

FURBEARER MANAGEMENT GUIDELINES

COYOTE *Canis latrans*



Since 1926, separate trapline areas in British Columbia have been assigned and registered to individuals licenced for the purpose of harvesting the province's plentiful fur resources. To obtain a licence, trappers must successfully complete a three-day course that focuses on humane trapping methods, fur handling, and trapline management. The trapline management component includes knowledge of, and fosters respect for, provincial trapping regulations, adherence to professional and ethical standards established by the Ministry of Water, Land and Air Protection and the BC Trappers Association, and practices that help to manage and maintain furbearer populations. There are approximately 2900 registered traplines in British Columbia, and 19 mammal species are officially classified as furbearers.

For management purposes, the coyote is a Class 3 species, which means that its home range is large relative to the size of most traplines and, because movement between and among adjacent traplines can be expected, population management can not be applied only at the individual trapline level. However, the two Class 3 species (wolf and coyote) are not considered sensitive to harvest, and the management focus is to encourage harvest, particularly in areas where conflicts with human interests occur.

The primary purpose of this document is to provide British Columbia's professional trappers, government managers, and industry with information on coyote biology, and on principles to consider in practical and effective management of the species. The material presented is generalized from the results of many studies conducted over a wide geographic area and local variations and exceptions may occur.

DESCRIPTION



The coyote is a medium-sized canid (member of the dog family) with the general appearance of a German shepherd dog, but about half the size and slimmer. It has a narrow, pointed muzzle, prominent pointed ears, long slender legs, relatively small feet, and a long, bushy, black-tipped tail. The texture and colour of its fur varies geographically, but is generally a buffy, grizzled grey with a mixture of cinnamon-coloured forelegs and feet, white throat and belly, and often a dark line down the back. Coyotes also vary considerably in size over their full geographic range. British Columbia adults are generally 1 to 1.3 m in total length (the tail constituting about one-third of that), and weigh 10 to 14 kg, with males averaging about 15 percent larger and heavier than females. There are two subspecies in British Columbia, one occupying the northern two-thirds of the province and the other to the south of that. Northern coyotes are generally larger and paler than those found in the south.

ECONOMIC CONSIDERATIONS

The coyote is a highly adaptable species, and one of the few that has expanded its North American range over the past century in pace with the spread of human settlements and developments. It has done so despite continuing and widespread attempts to control and, in some cases, to eradicate it, because of its well-documented taste for livestock and various game animals. In the generally unsuccessful effort to reduce coyote numbers, the species has been trapped, shot, and poisoned by professional predator hunters on government payrolls, and has had a price on its head in the form of

bounties. It was subject to both in British Columbia until the early 1960s, to no apparent avail. It is presently managed in this province as both a game species (since 1966) and a furbearer (since 1976).

The coyote's reputation for depredation is not undeserved. Coyotes kill an estimated one to three percent of all domestic sheep ewes and four to nine percent of all lambs in the United States each year. This wily predator has also caused havoc on poultry farms in some areas and occasionally at beef and dairy ranches during calving time. Further, profiteering from growing urban sentiments about "living in harmony with nature," coyotes have become an increasing threat to domestic pets in many urban areas. There have also been reports of predatory attacks on children in various areas of western North America, including at least two such cases in the BC Lower Mainland in recent years. Those are believed to have occurred during periods of reduced prey, or by individuals that had been fed by or otherwise habituated to humans.

In terms of relationships with other wildlife, in some areas coyote predation has been demonstrated to be the largest source of fawn mortality for ungulates such as bighorn sheep, deer and pronghorns. They also compete for local food resources with several other carnivore furbearers including bobcats, lynxes, foxes, weasels, raccoons, minks, and martens, and also prey on the young and sometimes the adults of all of those species. In addition coyotes almost certainly prey upon several species of endangered or threatened small mammals and amphibians (e.g., mountain beaver and Oregon spotted frog), particularly in the Lower Mainland where the habitat is extremely fragmented and where coyotes have only recently become more abundant and widespread than in the past.

Though the preceding paragraphs might appear negative in tone, their purpose is to outline the very prominent role that coyotes play both ecologically and economically, and to help explain the resulting conservation interest (no special concern for the species) and management challenges (potential concern for other species). On the positive side, coyotes kill many small mammals that are considered pests by farmers, they are conspicuous enough to provide benefits to people who enjoy watching and hearing wildlife, and their fur is moderately valuable. Coyote fur is used both for full coats and as trim on garments of other material.

