



## Introduction to Non-Lethal Beaver Management for Culverts and other Surface Water Facilities

This site will introduce you to some of the issues surrounding beavers in human-managed landscapes, non-lethal management methods, and will describe with photographs the installation of a "beaver deceiver" at Peterson Pond in King County, Washington.

Please note that all necessary permits must be obtained prior to starting construction on a "beaver deceiver". For example, the construction at Peterson Pond required permits from King County and the Washington State Department of Fish and Wildlife.

### Beaver Management Issues

Beavers were nearly extinct in North America by the late 1800s as a result of the demand for furs. Now that the fur trade has declined beavers are beginning to increase their numbers again. Historically, beaver have been found in every watershed in the country; as their numbers increase and they reclaim their former range, potential conflicts between people and beavers will also increase.

Beavers maintain wetland systems in the landscape. Their activities may change watercourses, raise watertables, and create new habitats for plants, fish, and other wildlife. There are impressive examples in arid climates of streams returned to year round flows with the addition of beavers back into the system. In the Pacific Northwest, beaver ponds are critical for slowing stormwater runoff, trapping sediments, and maintaining summer base flows among other ecological benefits. Recent studies indicate that coho that are reared in beaver ponds find more food, refuge from floods and predators, and may be twice the size of juveniles that are not reared in beaver ponds. To date, artificial structures and "restored" wetlands do not provide comparable levels of ecological functions as wetlands created and maintained by beavers. In addition, beavers maintain wetlands at a significantly lower cost than humans have been able to achieve.

In human-managed landscapes beavers can create several problems. The most common problem is plugging road culverts which causes the water to rise on one side of the road, flooding the road and potentially undermining the road bed. Culverts are easy to plug and difficult to unplug resulting in continuous and expensive road maintenance costs. The rising waters behind a beaver dam or a plugged culvert also results in land being flooded. Depending on the topography

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and the surrounding land uses, this problem may become quite serious. Finally, beavers are frequently implicated in the loss of trees around the edges of their ponds. In some cases, these trees may be special landscape trees or valuable orchard trees.

Historically, the most common response to beaver conflicts has been trapping and removal. Trapping can be quite expensive and is never a one-time solution to the problem. Even if an entire beaver family is removed from a site, new beavers are constantly dispersing across the landscape looking for suitable homes. If a place was suitable for one family of beavers, more will quickly move in to replace those removed by a trapping campaign. In addition, if beavers are removed from a system, the wetland area will likely degrade and the ecological functions of the area will decline. Fortunately, more permanent solutions are quite simple.

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## Non-Lethal Control Methods

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### Fencing

Beavers fell trees for food and for materials to create dams and lodges. They typically only fell trees within 200' of the shoreline and usually much closer since they are very vulnerable to predators when on land. Therefore, problems with beavers cutting trees are easily and permanently solved by wrapping important trees with chicken wire or hardware cloth within the riparian zone. Beavers do not climb well so the fencing only needs to be 3 to 4 feet high. Do not wrap trees very tightly as they need room to grow.

To protect larger areas or newly replanted restoration areas, erect a temporary fence of chicken wire or a similar fencing material. Again the fence only needs to be about 3 to 4 feet high, but it should be securely staked to the ground to prevent the beavers from crawling under it or pushing it over. Once plants at a restoration site have established themselves, they should be able to withstand some beaver activity. Typical shoreline tree species such as willows thrive with beaver cuttings resulting in denser growth patterns that benefit a variety of nesting songbirds.

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### The Beaver Deceiver

Flooding and damming problems can be countered effectively with well-designed, well-made flow control devices. Skip Lisle, wildlife biologist with the Penobscot Nation in Maine, has devised the "beaver deceiver" flow control device that is shown in the [Peterson Pond installation](#). He has also installed devices of his design at 18 culvert sites on the 130,000 acre Penobscot Nation lands. Beaver-related road maintenance costs had previously been a major cost as most of the land is forested and supports a large population of beaver. For the past 6 years, after installation, road maintenance costs in the Penobscot Nation due to beaver conflicts have been virtually non-existent. Beaver colonies continue to thrive near the devices and to maintain the wetlands and associated ecological benefits at no additional cost.

