Beavers in Connecticut

Their Natural History and Management

Connecticut Department of Environmental Protection
Bureau of Natural Resources
Wildlife Division

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Beavers in Connecticut

Their Natural History and Management

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BUREAU OF NATURAL RESOURCES
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DEP Wildlife Division Mission

The mission of the Connecticut Department of Environmental Protection (DEP) Wildlife Division is to maintain sustainable, diverse and healthy populations of wildlife, including endangered and threatened species, on all suitable habitat throughout the state in numbers compatible with existing land use practices and the carrying capacity of the habitat. The Wildlife Division conducts public awareness and technical assistance programs to enhance privately-owned habitat and promote an appreciation for and understanding of the value and use of Connecticut's wildlife. The Division also manages wildlife habitat on state forests and wildlife management areas, regulates hunting seasons and bag limits for all harvested wildlife species within Connecticut and manages public hunting opportunities on state-owned, state-leased and permit-required areas. In addition, the Division conducts, with volunteer assistance, conservation education and hunter safety programs to promote safe and ethical hunting practices.

FOREWORD

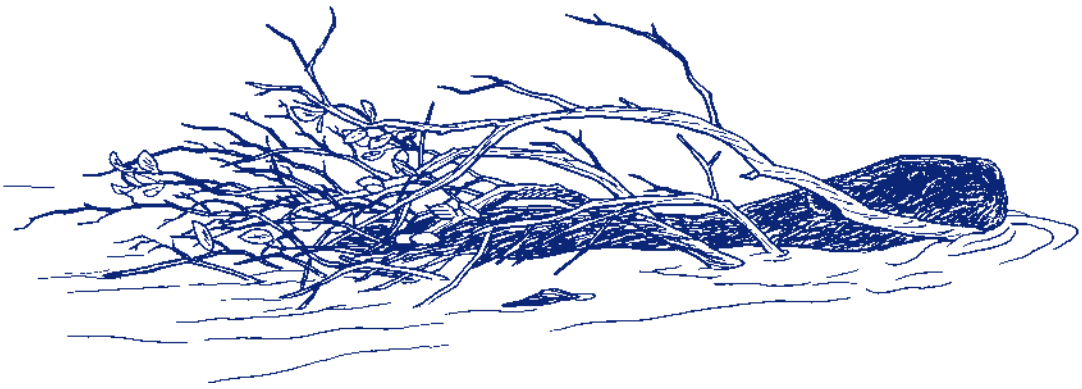
From the Wildlife Division Director
Dale W. May

This booklet is intended to provide property owners, land managers and municipalities with information on the natural history, population dynamics and beneficial aspects of beavers, as well as options for resolving beaver-human conflicts.

There are more beavers in Connecticut today than at any time during the past three centuries. This is due to protective Department regulations regarding trapping and decades of restoration work by wildlife personnel from the DEP. Beavers were extirpated from Connecticut and much of their eastern range by the mid-1800s before being reintroduced to Connecticut near the beginning of the 20th century. For several decades, especially in the 1950s-1970s, biologists and conservation officers routinely livetrapped and relocated nuisance beavers throughout the state to hasten their recovery and expansion into suitable habitat. Needless to say, they were successful. By the 1980s, the trap and transfer activity came to a halt. Beavers were restored in every watershed and we simply ran out of places to put them.

As with many wildlife restoration programs, the beavers and the wildlife agency are the victims of our own success. Along with ecological and aesthetic benefits presented by a thriving beaver population, we now are faced with an ever-increasing rise in beaver complaints. We respond to most of the hundreds of complaints we receive annually by extolling the virtues of beavers and preaching tolerance and appreciation. We do this sincerely and effectively. In addition, we provide technical assistance on options such as fencing and piping. However, we also recognize that beavers do cause serious problems that cannot be solved through tolerance alone. In some cases, such as where public health and safety are jeopardized, beavers may have to be removed completely from the site. In others, landowners employ trapping to maintain beaver populations at a manageable level.

Our goal is to maintain a balance between beaver populations, suitable beaver habitat throughout the state and human land uses. This cannot be accomplished in the absence of some form of population control, such as trapping. We provide landowners with information, technical assistance and options (both lethal and nonlethal) to ensure that beavers are viewed as an asset, rather than a liability. Now that we have successfully restored beavers to the state, we must accept the obligation to manage them responsibly.



Introduction

History of Beavers in North America

The beaver (*Castor canadensis*) has played an important role in the ecological, historical and cultural heritage of North America for thousands of years. By damming streams and brooks, beavers flooded vast areas of forestland, eventually creating systems of marshes and open ponds where mature forests once stood. Through this process, a variety of plant communities were created which provided the necessary habitats for a wide variety of plants, mammals, birds, reptiles and amphibians.

Native Americans relied heavily on beavers for food, medicine, tools and clothing. Beavers also were bartered and exchanged between different Native American groups. They were taken year-round as needed, using snares, dead falls and clubs and by draining their ponds. In a culture where all animals were respected for both their practical and spiritual values, the beaver was honored, especially as a source of guidance on family matters.

For two centuries after the first colonists arrived, beaver pelts were an important medium of exchange in North America, not only between Native Americans and the new settlers, but also between the colonists and Europe. The commercial trade in furbearers, especially beavers, helped drive the early economic and historic development of this country. Beaver pelts were in great demand in Europe, where the fur was made into high quality felt and then fashioned into hats. By the early 1800s, the beaver top hat was the fashion rage in England. This demand for fur allowed North American colonies to pay off large debts to England through beaver trapping. Much of this country was explored and mapped by trappers and "voyagers" who traveled into unsettled territory in search of beaver pelts. Settlers would later use many of the travel routes established by the early fur trappers as they moved west to settle new lands for farming.

By the mid-1800s, much of the East had been cleared of forests and thousands of acres of wetlands were drained for agriculture. As settlers pushed westward, these land use practices continued. There were no laws regulating the harvest of beavers or most other species of wildlife at that time. The loss of habitat and unregulated harvest resulted in the extirpation of beavers from much of their former range in North America. By the mid-1800s, beavers no longer existed in Connecticut and most of the northeastern United States.

Throughout New England, many farms were abandoned in the late 1800s as farmers traveled west in search of more productive land. As the forests grew back, habitat conditions once again became suitable for beavers. At about the same time, the top hat fell out of fashion and people's attitudes regarding the use of natural resources began to shift from one of resource exploitation to conservation. By the turn of the 20th century, all of the northeastern states had developed fish and wildlife agencies, as well as programs and laws to provide for the restoration of many wildlife species. These factors set the stage for the recovery of the beaver.

Beavers Return to Connecticut

In Connecticut, historical records indicate that a pair of beavers was released in Union in 1914. Sporadic releases in the late 1920s and early 1930s reestablished isolated populations, mainly in northwestern and northeastern Connecticut. Beavers also began moving into northwestern Connecticut from New York and Massachusetts where restoration efforts also were occurring. By the 1950s, even the small population of beavers present in the state, estimated at 20 colonies, was causing problems for property owners. The Connecticut State Board of Fisheries and Game initiated a livetrap and transfer program to relocate problem beavers into suitable unoccupied habitat. This helped the beaver population to increase dramatically and

expand its range over a larger portion of the state. With the beaver population well established throughout Connecticut, the Board of Fisheries and Game opened the first regulated trapping season in 1961 in response to the growing number of complaints and to manage the beaver population as a renewable natural resource.