From the 1920s to the early 1960s, the annual kill of coyotes in British Columbia included harvest for fur, but was probably focused more on animal control activities by government officers, bounty hunters and by rural residents in protection of property. The recorded kill was mostly on the order of 4000 to 7000 in the 1920s, and 1000 to 2000 in the 1930s, but data are sparse from then through the mid-1960s. Recorded annual coyote harvests ranged from about 4000 to 5000 in the late 1970s to the mid-1980s, when average pelt prices were at or above \$50, but have generally been below 1000 since the mid-1990s (Figure 1). Those numbers are believed to refer primarily to the fur harvest. The number of coyotes taken by hunters and in predator control operations by landowners or others is not known.

Figure 1: REPORTED COYOTE HARVESTS AND PELT VALUES 1965-2001

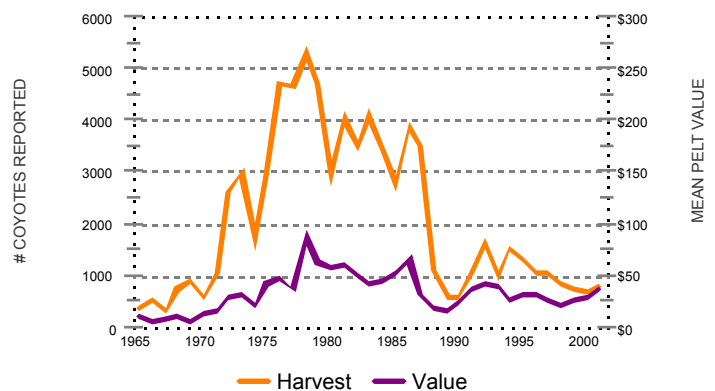
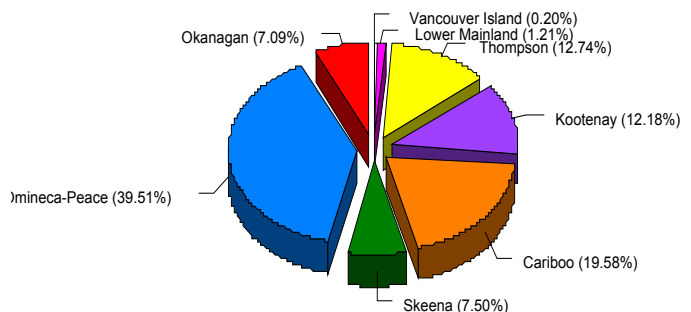


Figure 2: COYOTE HARVEST BY REGION 1985-2000



Coyotes are harvested in all of the administrative regions of the province, particularly those in the Interior, with the largest share from the Omineca-Peace and Cariboo regions (Figure 2). From the mid-1970s through to the mid-1980s, coyote pelts contributed an average of 7.1 percent of the annual provincial revenue from fur, with a high of 12.8 percent in 1977. That contribution averaged 2.4 percent in the 1990s, but rose to 3.1 percent in 2001. For added perspective, the coyote harvest in British Columbia is generally about 2 percent of the Canadian total, as compared to 50 to 60 percent for Alberta.

BIOLOGY

DISTRIBUTION AND HABITAT

Once occurring in Canada only in the southern portions of the prairie provinces, the coyote has expanded its range into almost all habitats that support prey populations, from remote boreal forests and alpine tundra to rural and urban areas. This expansion, which has occurred throughout North America, is likely related to new habitat opportunities created by human activities that have opened up the forest landscape and reduced wolf populations, and possibly also to a warming climate. The coyote can exist in close proximity to humans and appears to thrive in rural and agricultural areas. It tends to avoid areas of high precipitation, where dense, wet forests or deep snows provide poor habitat. In mountainous terrain, areas of deep, soft snow may be avoided by seasonal movements to lower elevations or slopes exposed to sun and wind. Studies in Alberta and Québec indicate that rural landscapes are generally better than forested areas as habitats for coyotes.

As indicated by recent trapper harvest records (Figure 2), the coyote currently ranges throughout much of the province's interior, particularly where it finds the open (unforested) habitats it is best adapted to. Coyotes are generally absent from the western coastal slopes north of the Lower Mainland, and are not found on B.C.'s coastal islands. They first appeared in the lower Fraser Valley in the 1930s, but their expansion into all available habitats in that area, including core urban areas, has occurred primarily in the past decade.

FOOD

Coyotes have a broad diet, and show great flexibility in their hunting and feeding habits, which vary with geographic location and the availability and vulnerability of their main prey within each region. In British Columbia, the coyote consumes primarily small mammals, (including hares, rabbits, ground squirrels, tree squirrels, voles and mice) and carrion (including road and railroad kills and remains from livestock butchering). They also eat the young of large ungulates, deer, birds, insects, fish and vegetation, particularly berries in the fall. Scavenging at ungulate kills made by larger predators, notably wolves and cougars, may be an important component of the diet of coyotes in some areas, especially during winter. In the northern parts of the province, snowshoe hares may comprise the bulk of the diet during periods of intermediate to high hare density. As noted previously, livestock and domestic pets may contribute significantly to the diets of individual coyotes in some areas.

