BEAVER

Province of British Columbia
Ministry of Environment
Wildlife Branch

*T*he beaver has been many things in the history of Canada and British Columbia. National symbol. Source of food and clothing for aboriginal peoples. A driving force for European exploration of North America. Beaver pelts even served as currency in early colonial period.

Some of the first wildlife regulations in British Columbia applied to the beaver, including the province-wide hunting and trapping closures between 1906 and 1911 and between 1919 and 1921.

By the mid-1940s, British Columbia wildlife authorities considered the beaver the most important fur resource because its dams provided habitats for other important furbearers such as mink, muskrats and otters.

Other observers have cited the beaver-produced benefits to other wildlife including fish, moose, waterfowl and a variety of other birds. A healthy beaver trapline is rich in other wildlife, as well.

This publication has been written to provide trappers with some guidelines on how to manage this valuable resource.

ECONOMIC CONSIDERATIONS *by David Hatler*

*T*here is evidence that beavers are greatly under harvested in British Columbia. Annual harvests during the 1980s have averaged only 16,000 pelts.

These small annual harvests have never exceeded six per cent of the most recent beaver population estimate of 400,000 to 600,000 animals, completed in 1979. Most authorities agree that beavers can usually sustain annual harvests of at least 25 per cent of their population or, from 100,000 to 150,000 animals in British Columbia.

The highest average pelt price of $52 was paid in 1946, the same year the province experienced the biggest beaver harvest, 23,000 pelts. Total revenue to British Columbia beaver trappers that year was $1.2 million.

The positive impact of beavers on the economy of British Columbia and North America is not limited to the value of their fur. Beavers also produce environmental benefits. They create and maintain habitats for other species of animals. They also work to stabilize watersheds, an activity with real, but unmeasured, dollar values.

On the negative side, beavers cost North Americans millions of dollars every year by causing flooding and associated damage to private and public property. The exact dollar value of the damage done by beavers in British Columbia is not known, but it may be substantial in some areas. Beaver activity can also harm fisheries values, by impeding fish movement through rivers and streams at critical times of the year.

Balanced management of the beaver resource—the theme of this publication—can increase the benefits to British Columbia through more revenue from pelt sales and decreased damage to property and fisheries.

BIOLOGY

A knowledge of the beaver's life history and factors affecting beaver population can help the professional trapper manage the resource. The material in this section of the publication is generalized from the results of many studies conducted over a wide geographic area. Local variations and exceptions may occur.

Continued on page 2

Social behavior:

The basic unit of beaver society is the family group, referred to as a colony. It usually consists of a pair of adults and one or two generations of offspring. In the fall, for example, a colony of nine beavers might consist of the adult pair, three yearlings and four kits. Such colonies might maintain more than one lodge and several dams, but will usually prepare only one cache of winter food.

Some colony sites may support single animals or pairs. The singles, which may be of either sex, are most often the sole survivors of former colonies. The pairs are usually newly-dispersed young animals.

The normal pattern of beaver life is for two-year-old juveniles to leave the colony of their birth and set out on their own in late spring, just before the birth of the colony's next litter. By leaving the home colony, the juveniles ease the pressure on the local food supply and reduce the risk of in-breeding. Their leaving also opens up new areas to beaver activity.

Colonies stay well separated from each other. Even in the best habitats, average densities rarely exceed one active colony per kilometre of shoreline. In fact, one colony per two or three kilometres of shoreline is more common.

The scent mounds prepared by beavers in spring are believed to serve as sign posts for dispersing animals, perhaps warning them to stay clear of active colonies and signalling vacancy in cases where one or more adult members have been lost.

Other behavior, especially aggression, probably reinforces the scent signals and helps extend the colony's influence beyond the main activity centres where most scent mounds are built.

On moving streams, the area used by a colony will usually extend further upstream than down, probably because it is more difficult to move food and building material against current than with it. A study done in Alaska showed that the maximum distance between a food cache and the cutting site was 800 metres upstream, 300 metres downstream and 600 metres along backwater sloughs.

