

NEWSLETTER

Newton's land trust working to preserve open space since 1961

FALL ISSUE

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Beavers Part II: The Penultimate Eco-Engineer

Editor's Note: In this second installment on the beaver, the Newton Conservators delves into the beaver as keystone species and engineer extraordinaire, exploring its dam-building, ecological significance, and its conflicts with that other engineer — humans.

ou can see it from space. It's a 2,790-footlong dam built by beavers in Canada's Wood **Buffalo** National Park. Beavers build their dams from stones, mud, and branches. Some of the branches, like willow, sprout and start growing on the dam reinforcing the strength of the dam. Historical diaries record dams so wide and strong you could drive wagons across them. Most dams are usually less than 100 feet long, with exceptional ones reaching 500-600 feet.

According to the Mass Audubon Society (MAS), Massachusetts had been beaver-free



Beavers are huge rodents that use their formidable teeth to harvest material for their dams



Google Earth image of the longest beaver dam in the world in Northern Alberta, Canada, courtesy of EcoInformatics International, Inc.

since 1750 (trappers extirpated beaver). Then forests reclaimed agricultural land in the early 1900s, renewing the supply of food and dam-building material for beavers. Finally beaver populations change without extensive trapping. When DCR started the surveys in 1952, there were two beaver colonies in the Prescott Peninsula survey area. This grew to

in 1928, a beaver showed up in West Stockbridge. MAS wanted to help restore the beaver population so "three additional beavers were brought from New York and released at Mass Audubon's Pleasant Valley Wildlife Sanctuary in Lenox."

Since then, the beavers have spread across Massachusetts and can be found everywhere except Cape Cod. One hotbed of beaver activity is Prescott Peninsula in the Quabbin Reservoir. The Massachusetts DCR has completed over 65 surveys of beaver activity in this area illustrating how

a high of 39 in 1981, dropped in 2017 to only seven, and recovered in 2018 to 14 active sites. DCR concludes that, "The 20-year average (1998-2018) for number of active sites is \sim 17, with a high of 23 and a low of 7."



A typical bank lodge is shown in this Washington Department of Fish and Wildlife illustration.

The beaver is a keystone species — its presence enables many diverse plant and animal species to thrive by providing specialized habitat. Once beavers are removed, that web of life depending on the habitat they create crumbles. The only other species with such ecosystem engineering capacity is us — the human being, and all too often we engineer the environment for the worse. But we are learning from the beaver and even employing beavers to restore landscapes we have damaged, especially in the western and Pacific northwestern states, where beavers are helping to restore deeply incised (eroded) streams and salmon and trout fisheries.

Ostensibly, beavers build dams to create ponds to serve as moats protecting their lodges from predators and creating climate-controlled underwater larders to help them survive the winters (see Part I of this series describing beaver anatomy and behavior). However, as Ben Goldfarb explains in his book *Eager*, impounding water has an ecologically systemic effect:

• It kills tall trees in the pond, and the dead spires provide perfect nesting sites for heron colonies.

• It provides habitat for a multitude of small fish (e.g. salmon and trout) to mature and a host of other animals, too: amphibians, insects, birds, moose, and muskrats. The list goes on and on and includes the endangered tundra swan and Saint Francis' satyr butterfly.

• It mitigates spring flooding effects by absorbing water into the wetlands surrounding the pond and releasing it slowly.

- It mitigates stream erosions (deeply incised streams) by slowing water and promoting sedimentation.
- It raises the water table, keeping streams that normally dry up in summer flowing and available for livestock.
- It detoxifies the nitrogen run-off from maintained park



Tree freshly felled in Millennium Park, West Roxbury

Why do beavers create these special environments? It's in their nature. Beavers instinctively build dams to stop the sound

of flowing

and agricultural

lands.

water. And dispersing beavers widen the area of impact yearly. Breeding adults kick yearling beavers out of the family compound after the yearlings have helped raise a new batch of of beaver kits and maintained the family lodge and dams for two winters, usually in the spring (Aprpil – June). These youngsters disperse, looking for running water to dam, and willow, aspen, and poplar to eat... and another beaver as mate to raise a family. They go anywhere from a couple of miles to 120 miles away to start their own colonies by damming water to form ponds.



