

# NEW YORK'S WILDLIFE RESOURCES

AN EXTENSION PUBLICATION OF THE  
DEPARTMENT OF NATURAL RESOURCES  
NEW YORK STATE COLLEGE OF AGRICULTURE AND LIFE SCIENCES  
A STATUTORY COLLEGE OF THE STATE UNIVERSITY  
AT CORNELL UNIVERSITY, ITHACA, NEW YORK

Number 18, 1984

## Beaver (*Castor canadensis*)

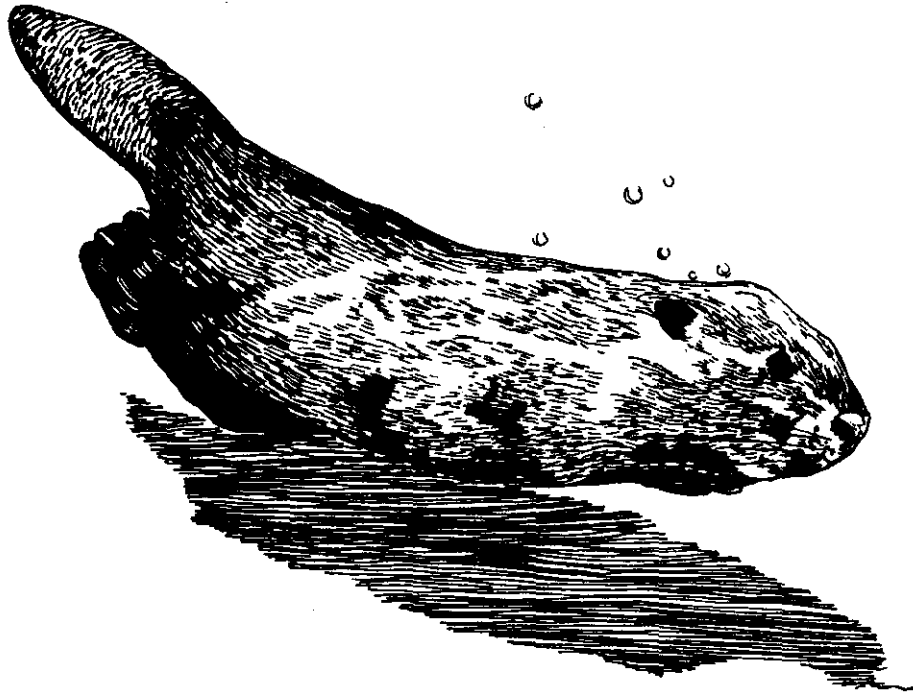
### Description

The beaver, New York's official state mammal, is the largest rodent native to North America. Adults average 18-27 kg (40-60 lbs.) in weight and 100 cm (40 in.) in total length. Today's beaver, however, is just a miniature of its ancestor; "beavers" present during the Pleistocene Era over 2 million years ago were the size of bears!

Historically, the beaver has been well-known to humans for its fur. Glossy tan to dark brown on its back and upper sides and paler below, beaver fur consists of fine, dense underfur covered with longer guard hairs. This thick pelage (fur) is valuable because of its beauty and insulative properties.

A beaver has a stocky body; short rounded head, short neck and short legs. But, by far, its most distinctive feature is the scaly, paddle-shaped tail. The flat, broad tail, with its leathery covering, is 20-30 cm (8-12 in.) long and 12.5-15 cm (5-6 in.) wide. This interesting appendage has many functions. It is used as a propeller and a rudder while swimming. It acts as a support or "prop" when the animal sits upright, as when gnawing on a tree. By slapping its tail against the water's surface, an alarmed beaver warns others of danger.

Beavers use the long claws on their dexterous front feet for digging, manipulating food, and working on dams. The "thumb" is small and weak, but the "little finger" is strong and has taken over the thumb's role in gripping.



Their hind feet are hairless, broad, and webbed between the toes. They are used to help propel these animals when swimming. The second claw from the outside on each hind foot is double, or split. A beaver uses this claw to groom itself, by spreading its coat with water-repellent oil from sacs near its urogenital opening. The water-repellent fur plus thick layers of body fat insulate the animal and allow it to remain in the water for long periods.