Normal social patterns can become disrupted when a large proportion of available colony sites are occupied. Two-year-old juveniles may have trouble dispersing, stay at the home site and increase pressure on local food supplies. High-density populations can also increase the incidence of disease and fighting, with the associated damage to pelts.

Figure 1

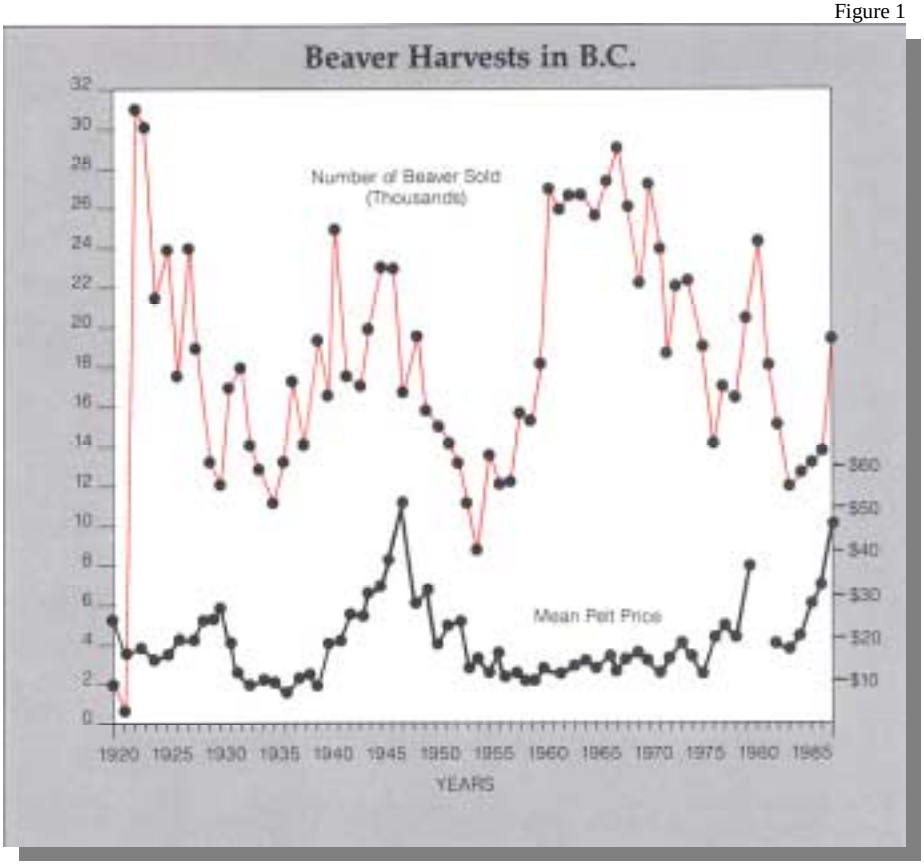
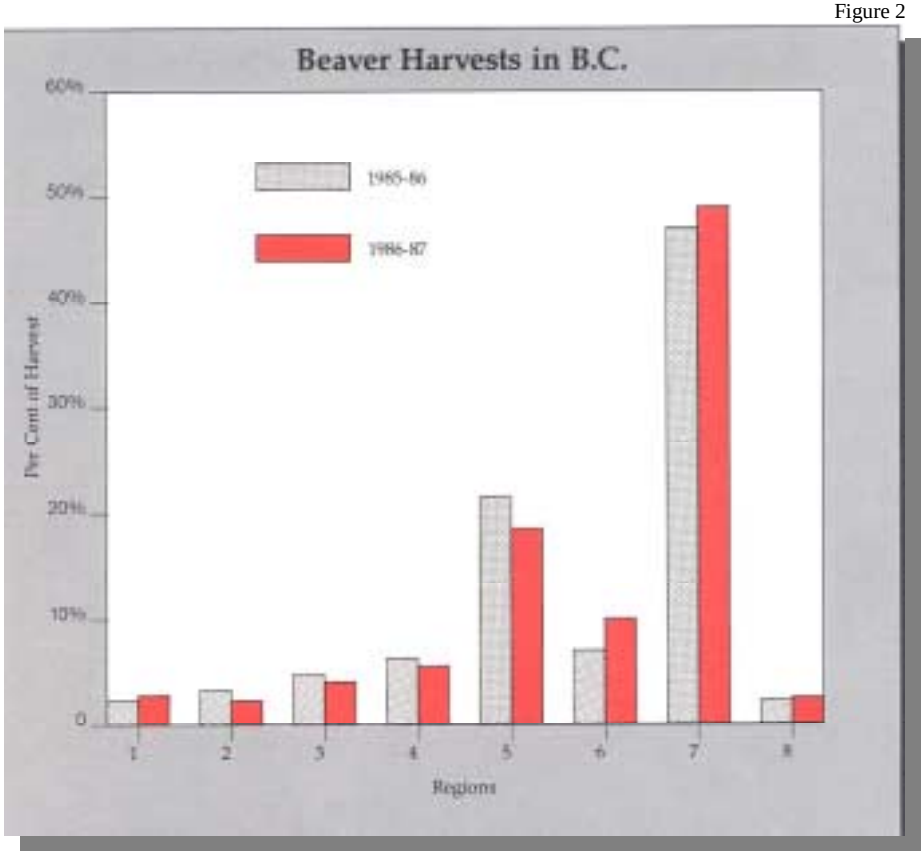