The Beaver Population Today

As we enter the 21st century, the beaver population is abundant (estimated at 5,000 to 8,000 individuals), well distributed and continuing to grow across Connecticut. In fact, there are more beavers in the state presently than at any other time in the last 300 years. Beavers exist today in a landscape drastically different than that of pre-colonial times. They now share their habitat with 3.4 million people on 3.2 million acres of land dominated by residential, commercial and industrial development. In addition, it is estimated that Connecticut has lost 25 to 30 percent of its original inland wetlands and watercourses. By compiling complaint data and monitoring the harvest of beavers, biologists are able to draw conclusions about the relative abundance and population trends of beavers in the state.

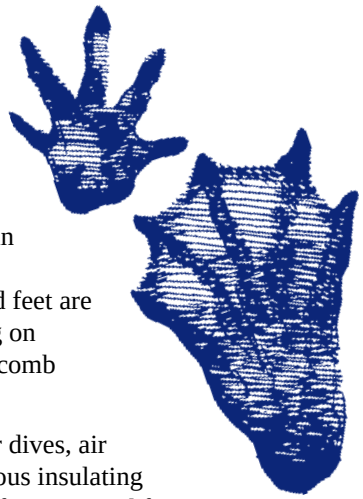
Each year, the Connecticut Department of Environmental Protection (DEP) Wildlife Division responds to hundreds of complaints related to beaver activity. The number of complaints is expected to increase as beaver populations continue to grow and suitable habitat is encroached upon or lost to development. Connecticut citizens and communities must continue to learn how to coexist with beavers. The Wildlife Division is faced with the challenge of maintaining a healthy beaver population on a statewide basis and keeping it in balance with the available habitat. This challenge involves minimizing the problems beavers cause while realizing the ecological, cultural, economic and aesthetic benefits they provide.

Natural History

Distribution and Habitat

Beavers are distributed throughout most of the forested regions of North America, from Alaska to northern Mexico, Nevada and northern Florida. They can be found throughout Connecticut. Beavers inhabit rivers, streams, lakes, ponds, marshes and other wetland sites. These areas must provide adequate food and water depth so that beavers can survive under the ice during winter. Large lakes prone to wave action, fast-moving streams and areas with highly fluctuating water levels are generally unsuitable for beavers.

Description



As North America's largest native rodent, the adult beaver weighs between 30 and 65 pounds. It measures from 24 to 36 inches, not including the tail, which can measure 12 to 18 inches. This heavy-bodied animal has powerful muscles and short legs and, while slow-moving on land, it is well-adapted for life in a semiaquatic environment. On land, beavers typically walk on all four legs, but if carrying mud or sticks, they may hold the materials in their front paws and walk upright. When underwater, thin membranes protect the beaver's eyes and internal valves automatically close within the ears and nose. The lips can seal tightly around the front teeth, preventing water from entering the throat and trachea and enabling the beaver to chew underwater. The large hind feet are webbed and clawed to help propel the animal through the water and provide stable footing on muddy ground. Beavers use their webless front feet to dig, carry materials, hold food and comb their fur.

The beaver's dense underfur is overlain with long, shiny guard hairs. When a beaver dives, air bubbles are trapped beneath the underfur next to the beaver's skin. This provides tremendous insulating qualities that allow the beaver to survive in icy waters. Two specialized claws on the hind foot are used for grooming the fur. The beaver's large, flattened, hairless tail is used as a rudder when swimming, a balance on land and a fat storage area; it also functions in heat regulation. The beaver swims at slow speeds by using its webbed feet and at faster speeds by undulating its body and tail. The tail is also used as a warning device when a beaver slaps it on the water before diving, signaling to other beavers that there is potential danger in the area.

The beaver has a pair of large scent glands, which produce castoreum oil, a pungent, yellowish fluid that is deposited on land to communicate territorial boundaries with other beavers. The beaver also has a pair of glands that produces an oil thought to be used in scent communication and as an aid in helping the fur repel water. Male and female beavers are indistinguishable, except that females have swollen nipples while nursing their kits. Kits are fully furred at birth, with eyes opened and teeth already cut but covered with a thin layer of tissue.

Food Habits

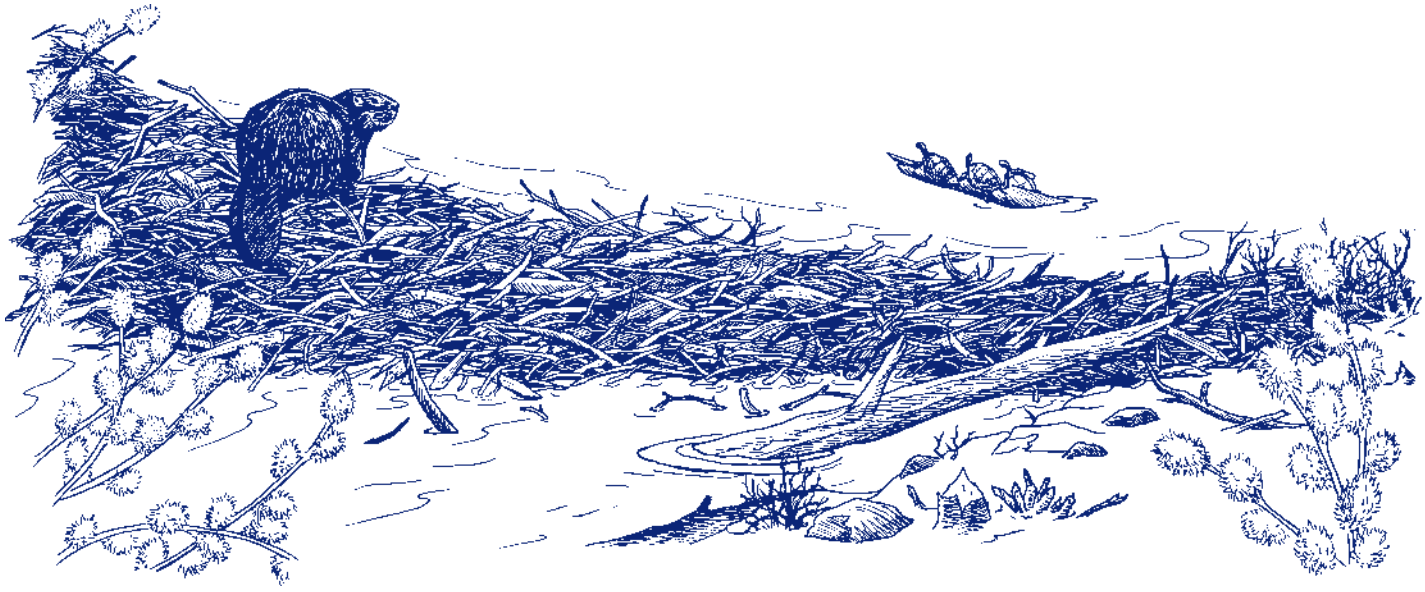
Using their sharp, continuously growing incisors, beavers feed primarily on the outer and inner bark, leaves, twigs, shoots and roots of woody plants. Preferred woody plants include aspen, birch, willow, ash and alder; although beavers will use almost any type of tree species if preferred foods are scarce. A variety of aquatic plants (water lilies, pondweeds, cattails) and other plants (horsetail, evergreen fern), sedges and grasses are consumed by beavers during summer. Branches and logs that have been stripped of leaves and bark for food are often used as construction materials for dams and lodges.