The hunting skills of coyotes are assisted by acute senses of vision, hearing and smell, and by considerable mobility. They are able to run up to 70 km per hour, and also swim well. Coyotes usually hunt smaller animals alone, and can often be seen "mousing" along roadways or in meadows, responding to sounds under the snow or grass by leaping high into the air to pin the prey to the ground with their front paws. Coyotes usually take larger prey, such as ungulates, using teamwork. Ungulates are most vulnerable to coyote predation when "yarded up" in deep snow, or when chased onto frozen lakes and streams where footing may be precarious.

The rate at which coyotes kill larger prey such as ungulates is probably influenced in part by the abundance of more regularly used prey species such as snowshoe hares and voles which undergo cycles of population highs and lows. When hares and voles are in the low phase of the cycle, coyotes may target alternative prey (e.g, ungulates, livestock, pets) to a greater degree.

SOCIAL BEHAVIOUR

The coyote social unit ranges from solitary animals to packs of up to 8 to 10 animals, generally composed of related adults, yearlings, and young. Populations consist of both residents which occupy stable home ranges and unsettled transients (mostly dispersing subadults), which may range



over larger areas. The core of a family pack consists of a mated pair, which may stay together for many years, and pups-of-the-year. In winter, groups may be larger than in summer, and are thought to also include young from previous years.

Home range size varies geographically, seasonally, and with changes in primary prey abundance, but may average 10 to 40 km² in British Columbia. Home ranges in the lower Fraser Valley are among the smallest reported, averaging 11 km², possibly because of the high densities of voles that may be found there. Home range size

generally increases with pack size, and coyote home ranges tend to remain stable over time. Lone coyotes may range over larger areas, and high concentrations of a food source (e.g., large carcasses, garbage dumps) may temporarily draw together larger numbers.

Home range “territories” are defended against other coyotes, and are defined by scent marking (urine or feces) and howling. Howling is performed by resident individuals (never transients), most often by alpha males, and usually along the periphery of territories. The removal of the dominant pair may allow an adjacent pack to take over part of a subsequently undefended area. Coyotes are usually less abundant in areas with high wolf numbers. Wolves occasionally kill coyotes, but coyotes benefit from carrion left from wolf kills (especially in winter), which may compensate for the associated risk of being killed. Coyotes and red foxes, having similar food habits and habitat predilections, also have a dynamic relationship, with coyotes both displacing foxes and killing them directly.

ACTIVITY AND MOVEMENTS

Coyotes are most active around sunrise and sunset, but their activity patterns are usually dictated by those of their major prey. In areas where disturbance from humans is low, coyotes may show higher levels of activity during the day. As suggested by the fairly large home ranges, daily movements of several kilometres are common. The daily movements of established residents within their territories vary seasonally and depend on habitat, prey abundance, and other factors, but averaged 4 km in one study in the American mid-west. The largest movements are those undertaken by transient animals, particularly juveniles, during dispersal from the home ranges of their parents. The distance of such movements varies among habitats and areas, but may average 10 to 50 km, and occasionally exceeds 100 km. Juvenile dispersal usually occurs between late autumn and late winter and involves most individuals, although some juvenile females may remain in the family territory.

REPRODUCTION

Coyotes generally breed between early February and mid-March, and the young are born in April and May (later in more northerly areas), after a gestation period of 60 to 63 days. Dens used for whelping and rearing most often consist of burrows dug into soil banks or ridges, but other sites such as depressions under rock ledges, hollow logs, and thickets are also known. Litters average five to six pups in most areas, but can be larger when food is abundant and may decrease if coyote density becomes too high or food is scarce. Individual litters of 12 or more have been documented. The proportion of females that breed and give birth varies with food availability, social organization, and harvest levels. In general, most adult females and up to 70 percent of female yearlings produce litters. Coyotes can successfully hybridize with dogs or wolves and produce fertile offspring.

CARE AND DEVELOPMENT OF YOUNG

The blind and helpless newborn pups are cared for by both parents and other pack members. After birth, the parents may move the pups to new den sites, especially after disturbance by humans or potential predators. Pups start to emerge from the den at approximately three weeks, focusing their activity nearby, and are weaned at five to eight weeks of age. At four to five months of age, they are generally independent from their parents and are capable of moving off on their own.

MORTALITY, PARASITES AND DISEASE

Coyotes may reach 18 years of age in captivity, but few live longer than six to eight years in the wild. Most mortality near settled areas is human caused, both directly by hunting, trapping, and predator control activities and indirectly (e.g., road kills). Wolves and cougars are the primary natural predators, but bears and golden eagles are also known to prey on coyotes, especially pups.

