BEAVERS: VITAL FOR SALMON AND A HEALTHY CHEHALIS BASIN

Chehalis Basin Collaborative for Salmon Habitat (CBC-fSH)


Credit: Beaver Smithsonian




Credit: WDFW

HISTORY

Not too long ago, there were between 60 to 400 million North American Beavers in the U.S. 15 million to 250 million beaver ponds once covered North America ---235,000 square miles--- Arizona and Nevada combined! These beavers created complex stream and river systems unlike what we usually see today.

In 1805, when the Missouri River Basin was surveyed, explorers Meriwether Lewis and William Clark encountered beaver dams - "extending as far up those streams as [we] could discover." In the 19th century, a robust trade in beaver pelts, along with a loss of habitat due to settlement, almost wiped them out.

Beaver populations recovered somewhat through the 1920s and 1930s, but never to their original numbers.

INSIDE THIS GUIDE LEARN ABOUT:

- NATURAL HISTORY OF BEAVERS
- NATIVE PEOPLE AND BEAVERS
- BEAVERS AND BIODIVERSITY, WATER QUANTITY, AND WATER QUALITY
- BEAVER RELOCATION
- BEAVER DAM ANALOGUES
- CO-EXISTING WITH BEAVERS
- BEAVERS AND CLIMATE CHANGE
- AND MORE!

NATURAL HISTORY OF BEAVERS

The North American Beaver is the largest rodent in North America, and can weigh up to 60 pounds. They have made many adaptations to life as a semi-aquatic mammal. Beavers have:

- Fur is thick, with dense interlocking hairs, it acts like a life-preserver, or dry suit.
- Feet are webbed and flattened, and have scale-covered tails.
- Tails are used as kick stands, rudders and as alarm systems.
- Have closable nostrils and ears, and can hold their breath up to 15 minutes.
- Their transparent eyelids allow them to see below the surface of the water.
- Large teeth which grow throughout their lifetime, and self-sharpen.
- They have a second set of fur–lined lips that close behind their teeth, permitting them to chew and drag wood without drowning.
- They eat the inner bark of trees like willows, and in the summer enjoy green plants including ferns.
- Are like farmers, as beaver ponds irrigate water loving trees like willows, and they will chew one section and cultivate another crop.
- Their dams allow for submerged lodge entrances to repel predators and store food. Beavers are a prized food for many predators, like bear, coyotes, and cougars because of their high fat content.









Beaver Lodge at Millersylvania State Park

This beaver lodge is about four feet tall and 6 feet wide

BEAVERS AND THE CHEHALIS PEOPLE

"Beavers have always been very important to the Chehalis People. Beaver are in many Chehalis tales, and the holder of great power and could perform shamanistic ceremonies. He was the first to try to cross the horizon to the land of the salmon people."

--- William Thoms, Cultural Resource Specialist, with the Confederated Tribes of the Chehalis Reservation

According to Thoms, beaver hides were a popular and widely-traded item, especially down the Pacific coast. The French at the trading posts around the Columbia River were especially fond of Chehalis pelts.

- The fur was left on the hides and made luxurious blankets. The animals were so easy to catch that a woman could make two or three blankets in a week (6 to 8 hides per blanket).
- Hides were also cut into strips and twisted into material for skirts.
- Beaver meat was common; beaver tongue soup was a special delicacy.
- Young beavers were kept as pets by certain families.
- Beaver teeth were decorated with circles and dots and used like dice in a game played by women and children.

CURRENT THREATS

Here in Western Washington, we are living in a world created in large part by beavers, and people like to settle in the same places that beavers occupy -- floodplains. Because of this, today, only 2% of the land in the west remains in riparian, streamside habitat. **However, this 2% provides the habitat complexity to support 80% of our biodiversity.**

Some think that beavers are a nuisance species, and in 2017, trappers in Washington State killed at least 1,700 “nuisance” beavers, nearly 20 times more than were relocated alive. **(For information on how to effectively co-exist with beavers, see page 9.)**



Credit: traditonalanimalfoods.org

BEAVERS: ECOSYSTEM ENGINEERS AND A KEYSTONE SPECIES

Beavers have been building ecosystems in North America for the past 7 million years or so. People, some called "beaver believers,” have discovered that, far from being forces of destruction, beavers are critical in the creation of healthy, diverse, and complex ecosystems.

Beavers are **"ecosystem engineers,"** as they create, greatly modify, and maintain habitat and ecosystems, which results in a large impact on the biodiversity of an area.

