



## **MANAGEMENT STRATEGY FOR BEAVERS**

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### **General Overview**

Beavers are one of the most valuable mammals in our ecosystem. They are described by biologists as ecosystem engineers because of their ability to change and modify the landscape to create new aquatic environments and habitats. Beaver-created ecosystems are among the most biologically diverse and dynamic on Earth: seven times more productive than the most fertile farmland and comparable to coral reefs and rainforests.

Beavers are also recognized as a Keystone Species because wetlands and meadows created by beaver dams are essential for the survival of many other species besides beavers. Many of the animals dependent on beavers are now threatened by the effects of climate change. Known as "mosaic habitats," beaver sites naturally progress from pond to meadow to forest and back again in an endless cycle that creates a series of diverse successional habitats. Although the cutting and flooding of trees around a

beaver site may appear destructive, the wetlands, grasslands, woody vegetation, and dead snag trees created are vital for a variety of wildlife. Indeed, the Wildlife Habitat Incentive Program (WHIP), sponsored by the U.S. Dept. of Agriculture, artificially creates such clearances in order to provide habitats for endangered and threatened species. Beavers do this job for free.

Beaver sites provide many more benefits than simply creating wildlife habitat. Two of their most important contributions are improvements to water quality and water flow control. Counterintuitively, beaver dams and ponds may actually reduce the risk of flooding by acting as natural "sponges." During heavy rains and high water flows, beaver sites act as natural spillways or catchment areas to absorb excess water and reduce erosion damage from high runoff events; during droughts, beaver sites slowly release stored water to recharge aquifers. Beaver wetlands also act as the "earth's kidneys" to capture and store particulates and wastes such as heavy metals, fertilizers, and pesticides present in runoffs.

In addition, beaver wetlands provide standing water open to the sunlight, which encourages algae and aquatic plant growth; this, in turn, supports invertebrates and amphibians that feed a variety of fish, birds, and mammals. Therefore, beaver ponds serve as ideal nurseries for native trout and salmon species; indeed, some Western states artificially dam streams with "beaver dam analogs" in order to encourage beavers to move in and create true beaver dams in order to restore fish populations and stream habitats destroyed by deep channel incision and erosion.

Historically, beavers were trapped nearly to extinction by white traders in North America, including Vermont. In more recent times, beavers have made a slow comeback, sometimes aided by reintroduction. The most dramatic example comes from Idaho, where 76 beavers were parachuted in wooden crates in 1948 into remote, roadless areas, where all but one of the beavers survived to successfully colonize sites. One of Protect Our Wildlife's Board members, Jennifer Lovett, wrote a children's book about it, called

*Beavers Away!*. Because settlers established their own colonies and settlements in sites formerly occupied by beavers that were cleared by trapping, the reintroduction of beavers in modern times sometimes leads to conflicts with humans and their infrastructure network of roads and housing. However, most of these conflicts can now be resolved through non-lethal, humane solutions that have been developed in the past 20-30 years, as outlined below.

