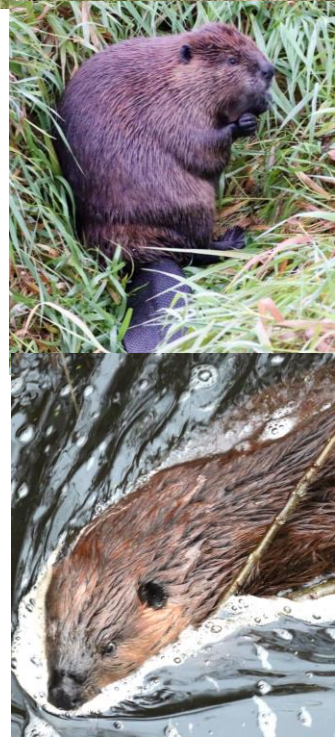


# Beavers and Climate Resilience in Connecticut

## Beaver biology and ecology

Beavers are large, semi-aquatic rodents living in communal family groups in wetlands throughout most of the US and Canada. A separate species is found across northeastern Eurasia. In the eastern US, beavers have recolonized much of their native habitat after being suppressed by the fur trade in the early 1800's. Beavers use their sharp teeth to gnaw and cut down waterside trees. Beavers eat a variety of plants including the cambium layer just under the bark of certain trees, but do not eat wood itself. Branches from felled trees are used for building materials for dams to create ponds and wetlands. While beavers prefer to dig into existing banks to create burrows, they also construct lodges from tree limbs, mud, and rock with under water entrances and living space above the water surface in ponds or existing wetlands. Beaver dam and pond systems provide habitat for many species and are important stable sources of water and vegetation in drought and fire prone areas. However, beaver activity can impact people and property by causing localized flooding and damaging mature trees. In Connecticut, beaver populations are managed by the Department of Energy and Environmental Protection (CTDEEP) while maintenance of beaver dams and streams is under the jurisdiction of local Inland Wetlands Agencies.



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## Beavers and climate change

Recent research has focused on significant nature-based climate solutions provided by beavers. These include increasing groundwater recharge, carbon sequestration, water quality improvements, and creating drought or fire refuges and habitat reservoirs that enhance biodiversity. The ecosystem services provided naturally by beaver created wetlands benefit people throughout their range, including in Connecticut.

In the western United States, beavers are seen as a low-cost climate resilience solution for increasing water retention in headwater streams, thus buffering drought conditions and reducing fire risk due to a changing climate. Areas where beavers are no longer present have benefited from man-made Beaver Dam Analogues, porous wooden post and stick check dams, which slow and retain water and sediment. These analog dams while good at retaining water in dry conditions, are not always as effective as beaver constructed dams at resisting breakage in high flow events, meaning flooding in extreme conditions can be worse than having no dam at all. In the appropriate location, Beaver Dam Analogues can create the appropriate habitat that beavers thrive in allowing for successful reintroduction where predation risk for beaver is low. Beaver Dam Analogs are primarily used in western states where beaver populations are still recovering, and human property is not likely to be negatively impacted by beaver activity.

Some active beaver dam systems can also reduce downstream flood risk by slowing water speed during storm events. A large-scale European study showed beaver dam systems reduce peak flows. Even for the largest storms monitored, the average water flow was diminished by up to 60%. While this effect would be dependent on specific site characteristics, including the aquifer water storage and release capacity, and the dam robustness and beaver colony health, beavers are increasingly seen as a partner in floodplain resilience in dynamic stream systems. Research by University of Connecticut scientists has argued that pre-1600, when large scale fur trapping began eliminating beavers, rivers were not free flowing, but tended to have many discontinuities, like beaver dams, that slowed them creating meadow, pond and slow flowing water areas and were drought resistant and better able to handle extreme precipitation events. Sediment load into Long Island Sound pre-beaver removal was far less than in the years after beaver trapping and has never returned to pre-beaver removal levels. Currently, in the Yale-Meyers forest in Northeastern Connecticut, a century after the reintroduction of beaver, one third of the river system has beaver ponds, one third beaver meadows and a final third remains free flowing showing that even in a very populous state, beavers can have a role restoring rivers and increasing resilience to the impacts of climate change.

## Beaver Management

Since the recovery of beaver populations in eastern North America and the regulation of fur trapping, beaver dams, lodges and beaver cut trees are a common sight in New England. Increasing density of people in beaver habitat, however, has led to conflict when beaver engineering results in localized flooding, changing stream channels or removal of trees or destruction of landscaping. Additionally, beaver dams can be barriers to migrating fish, change habitat where rare wildlife is found, or increase health risk of water borne disease to public water supply. Beaver do not respect property rights and people are loathe to accept normal beaver behavior when it includes property destruction.

In Connecticut, property owners and municipalities faced with nuisance beavers have choices for how to address problems. The CT DEEP policy is to maintain healthy beaver populations consistent with available beaver habitat and local land use practices. Before reporting nuisance beaver activity, people should first determine if the normal activity by beavers can be tolerated and if simple modifications like protecting trees and shrubs with heavy gauge wire will stop beaver cutting. Wetlands are dynamic systems and variation in water level and flow should be expected. However, when beaver activity results in larger scale flooding or damage to property or roads, then more intensive interventions may be necessary.