Beavers flood areas to increase the vegetation they feed on like willow- and alder- and also use the plants as their building materials. Their dams and ponds also protect their constructed lodges. Their lodges and ponds provide safety from predators, shelter from the elements, and food storage. Lodges also provide homes for many other animals like muskrats, mink, river otters, and the bases of lodges provide refugia for small fish. Some birds even nest on top of lodges.

Note: On land, beavers are very vulnerable to predation -- they are slow, soft, and have poor eyesight. In the water they are better able to evade predation - thus they flood areas so they can get from where they are to where they need to be with minimal time on land.



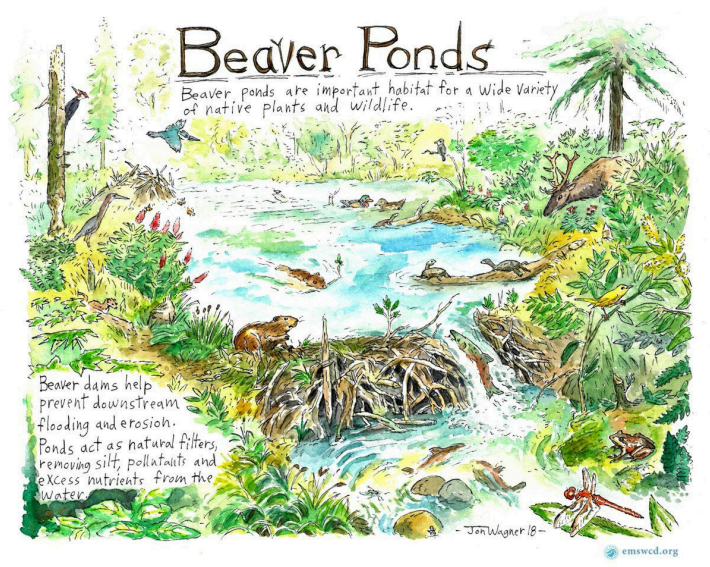
Credit: nwf.org

ULTIMATE KEYSTONE SPECIES

Beavers are the ultimate keystone species: an organism whose pond-creating powers support entire biological communities. One beaver or beaver family creates habitat for a multitude of species, salmon, and other fish, mammals, waterfowl, insects, amphibians, and reptiles.

"Beavers are the center of terrestrial ecosystems as well as aquatic ones. Beaver ponds increase forbs, grasses, and shrubs, which are forage for bear, elk, deer, and everything else."

-- Mike Sevigny, Wildlife Manager, Tulalip Tribes



"Landowners often say to me, Oh, I didn't know beavers are such a benefit to wildlife" and "how they want to see increased wildlife on their land."

--Alexa Whipple, Project Director at the Methow Beaver Project

BEAVER PONDS AND SALMON



Wildcat Creek Beaver Pond

Beaver ponds create indispensable salmon nurseries and critical over-wintering habitat for coho salmon. Their dams with walls made of mud, rock and wood, hold back water which form ponds and wetlands. These beaver-engineered deep pools, lazy side channels, and sluggish backwaters are habitat that baby salmon need to conserve energy, feed and evade predators.

Studies have shown that salmon that use off-channel and beaver pond habitats often have higher survival and overall production rates. (In addition, the weight of the water in the ponds presses water deep into the ground, having an extra benefit of recharging aquifers for use downstream including farms and ranches.)

In "The Importance of Beaver Ponds to Coho Salmon Production in the Stillaguamish River Basin, Washington" 2004 study, it was found that beaver ponds in the Stillaguamish watershed- once supported as many as 7.1 million juvenile coho each winter. By the early 2000s, the watershed's depleted ponds could sustain fewer than a million.

In the Pacific Northwest, most of the loss of coho salmon production-related to loss of beaver habitat.

SALMON CO-EVOLVED WITH BEAVERS



Many biologists historically regarded beaver dams as stream-choking barriers to salmon passage. In the 1970s, Washington, Oregon, and California passed laws mandating the removal of in-stream wood, beaver dams included. This does not stand up to scientific scrutiny, as salmon and beaver have co-evolved over thousands of years. One 2016 study documented individual salmonids traversing more than 200 beaver dams on their way to spawn in Oregon streams, suggesting that salmon have little trouble negotiating the obstacles.

There's even an expression- "beavers taught salmon how to jump."

BEAVERS AND WATER QUALITY

As water slows down behind beaver dams, this allows for sediments to settles out, which increases water clarity and decreases water turbidity. Excess nutrients and pollutants are also absorbed and used by plant life, which also improves water quality.

WATER QUANTITY AND GROUNDWATER RECHARGE

Ponds are beavers' most visible positive impact on water storage. However, their ability to recharge groundwater may even be a greater contribution. Beaver dams slow water, connect it with its floodplain, which allows the water to seep into the ground, to recharge groundwater.