### **Main challenges with beavers:**

- Felling trees
- Flooding

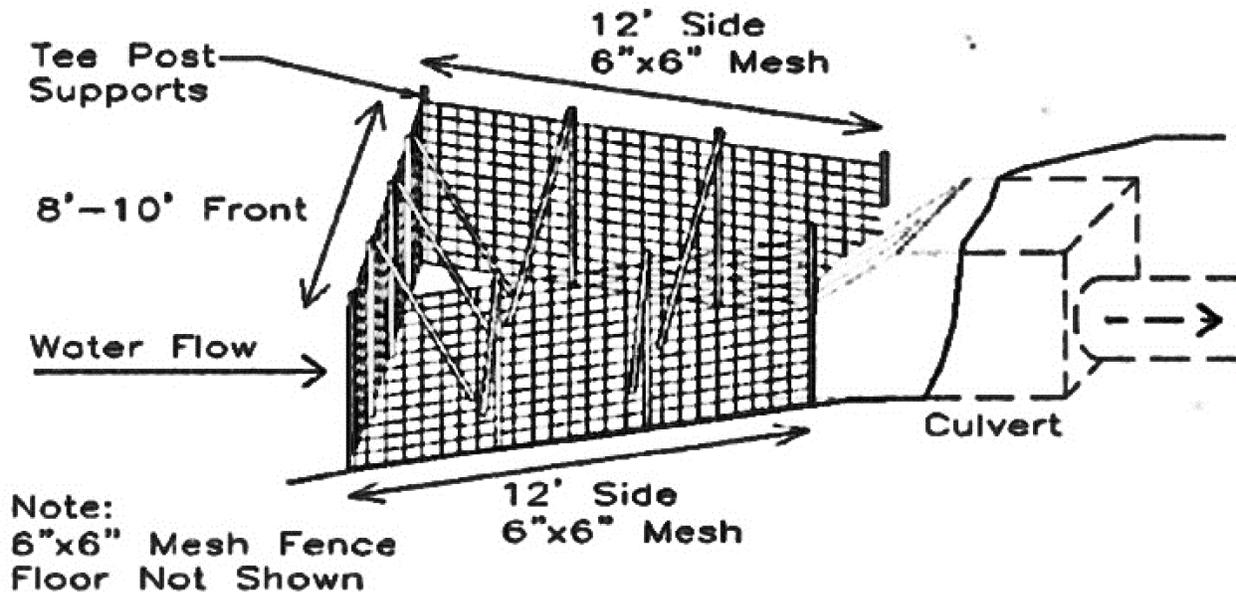
### **Best Management Practices:**

The most sustainable, long-term solutions to beaver-human conflicts happen to be non-lethal practices such as installation of culvert devices and pond levelers, also known collectively as “beaver baffles” or “beaver deceivers” (described below). These have a success rate of 87-97 percent: This is based on the monitoring of hundreds of installations over a decade or more. For example, Beaver Solutions, based in Southampton, MA, conducted a client survey of 482 total sites over a period including the 1990s and early 2000s. Out of 227 sites where culvert devices were installed only 7 failed; out of 156 sites where pond levelers were installed only 21 failed. Often, failures were due to lack of maintenance of the device (i.e., failure to clear debris) or installation of a wrong-sized pond-leveler pipe for capacity needed.

In addition to being the most humane (i.e., non-killing of beavers), culvert devices and pond levelers are the most sustainable solutions. Such devices are best installed by professionals with decades of experience, such as Skip Lisle of Beaver Deceivers International™ based in Grafton, VT (phone: 802-842-1017, e-mail: [skip@beaverdeceivers.com](mailto:skip@beaverdeceivers.com)). In southern Vermont, towns can also access Beaver Solutions of

Southampton, MA (phone: 413-527-6472). Organizations such as Protect Our Wildlife and Green Mountain Animal Defenders may have funds available to help finance such projects. Other solutions, such as tree protection, can be implemented on a self-help, individual basis.

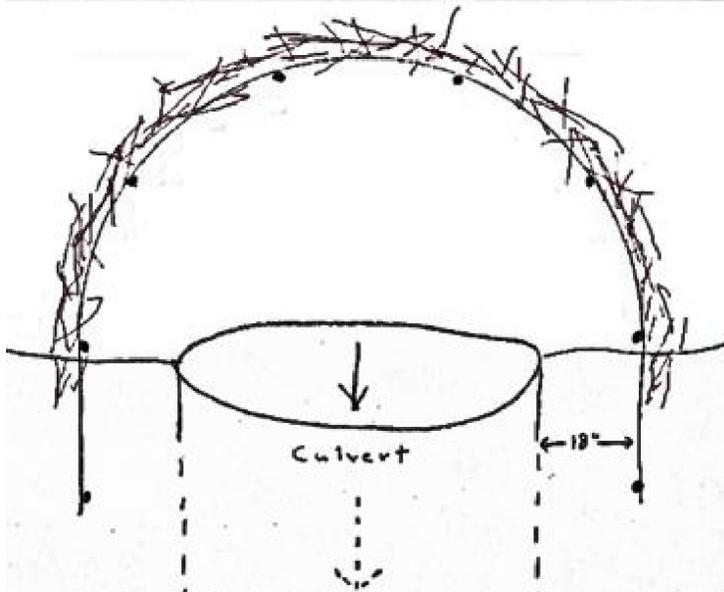
### Culvert Fence Device:



