

Beaver Coexistence

Common Issues

Beavers provide many benefits to the river system. Their presence is also sometimes challenging because their dams and canals can cause localized flooding, block irrigation ditches and road culverts, and divert water in unexpected ways. They may also damage or cut down a particular tree or set of woody vegetation that is important to a landowner.

Questions to Consider

- Can beavers be allowed to stay on the property? Perhaps on a limited portion of the property?
- Does management allow for the installation of beaver coexistence structures?
- Can some flooding be tolerated at the site if it is controlled at a predetermined level?

Principles of River Health

Beavers are a Keystone Species

Beavers are a “keystone species,” or a species that has an outsized role in supporting its environment. The actions of beavers benefit the ecosystem as a whole and encourage the presence and success of other species. Beavers are “nature’s engineers,” modifying the landscape by building dams and canals that slow and spread water, facilitate the growth of riparian vegetation, expand or create new ponds and wetlands, and maintain a higher water table.

Beavers Slow and Spread Water

Beaver dams slow the water moving through the landscape, allowing it to soak into the soil and spread out onto the floodplain, thereby recharging groundwater, raising the water table, increasing

soil moisture, and supporting late season flows. Beavers also dig and maintain canals on the floodplain as they gather wood, and these canals also help to spread water across the landscape. Beaver ponds are areas where nutrients, metals, sediments, and other solids settle out of moving water onto the pond bottom where they are processed by microbes, thus improving downstream water quality.



These photos were both taken in Routt County in late September, and show that beaver complexes maintain water storage and healthy riparian vegetation, even in late summer | Photos by Kim Lennberg, Alba Watershed Consulting and Roddy Beall, Zenobia Consultants

Homes for Many

Beaver ponds and wetlands are hotspots of biodiversity, hosting many aquatic and terrestrial species such as fish, insects, aquatic mammals, birds, amphibians, reptiles, ungulates, and carnivores.

Protection from Natural Disasters

In addition to ecological benefits, beavers are an effective partner for building resilience to drought, wildfires, and floods. Beaver complexes rehydrate the landscape, slow snowmelt and stormwater runoff, and prevent or correct stream channel incision. These benefits eventually allow for more connected floodplain benches and more robust riparian vegetation. Beaver wetlands keep moisture in the soils and floodplain, supporting abundant vegetation and creating a refuge for animals in the face of drought and wildfires. Beaver complexes also mitigate the damaging effects of floods, including post-wildfire floods, by giving floodwaters and associated sediment and wood a capture area before overtaking downstream infrastructure.

Recommended Practices or Actions

For landowners able to embrace beavers on their property, several methods and techniques are available to help accomplish successful coexistence that are cost-effective, often eligible for grant funding, and require little maintenance, as described below. These actions can be taken by landowners with the guidance provided here as a starting point, and professional training is available through the BeaverCorps Program.

Protect Important Trees with Tree Wrappings



*Metal tree wrappings protect cottonwoods
Photo courtesy of Friends of the Yampa*

Beavers fell trees and limbs for food and building materials and to keep their constantly-growing teeth in check. Protecting highly valued individual trees from beaver gnawing can be accomplished by placing heavy wire cylinders around the base of their trunks. Specifically, install 2x4-inch wire mesh cylinders with a minimum of a 3- to 6-inch gap around the base of the tree trunks, 2 feet above estimated snow level. In the valley bottoms, a 4-foot-high fence is almost always enough. If the adjacent waterbody floods its banks and has a lot of flow power, like on the mainstem Yampa, it can be helpful to drive wooden stakes into the upstream and downstream sides of the wire cylinders and secure them to the cylinder with a short length of wire to add extra stability. Broader fences can be installed as well for an entire stand of trees (such as an orchard). When installed correctly, this method is very effective, inexpensive, and doesn't require maintenance. An alternative to caging is applying a mixture of sand and paint to the bottom 3 to 4 feet of a tree trunk to make the bark "gritty" and undesirable for beavers.

Keep Culverts Open with Starter Beaver Dam Analog

A landowner or land manager may want to preemptively protect a culvert or other structure from increases in beaver activity in areas where beavers are known to be active. This can be accomplished by installing a porous starter dam (similar to a beaver dam analog) 10 to 12 feet upstream of a culvert to prevent beavers from damming directly on the culvert. This method works by encouraging beaver activity to occur well upstream of the culvert rather than inside the culvert. It is important to still consider other design elements such as sediment transport and aquatic passage as part of this mitigation technique.