Like all other rodents (Order Rodentia), the beaver's two upper and two lower incisors (front teeth) grow continually. The animal must keep them worn down by gnawing on wood. These chisel-shaped teeth are well suited for beavers' tree felling and feeding activities.

The beaver has several other adaptations for its underwater activities. Its lips can be closed behind the incisors, and by pressing the tongue tightly against the roof of its mouth, the beaver can gnaw underwater without choking. Special valves also close off the nostrils. Underwater, the beaver is extremely agile and mobile. Transparent eyelids called nictitating membranes allow the animal clear vision underwater while protecting its eyes from debris. It is able to remain submerged for 15 minutes because its heart rate slows.

## **Distribution and Abundance**

The beaver's hide and fur helped lure the Europeans to explore vast regions of North America in the 1600's and 1700's. This furbearer was very plentiful in what is now New York State. In the early 1600's, explorers reported that most bodies of water in the region, whether large or small, had dense populations of beavers. Felt hats, made of beaver fur shaved from the beaver pelts, were highly fashionable in Europe, so New World trappers took many beavers to meet this demand. Historians estimate that by 1671 annual fur exports from the area which is now New York State reached approximately 80,000 beaver pelts per year. New York remained a major source of beaver pelts well into the 1700's. Because of exploitation, the animal was nearly extirpated statewide by the late 1800's. With the exception of a remnant colony in the Adirondack region, this native furbearer had vanished from the state's woods and waters.

The beaver's comeback, beginning in the 1920's, resulted from several social and environmental changes. In the mid-1800's the fashion in Europe became silk hats, reducing the demand for beaver pelts. Protective legislation, reintroduction efforts, and natural reproduction and dispersal of the few remaining native beavers helped reestablish this animal. An important contribution to the ensuing expansion of the beaver population was a significant ecological transition over much of the Adirondacks. Forest fires of the early 1900's, especially in 1903 and 1909, led to the establishment of extensive stands of poplar along many Adirondack waterways, providing an abundant supply of food for a burgeoning beaver population. Increases came year after year. Natural dispersal, aided by trap and transfer efforts of the Bureau of Game (predecessor of today's NYSDEC Bureau of Wildlife), expanded the range of the beaver so that now the beaver is found throughout upstate New York. In fact it may be found virtually everywhere in the state except in New York City metropolitan areas and on Long Island.

## **Life History**

The beaver's breeding season occurs from February through March. Females are believed to be monogamous. Males appear to be polygynous; one dominant male may breed several females.

The gestation period is about 12 weeks long. Before the birth of her young, the female drives away all other residents of the den. Up to 9 (average 3-4) young beavers, called kits, are born in April or May. When the kits are about 2 weeks old, the rest of the family which had been driven out earlier by the pregnant female, returns to the den. During a reproductive life of 10 years (beavers usually live 10-12 years in the wild) a single pair could potentially give rise to as many as 600 beavers. It is this high reproductive potential that enabled beavers to repopulate New York State during this century. Today, without management efforts such as regulated trapping, the beaver's high reproductive potential might cause population levels to rise such that extensive human-beaver conflicts result.

Kits are fully furred at birth and weight 340-630 g (12-22 oz.) on the average. Their eyes are partially open and their incisors have erupted. These well-developed young are able to swim, but usually do not leave the den until weaned at about 5-7 weeks. Kits stay with the colony until about 1 3/4 years old and sexually mature. A colony typically consists of 5-12 members of a single family occupying one pond or a series of ponds on a section of a stream. The colony usually shares in the maintenance of a common dam or dam system. During the summer, the colony typically will be made up of the parents, kits and immature young born the previous year.

Other than when the female drives her family from the den shortly before giving birth to kits, the primary aggressive behavior beavers exhibit is male-male fighting during the mating season. Another social activity is "scent-marking." Castoreum, an oily, heavily scented substance produced by musk sacs or castors near the urogenital opening, is deposited on piles of mud. These scent-mounds may mark the territorial boundaries of a beaver colony, or just the territory of the dominant male.

In the spring, the subadults (1 3/4 years old) along with the kits of the previous year are driven from the den or lodge before the birth of the next litter. The subadults travel along the stream or across land to seek mates and suitable habitat in which to establish their own colony (dam, lodge, or den). The only other common long-distance movement a beaver might make is one in search of a new food supply. A colony might deplete its food supply within an area over a period of 10 years or less. Then, the entire colony relocates. Sometimes a colony may make these long-distance movements without first depleting its food supply.