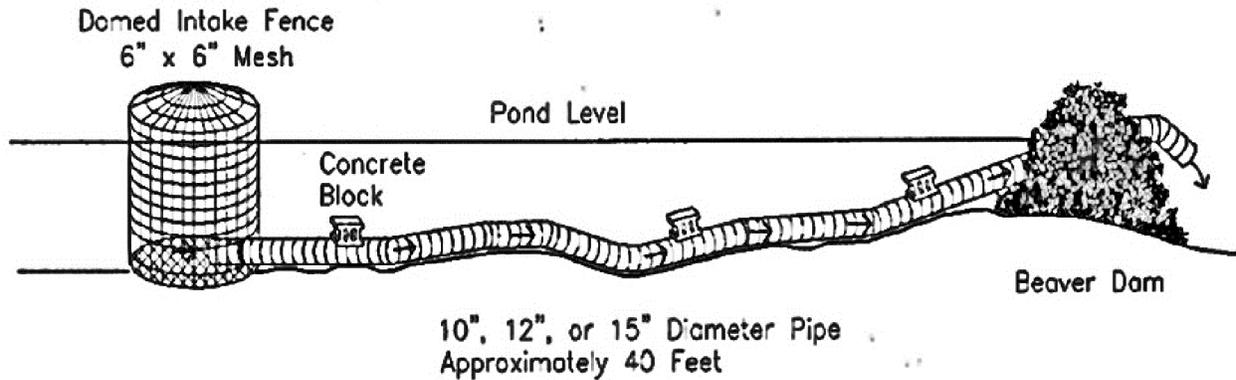
One of the most common conflicts between beavers and humans is the damming of a road culvert, which to beavers looks like a "hole in the dam" that needs to be filled in order to create a pond. Unfortunately, damming of culverts can cause flooding of town roads because the dams interfere with the function of the culvert. This can easily be remedied by a culvert fence device, as depicted above. The device is essentially a quadrangular fence built around the culvert, using metal stakes and galvanized or plastic-coated fencing set into the stream bed directly adjacent to the culvert. It prevents the damming of the culvert by several means. Physically, it creates a barrier around the culvert, typically 30-40 feet, that prevents beavers from directly damming the culvert. It also creates more surface area for the beavers to dam. Third, by widening the water flow coming into the culvert, the device slows down water flow and thus reduces the sound

and feel stimuli of flowing water that triggers beavers' damming instincts. Typically, such devices have a 95 percent success rate. They do require regular maintenance, such as clearing debris adjacent to the fence, ideally on a quarterly basis.

A less expensive variation of this device is the **Diversion Dam**, which is essentially a human-made start to a dam built about 10-15 feet upstream from the culvert. For example, rocks can be piled in a semicircle around the culvert, encouraging beavers to dam against the rocks instead of directly against the culvert itself (see figure below). This does not require special expertise and can be done by the road crew or volunteers and works best in shallow, low-flowing water. The diversion dam typically has an 80 percent success rate.