Mass Audubon Society's (MAS's) experience at Wachusett Meadow Wildlife Sanctuary in Princeton illustrates the beaver's eco-

Active Beaver Lodge in Kendrick Pond at Cutler Park

engineering capacities well. Originally Wachusett Meadow was an historic farm with two barns and many agricultural/ pasture fields fenced by stone walls. With the end of farming, forest reclaimed much of the landscape. MAS noticed the first beavers arriving in 1993. Cindy Dunn, Assistant Sanctuary Director at Wachusett Meadow, explains these animals capitalized on the old stone walls, patching them with mud and using them as dam foundations, flooding an area near the barns.

The beavers also flooded the sanctuary's wetland area. Initially visitors complained of the "barren swamp" the beavers had created. Then herons started a nesting colony in the trees killed by the "barren swamp," and people began to comment on the abundance of other animal and plant life. When the sanctuary completed a capital campaign to build a boardwalk across the wetlands, the beavers submerged the newly built boardwalk! Then the dams failed, the pond drained, and the herons abandoned the rookery. As of May 2019, beavers actively occupied only three or four of the 24





Beaver dams built on old stone walls in Wachusett Meadow Wildlife Sanctuary

leads to beaver conflicts with humans in less forgiving environments like cities. Dispersing beavers cannot resist culverts, which are small and easy to dam. In December 2018, the city of Framingham killed beavers that caused a street to flood



— in winter when only a bit of water turns to ice, the ice becomes a public safety issue. Framingham claimed it had to move quickly.

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Beaver pond with heron rookery at Rocky Hill Mass Audubon Sanctuary

However, by killing the beavers, Framingham may simply be encouraging next year's dispersing subadults to move in and continue the flooding problem. It's a gamble. Research shows that water flow control devices are likely a more economical, sustainable, and humane measure to combat flooding caused by recurring beaver dams.



Waterflow control device. The culvert fence and pond leveler pipe is still working after beavers attempt to rebuild dam in 2004.

attempt to rebuild dam in 2004. 1992. That flooding happened in 2012 when beavers "constructed a dam inside a ... 60" diameter culvert pipe under Wells Avenue. The city hired an animal control company to capture and kill two beavers, and then the City of Newton Utilities Division removed the dam within the culvert. The city has not installed any flow diverting devices to date [May 2019]."

This doesn't mean there are no more beavers in Newton. Jennifer Steel, Newton's Chief Environmental Planner, has been monitoring the water levels around Kesseler Woods, where she has received emails regarding "ever worsening" water levels. She has discovered that Newton beavers are as savvy as the Wachusett beavers about using man-made stone for foundations. The wily rodents seem to have placed their dam across the Saw Mill Brook atop a sewer line encased in concrete! So far, however, no one has experienced a flooded backyard.



Trees wrapped in wire to deter beaver from ruining Pennypack Ecological Restoration Trust's reforestation efforts in Huntingdon Valley, PA.

Humans describe beavers as hardy, industrious, gregarious, good parents, family-oriented, hard-working, skilled structural and eco-

engineers, even "cute"... the list is long. We might also call them "over-zealous," and not simply because they cause us inconvenience by flooding our roads and parking lots – sometimes beavers cause themselves serious inconvenience.

Dan Clark, Ph. D., Regional Director of the Quabbin/ Ware Region DCR – Division of Water Supply Protection, tells an intriguing story of beaver damming prowess gone awry. On a winter's hike in the Quabbin Reservoir area, he noticed the water was unusually high at a particular pond with an active beaver dam. When he investigated further, he saw that the beavers had raised the water level so high they had flooded their own lodge and were now sleeping in a bird's nest affair they had constructed atop their lodge! It was snowing, and the two beavers were covered in snow. He speculates that they probably spent the winter there, quipping that beavers are extraordinarily hardy animals. ◆

References

To read our Spring 2019 article about beavers, go to https:// newtonconservators.org/newsletters/

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🦑 Barbara Bates