Life Cycle

Beavers are monogamous, having only one mate during the breeding season and often for life. They will readily take a new mate if one of the breeding pair is lost. Breeding occurs in midwinter (January or February). After a gestation period of 100 to 110 days, a single litter of two to six kits is born, usually in May or early June. An established colony of beavers in midwinter is typically comprised of an adult pair, two to four kits and two to four young from the previous year. At two to three weeks of age, the kits begin to eat vegetation; they are weaned at approximately six weeks. The young remain with the adults until their second year, at which time they are forced to leave the parent colony. This usually occurs in spring, before the next litter is born. The two-year-old beavers travel in search of suitable, unoccupied habitat where they can establish their own territory and start a new colony. Most beavers do not breed until their third year.

Dam Building

Unlike most wildlife species, beavers have the ability to modify their surroundings to meet their needs. They do this by damming a stream or brook and flooding an area of trees and shrubs to make an impoundment or “flowage.” By creating an impoundment, the beavers are less vulnerable to predation and they improve their access to food and dam-building materials. The length and height of a dam varies, depending on topography and water flow. In addition to the branches and sticks they cut, beavers also will use mud, leaves, grass, sod, lily pad tubers and even corn stalks as dam-building materials. They push materials, such as mud and stones, onto and into the growing dam by pushing them with their front feet and snout.



Adult beavers do the majority of the dam building with assistance from the juveniles. One or more dams may be built by a colony, depending on such factors as topography of the land, quality of the habitat and the number of colonies in the area. Several dams are often built downstream from the main dam, creating a terrace effect.

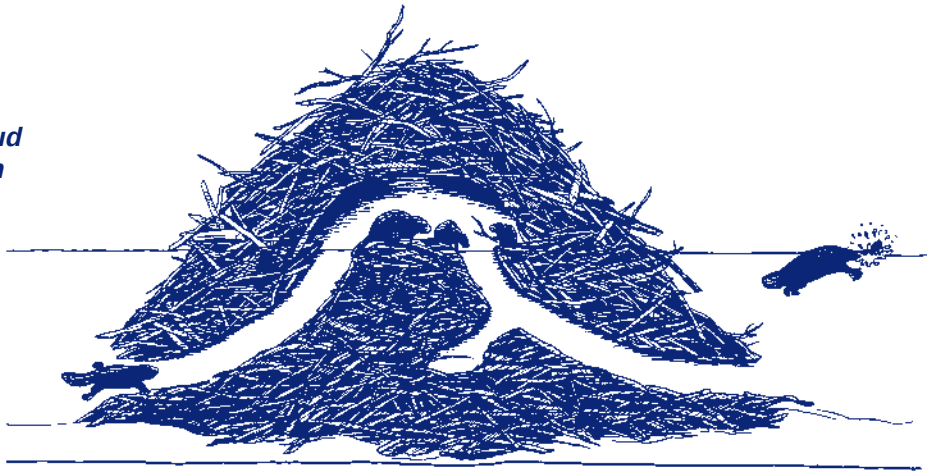
Lodge Building

Beavers typically construct a mound-shaped island of sticks and mud that serves as a year-round lodge. This lodge can vary in size from 20 to 40 feet at the base and rise four to eight feet out of the water. The lodge, which provides protection from the weather and predators, has several underwater entrances leading to one dry chamber used for resting, feeding and grooming. The kits also are born and cared for in the lodge. When beavers first move into an area they may temporarily use a bank den until a dam and suitable lodge can be constructed. Bank dens also may be used as temporary shelters when danger threatens and the beaver is far from the main lodge.

Behavior

Territorial by nature, beavers will not tolerate other beavers within their colony's home range. Beavers are active year-round. They are typically nocturnal, but are sometimes observed during the daytime. Activity is concentrated in the vicinity of the lodge and dam, but beavers may travel several hundred feet from the water in search of food and materials for dam and lodge maintenance. Beavers spend a great deal of time in the lodge during winter when their pond or impoundment is frozen. They rely on a stored pile of sticks and branches, commonly called a food cache, which is anchored to the bottom of the pond adjacent to the lodge. When the pond is iced over, beavers usually restrict their daily travel to retrieving food or checking the dam. If water depths are too shallow, the beavers may be frozen into the lodge and not survive the winter.

Beavers are normally docile animals and generally do not pose a threat to dogs or people swimming in the same area occupied by them. Beavers, like most other species of wildlife, tend to avoid people. However, it is not unusual for an adult with young in a lodge to swim back and forth and slap its tail on the water if someone approaches the lodge or enters the water.



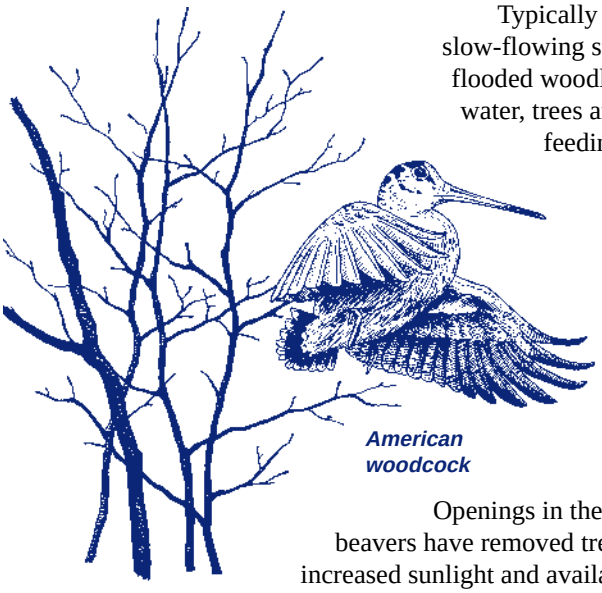
A dome- or teepee-shaped lodge is constructed by beavers out of sticks and mud within the wetland, upstream from the dam. The lodge contains a dry inside chamber which provides cover from the elements and a place to raise young. There are usually several underwater entrances to the lodge.

Benefits of Beavers

Creation of Wildlife Habitat – The Beaver Flowage Cycle

As soon as beavers move into an area, they begin to modify its ecology. As trees are cut and woodlands are flooded, natural succession (the predictable process where one plant community is replaced by another) occurs. Beavers can eventually create an open grassy habitat, called a "beaver meadow," where a forest once stood. At each stage of the beaver flowage cycle, favorable conditions are created for a new assemblage of wildlife.

Tree swallow



American woodcock

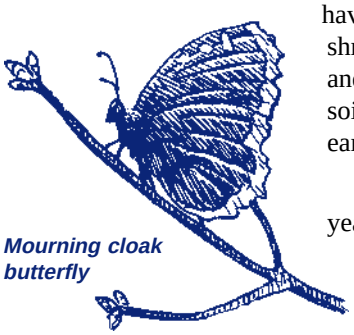
Typically the cycle begins when a beaver dams a slow-flowing stream in a forested area. This newly-flooded woodland, with its interspersion of standing water, trees and shrubs, creates ideal nesting and feeding habitat for waterfowl, including cavity-nesting species like wood ducks and hooded mergansers. As some of the older, larger trees die, they provide prime nesting sites for great blue herons. Woodpeckers excavate holes or cavities in the standing dead and dying trees (snags) and feed on the insects that are attracted to them. Abandoned woodpecker holes make excellent nest sites for other wildlife that cannot excavate their own cavity, such as black-capped chickadees, nuthatches, tree swallows and screech owls. Brown creepers may find their specialized nesting spots under the flaps of peeling bark on many of the snags.

Openings in the forest canopy occur over the water and on the surrounding land where beavers have removed trees and shrubs. Aquatic vegetation takes hold in response to the increased sunlight and available nutrients. Invertebrates, like crayfish, dragonflies, damselflies and fishing spiders, are now much more common. The presence of invertebrates attracts insect-eating wildlife, such as tree swallows, eastern kingbirds and bats.