Figure 2



Habitat:

The best habitats for beaver are along the slower-moving sections of rivers and streams and on ponds and shores of small lakes not exposed to heavy wave action. Beavers prefer muddy shores and bottom areas because rock and gravel make burrowing, channelling and damming difficult. Stable streams, such as those draining lakes, are better than those where water levels fluctuate.

Along northern waters that freeze over in winter, suitable habitat must also support accessible supply of woody vegetation so the beavers can build a cache of winter food. The water near the lodge must be deep enough so that the ice does not become so thick that it blocks access to the food cache or prevents escape from predators.

Food:

Beavers eat a variety of plants in the summer, including grasses, forbs, the leaves of shrubs, and pond lillies. However, their mainstay throughout the year in most areas, especially during the long winter season, is the bark and twigs of certain deciduous trees and shrubs, particularly aspen, cottonwood and willow.

The most productive beaver colonies are often in newly-occupied stands of poplar that naturally regenerate in forest clearings created by fire, blowdown, bug-kill or logging and on old sedimentation bars along large rivers.

Aspen regrowth may support population expansion for beavers as early as eight to 10 years after a burn but on most sites it takes 20 to 30 years to produce aspens at a size that will provide the maximum amount of useable food.

Beaver generally overuse their food supply, especially aspen. A new colony will usually cut more than it needs, wasting up to 65 per cent of the available food by not using bark on the larger pieces. They also drown food supplies in the rising waters behind their dams.

It can take only two or three years for a colony to use up the aspen within safe and efficient foraging distance from the water's edge, about 50 metres. Fortunately, willow often takes hold in the increased moisture and nutrient conditions in beaver impoundments. The willow growth is often vigorous enough to allow the beavers to live a few more years at the same site after the aspen has been exhausted.

In short, active beaver systems are not permanent. Local shifts in activity centres and colony expansion through raised water levels may occur but the local carrying capacity and population numbers will eventually be reduced to much lower levels by the beavers' own activities.

It may be only 10 years between the time a beaver colony is established and the time it is abandoned, especially in aspen habitat. However, periodic removal of some animals by trapping or local catastrophes can extend the period of occupancy and minimize the damage to habitat, allowing an earlier and more complete recovery of woody vegetation.

Reproduction:

Yearling beavers are capable of breeding but most do not. The dominant pair in active colonies usually produce only one litter per year. As many as nine embryos have been found in pregnant females but three or four is the most common number. Live litters of more than five kits are very rare. An average of five to seven beavers per colony is the rule in most areas.

Litter size increases with the size and age of the female. A female beaver reaches maximum reproductive capacity between the age of five and nine years. However, the differences among age classes are too small to be of management significance. Habitat quality also affects litter size. The largest litters are born in newly-colonized aspen habitat and the smallest in older, degraded sites.

Mortality:

In northern areas, climatic factors are particularly important to beavers, affecting entire colonies.