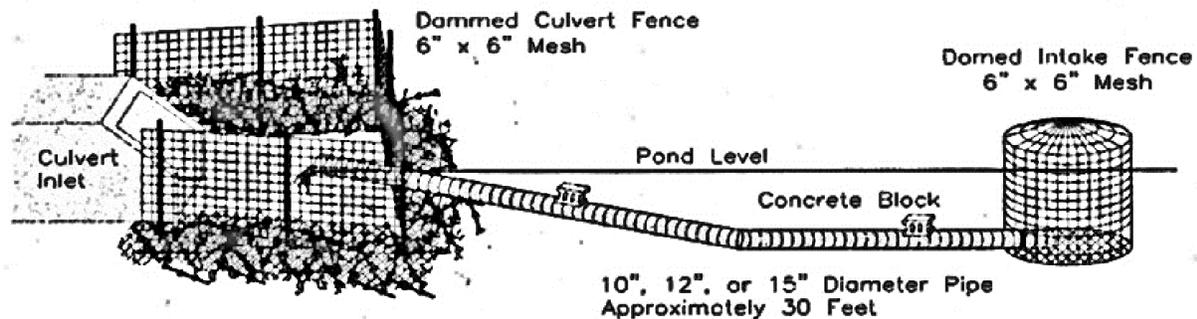


**Pond Leveler Device:**



The pond leveler device is designed to regulate the water level of free-standing beaver dams and ponds and thus prevents flooding of adjacent roadways or structures. It consists of a conical fence that protects the intake end of a long, flexible plastic pipe, while the outlet end of the pipe runs through the beaver dam. Typically, the intake must be set in at least three feet of water in order to "fool" the beavers from attempting to dam the intake, while the height of the outlet set in the dam regulates the desired water level of the pond. The pond leveler typically has a 90 percent success rate.

### Fence and Pipe Device:



The most "foolproof" device to exclude beavers from a culvert is the fence and pipe device, combining the benefits of both the culvert device and the pond leveler. While the culvert fence keeps the culvert open, the pond leveler ensures water flow through the dammed fence and maintains the desired water level. This device is recommended for sites that have high water tables

near culverts and high water flows during spring runoffs. It requires minimal maintenance and has a 99 percent success rate.

### **Tree Protection:**

Beavers favor cutting down and eating alder, aspen, apple, birch, cherry, cottonwood, poplar, and willow trees, with aspen/poplar and cottonwood being their absolute favorites. They will also harvest oaks and maples, but rarely conifers.

Trees can be easily protected by wrapping them with 12-15 gauge 2" X 4" inch wire mesh, 3-4 feet in height. Do not use chicken wire, as this will rust out in a year or two and can easily be pulled down or crushed by beavers. Trees should be wrapped with 3-6" inch spacing between wire and trunk. Alternatively, you can paint tree trunks with an exterior latex and mason sand mixture, mixed at a ratio of 5 oz. of sand per quart or 20 oz. of sand per gallon. This creates "grit" in the paint mixture that deters beavers. Do not use too much sand as the mixture will then simply "roll" off the trunk.

Protection of trees can accelerate beavers' depletion of available food resources and encourage them to move on to another site. Typically, beavers will only harvest trees within 100 feet of a pond.

### **Raising Roads:**

Consider raising the height of the road bed and install larger culverts with beaver control devices. In certain areas where topography will not permit raising the road bed or installing beaver control devices, a dip/spillway armored with riprap and logs with a roadbed of coarse gravel can be built in the road itself to allow the flooding caused by beavers to pass over with little to no damage.

### **Relocation:**

Live trapping and relocation of beavers is currently not legal in Vermont and will be penalized by the Dept. of Fish and Wildlife.

Empty habitat niches are hard to come by and beavers will defend their territory against new beavers. Thus, relocation can create more problems than it solves.

Towns should also be aware that they should consult with the Dept. of Fish and Wildlife **before** attempting to dismantle beaver dams. The sudden release of water that results can cause extensive property damage downstream.

### **Facts about Trapping**

Trapping is not only grossly inhumane, but it is not a long-term solution. In their decade-long client survey, Beaver Solutions found that trapping was successful, i.e., removed beavers during the entire observation period, only 16 percent of the time. **In other words, 84 percent of the time, beavers returned to the site to replace the colony that had been trapped.** While trapping may immediately remove beavers, it almost ensures that new beavers will arrive to occupy an empty habitat niche. **Since beavers are territorial, the best way to exclude beavers from moving into a site is to find a way to accommodate an existing colony already there.**

Town officials should also be aware of other issues that may arise from trapping, whether on land or in the water. Traps routinely catch unintended species, causing debilitating injuries or immediate death. A trap set for a beaver can also trap a river otter or other non-targeted animal. If set underwater, traps may kill by drowning the beaver (or other animal), which can take up to 15 minutes. Drowning is deemed "inhumane" by the American Veterinary Association.

Domestic animals, such as dogs and cats, and protected species including herons, bald eagles, and Canada geese are caught in leghold and body gripping "kill" traps in Vermont; traps are

indiscriminate. The town may even be legally liable for any damages or injuries to pets from trapping.

