at least one year and construct/maintain beaver built infrastructure (dam, lodge, bank den). Trail cameras, visual surveys, delivering food caches, and PIT tag arrays are all useful tools in monitoring beaver presence. However, these tools cannot determine the number of beavers successfully reintroduced; they can only show that a site is occupied by at least one beaver. Sixteen of the 45 colonies relocated between 2011 and 2014 were classified as successful. Results from 2015's efforts will not be evaluated until summer of 2016.

Table 1: Success metrics of beaver introduction 2011-2015

Trapped Beavers	180
Escaped Captive Facility	7
Died in Captivity	3 adults, 3 kits, 1 juvenile
Returned to colony or moved short distance	3 kits, and a pair
Relocated Beavers	161
Successfully relocated colonies 2011	3 out of 5
Successfully relocated colonies 2012	4 out of 11
Successfully relocated colonies 2013	5 out of 18
Successfully relocated colonies 2014	4 out of 11
Successfully relocated colonies 2015	Unknown until 2016
Total colony success 2011-2014	16 out of 45 relocated colonies successful

Of the 161 beavers reintroduced between 2011 and 2015, 17 were documented on PIT tag arrays dispersing from the relocation site. One beaver was found to survive and migrate more than 40 miles across the watershed 983 days post a successful reintroduction. This shows that unsuccessful beaver relocations can still be performing ecological restoration in the watershed years after relocation.

Data show that monitoring beaver movement through PIT tags is not effective as beaver have been documented to travel undetected through PIT tag arrays. Beavers were documented moving both upstream and downstream from their relocation site and were found traveling without family members. Both related and unrelated beavers were shown abandoning their relocation partner at a relocation site. Data also suggests that site abandonment is not always indicative of that site being of poor quality. One year a site can be accepted by relocated beavers whereas another year it may be rejected.

Objective 10: Monitor stream complexity.

A goal of this project was to increase stream complexity. Table 2 depicts monitoring results from 2015 and ways this project increased stream complexity.

Table 2: Increase of stream complexity

Gauge of Complexity	**YBP's measurement of increasing stream complexity in 2015**
Hydraulic retention	Stored 24.6 million gallons of water
Instream structure (LWD)	26 new beaver dams created
Large Pool Volumes	24 new pools created
	Pond/pool circumferences varied from 5m^2 - 1271 m^2.
	Pool depth varied from 0.3m – over waist
Edge Habitat	26 new beaver dams increased edge habitat and cover for juvenile fish by 365m.
Floodplains connected= overland flow	Yes
Side Channels created	Yes
Habitat heterogeneity	Length of beaver created habitat varied from 60m to 850m of stream length.
	Number of dams (LWD) / colony varied from 1-7 dams.
	Pool depth varied from 0.3m – over waist
	Pond/pool circumference varied from 5m^2 - 1271 m^2.

** Sample was 11 beaver colonies in 2015.

** Longer beaver colonies persisted on the landscape the more complexity they created.

An estimate of the groundwater storage was calculated from Pollock et al., (2003) as follows:

Number of successful sites * Average pond surface area per site (m^2/site) * infiltration rate (m/s)* number of days of infiltration * conversion factor = volume of groundwater storage (m^3/yr)

11 * 670.3 m^2 * 0.0000004 *365 * 86,400 = 93,008 m^3/yr = 93 million liters/yr = 24.6 million gallons/ yr

Where:

Number successful sites in 2015 = 11sites

Average pond surface area/successful site = 670.3 m^2/site

Infiltration rate = 0.0000004 m/sec (Pollock et al., 2003)

Number of days of infiltration = 365 days (ponds are observed to have water year-round)

Conversion factor = 86,400 (converting from per seconds to days)

The estimated water storage for the 11 sites equals **24.6 million gallons per year**. It must be noted that these measured benefits are only depicting the 11 colonies that were deemed still successful in 2015. Other sites may have been created that go undetected. Additionally, beaver colonies are dynamic and decrease with normal attrition (predation, trapping, harsh winters, or disease) and increase with reproduction and dispersion. 12 million gallons of water storage translates to 0.05 CFS in stream velocity.

Figure 16: Beaver relocation site along the North Fork Manastash after 3 years of success.

Lessons learned:

1. Beavers can pass PIT tag arrays traveling upstream or downstream without detection and lose ear tags making it difficult to evaluate successful reintroduction.
2. Monitoring efforts can only detect if a site is occupied by at least one beaver it cannot show individual beaver retention or abandonment.
3. Data shows reproduction of relocated beaver.
4. Antidotal evidence shows offspring dispersal from reintroduced parents.
5. Site abandonment is not always indicative of that site being of poor quality.
6. Beavers do not always remain or disperse from a site together. Our data shows instances of both related and unrelated beavers abandoning their relocation partner at a relocation site.
7. The longer a beaver colony persists the more complexity it brings to the watershed.

Project Match: 2011-2015

Affiliation	Contribution	Total
Yakama Nation	Captive Holding Facility	$140,530
WDFW	Field Truck and Staff Time	$47,945
USFS	Educational Outreach & Supplies	$18,494
MCFEG	Educational Outreach	$5,729
Community Volunteers	Trapping, Relocating, and Monitoring	$69,600
CWU	Handcock traps	$10,000
Other	Supplies	$670
Total		**$292,968**