Damming behavior in beavers is stimulated by the sound and feel of flowing water. System modifications that reduce the noise of running water through a culvert or by the installation of a receiver fence that physically moves the beavers back to a point where water movement is not significant serve to reduce their damming behavior. Modifications to culverts to improve fish passage such as eliminating the "fall" at the downstream end or reducing the slope of the culvert will reduce water noise and hence reduce conflicts with beaver. Both the receiver fence and the round fence act as "filters" by diffusing the incoming water over a large area to prevent the beavers from determining where the water is leaving the system and it prevents them from plugging up the pipe or culvert.

The Peterson Pond installation is composed of three components, a receiver fence, a pipe, and a round fence. The receiver fence serves to exclude the beaver from the outlet of the pond. In many situations all that might be required would be a receiver fence to exclude the beavers from a culvert opening. Where a receiver fence must be smaller than desired because of site characteristics, then a pipe and round fence might be added. The pipe extends upstream from the receiver fence and then the upstream end of the pipe is protected by a round fence.

On August 15 and 16, 2001, the Humane Society of the United States and the King County Wildlife Program sponsored workshops on non-lethal beaver control measures. Over 120 people attended the two workshops, representing many agencies throughout the Puget Sound Region. Workshop presenters included Dr. John Hadidian, HSUS; Dr. Dietland Muller-Schwarze, SUNY Syracuse; Dr. Donald Hey, The Wetlands Initiative; Mr. Skip Lisle, Penobscot Nation; and Dr. Kate Stenberg, King County Wildlife Program. Contact information for the presenters is given in the [acknowledgments](#) section. The workshop also included a demonstration portion. The following photo story of the Peterson Pond installation is presented as a visual aid to remind workshop participants of the construction sequence of the various components that were demonstrated. We hope that this information will be helpful to other web users as well.

Before attempting installation of any devices in streams and wetlands, please be sure to get all the proper permit approvals. In Washington, a Hydraulic Permit Approval is required from the Washington Department of Fish and Wildlife and there may be local county or city permits required as well. In the Puget Sound region, additional federal permits may also be required if the proposed work is located on larger stream systems in watersheds where chinook may be present.

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## Beaver Biology

Beavers are the largest member of the rodent family in North America and are found from sea level to elevations of 12,000 feet. Beavers are semi-aquatic animals spending much of their lives in ponds, rivers, streams and adjacent woodlands. They have webbed hind feet, small ears, a broad, flat tail and can weigh up to 60 pounds. They den in the banks of streams and rivers or build lodges made up of branches and logs plastered together by mud. Beavers also form dams out of branches, logs and mud to create deep water ponds. These ponds not only create safe areas for the beavers but the diverse wetland systems created support a wide variety of fish, amphibians, birds and mammals. Beavers eat the bark, leaves and twigs of many tree species as well as herbaceous aquatic plants such as lily pads, skunk cabbage, grasses and sedges. Beavers feed close to water where they are safer from predators, therefore feeding activity is

restricted to a relatively narrow riparian strip where important trees can be easily protected by fencing.

Beavers are primarily nocturnal and active year-round. They are monogamous and reproduce once a year. Adults usually mate in February and produce two to four kits in May. Family groups are usually made up of five to six individuals with all members working together to build lodges, dams and gather food. Colonies consist of two adults and the young of the current and previous year. By the age of two, young beavers leave their family group to establish a colony of their own. Beavers are territorial and only tolerate the presence of family members under the age of two. Maximum colonies densities rarely exceed one for every half-mile. While habitat loss represents the greatest threat to beavers, other common causes of mortality include cars, domestic dogs and coyotes.

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## Acknowledgments & Contacts

The workshop was sponsored by [the Humane Society of the United States](#) and [the King County Wildlife Program](#).

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### Related Information

For questions about the  
Water and Land Resources Web Site, please

<http://dnr.metrokc.gov/wlr/dss/beavers/beaverintro.htm>

7/23/03

contact [Fred Bentler](#), webmaster.

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Updated: Mar. 24, 2003

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