Beavers mate for life and are very family-oriented, with kits remaining with their parents for at least two years. Unless an entire colony is eliminated, kits may be orphaned and die a slow death from starvation.

**Bottom line:** Trapping is a short-term “solution” that should always be adopted as a **last resort**, when no other options are available.

### Trapping Myth

It is sometimes asserted that trapping is necessary in order to manage and control beaver populations. Scientific research conducted over decades of monitoring beaver sites in untouched wilderness areas demonstrates this to be completely false. Beavers self regulate their populations in accordance with the “carrying capacity” of the land. When habitat becomes sparse or exhausted, beavers naturally reduce their reproductive capacities. Thus, beavers can maintain stable populations even in the **complete absence of human intervention**. As a matter of fact, trapping is **counterproductive** to managing beaver populations because, by artificially removing beavers and creating empty habitat niches, it stimulates beavers’ reproductive capacity, thus prolonging a population growth cycle.

Two studies conducted at opposite ends of the country illustrate how beavers self regulate their populations. At Quabbin Reservation on the Prescott Peninsula in central Massachusetts, beaver colonies were monitored over a period of 44 years, from 1952 to 1996. After growing steadily until c.1980, beaver populations then declined sharply, stabilizing in the mid-1990s at the level they had attained in the mid-1960s, 30 years earlier (see graph).

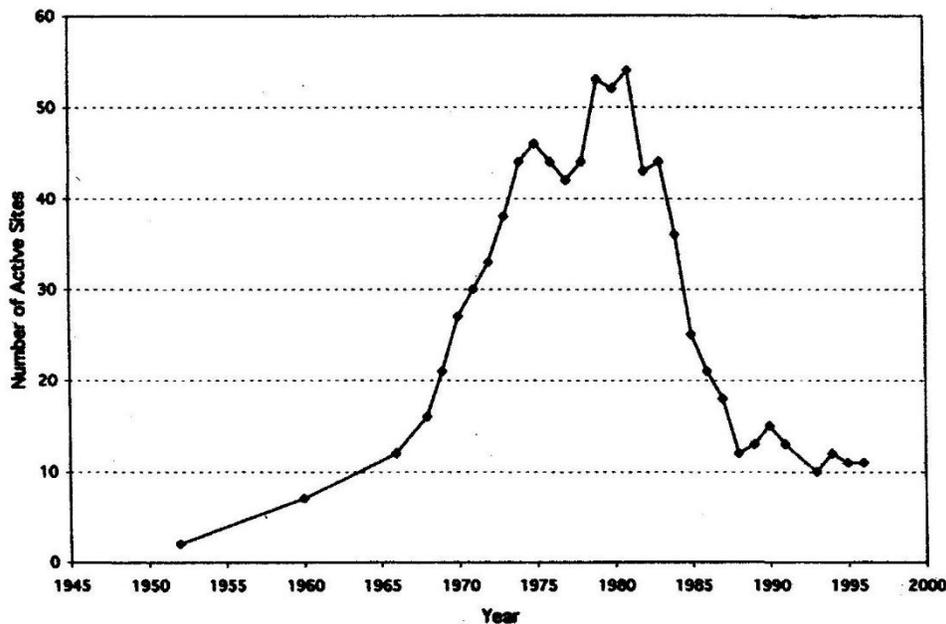


Figure 3. Results of beaver population surveys on Prescott Peninsula, Quabbin Reservation, Massachusetts, 1952–1996.

Meanwhile, at Sagehen Creek in California, where beaver colonies were monitored between 1945 and 1991, beaver populations exhibited a cyclical rhythm. Populations climbed until c.1961, then declined until 1969 before resuming an increase until c.1980, then declining again until at least 1990 (see graph). At both sites, beaver populations seemed to have stabilized at around 10 colonies or 10 animals. This is not simply due to beavers moving out of the area, as lack of dispersal of two-year-olds has been observed in conditions of both high- and low-population densities. Both sites were “unexploited” during the entire time of the study, or in other words, no lethal trapping was conducted. It is remarkable that similar population dynamics were observed at two sites that were “quite different in geographic location, size, vegetation, topography, elevation, and stream characteristics.” This indicates that beavers can regulate and maintain stable, low-density populations in accordance with available habitat and food resources no matter the location or environmental conditions.