Although conditions for brook trout may actually improve for the first few years after beavers have dammed a stream, the improvement is usually short-lived. Accumulating silt reduces water levels and covers the gravel substrate upon which fish lay their eggs. The water begins to warm up as the depth is reduced and exposure to sunlight is increased due to the loss of shade trees along the stream. Fish that flourish in warm water, such as bass, perch and sunfish, replace fish that prefer cooler water, like brook trout. Mink and river otter feed on the fish, frogs, salamanders and invertebrates that inhabit the new wetlands created by beavers.

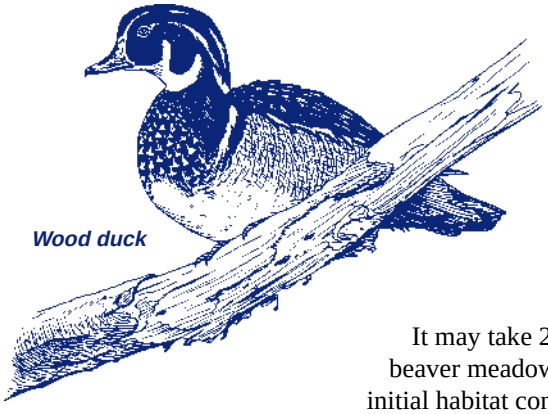
Mink

Over time, the beaver flowage may eventually look more like an open pond, as fewer trees remain standing and aquatic plants, such as cattails, sedges and rushes, become more dominant. The wetland is now highly attractive to muskrats, mallards, Canada geese, black ducks, least bitterns (state threatened) and king rails (state endangered). On the land surrounding the beaver flowage, great changes also have been taking place. As the forest canopy is removed by the beavers' cutting activity, plants, shrubs and vines that prosper in open sunlight begin to dominate the site. White-tailed deer and black bears feed on the various fruiting, succulent plants and grasses growing in the rich soil. The American woodcock, whose long bill is highly adapted for probing the soil for earthworms, often finds abundant worms in the moist soil surrounding a beaver flowage.



Mourning cloak butterfly

If beavers remain in an area, they typically exhaust their food supply over a period of years. After the beavers die or move on to find a new territory, the dam eventually breaks and a mud flat or silt bottom is exposed. Depending on site conditions, both grasses and sedges or shrubs and trees may begin to sprout and grow. A meadow containing a mix of grasses, sedges, wildflowers and weeds may persist for years, providing habitat for the American goldfinch, chipping sparrow, field sparrow, monarch butterfly and others.



Wood duck

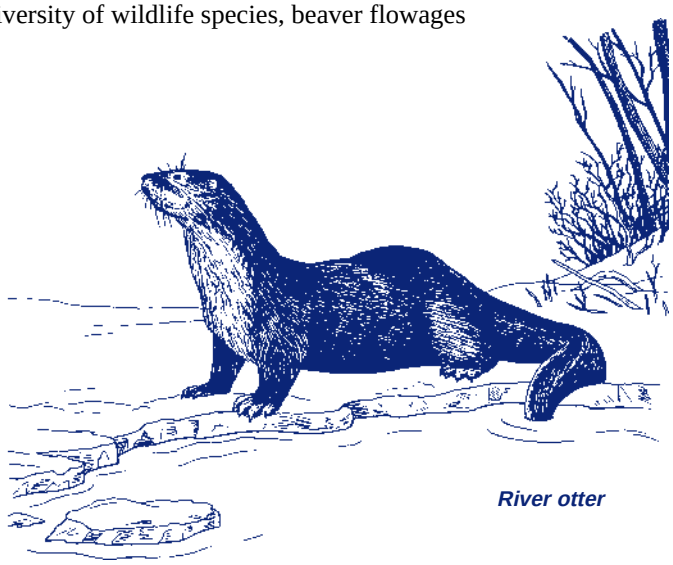
Predators, like the red-tailed hawk, fox and coyote, hunt the abundant populations of mice, voles and shrews that find food and cover in the beaver meadow. Dusky salamanders, two-lined salamanders and pickerel frogs also may be present. The meadow may still contain some standing dead trees, indications of its history under the influence of beavers.

After a period of years, shrubs become established and provide habitat for the yellow warbler, common yellowthroat, blue-winged warbler and chestnut-sided warbler. The change in plant communities is variable. It may take 20 to 50 years before the area resembles a forest again. In some cases, a beaver meadow may persist almost indefinitely. Factors influencing succession include initial habitat conditions, water chemistry, soil type, silt depth, amount of decaying vegetation and the length of time beavers are present.

Wetland Values

In addition to providing vital wetland habitat for a diversity of wildlife species, beaver flowages also provide many other functions and values, including:

Pollution filtration
Sediment removal
Aquatic productivity
Chemical and nutrient absorption
Flood control
Ground water recharge
Aesthetics
Recreation
Nutrient recycling
Water supply
Education and scientific research



River otter

Economic Benefits

As in past history, humans continue to derive economic benefits from beavers. Beaver pelts are sold to fur buyers who in turn sell them to manufacturers, where they are made into high-quality garments, such as coats, hats and gloves. The castor, obtained from the castor glands, is used as a base for perfumes. The meat may be used for personal consumption or is fed to pets.

From 1996-2000, an average of 926 beavers has been harvested annually in Connecticut during the regulated trapping season. The value of pelts fluctuates each year based on a variety of economic factors, including the demand for goods and the level of economic prosperity, especially in Europe and Asia where many of the furs are purchased.

Educational, Recreational and Aesthetic Benefits

Beaver flowages can be pleasing, aesthetic additions to a forested landscape. People value having the opportunity to see beavers and other wetland wildlife. Beaver flowages also offer tremendous recreational benefits for people, by providing places for canoeing, fishing, hunting, trapping, birdwatching and photography. As an educational asset, a beaver flowage can also be used as an outdoor classroom for students to learn about wildlife and wetland ecology. Beavers are an integral part of the Connecticut landscape, helping to promote biodiversity in our ecosystem.

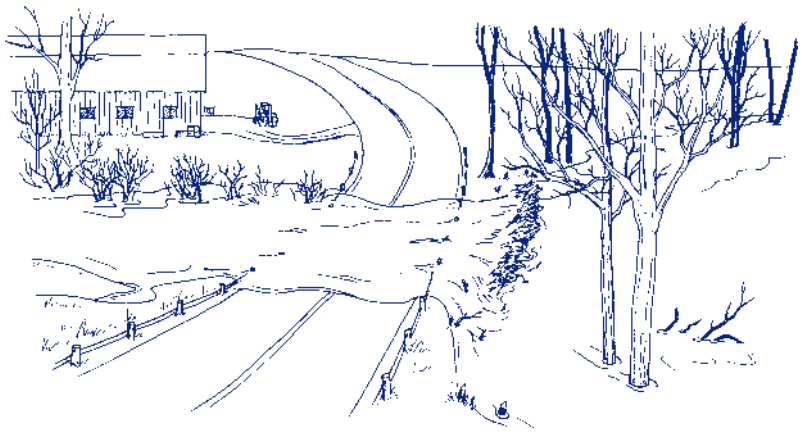
Yellow-rumped warbler

Beaver/Human Conflicts

- *Flooding*
- *Tree cutting*
- *Damage to man-made structures*
- *Impacts on other natural resources*
- *Water quality and public health issues*

While beavers can create and enhance wetland wildlife habitat, their activities often conflict with human needs and desires. The majority of conflicts involve flooding and the killing of trees. Trees are killed by felling or girdling, or by the flooding of their root systems for long periods of time. These trees may fall near or on buildings, cars, roads, driveways, railroads or power-lines. Flooding may affect buildings, roads, man-made dams and ponds, parking lots, driveways, agricultural fields, lawns, wells and septic systems. One of the most common complaints in Connecticut is the plugging of culverts that can cause property flooding and road and driveway damage. Beaver dams also may negatively affect other natural resources by altering wetland ecosystems. For example, dams can serve as barriers to migrating fish and cause inundation and siltation of rare plant and animal habitats.