Some engineering solutions allow beaver and the ecosystem and resilience benefits they provide to co-exist with people and development. For example, flexible pond levelers are a device that creates a permanent leak in a dam, lowering the water in the impoundment behind the dam to a desired level. A long flexible tube or pipe is inserted through the dam at the desired water level. The inlet to the pipe is farther away from the dam and in at least three feet of water and surrounded by a domed wire mesh fence. These devices are about 90% effective at lowering water level and reducing unwanted excess flooding. A flexible pond leveler could also be used in situations with concern about downstream flooding from a catastrophic dam breach to lower risk. Breaching a beaver dam or installation of a water leveling device is a regulated activity in Connecticut and must be approved by a town Inland Water Agency. Dam breaching and removal is generally not approved nor effective at discouraging beaver activity. Breaching a dam can result in downstream flooding, and if beavers are not removed, they will simply repair or rebuild the dam.

Beaver will also often use existing structures as part of a dam. From a beaver's perspective, road culverts seem like a hole in a dam, but culvert blockage can lead to road flooding and erosion. There are several systems in use to discourage beaver activity at culverts or allow them to persist without damage to the culvert or roadway. Diversion dams, fence and pipe devices and keystone culverts all have high success rates and are used throughout Connecticut.

Occasionally, however, when beaver damage cannot be controlled in other ways, or if there is concern for a public water supply, beaver are trapped and removed. Beaver populations in Connecticut can be managed by landowners on their property during regulated beaver trapping season through a mandatory pelt-tagging program by contracting with a licensed fur trapper. There is no limit to the number that can be trapped in season, though the type and placement of traps, and when traps are monitored, is highly regulated. Pelts taken must be tagged and recorded. Under specific circumstances, CT DEEP Wildlife Division may issue special authorization to trap beaver outside of the regulated season. Typically, live trapping of beaver is not recommended due to expense and lack of suitable sites for resettlement.

## Municipal Beaver Management Example Putnam, CT

Typically, when a property owner complains about beaver activity, or a flood concern arises due to a beaver dam on town property, town staff first evaluate the issue. If the problems are on private property, the owners are referred to CT DEEP. On town land, staff may try to persuade the beaver to relocate down or upstream by breaching the dam or fencing off trees or habitat. If the beaver cannot be persuaded to leave, the town pays for a licensed trapper to trap the beaver and relocate, if relocation is possible. Town staff then remove the top of the dam a few feet at a time to lower the water level behind the dam in a controlled way. This is a slow process and requires ongoing maintenance to prevent flooding downstream until the dam is fully removed and is done with approval from the town Inland Wetlands Agency.

Questions about beavers, dam safety or flooding should be directed to CT DEEP Bureau of Natural Resources Wildlife Division. Contact local municipal Inland Wetlands Agency for approval before installation of water control devices or modification of beaver dams.

### Flexible Pond Leveler

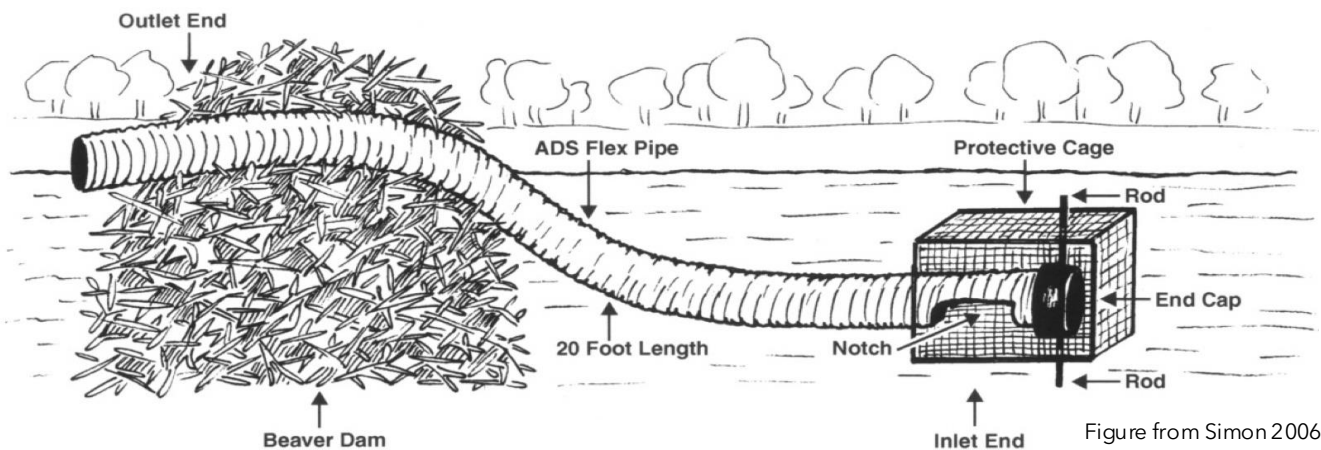


Figure from Simon 2006.



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