The beaver is a true herbivore; nearly 100% of its diet consists of plant material. It locates food primarily through its acute sense of smell. (The beaver's sense of hearing is also acute, but its vision is poor.) Throughout the summer, this rodent eats soft, herbaceous foods such as grasses, ferns, sedges, reeds, bur reeds, pondweeds, mushrooms, duckweed, and the leaves, stems, and roots of water plants like cattails, arrowheads, and water lilies. They rely on the bark, twigs and buds of aspen (poplar), maple, willow, birch, alder, and black cherry for the bulk of their autumn and winter diets. These animals anchor small trees and branches in the mud at the pond's bottom; this feed pile (often several hundred pounds of trees) provides a ready food source when winter weather locks this non-hibernator beneath the pond's ice. Often, a beaver may emerge from its den and ice-covered pond to feed on "fresh" material.

Beavers are noted for their ability to cut trees with their chisel-like incisors. They cut trees mainly to reach the succulent tops, leaves and twigs on which they feed. Often they gnaw the remaining branches into shorter pieces for use in building dams and lodges. There have been reports of up to 300 trees being cut by one adult per year. Beavers do not cooperate in cutting trees. Furthermore, a beaver cannot control the direction in which a tree falls.

One type of structure beavers construct from cut trees is the dam. These builders use branches, mud and rocks to dam streams or small rivers. Dams vary greatly in length and height. The beaver's gestation period, the period of high water, and the period of greatest dam maintenance activity by the beaver all coincide in the spring. This suggests that beaver impoundments function to provide the females ("mothers" and "mothers-to-be") with protection from predators. These structures require maintenance especially after suffering damage due to heavy rains and spring runoff.

The beaver also builds another distinctive structure: the lodge. This is a mound of sticks, cemented together by mud brought from the bottom of the pond. The lodge is usually located at the center of the pond. Two or more underwater entrances lead to a dry, internal compartment (den) above water level. This chamber is at least 0.9 m (3 ft.) in diameter, but may be as large as 1.4 m (5 ft.) wide. Inside, beavers place their favorite nesting material: sticks which they have split into long, soft fibers. Most feces



are deposited outside the lodge in the water, so the den and nesting materials remain "clean". The lodge provides the beaver with shelter and a place to rear young. On larger, fast-moving streams and rivers, the beaver may build its lodge at the edge of the waterway or it may burrow into the stream or riverbank.

Probably due to the beaver's size and building habits, it has relatively few natural predators. Dogs, bobcats and bears may occasionally kill young beavers moving overland in their search for a new home, but generally beavers suffer little mortality due to predation. Automobiles and falling trees kill a small number of beavers each year. Their parasites include fleas, lice, intestinal worms, and ringworms. Diseases include pseudotuberculosis, rabies, lumpy jaw, and tularemia. Occasionally, local tularemia epidemics are reported. Possibly, beavers contract this disease from infected muskrats inhabiting the same area. Overall, trapping is the primary cause of mortality among beaver populations.

Besides their conspicuous dams, lodges and scent-mounds (previously described) beavers leave many different characteristic signs of their presence. Beaver cuttings are most obvious. Fallen trees show the

encircling cut/groove; wood chips and toothmarks commonly 0.3 cm (1/8 in.) wide provide evidence of beavers' "work". Logs and twigs stripped of their bark and strewn along the pond's bank or in the water show signs of feeding activity. Droppings are not often found, but they are oval, about 2.5 cm (1-1 1/4 in.) long, about 1.9 cm (3/4 in.) in diameter, and appear to be formed of "coarse sawdust". Canals and skids, used to transport cuttings, may be present in the area. Canals are typically 0.3-1.3 m (1-4 ft.) wide, up to 60 cm (2 ft.) deep and several meters long. Tracks are large and readily seen in mud or sand. The hind foot tracks show five toes and the distinctive webbing. The hind track is about 13 cm (5 1/4 in.) wide. The imprint made by the front foot shows 5 toes. Often parts of the tracks are poorly defined or are obliterated by marks made by the dragging tail. The only commonly heard noise produced by the beaver is the sharp, loud tail slap upon the water's surface.