Keep Culverts Open with Flow Devices



A flow device excludes beavers from a culvert and maintains flow of water | Photo courtesy of Skip Lisle, Beaver Deceivers International

Flow devices, including Beaver Deceivers™, are structures made of wood, wire, and plastic pipe that exclude beavers from a culvert opening while maintaining flow into the culvert. Flow devices are built with enough surface area and strength to tolerate some level of damming, and flow is maintained into the culvert through a polyethylene pipe system that brings water from an upstream “filter fence” into the downstream “receiver fence.” The beavers are allowed to develop their ponds, but the flow device assures that the culvert remains operable.

Manage Flooding with Pond Leveler

As beavers continue to maintain and improve their dam complexes over time, their ponds become larger and can eventually spill into an area that landowners do not want flooded (such as a hayfield). When this occurs, a “pond leveler” pipe can be installed to keep the pond to the desired size by allowing excess water to flow downstream. The pond leveler creates a permanent leak through the beaver dam without allowing beavers to detect the flow of water into the pipe because it is located upstream of the dam and surrounded by a fenced cage, preventing the beavers from getting close enough to the pipe’s inlet to feel or hear flowing water. Water continues to flow through the pipe unless the pond level drops below the peak of the pipe, so the level of the pond is controlled by the height of the pipe.



*A pond leveler maintains the pond level at a certain height
Photo by Roddy Beall, Zenobia Consultants*



Cross section through a pond, showing design of pond leveler | Diagram from Project Beaver

Benefits of Implementing Recommended Practices

- Coexistence with beavers reduces stream power, thereby reducing bank erosion and channel incision on site and further downstream
- Beaver complexes provide great habitat for fish and other wildlife
- Beaver ponds provide stock and wildlife with a source of water during late summer dry-up, when there is little or no water in the creek or river
- Beaver complexes can protect the landscape from the impacts of both wildfire and flooding
- Coexistence with beavers can raise groundwater levels, watering streamside pastures from the roots
- Beavers cutting aspen, willow, alder, and other trees cause the trees to regenerate, improving the quality of the riparian area
- Sediment captured in beaver ponds can create new topsoil for future pastures
- Beaver coexistence is less expensive than trapping, which often needs to be done each year as new beavers move in

Reference and Resource Materials

The [Yampa Valley Beaver Working Group](#) is working to provide beaver coexistence measures at little or no cost to landowners.

Colorado Parks and Wildlife (CPW) is currently developing a [Beaver Conservation and Management Strategy](#) to increase and sustain the prevalence of beaver and beaver-influenced wetlands in suitable habitats for the benefit of Colorado's stream and wetland ecosystems and the array of wildlife species that utilize them.

The US Army Corps of Engineers circulated a comprehensive [Guide to Working with Beavers](#) that shows many examples of fencing and deterrence structures to coexist with beavers in a working landscape.

The Watershed Center developed the [Landowner Guide to Beavers](#), which provides information about the benefits of beavers, details about what beavers need to survive, a brief explanation of coexistence strategies, and links to additional resources.

Utah State University has created a [downloadable design manual](#) to provide restoration practitioners with guidelines for implementing a subset of low-tech tools—namely beaver dam analogues and post-assisted log structures—for initiating process-based restoration in structurally-starved riverscapes.

The [Beaver Institute](#) is a nationwide nonprofit with useful information about beaver behavior and coexistence, as well as the [BeaverCorps training program](#) for non-lethal beaver management.

[The Beaver Restoration Guidebook](#) is an excellent reference document on the science behind the benefits of beaver and beaver coexistence techniques.

[The Colorado Beaver Activity Mapper](#) shows existing beaver complexes and an estimate of the potential total number of ponds that a stream could naturally support. Visit the map and explore different stream segments.

The USDA NRCS Conservation Practice 643: [Restoration of Rare or Declining Natural Communities \(Code 643\)](#), can be used through the Environmental Quality Incentives Program (EQIP) to access cost sharing. EQIP provides payments to restore and manage riparian corridor habitat.