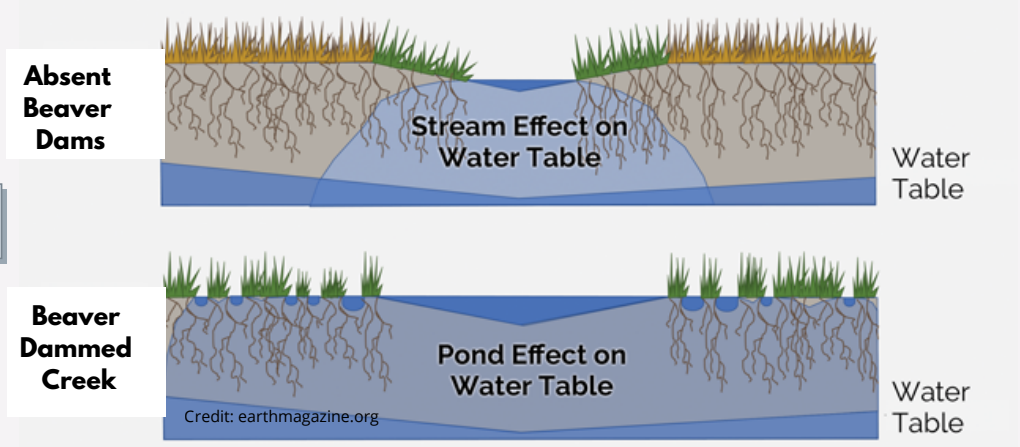
At the Tulalip Tribes beaver relocation sites, (learn more on next page), **biologists have found that for every cubic meter (264 gallons) of surface water that beavers impound, another 2.5 cubic meters (660 gallons) sinks into the earth.** As that water trickles through the soil, it cools off, eventually reemerging to mingle with stream flows downriver.

A recent study conducted by Beavers Northwest (beaversnw.org) showed: **Water temperatures downstream of beaver ponds were from 3.5 degrees F cooler than upstream!**

This exchange between surface water and groundwater also has some- seasonal creeks turning into perennial flowing streams.

As air and water temperatures rise from climate change and other human impacts-and-fish (temperature sensitive salmon and bull trout) and other wildlife experience thermal stress, these downstream cooling effects could make a difference if enough beaver ponds exist in the region.

Beaver Ponds and Groundwater Recharge



OUR WATERSHED, CREATED IN LARGE PART BY BEAVERS



Delezene Beaver Complex

"The longer that beaver dams have been around, the more liable they are to have affected the evolution of a multitude of species, from aquatic invertebrates and plants to fish, amphibians, and wetland dependent birds and mammals."

---Frances Backhouse, author of "Once They Were Hats"

BEAVER RELOCATION

Beaver were instrumental in sculpting our fertile river bottoms, low-gradient rivers. Today, salmon restoration biologists are working to boost beaver numbers. On-going studies document how beavers help replenish groundwater, keep streams flowing year round, and help fight climate change.

The Tulalip Tribes

Here in Washington state, where more than a century of habitat loss has devastated salmon, the Tulalip Tribes have strategically dispatched more than 100 beavers to support the salmon so integral to their history and culture.

For example, on one western Washington stream, eleven separate beaver dams have transformed it from straight-and ditch-like to one with a patchwork of deep pools and side channels. Beavers and their dams create the habitat complexity that coho and other salmon need.

Beaver Bill

In 2019, a revised Beaver Bill, RCW 77.32.585 which highlighted the ecological value of beavers, now allows nontribal groups, such as environmental nonprofits, to also relocate beavers in Western Washington.

The Cowlitz Tribe

The Cowlitz Indian Tribe was recently awarded a grant to inventory existing beaver habitat in SW Washington on public and private timber lands that are located on the aboriginal lands of the tribe. This survey work will help plan for strategic relocation of beaver into Southwest Washington.

"Our culture and members depend upon a healthy ecosystem. Beaver are a key species that enable the ecosystem to function properly. This project will lay foundational work for strategic relocation to suitable habitat within the aboriginal lands of the tribe."
---Philip Harju, Cowlitz Indian Chairman

For questions about beaver relocation in the Chehalis Basin contact: Megan Tuttle, WDFW Habitat Biologist III, at Megan.Tuttle@dfw.wa.gov. 3

BEAVER DAM ANALOGUES (BDAs) and Ecosystem Restoration

Salmon biologists are also building structures which mimic beavers ecosystem engineering skills. After years of study, in 2007, federal scientists began restoration work on a highly degraded Oregon stream, known as “the Bridge Creek Beaver Project (BCBP).”

