

# Beavers: Wetland Ecosystem Engineers

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## Getting to know beavers

Beavers, *Castor canadensis*, are the largest rodents in North America, weighing up to 32 kg and measuring up to 1.3 m long (including their tail). Chunky as they are, according to the [Canadian Wildlife Federation](#) ancestors of the beaver were even larger. “In the Pleistocene ice age—the era of the mastodons and the mammoths—the giant beavers that inhabited the expanses of Eurasia and North America measured just under 3 m in length, including the tail, and probably weighed 360 kg”.

These stocky, semi-aquatic mammals are adapted for aquatic habitats like rivers, streams, ponds, and wetlands. They occur throughout Alberta except for high elevation sites in the Rocky Mountain Natural Region and the driest parts of the Grassland Natural Region. They can be locally abundant in the right conditions (to the bane of many a farmer or rancher).

Beavers are herbivores. While they prefer certain species such as aspen, willow, and cottonwood, they can and will eat the bark, leaves, and twigs of most woody species that grow near the water, focusing on the bark and cambium, the thin layer of tissue that grows just under the bark. They also eat herbaceous and aquatic plants such as cattails and water lilies.

Their preferred habitat must have an adequate supply of deciduous trees and shrubs close to the water's edge to meet their needs for foraging, and to provide construction materials for their lodges and dams. Beavers are most active from dusk to dawn and midday usually finds them in the lodge in both summer and winter. They remain active throughout the winter and they create caches of food close to their lodge. Beavers can swim under the ice and the lodge is accessible all winter.

## Creation of habitat

Beavers are a keystone species – a species that that helps define an entire ecosystem. Without its keystone species, the ecosystem would be dramatically different or cease to exist altogether. There are few species that can fundamentally alter the landscape the ways beavers do, and that’s why they are sometimes referred to as “ecosystem engineers”.

Beavers feel safest in water and create canals and ponds to expand, explore, and exploit riparian corridors. They construct their lodges, which can only be accessed through underwater entrances, in ponds, along river edges or in the shallow bays of lakes. Their dams create deep-water reservoirs that won’t freeze solid in winter and trap them in their homes or dry up in summer and expose entrances. Dams also increase the amount of swimmable water and reduce the need for risky overland excursions to reach target trees.



Beavers enjoying a winter day along the South Saskatchewan River. Photo credit Paula Munro.

When trees are cut down to form dams, the flooding of adjacent trees can cause them to die, and aquatic vegetation to spread. Other pioneer species soon grow around the flooded area, adding to the available food supply. The beaver thus creates its own habitat and wetland habitat that benefits many other species at all levels of the food chain, including fish, furbearers, reptiles, amphibians, waterfowl, and shorebirds. Beaver-made ponds and wetlands are important for waterfowl nesting and feeding. Ponds not only create open water and wetland habitat for ducks, but the flooding that kills remaining trees can create nesting habitat for cavity-dwelling species such as wood ducks.

While beavers create intricate wetland mosaics – ponds, canals, marshes, and braided streams – through engineering, they also maintain open grasslands and improve forests within the mosaic by altering the tree and shrub habitat. And when beavers cut down aspen trees, it can rejuvenate adjacent riparian forests. Trimming riverside trees also allows more light to reach shaded areas and creates habitats for invertebrates and fish. By putting woody debris back into streams, they also improve and support aquatic ecology.

## Hydrological benefits



Beaver dam across a wetland side channel in BC. Photo credit: Maggie Romuld

Beaver dams function as “speed bumps” for streams. Reducing the speed of water provides several benefits. Slowing down moving water creates deeper water that can provide critical habitat for fish during times of drought; open water is created where previously none existed, providing habitat for wetland species; and ponded water allows sediments and pollutants to settle out, improving water quality, and moderating potential flooding downstream.

Beaver dams also alter downstream hydrology as impounded water enters underground flow paths, rejoining surface flow long after spring floods or extreme rainfall events. Water that seeps into the soil around a beaver pond can elevate and stabilize the water table by storing and gradually releasing precipitation and runoff to stabilize groundwater supplies. Once water gets into the groundwater system, it moves quite a bit slower, feeding base-flows and drought-proofing the system.

When beavers abandon dams due to factors such as lack of food, the pond drains and beaver meadows can form. These beaver-made ecosystems continue to protect and filter our drinking water, provide habitat for wildlife, store floodwaters to reduce property damage, and support flow during droughts. By keeping water on the land longer, more water is available for animals and humans.

## Friend or foe?

Depending on the circumstance, beavers can be viewed as either a benefit or a bane for society. Though they benefit the environment in numerous ways, when they build in inconvenient places, they can cause a great deal of damage. Seemingly overnight, beavers can dam a culvert, flood a property, or topple favoured trees. (Each year, the average adult beaver cuts approximately one metric tonne of wood — about 215 trees — for food and building materials.) The environmental services beavers provide typically outweigh damages, but many Canadians see beavers as an expendable nuisance when their dams flood highways, farmer's fields, or expensive waterfront property.

There is, however, a growing interest in how beavers, with their natural ability to build dams and divert water, could help manage flooding. A mounting body of research suggests that we need more beavers, not fewer, and that beavers perform a vital service to the riparian world that will be particularly needed in the drought years ahead. As we face rising damage from extreme floods and droughts, the message is clear: we need to rethink our relationship with beavers and learn to appreciate them as stewards of healthy watersheds. While manmade wetlands often cost tens of thousands of dollars per acre, beavers work for free. Scientists are increasingly seeing beavers as a relatively cheap and natural solution for combating climate change.

References and more information:

Feature Fauna Fact Sheets: [Canadian Wildlife Federation](#).

Leave it to beavers: [Ducks Unlimited Canada](#).

Managing Beaver Damage: [Texas A&M AgriLife Extension](#).

Rethinking the beaver: [Canadian Geographic](#).