## **Habitat**

Beavers require a constant, plentiful water source. They are most often found along stretches of streams and rivers narrow enough to be dammed, having moderate to little gradient, and with ample food adjacent to the waterway. Some live along large rivers, forest-lined lakes or wooded marshlands. Beavers may be found anywhere suitable habitat exists; frequently their activities conflict with humans' land uses.

In a sense, the beaver creates its own suitable habitat by damming streams. The pond which results offers protection and aids in establishing food sources (such as sedges, reeds, grasses), the primary requisites of "suitable habitat".

## **Ecological Role**

Few animals have the ability to make such a marked impact on the ecology of the area they inhabit as the beaver. In fact beaver dams control erosion downstream by aiding in "flood control", but their failing dams can cause flooding and erosion. They decrease siltation downstream by providing a pond as a settling basin. Most dramatically, the ponds created by beaver dams create habitat for a variety of predators, furbearers, waterfowl, amphibians, reptiles, fish, other tiny vertebrates, and invertebrates. Flooded trees die and become snags--potential homes for cavity nesting wildlife such as the

wood duck. Areas surrounding impoundments cleared by beavers become edges--vegetation transition zones preferred by many wildlife species.

Like nearly all ecosystems, those produced by the beaver will undergo a natural pattern of changes in community structure, a process called succession. Over several years, open areas created by beavers may experience reinvasion by alders and willows, providing food for a "new" set of wildlife species including deer and grouse. At first, trout may flourish in a beaver pond, but with time the water depth diminishes and the summer sun warms it considerably. Eventually, the temperature is high enough to make the pond inhospitable to trout. As the dead trees, roots, branches, leaves, and other plant material on the pond bottom begin to decay, the water becomes brown, warmer, and more acid. The supply of oxygen available for fish diminishes, further limiting the suitability of the pond for trout and other fishes.

Although beavers may exhaust the supply of winter food and the colony may relocate to another more suitable site, their dam usually remains for a considerable period of time. Silt, debris, and organic material accumulate in the basin, providing a sufficient substrate for lush growth of aquatic vegetation and turning it into a marsh. As the process continues, the dam deteriorates and weakens until a heavy spring runoff or a major storm causes it to give way. The pond drains, leaving an open area of rich soil which is quickly invaded by grasses and sedges. These are eventually followed by berries, shrubs and low willows. A beaver meadow is thus formed. Often, beaver will reuse an area. Certain sites are known to have been occupied periodically for over a century.

## Management

Beavers first came under "management" in 1895 when a group of sportsmen led by Harry V. Radford persuaded the New York State Legislature to pass a law prohibiting the trapping of beaver. This law also prohibited the molesting and disturbing of their dams and lodges. In 1901, a private individual, E.H. Litchfield, released about 12 beavers on his preserve. Three years later, the legislature authorized the State Forest, Fish and Game Commission to purchase seven beavers from the Canadian exhibit at the Louisiana Purchase exposition in St. Louis. These beavers were transported to Old Forge in December of 1904 and 6 of them were released in the South Fork of the Moose River and at the head of Big Moose Lake.



In 1906 the Commission purchased 25 more beavers from Yellowstone Park and 14 were released in various parts of the Adirondacks. These actions were typical of that early stage of wildlife conservation we now call the era of preservation. It was generally a reactionary period during which people sought to right the wrongs of earlier decades of unregulated and sometimes excessive exploitation.

Protected by law and having few natural enemies, beaver populations increased rapidly. So successful was the stocking program that by 1916 the Conservation Commission could report ". . . the success of stocking the Adirondacks with beaver has become increasingly apparent throughout the region. . ." By 1924 the beaver had become so well established that the Conservation Commission allowed an open season on trapping. Seasons were held intermittently until 1948, when they became "annual events". In 1932, beavers were so plentiful some had become nuisances, conflicting with human activities. The Conservation Department hired two men to trap nuisance beavers. During the next six years, over 600 beavers were trapped and relocated.

Currently DEC's efforts are aimed at more precisely defining the carrying capacity for beavers, conducting annual aerial surveys of the number of beaver family units (colonies) in selected areas, determining the annual take, updating regulations governing the taking of beavers, and more precisely defining the methods needed to maintain populations at levels commensurate with beaver ecology and human tolerance.