Low temperatures with light snowfall can increase the beaver's food-energy needs by robbing the lodge of its insulating layer of snow. Deep ice in the beaver pond can entrap the food cache. Under these harsh conditions, beavers will either starve or dig out but survival rates are poor for beavers that attempt to forage above the ice.

Winter and spring thaws that raise water levels may flood out colonies at a time when there is nowhere else for them to go, resulting in mass drownings. Rapid spring break-ups can be accompanied by a violent grinding action of ice, destroying lodges and their inhabitants.

A poor food cache—perhaps caused by declining habitat or the effects of late fall flooding—causes beaver to starve or leave the lodge and take their chances foraging above the ice.

Beavers die from a variety of other causes. They are sometimes killed by the trees they are felling, from wounds inflicted by other beavers and by wolves. Beavers are most vulnerable to wolves in the advanced stages of colony occupation, when they are foraging at the greatest distances from the safety of water. Winter foraging above the ice is also dangerous.

Kits are relatively secure in their home colony. Juveniles are vulnerable to predators during dispersal and in the first year on their own but suffer relatively low rates of predation for a number of years after that phase. Beavers are not known to be killed in large numbers by parasites or disease. However, there are records of some widespread and devastating outbreaks of tularemia, caused primarily by the stresses of overpopulation. The disease can also be serious in humans, occasionally causing death.

The breeding cycle:

When colonies are confined beneath the ice, they are isolated and sedentary around their food cache and appear to remain so throughout the breeding season.

If adults are trapped or lost to other causes early in the winter, there is little chance they will be replaced by immigrants before the breeding season ends. Younger colony members may try to take over the reproductive role but local productivity will usually be reduced, if not temporarily lost

The colony cycle:

The length of time a beaver colony is occupied varies from place to place in British Columbia, but some generalizations can be made about the cycle for a secure, untrapped colony.

- **Year 1** – A pair of dispersing two-year-olds colonizes a prime aspen site. The total number of beavers at that site for the first trapping season would be two animals of about the large (L) pelt size category.

- **Year 2** – The pair develops the site and produces the first litter. The total number of beavers available in the second trapping season would be two adults, probably both XL and as many as three or four in the S-cubs pelt size category.

- **Year 3** – The beavers have made an extensive impact on the aspen stand. The second litter is produced. The number of beavers available during the trapping season would be two adults in the XL to XXL category, as many as three or four yearlings mostly in the M and LM category, and as many as four S-cubs.

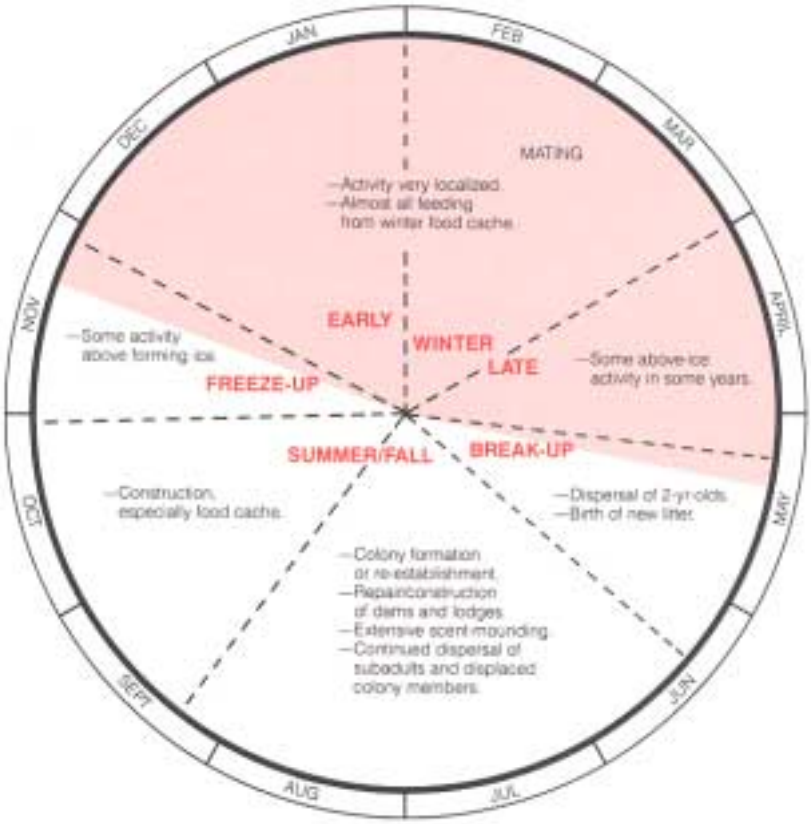
- **Years 4 and 5** – The aspen is depleted. The beavers are making more use of the willow. The two-year olds strike out on their own before the next litter is born. The total number of beavers and sizes would be about the same as in Year 3.