Scientists designed and installed more than 120 wooden post and stick structures on BCBP in Oregon. These stream restoration, channel-spanning, semi-porous wooden post structures have willow and/or maple tree stakes woven in like the weaving of a wicker basket.

Their form and function will mimic the effects of beaver dams, and to be semi-permanent, lasting long enough when possible, to get beavers back into the system.

BDAs help promote floodplain connectivity and enhance ecological resilience in degraded waterways. The creation of beaver dams is seen as vital for recovering endangered and other threatened salmon populations.

Skookumchuck River and BDAs

In the Skookumchuck River in Chehalis Basin, thanks to the partnership of private landowners, land trusts, conservation districts, and state agencies, over 2,600 feet of shoreline along the Skookumchuck River will be restored and over 74 acres of land will be protected to provide critical habitat for salmon and other aquatic species.

New vegetation including endangered oak trees are being planted on the property, and in the river, 20-foot-long logs are being put in horizontally to stabilize the banks. Other logs are being placed in the river vertically to create beaver dam analogs, structures that mimic the function of beaver dams. The logs will give fish places to hide from predators and oxygenate water as it flows through.

For a link to article and videos on the project, check out: https://wdfw.medium.com/saving-salmon-in-the-skookumchuck-ac9e660d4d5d.



"Without bold steps across the Chehalis Basin to rebuild rivers and streams with the forest and floodplains, scientists estimate we could lose Chehalis River spring Chinook salmon entirely in 60 years. We could also lose a significant percent of the economically-vital steelhead runs in that same period."

--From: "Saving Salmon in the Skookumchuck" Washington State Department of Fish and Wildlife, October 23, 2020



WA State Beaver Dam Analogue

“The Chehalis Basin is one of the state’s only major river systems with no salmon species listed as threatened or endangered. We want to keep it that way by restoring and protecting their habitat.”

---Emelie McKain, (former) Aquatic Species Restoration Plan (ASRP) manager for the WA Department of Fish and Wildlife

BEAVERS HELP REDUCE THE IMPACTS OF CLIMATE CHANGE

As our climate changes in the northwest, we will have more rain and less snow. Large, sudden high-flow events will be more common in streams.

Beaver Dams will help by:

- Adding **"roughness"** to the channel which helps slow down the water as it moves through a system. Slower water means less erosion and in some cases less flooding from storms.
- Forming ponds that **absorb** some of the water even if they already appear full, so the volume of water also decreases through a beaver system. In turn, groundwater supplies are replenished.
- **Maintaining stream flows** during dry periods in the summer.
- **Sequestering Carbon:** Ponds and other wetlands created by beavers store carbon. The wet, anoxic (lack of oxygen) environment slows decomposition and carbon release.
- **Providing Fire Refugia:** Beavers **fireproof the landscape** as water from dams and their resulting ponds inundate meadows and drowns flammable conifers. **Beavers dams raise the groundwater table, creating a verdant 'greenway' that is less prone to burn.** In this way, beaver wetlands become natural fire breaks. And as wildfires are more likely to occur in western Washington, fire control becomes increasingly important.

Mother beaver with kit



"Beavers, the animal that doubles as an ecosystem, are ecological and hydrological swiss army knives, capable in the right circumstances of tackling just about any landscape scale problem. "

---Ben Goldfarb, author of Eager - The Surprising, Secret Life of Beavers and Why They Matter.

Methow Valley:
The edge of a large high-elevation pond with burned areas in the background.



For more info: https://www.nasw.org/article/let-beavers-do-work-fighting-wildfire-one-dam-time