## **Economic and Social Values**

New York State's official mammal, the beaver, has possessed both aesthetic and economic values throughout the history of North America. Many centuries ago, certain Indians attributed the creation of the world to the building activities of giant beavers.

More than any other New World "treasure", the beaver's hide and fur lured the Europeans to explore and eventually settle North America. Later, this rodent stimulated exploration of the West. Fort Orange (Albany) in what is now New York State, was established by the early 1600's primarily as a fur trading post. This settlement served as an important link between trappers (Iroquois Indians and white men alike) and the hatmakers of Europe who used the beaver's hair for making the fashionable beaver felt hats. Algonquin

Indians who inhabited the Northern Adirondack region traded most of their furs at Ville Marie (Montreal) to the north.

The beaver still remains a valuable furbearer resource in New York State. In recent years trappers have harvested about 8000 beavers annually for a raw fur value of approximately \$200,000. Today, castoreum from beavers is used in trap baiting, in medicines, and in perfumes. Beaver meat is edible as long as the castors are carefully separated from it. Beavers also provide aesthetic values for those who travel in and enjoy wild areas. They are not always easy to observe, however, because they are primarily nocturnal.

Beavers possess a few negative social and economic values, as well. These animals account for about half the time New York State Department of Environmental Conservation (DEC) personnel spend on complaints about wildlife. Occasionally, dam building activities of a beaver colony may flood pastures, fields, or roads, or disrupt or contaminate public water supplies. Some landowners may also be annoyed when a beaver cuts trees or kills trees by flooding.

Beavers and other wild and domesticated animals are responsible for transmitting Giardiasis, an intestinal disorder, to humans via water sources. Especially at risk are backcountry hikers drinking unpurified water. Although the water may look, smell and taste good, the disease-causing organism may survive in water for up to 2 months after deposition there in the animal's feces. Giardiasis is not usually life-threatening, but all drinking water should be boiled; purification chemicals such as chlorine and iodine are not considered reliable in killing the Giardiasis organisms.

## **Control Methods**

Control of beaver populations is best achieved through regulated fur trapping. This also serves to reduce overall nuisance complaints, although it is sometimes necessary to trap or shoot problem-causing beavers. The New York State DEC has primary responsibility for alleviating problem beaver situations. Nuisance beavers should be reported to the New York State Department of Environmental Conservation.

## Selected References

- Caslick, J.W. and D.J. Decker. 1981. Control of wildlife damage in homes and gardens. Info. Bull. 176, Coll. of Ag. & Life Sciences, Cornell Univ., Ithaca, NY. 28 pp.
- Champagne, G.C. 1971. The beaver in New York. The Conservationist, Aug-Sept 1971, NYS DEC, Albany, NY. 4 pp. p. 18-21.
- Decker, D.J. 1980. The Beaver - New York's Empire Builder. The Conservationist Nov-Dec, 1980. NYS DEC, Albany, NY. 4 pp. p. 15-17, 40.
- Fergus, C. No date. Beaver. Wildlife Note 175-14, Div. of Info. and Ed., Penn. Game Comm., Harrisburg, Pa. 3 pp.
- Hall, E.R. 1981. The mammals of North America, Vol. II (2nd ed.). John Wiley & Sons, NY. 1181 pp.
- Hamilton, W.J., Jr. and J.O. Whitaker, Jr. 1979. Mammals of the Eastern United States. Cornell Univ. Press, Ithaca, NY. 346 pp.
- Jenkins, S.H. and P.E. Busher. 1979. Castor canadensis. Mammalian Species, No. 120, American Soc. of Mammalogists, 8 pp.
- Murie, O.J. 1974. A field guide to animal tracks (2 ed.). Houghton Mifflin Co., Boston, MA. 376 pp.
- Parsons, G.R. 1977. The case for trapping. The Conservationist, Sept-Oct, 1977. NYS DEC, Albany, NY. 8 pp. p. 2-9.
- Rue, L.L. III. 1964. The world of the beaver. J.B. Lippincott Company, Philadelphia, PA. 158 pp.

-- S.L. McCarty  
D.J. Decker  
J.W. Kelley

(Illustrations drawn by Donna Curtin.)