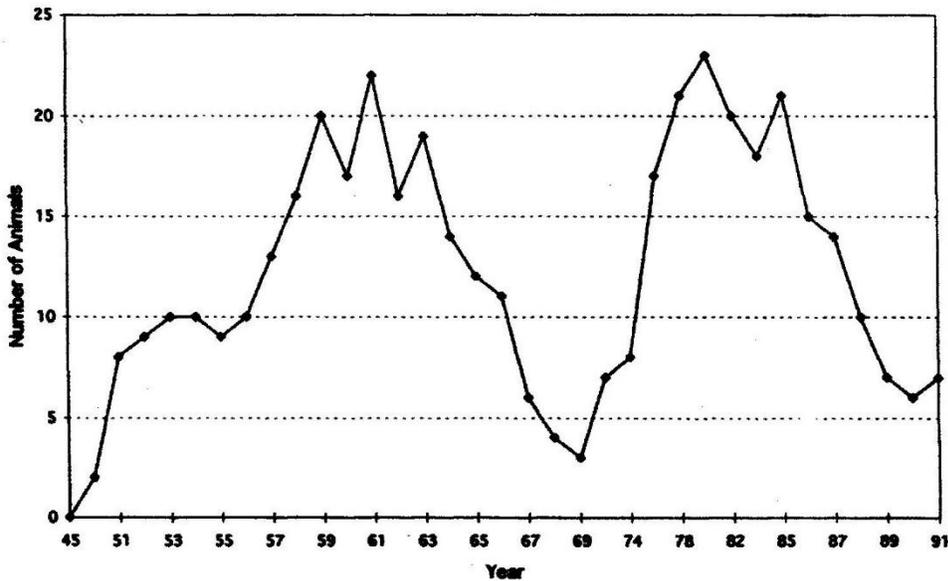


Figure 4. Results of the beaver surveys on the western section of Sagehen Creek, California, 1945–1991.

***Beavers create dynamic ecosystems that benefit and support an enormous variety of species from mice to moose. When these landscapes contain healthy predator populations, including coyotes and bobcats, they stay balanced. The natural predator-prey cycle limits overpopulation of both predators and small mammals and rodents.***

***- Jennifer Lovett, Conservation Biologist, Stamford VT***

### **Other Wildlife Conflicts:**

While this document focuses on beavers, it is important to note that humane solutions to various wildlife conflicts are available. This includes: fencing, wildlife-proof dumpsters, and exclusion methods. You can learn more by visiting: <https://www.protectourwildlifevt.org/conflicts> Funding may be available to assist on a case-by-case basis.

We recommend HEART (Humane Eviction And Removal Team)

Wildlife in Burlington to address various needs. They can be found at: <https://www.heartwildliferemoval.com/main.html> They may be reached at 802-651-6863.

### **In closing:**

It is our hope that towns will employ non-lethal solutions to address wildlife conflicts first and to resort to lethal methods only as a last resort when public health or infrastructure is at risk.

When/if trapping is used, the town should make the public aware either through Front Porch Forum or other means of communication. This should be done in the spirit of transparency and to also help keep people's pets safe. A trap set on the bank of a river or in shallow water to trap semi-aquatic mammals like beavers, can also trap a dog. Traps that are set for raccoons are often baited with marshmallows, fish, and other tempting foods that may attract an unsuspecting dog or cat.

### **Sources:**

Beaver Institute, Inc., 14 Mountain Road, Southamptn, MA 01073, publications available at [www.beaverinstitute.org](http://www.beaverinstitute.org).

Beaver Solutions, LLC, 14 Mountain Road, Southamptn, MA 01073, website at [www.beaversolutions.com](http://www.beaversolutions.com).

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Peter E. Busher and Paul J. Lyons, "Long-Term Population Dynamics of the North American Beaver, *Castor Canadensis*, on Quabbin Reservation, Massachusetts, and Sagehen Creek, California."