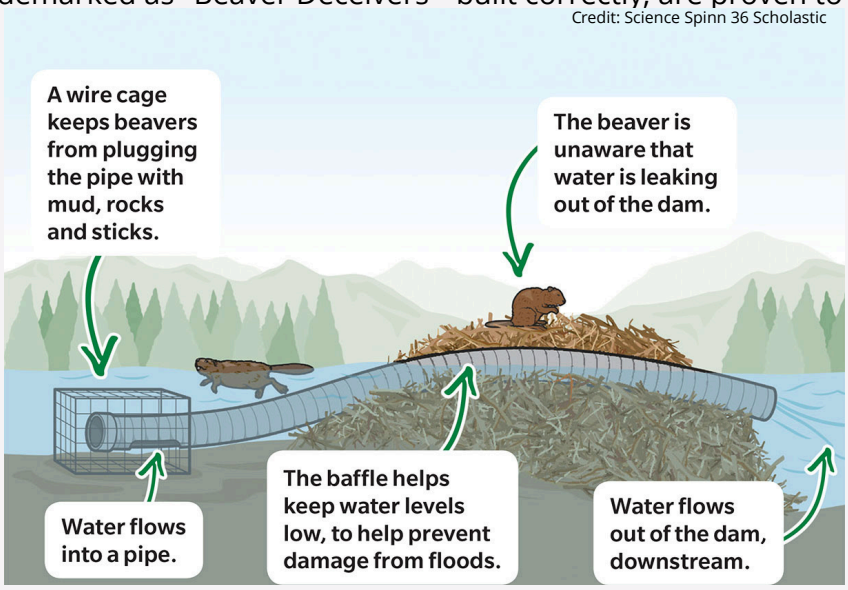
Credit: Joe Weirich

HOW TO COEXIST WITH BEAVERS

POND LEVELERS

These are flow devices with pipe and fence systems that partially drain ponds by creating a leak that not even a beaver can plug. Pipe end is surrounded by metal cage that prevent beavers from detecting and plugging the leak. Flow devices, some trademarked as "Beaver Deceivers " built correctly, are proven to be effective.

Credit: Science Spinn 36 Scholastic



For more information, check out: https://kingcounty.gov/services/environment/animals-and-plants/beavers/Resources.aspx

HOW TO PROTECT TREES FROM BEAVER CHEWING

There are effective ways to protect selected trees without destroying the beavers and their wetland ecosystem. An effective deterrent to beaver chewing is using a combination of sand and paint and paint onto the trunks of trees :

Sand-Paint Method to Protect Trees from Beavers

Ingredients

- Paint: Exterior Latex (choose a color to match the bark)
- Mason Sand: 30 mil – 70 mil

Formula

- Mix 5 oz sand per quart of paint, or
- Mix 20 oz sand per gallon of paint, or
- Mix 140 gm sand per liter of paint.



Credit: beaverinstitute.org

Painting a combination of sand and paint onto trunk of the tree.

Procedure

Make in small batches at a time on the day you are going to apply it. Using too much sand will cause the mixture to roll off the tree. Apply paint to bottom three to four feet of tree trunk (2 feet above snow). Do not need to reapply for several years. Consider leaving some trees unpainted for beaver food. This formula does not work for saplings, so protect them with wire fencing.

For information on beaver deterrent options, and fencing options: https://www.beaverinstitute. org/problems-solutions/tree-damage/

REFERENCES AND RESOURCES:

- **Beavers Northwest (beaversnw.org)**
  "To advocate for the many benefits beavers provide through research, outreach, and landowner assistance."
- **Center for Biological Diversity (biologicaldiversity.org)**
- **Eager– The Surprising, Secret Life of Beavers and Why They Matter** Ben Goldfarb
- **"Environmental Benefits of Beavers: Beavers Increase Biodiversity."** King County, WA January 11, 2018
- **"In Oregon, a Peculiar Case to Protect the Beaver"** Ben Goldfarb, The Modern West, February 20, 2018.
- **"Let beavers do the work: Fighting wildfire one dam at a time."** Olivia Box, National Association of Science Writers, September 7, 2020.
- **Methow Beaver Project (methowbeaverproject.org)**
  "Provides solutions to support landowners, restoration professionals and educators in understanding the benefits of beavers and the importance of coexistence with beavers for our ecosystems, for our wildlife, for our community, for us."
- **"Rodents Restoring Riparian Resilience with Alexa Whipple"** Fisherwoman Podcast, November 9, 2020. Methow Beaver Project.
- **"Saving Salmon in the Skookumchuck"** Washington State Department of Fish and Wildlife, October 23, 2020.
- **The Bountiful Benefits of Bringing Back the Beavers"** NPR, June 24, 2018
- **"The Importance of Beaver Ponds to Coho Salmon Production in the Stillaguamish River Basin, Washington, USA"** North American Journal of Fisheries Management, August 2004
- "**The Re-beavering of the American West"** Ben Goldfarb, The Atlantic, December 4, 2018
- **"Using Beaver Dam Analogues for Fish and Wildlife Recovery on Public and Private Rangelands in Eastern Oregon",** USDA, Northwest Climate Hub, 2019.
- **WDFW Lunch and Learn: "Beavers in the Chehalis Basin"** webinar with staff from Beavers Northwest, WDFW's Habitat Program, and Wild Fish Conservancy: https://www.youtube.com/watch?v=1RGutZwfkpUnar. September 8, 2021.


Credit: Creative Commons

To learn how you can help restore the native ecosystems that salmon need in the Chehalis River Basin, visit: the Chehalis Basin Lead Entity website at chehalisleadentity.org or contact Kirsten Harma at kharma@chehalistribe.org