- **Years 6 to 10** – The pattern is the same as in years 4 and 5, but with decreased reproductive performance because of the deteriorating habitat. The over-wintering colony might include one or both adults at XXXL sizes but there would be progressively fewer of the smaller classes. The remaining colony members starve or relocate.

This cycle will be shorter where the primary winter food is not aspen or cottonwood.

Figure 3

Annual cycle for northern beavers. The shaded portion signifies the approximate period of under-ice existence, while the unshaded represents the ice-free time.



HABITAT CONSIDERATIONS

Impacts:

Forestry activities impact greatly on beaver habitat in British Columbia. Widespread suppression of forest fires has reduced considerably the amount of new or renewed beaver habitat coming into production.

Extensive logging changes drainage patterns and can reduce the carrying capacity of once stable stream systems. Silvicultural practices that eliminate or shorten the deciduous shrub and tree stage of the forest regeneration cycle also have negative impacts on beaver populations.

Enhancements:

There are ways trappers can improve beaver habitat at colony sites. During visits to colonies in late summer and fall, trappers can clean up around aspen felling sites, moving larger chunks of trees to the water so beavers can use them in building. Trappers can also help minimize tree wastage by knocking down snags and clearing areas to make felling easier for the beavers.

Cleaning up an aspen stand for beaver use also reduces the number of hiding spots for predators.

Trappers can also help in the recovery of overused and abandoned beaver sites by breaking up old dams to reduce water levels around areas where forage trees can take root. Selective spring burning of beaver meadows and adjacent uplands can help in the recovery process, as will the stimulation of shrub growth by shearing or winter cutting and pruning. Trappers can even plant cuttings of aspen and willow—especially willow—in selected areas, preferably in spring.

HARVEST MANAGEMENT

Beavers are vulnerable to over-harvesting, despite their own tendency to overpopulate beyond their habitat's ability to support them.

They are vulnerable because they are confined to watercourses and their lodges and dams make them easy to find. They are also relatively easy to trap.

However, those same characteristics make them easier to manage than most fur-bearing animals. For one thing, a population count can be made before trapping.

Optimal management of a beaver trapline prevents colonies from reaching the lower levels of productivity, that is, after about five or six years.

While beaver populations can withstand a harvest of 25 or as much as 30 per cent of their numbers every year, it is difficult to achieve that harvesting level by selectively trapping one or two members from each colony on a trapline.

The problem with such a method of harvesting is that the wrong members of the colony may be trapped at the wrong time. For example, if the adult male is trapped before breeding, the colony will fail to produce a litter in that year. If the adult female is trapped, the colony may be abandoned.

The effect of taking one or two animals from each colony could be to leave the weakest members—the juveniles and kits—to survive, or perish, on their own.

In many cases, a more practical and efficient strategy would be to trap all the members of a colony site. The schedule for the next trapping of that site would depend on the timing of recolonization and the condition of the habitat.

If the food supply at the site is poor, the trapper may be justified in trapping it whenever it becomes active until habitat conditions have improved.

In general, no more than 60 to 70 per cent of established colonies should be occupied by beavers in any one year. The remaining 30 or 40 per cent should be left open to regenerate food supplies and to provide colonization opportunities for dispersing animals.

If the food supply at the site is adequate, it would probably pay to wait at least three years after the first cache appears before trapping again. The wait would be profitable because there would probably not be more than two or three valuable animals of large pelt size in either of the first two years after recolonization but there may be five or more valuable animals after three years.