Beaver damage can be costly and frustrating for landowners and others who use the affected areas. Many Connecticut towns spend thousands of dollars annually to break dams and clear culverts. Nationwide, beavers cause millions of dollars worth of damage each year. People living near beaver flowages often express concerns relating to aesthetics, water quality and health issues, such as giardiasis (see insert on giardiasis) and increased mosquito populations (see insert on mosquitoes). Some people feel that beaver activity "ruins" the aesthetics of an area, expressing that the dead trees and "stagnant" water are unsightly or that the beaver flowage smells. As organic matter builds up in a pond, the natural process of decomposition takes place. In a beaver pond, much of this decomposition occurs where oxygen levels are low or nonexistent. Decomposition under these conditions may create a smell much like rotten eggs. This is natural and there is no cause for alarm. The smell is usually temporary and tends to dissipate as the weather cools or rainfall increases.



Giardiasis

Giardiasis is an intestinal infection caused by an organism (a protozoan), known as giardia, that is shed in the feces of humans, dogs, cats, cattle, birds, deer, mice, beavers and other animals. The infection is contracted when food or water contaminated by feces is ingested. Giardiasis is found worldwide, with a higher incidence in countries with poor sanitary conditions. The infection is usually asymptomatic, but it can cause intestinal pain, diarrhea and weight loss.

Outbreaks in the United States have stemmed from contaminated municipal water supplies, with the blame often falling on aquatic and semi-aquatic animals, such as beavers. However, it has not been clearly established if wildlife species are important reservoir hosts for the organism that causes the illness. In the United States during the last three years, the Centers for Disease Control and Prevention has documented over 50 percent of all giardiasis cases being traced to poor sanitary practices at day care facilities. Human sewage leaks have also been implicated in outbreaks of the infection. Giardiasis can be prevented through proper sanitation and by not drinking untreated surface water. For more information on giardiasis, contact your local public health department.

Preventing and Solving Beaver/Human Conflicts

The Wildlife Division provides technical assistance to individuals experiencing problems associated with beaver activity. The options available depend on the time of year and the nature and severity of the problem. The following section outlines these options.

Land Use Planning/Development Design

Many beaver problems are the direct result of human encroachment on their habitat. Beaver/human conflicts can be expected to increase as land in close proximity to wetlands is developed for residential, commercial and industrial use. Municipal land-use planners and inland wetland commissions should be aware of the potential for beaver activity along wetlands and watercourses. Standard setbacks from wetlands may need to be increased based on site-specific characteristics.

Wetland crossings at roads, highways and driveways should be minimized. If a road must cross a wetland, consideration should be given to proper elevations and structure design. Research in New York has found that culvert size and type are the major factors determining whether beavers will plug a pipe. Standard round culverts may restrict stream flow, alter the stream width and may generate noise that attracts beavers. In general, larger cement box culvert or aluminum pipe arch culverts are preferred over smaller round culverts. Bridges are the least likely structures to be

Mosquitoes

Mosquitoes can exist in almost any natural aquatic environment or artificial container. Examples include salt marshes, swamps, snowmelt pools, shallow depressions or ditches that retain rainwater, tree holes, tire piles, clogged rain gutters and abandoned swimming pools. Connecticut has 48 species of mosquitoes, each with its own unique life cycle. In general terms, some species of mosquitoes lay their eggs on moist substrates (e.g., mud, wet leaves, inside tire casings). The eggs later hatch when the area is flooded by tides, rain water or melting snow. The eggs of other species are laid directly on stagnant water surfaces, hatching within a few days. For all mosquitoes, their development is dependent on water temperature. Mosquito larvae need at least seven to 10 days to fully develop and emerge as adults. Certain species within both of these groups can transmit viruses and other organisms that can cause diseases such as Eastern Equine Encephalitis, West Nile Virus (WNV) and heartworm (which normally affects dogs and cats).

Beavers moving into an area may impact mosquito production, depending on the landscape. River and stream systems that have broad flood plains may contain many shallow depressions that are intermittently flooded as the stream overflows its banks or after heavy rainfalls. Mosquito species that lay their eggs on moist substrates would be expected to reproduce in these flooded depressions. When a wetland is flooded by beaver activity, small, shallow temporary pools are replaced by deeper permanent water. With this change in water depth, mosquito species that lay their eggs on the surface of the water would be expected to lay their eggs in the beaver flowage. This change in mosquito species composition may take several years as the new wetland stabilizes. Heavily vegetated edges and shaded eddies, not experiencing direct sunlight and wind, would most likely provide potential mosquito breeding habitat. It is important to note that the populations of mosquitoes within deeper impounded beaver flowages are part of a more complete food web and are more likely to fall prey to fish, aquatic insects, amphibians, reptiles and birds. There is no evidence that the presence of beavers will increase overall mosquito populations; however, their presence does influence what types of mosquitoes may be present.

For information on Connecticut's mosquito virus testing program and test results, contact the State's Mosquito Management information line at 1-866-WNV-LINE (toll-free in Connecticut). For technical questions on mosquitoes and mosquito control measures, contact the DEP Mosquito Management Program, at (860) 642-7630.

dammed because they generally do not restrict the width of the stream. While some of these structures may be more costly to purchase and install initially, the lower maintenance costs resulting from less frequent plugging may represent a significant advantage economically over the long run. On driveways or roads through woodlands where there is light traffic, a shallow water crossing (ford) can be built from stone that will allow water to pass during flooding. This type of shallow water crossing acts much like an emergency overflow spillway on a dam.

Coexistence/Tolerance

Beavers readily coexist with humans, often successfully surviving in very populated areas. In many circumstances, people experience relatively insignificant beaver damage, such as the cutting of trees around a pond or lake or the flooding of an existing wetland. The beavers are simply doing what is natural and tolerating their activity is part of coexisting with wildlife. Although some landowners may think that the changes that occur when an existing wetland or woodland is flooded by a beaver dam are aesthetically unpleasant, the changes are part of a natural cycle. Wetlands are dynamic systems that should be expected to change over time.

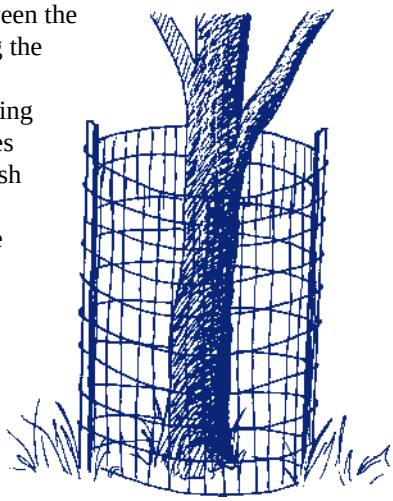
Repellents and Harassment

There are no known or registered repellants that are effective against beavers and harassment usually does not cause beavers to abandon an area. Dam removal may be an effective technique for discouraging young beavers from establishing new territories in undesirable locations (see section on Dam Removal). In rare instances, such as when a young beaver has not established a territory, continual removal of dam materials may persuade it to abandon the site. Where beavers have been well established, dam removal will only be effective if the beavers have moved out of the area or have been trapped.

Breaching (removing a section of a beaver dam) may be used to relieve a flooding condition. If breaching is being done as an interim measure to reduce flooding, it will need to be done on a regular basis, as the beavers will rebuild the dam each night. Breaching also will be necessary prior to installing fencing at a culvert or a water level control device. These activities are regulated under the Inland Wetlands and Watercourses Act (see sections on Exclusion Fencing and Water Level Control Devices and Regulatory Aspects of Beaver Management).

Protecting Trees and Shrubs

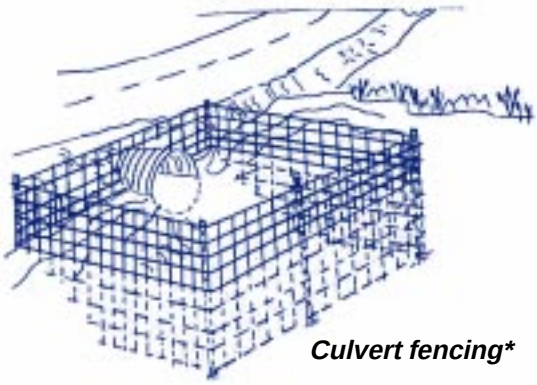
Enclosing the bottom 4 feet with heavy-gauge wire mesh fencing can protect individual trees. Beavers are not adept climbers and the fence will act as a barrier. The mesh size should not exceed 2 inches by 4 inches and the fence should be secured with metal stakes. Leave a 6-inch space between the tree trunks and the fence to allow for tree growth and to prevent beavers from chewing the bark through the mesh. Do not use light-gauge fencing or chicken wire. Beavers are powerful chewers and they may be able to damage the fencing to get at the trees. Fencing can be especially effective for protecting expensive ornamental trees along ponds, lakes or river edges. A larger area of trees can be protected by placing a 4-foot high wire mesh fence (not exceeding 6 inches by 6 inches) around the site. Those who own shoreline along a large lake and are experiencing light beaver damage to surrounding trees have the option of using the standard wire fence described previously or an electric fence to discourage beavers from taking trees. Electric fences should be set about 4 to 8 inches off the ground.



Exclusion Fencing at Culverts

Culverts provide a convenient location for beavers to build a dam. The beavers simply plug the culvert, while the roadway serves as the dam. Hazardous driving conditions can result when the culvert is unable to pass adequate amounts of water during storm events, resulting in a flooded road surface. In addition, standing water adjacent to roads can destabilize roadbeds and create serious settling, cracking and pothole problems. To prevent beavers from directly plugging a culvert, a fence may be installed in front of the culvert as soon as it is evident that a beaver problem exists or is likely to develop. Ideally, the beaver builds its dam against the fence, leaving the culvert to drain water as it was intended. This should alleviate flooding of water over the road and still allow the beavers to create an impoundment.

Before installing exclusion fencing, all debris should be removed from the culvert. Care must be taken to release the water slowly to avoid potential downstream flooding. After the dam is removed, exclusion fencing should be installed immediately as beavers will begin rebuilding the dam overnight. Fencing material should be heavy-gauge woven wire (e.g., concrete reinforcement wire), 5 feet high, with no larger than 6-inch mesh openings. It also should extend back to the culvert walls or cement abutments. The fence should extend out 10 to 20 feet from the culvert, shaped as a half circle and secured to the bottom of the beaver flowage with metal posts. At sites where the topography makes it impossible to assure that the fencing is flush with the wetland bottom, it may be necessary to construct a wire bottom to the exclusion fencing. If the fence cannot be installed for several days, wooden sticks or iron pipes should be driven into the wetland bottom in front of the culvert to prevent the beavers from plugging it.



Culvert fencing*

The use of fencing to alleviate roadside beaver problems has its limitations. Freezing and thawing can damage wire; therefore, maintenance must always be factored in. Existing topography and the feasibility of installing the fence also must be considered.

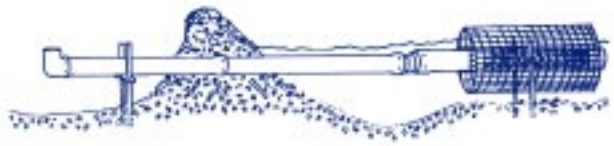
Water Level Control Devices

In some beaver complaint situations that involve flooding, a water level control device (WLCD) may be effective in reducing water levels to a tolerable level. "WLCD" is the general term applied to any type of device installed through a beaver dam to maintain a constant flow of water through the dam. Ideally, WLCDs are used in situations where some reduction in water depth (usually a minimum reduction) would create a tolerable situation for the people involved, yet maintain beavers at the site so that valuable wetland wildlife habitat can be conserved.

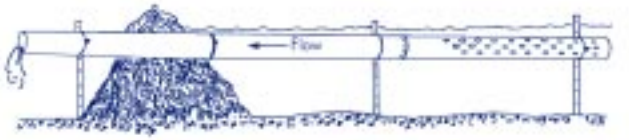
The use of WLCDs in beaver management originated in the late 1920s. Although the concept is generally the same, there are a variety of well-established designs, including "beaver pipes" (perforated plastic or aluminum pipes), "New Hampshire beaver pipes" (3-sided wooden box with a wire bottom), "Clemson Pond Leveler" (perforated pipe surrounded by a wire mesh cylinder and a standpipe outlet), "beaver baffler" (pipe created by multiple layers of fencing), and the Massachusetts design (flexible plastic pipe with a wire box protecting the inlet). Regardless of what the devices are called, the idea is to reduce the sound and sensation of water flow through the device so that the beavers will not plug it.

WLCDs work best where there is one main dam located at the outlet of a waterway. They do not work well when beavers have a number of locations to build a dam, such as in a meandering stream course. A water depth of 3 to 4 feet is needed at the location of pipe installation. Entrances to the lodge must remain underwater and there must be sufficient water depth so the beavers will not be frozen into their lodge during winter. Landowners must still tolerate some