SYSTEMATIC MANAGEMENT

1. Inventory: The best time to map beaver colonies on the trapline is in the fall, usually September and October, when the animals are most active in their final preparations for winter. Surveys can be done on foot, by boat or from a small aircraft after leaves have fallen.

2. Assessment: During the survey, each site showing evidence of beaver activity should be classified as active, that is, with a food cache, or inactive.

The status of each of the sites should be assessed, with the following considerations in mind:

a) Standing food supply—Are the animals on aspen, willow, or some other winter food? Is it abundant and accessible, generally adequate or depleted? A rich supply of aspen may indicate a new, expanding colony that can be left another year or two so that it can provide the highest possible yield. Colonies subsisting on barely adequate supplies of willow or other vegetation have little potential for increasing their numbers and are candidates for immediate trapping, since they may not even survive the winter.

b) Size of food cache—Cache size may give some indication of colony size and vigor. Colonies with small caches, especially on older sites, are least likely to survive, even in the absence of trapping.

c) Expansion potential—Some sites, though largely depleted of food, can easily be expanded by further damming upstream or downstream, while others are limited in growth potential by surrounding vegetation and topography. The highest long-term yields may be realized by letting some colonies expand where they are able and, in other cases, by preventing such expansion. Limiting expansion will depend on the available food supply, security, and proportion of active sites elsewhere in the system and the threat of damage to property.

d) Security—Some beavers, especially inexperienced two-year-olds, may try to settle in inappropriate areas, such as along a stretch of stream that will freeze too deeply in winter or along rivers that wash out caches and lodges in winter and spring. Such animals are best trapped before freeze-up.

e) Damage potential—Colonies in areas where they conflict with the interests of property owners should be trapped when pelts are of value.

3. Harvest Planning: The trapper's inventory and assessment work provides the background information on the number and distribution of beaver sites that are available for trapping.

Since no beaver colony can maintain itself in a productive state indefinitely, the trapper's general plan should be to trap all beavers in a rotation of three to five years. However, the specific plan would vary from place to place.

The trapper should determine the rotation period depending on a number of factors:

a) Trapline characteristics—On a large, remote, trapline with extensive wetlands, the only practical approach may be to divide the total area into sections, trapping each heavily during one year then leaving it for several years while the others are being exploited. In other areas, the trapping might be done on a drainage or colony basis, trapping intensively on a particular drainage once every few years or targetting only every second or third colony along a drainage in any given year.

b) Recolonization potential—Although some upland movements occur, most beaver dispersal is along waterways, both upstream and downstream. Therefore, landlocked lakes and ponds or stream sections above rapids and falls may be recolonized more slowly than accessible sites. Where two or more colonies live in such situations, it may be possible for the trapper to keep at least one active so that a nearby dispersal source remains available.

The trapper might even choose to live trap or snare beavers and move them. Such transplants should involve more than one animal, preferably a pair of young, and should be done in late summer when wanderlust is least and the construction urge is greatest.

c) Pelt quality—Pelts reach maximum primeness in January and February and on stable systems such as lakes and dammed streams it may be most effective to conduct most of the trapping under ice during those months. On moving water bodies with large or fluctuating flows, the safest and most effective trapping would be in late fall, before freeze-up. Spring trapping is wasteful because the pelts are past prime and often damaged. Spring trapping also removes pregnant females, reducing future harvests.

SUMMARY:

The potential yield on a trapline depends on the number of colonies and the number of beavers per colony. The number of potential colony sites is determined largely by topographic features that are beyond the trapper's control.

However, the number of colony sites that are occupied and the number of beavers per active colony are related to habitat conditions that can be influenced by the trapper's harvesting system and, occasionally, by local enhancement.

The average size of beavers available depends both on habitat quality and on the trapping rotation schedule. The largest pelts are produced in the best habitats and over the longest rotation, that is, up to three to four years.

Failure to work a trapline for long periods may result in widespread habitat population stagnation. Beavers cannot be stockpiled and maintained in a productive state while the trapper is waiting for better prices.

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A more complete list of beaver references is available on request from …

Supplement: Additional references to accompany Management Guidelines for Beaver in British Columbia July 1988

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