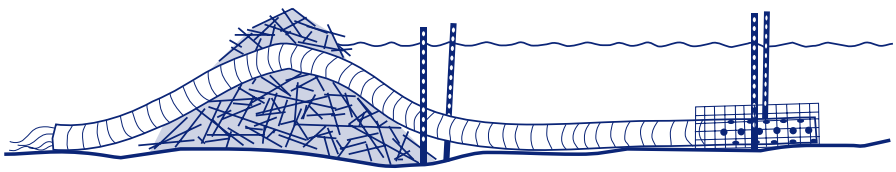
Water Level Control Devices



Clemson beaver pond leveler*



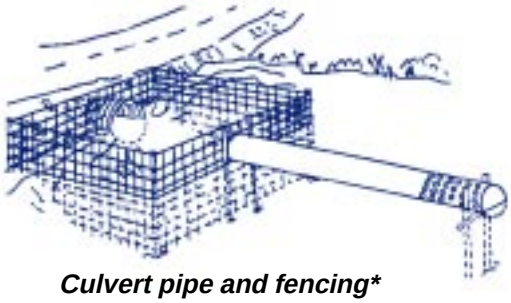
PVC beaver drain pipe*



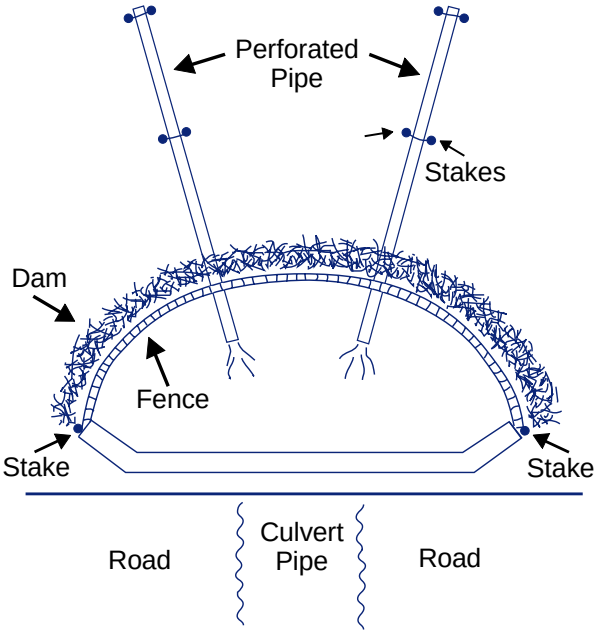
Massachusetts beaver pond leveler*

**Diagram courtesy of New York Department of Environmental Conservation*

Combination Exclusion Fencing and Beaver Pipes



Culvert pipe and fencing*



flooding, especially during storm events. The height at which the outlet end of the pipe is set determines the water level, provided sufficient pipes are used to handle normal runoff. As long as the pipes continue to pass incoming flow, water levels should remain relatively stable (excluding storm events), regardless of the height of the beaver dam. Excess water from heavy rains will flow over the dam.

A combination of pipes and fencing can be used at a roadside culvert where a reduction in water level is desired. After the beaver debris is cleared from the culvert and a woven wire fence is installed as described previously, pipes may be added as shown (see figure on previous page). (Contact the Wildlife Division for a list of licensed commercial Nuisance Wildlife Control Operators who are available to provide assistance in the use of fencing and water level control devices to address beaver flooding problems.)

Exclusion Fencing at Pond Drains and Water Control Structures

Beavers often cause problems in ponds and lakes by plugging outlet pipes or concrete water control structures at man-made dikes or dams. At the first sign of beaver occupation, protective measures should be taken. Fencing the structures with a heavy-gauge, woven-wire mesh will prevent beavers from directly plugging the outlet pipes and make maintenance of these structures more efficient. However, fencing will not control water levels. Landowners must take responsibility to maintain the flow of water through the control structure. Removal of the beavers may be necessary if potential downstream flooding would create a public health or safety problem. Anyone who is concerned that beaver activity at a dam may pose a downstream safety hazard should contact the Dam Safety Section of the DEP Inland Water Resources Division, at (860) 424-3706.

BE ADVISED

- Water level control devices (WLCDs) should only be used at sites where the intention is to maintain a tolerable water level for both beavers and humans.
- While exclusion fencing and WLCDs may remedy a site-specific beaver problem, they do nothing to curb beaver population growth.
- WLCDs require regular monitoring and maintenance.
- The installation of fencing or WLCDs and the removal or breaching of dams are considered regulated activities under the Inland Wetlands and Watercourses Act (Connecticut General Statutes Sections 22a-36 through 22a-45). A town's wetland commission needs to be contacted before any work can be undertaken.
- To obtain instructions and a list of materials required to install a WLCD, contact the Wildlife Division.

Trapping

In situations where the presence of beavers cannot be tolerated or the landowner wishes to control the number of beavers on his/her property, trapping during the regulated winter trapping season is the most effective approach (consult the current Connecticut Hunting and Trapping Guide for season dates). Approximately 70 percent of the beavers harvested annually in Connecticut are taken in direct response to nuisance complaints from the general public. Trapping removes a portion of the beaver population each year. Consequently, population growth is stablized and conflicts with humans are reduced.

Trapping season dates are established so that beavers are harvested at the time of year when the fur is of greatest value. Thus, the populations are managed as a renewable natural resource. Trapping season results are monitored through a mandatory pelt-tagging program. All trappers must obtain written permission from the property owner before trapping on private land and they must follow all trapping laws and regulations, which are among the strictest in the country. (Contact the Wildlife Division for a list of volunteer trappers who are available to provide assistance.) Special authorizations to trap beaver outside of the regulated season may be issued by the Wildlife Division where beaver activity threatens public health and safety or causes damage to agricultural crops (see section on Regulatory Aspects of Beaver Management).

Long-term Population Management

While exclusion fencing and WLCDs may remedy site-specific beaver problems, these techniques will not curb beaver population growth. In Connecticut, there is little natural predation or disease to control beaver populations. Historically, the eastern timber wolf was considered a major predator of beavers. However, wolves were extirpated from Connecticut and neighboring states shortly after the arrival of the colonists and they are not likely to return to the highly developed eastern landscape. Today, bobcats, coyotes, otter and mink may prey on beaver kits and occasionally adults, but natural predation does little to reduce the overall population of beavers. Some beavers are killed by vehicles or they die of natural accidents, injuries or disease, but none of these sources of mortality are significant. Humans remain the primary factor controlling the population growth of beavers.

Carrying Capacity

Beavers are territorial, allowing only one colony or family unit to occupy a given area. If beaver populations were allowed to grow unchecked, complaints would rise dramatically because beavers would be forced to occupy more sites, including those that could cause conflicts with people. Beavers have the ability to exhaust the food supply in an area and make it unsuitable for further occupation.

The ability of an area to support a wildlife population is limited by biological factors, including food, water and cover. The capacity of an area of land to support a healthy population of any one species over time is referred to as its “biological carrying capacity” (BCC). The reproductive potential of most wildlife species can cause their populations to exceed BCC. If this occurs, the habitat quality decreases and the physical condition of the animals can decline.

“Cultural carrying capacity” (CCC) is defined as the maximum number of animals that can coexist with local human populations. This concept is used to define the negative aspects of high deer populations in relation to the current human population, but the concept can easily be applied to beaver populations. Due to the high level of development in relation to Connecticut’s relatively small land base, a population can reach CCC long before it reaches BCC. While Connecticut could biologically provide more habitat for beavers, a higher population would cause a dramatic increase in the number of complaints and have a negative effect on other natural resource values.

Does Trapping Harm Wildlife Populations?

The annual removal of beavers during the regulated winter trapping season is the best long-term solution to maintaining a balance between beaver populations, suitable beaver habitat throughout the state and human land uses. A yearly harvest by regulated trapping helps to ensure that beavers will not become so abundant that there is no suitable habitat left for them to occupy over large areas. Trapping in Connecticut is strictly regulated. It is only allowed for species that are common throughout the state. Most wildlife populations produce more animals than their habitats can

support. When this happens, there may be an increase in natural mortality, an expansion of the population into marginal habitats or both. Trapping can remove a portion of the surplus animals and helps keep populations in balance with BCC and CCC. Restrictions such as seasons and bag limits are used to prevent overtrapping. Trappers' reports help wildlife biologists to monitor harvest and the status of wildlife populations.

Why Not Relocate?

Many people request that the beavers causing problems on their land be live-trapped and relocated. While this was an important technique for reestablishing beaver populations in unoccupied range from the 1950s to the 1970s, relocation is no longer considered a viable option for alleviating beaver problems in Connecticut. In heavily developed states where beaver populations are abundant and widely distributed, it is highly probable that this technique will create new problems. While suitable unoccupied habitats still exist in the state, relocated animals seldom stay in the area where they are released. Beavers that do remain at the relocation site will soon produce offspring that will be forced out of the parent colony at two years of age. These two-year-old beavers must travel in search of new unoccupied habitats where they can establish a territory of their own. From an ecological perspective, it is undesirable to have all potential beaver habitats occupied at once. Rather, a mosaic of wetland habitat types in different stages of succession is desired across the landscape. Most importantly, moving beavers does not reduce the overall beaver population and, thus, does not reduce the number of complaints and damage.

Regulatory Aspects of Beaver Management

Regulated Trapping

Section 26-72 of the Connecticut General Statutes (CGS) gives the Commissioner of the Department of Environmental Protection the authority to regulate the taking of furbearing animals. This includes establishing open and closed seasons, legal methods of take and season harvest limits. The DEP also can authorize trapping outside of the regulated trapping season for specific reasons, such as where public health and safety are jeopardized or natural or agricultural ecosystems are threatened (CGS Section 26-3). Wildlife Division staff can coordinate on-site inspections to verify if out-of-season trapping is warranted. Out-of-season trapping may be done by landowners or lessees of property sustaining agricultural damage (CGC Section 26-72), or by Nuisance Wildlife Control Operators—licensed commercial contractors in the business of nuisance wildlife control (CGS Section 26-47) and volunteers (CGS Section 26-7) who possess the necessary authorization issued by the DEP.

Beaver Trapping Objectives

- Maintain a healthy statewide beaver population at a level compatible with current land use patterns and habitat availability.
- Provide landowners with a cost-efficient option for eliminating or greatly reducing property damage, thus cultivating an attitude of tolerance among landowners. Approximately 70 percent of all beaver trapping is conducted in direct response to landowner complaints.
- Ensure perpetuation of the beaver population by not allowing large areas of habitat to become exhausted simultaneously.
- Provide for the cultural, economic and sustainable use of a renewable resource that will help to control the increase in the beaver population.
- Preserve rare and endangered species, anadromous fish runs and other sensitive natural resources jeopardized by beaver activity at ecologically important sites.

Beaver Dam Removal/Breaching

The breaching or removal of beaver dams and the installation of fencing or WLCDs are generally considered regulated activities under Connecticut's Inland Wetlands and Watercourses Act and should be done with great care under the auspices of the appropriate wetland agency. These activities can pose danger to life and property downstream and have negative environmental consequences, including disruption of wildlife and fisheries habitat, downstream siltation and erosion. Permit determinations are made by the appropriate wetland agency.

Man-made Dams

Many man-made dams, large enough to cause a loss of life or property if they were to breach or fail, come under the jurisdiction of the DEP Dam Safety Section as outlined in the Dam Safety Statutes (CGS sections 22a-401 through 22a-411). Under state statute, the DEP can request the removal of beaver debris or a beaver dam if the debris/dam is constructed on or is obstructing an existing dam or dike regulated by the DEP. Maintaining unobstructed principal and emergency spillways is essential for ensuring that the dam's hydraulic capacity and structural integrity are not compromised. Failure to comply with such a request may result in formal enforcement action being taken in order to remove the beaver debris/dam.

The Inland Wetlands and Watercourses Act

In 1972, the Connecticut State Legislature enacted the Inland Wetlands and Watercourses Act (CGS Sections 22a-36 through 22a-45). With this legislation, the General Assembly recognized that the "inland wetlands and watercourses of the state of Connecticut are an indispensable and irreplaceable but fragile natural resource with which the citizens of the state have been endowed." The purpose of the Act is to provide for the protection, preservation, maintenance and use of inland wetlands and watercourses by minimizing their disturbance and pollution; maintaining and improving water quality; preventing damage from erosion, turbidity or siltation; and preventing loss of fish and other beneficial aquatic organisms, wildlife and vegetation.

Because wetlands and watercourses are of such great biological, cultural, aesthetic and economic importance, most activities in wetlands and watercourses are regulated. A regulated activity is defined as "any operation within or use of a wetland or watercourse involving the removal or deposition of material, or any obstruction, construction, alteration or pollution of such wetlands or watercourses." The Act delegates the authority to regulate wetlands and watercourses to each town. All towns have an appointed wetlands agency/commission that is responsible for determining whether an activity proposed within or adjacent to a wetland or watercourse will require a permit. Certain activities in or around wetlands and watercourses also may require review and approval beyond the local wetlands agency (e.g., the DEP has jurisdiction over activities within tidal coastal or navigable waters). For more information, contact your town's wetland commission.

Summary

Beavers are fascinating animals, inspiring wonder when we examine their ecology, adaptations and the role they play as a keystone species in creating a diversity of wetland habitats across the Connecticut landscape. However, beaver activity can also cause property damage and economic loss, jeopardize other rare natural resources and create public health and safety concerns.

Landowners and others sustaining damage need to have flexibility and choice in dealing with beaver problems. A combination of factors, including the individual landowner's attitude, site characteristics, the severity of damage being sustained, off-site impacts and other natural resource values, should be considered when deciding what option or options are best suited to resolve a particular nuisance beaver problem. Successful management of beaver problems will require that all the management options discussed in this booklet be used at various times. The annual trapping of a limited number of beavers will prolong the life of a colony and the associated benefits, while minimizing potential human/beaver conflicts. Protective fencing can be employed if tree cutting is a problem. A WLCD can be installed at a road culvert if site factors are favorable and periodic maintenance is practical. If the presence of beavers is not acceptable, trapping can be conducted during the regulated season.

The Wildlife Division seeks to manage a healthy, well-distributed beaver population in suitable habitat throughout Connecticut, while minimizing potential human conflicts. By providing resource information and management options through publications, presentations and individual technical assistance, either by phone or through on-site inspections, the Wildlife Division hopes the public will have a better understanding of the options available for resolving human/beaver conflicts. While the Division will continue to use and promote a variety of solutions for site specific problems, the regulated beaver trapping season will remain a key management tool. Trapping is the only technique that limits the growth of the beaver population in a landscape with limited biological and cultural carrying capacity.

Where to Go for Help

If you have a beaver complaint or would like more information on controlling beaver damage, contact the DEP Wildlife Division office nearest you:

DEP Eastern District Headquarters
209 Hebron Road
Marlborough, CT 06447
860-295-9523

DEP Wildlife Division
Sessions Woods Wildlife Management Area
P. O. Box 1550
Burlington, CT 06013
860-675-8130

Dam safety issues should be directed to:

DEP Inland Water Resources Division
Dam Safety Unit
79 Elm Street
Hartford, CT 06106
860-424-3706

DEP web site: http:\\dep.state.ct.us

Questions concerning wetlands regulations should be directed to your town's wetland commission.

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Quick Facts

Mid-1800s: Beavers no longer existed in Connecticut. Habitat loss and unregulated harvest were responsible for their demise.

Early 1900s: Wildlife managers started livetrapping and relocating beavers to Connecticut.

1961: Year of the first regulated trapping season for beavers in Connecticut.

5,000 to 8,000 Beavers: Population estimate of beavers in 2000.

30 to 65 pounds: Weight of an adult beaver.

24 to 36 inches: Length of an adult beaver's body.

12 to 18 inches: Length of an adult beaver's tail.

Uses of a beaver's tail: Rudder when swimming, balance on land, fat storage, regulation of body heat and a warning device (slapped on water to alert other beavers of possible danger).

Foods: Outer and inner bark of trees, leaves, shoots, roots and a variety of aquatic plants.

January - February: Mating season.

May - early June: Young are born.

2 to 6 Kits: Normal litter size.

Age 2: Young leave colony to look for their own territory.

Age 3: Age at which most beavers first mate.

About this Document

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Connecticut Department of Environmental Protection
Bureau of Natural Resources
Wildlife Division
http://dep.state.ct.us