Coyotes host a wide variety of parasites including flukes, roundworms, and several types of tapeworms internally, and various lice, fleas, ticks, and mites externally. While some of those occasionally affect the health of individuals, most are not significant at the population level. A possible exception is sarcoptic mange, a mite infestation that causes hair loss and can result in reduced condition and poor survival of large numbers of animals (especially juveniles) in some winters. Mange is usually associated with high coyote population levels, probably because it is more readily spread from animal to animal under those conditions. Infectious diseases such as canine distemper and canine parvovirus, known to cause mortality in coyotes, are also most prevalent at high population density. Rabies has been reported in coyotes, but is not common and has not been identified in any specimen from British Columbia.

POPULATIONS

The highest known densities of coyotes, as high as 10 to 20 animals per 10 km² in early summer after whelping, have been found in the characteristically open habitats of the American southwest and mid-west. Studies in Alberta have documented densities of one to six coyotes per 10 km² and, although there have been no comparable studies in British Columbia, the better habitats in this province probably also support numbers in that range. In areas where coyotes rely heavily upon cyclic prey populations such as snowshoe hares, their numbers may fluctuate three-to six-fold following changes in prey densities. The age structure in a coyote population varies with reproductive and mortality rates, but juveniles will often comprise more than half of the animals present at the beginning of the winter.

HARVEST MANAGEMENT

GENERAL CONSIDERATIONS AND OBJECTIVES

The coyote is officially designated as both a furbearer and a game species in British Columbia, and can therefore be legally harvested by both licenced trappers and hunters. It is also identified as a Class 3 furbearer under BC's Fur Management Program, which means that it is not considered sensitive to harvest but is nevertheless to be managed on a regional rather than individual trapline basis.

In 2002-03, the open season for hunters over most of the province was seven months long, from 1 September through 31 March, but was 10 days shorter in Region 4 (Kootenay) and three months longer in two management units of Region 8 (Okanagan). Seasonal bag limits of 10 animals per licence applied in Regions 4 and 6 (Skeena), but there was no bag limit in the rest of the province. The province-wide trapping season was 5.5 months long (15 October to 31 March) with no trapper bag limits or quotas. There were no Compulsory Reporting or Compulsory Inspection requirements for either hunters or trappers anywhere in the province.

Those liberal regulations reflect the low level of conservation concern for the species, consistent with its Class 3 status. Coyotes have high reproductive potential, low rates of natural mortality, and a high dispersal capability. The combination of those features results in an ability to withstand harvest rates of more than 75 percent and, adding the species' intelligence and adeptness at

avoiding hunters and traps, the net result is a low likelihood of overharvesting. Indeed, decades of attempts to extirpate coyotes in many areas throughout their range have been largely unsuccessful. Thus, the most important management consideration for coyotes will usually be keeping numbers low enough so that conflict situations with humans are minimized, the threat of widespread disease outbreaks is reduced, and the pressure on local prey populations (including species at risk) and competition with other furbearers is not excessive. When pelt prices are high, or in areas where coyotes may be the primary fur resource present, the maintenance of a healthy, productive coyote population may also be a consideration. Those issues are best addressed by two strategic objectives in harvest management planning:

1) SUBSTITUTING HARVEST FOR NATURAL MORTALITY WHEREVER POSSIBLE Dispersing juveniles are the least likely component of the population to survive the winter and are therefore the primary targets in relation to this objective.

2) CONTROLLING ANIMAL NUMBERS TO MINIMIZE NEGATIVE ECOLOGICAL AND ECONOMIC EFFECTS The removal of most juveniles and some adults may help maintain a prey base that can provide for better survival of the remaining animals, less chance of those remaining animals being in poor condition and subject to disease, less competition with and predation on other local species that may be at risk or otherwise important, and reduced human conflict situations.

Addressing those two management objectives while trapping is assisted by natural vulnerability patterns within the coyote population. Juveniles, the most expendable members of the population, are generally less secure and more likely to be travelling extensively in search of food than are adults with established territories, and are therefore the ones that are most likely to encounter traps or hunters (Objective 1). They are also less likely to be cautious because of lack of experience both generally and in the subject area. Transient juveniles are also the primary source of potential competition for the local food supply, and are the most likely to contract and carry diseases (Objective 2).

Note that removal of resident adults may actually result in increased local populations since, with the territorial system no longer in place to repel intruders and monopolize resources, the number of successfully breeding females in the area may temporarily increase.

PLANNING AND INFORMATION CONSIDERATIONS

Provincial managers and trappers will almost never have detailed population information for coyotes, so annual harvest operations will usually be based on other considerations. With the above two strategic objectives as the general background, the following sections describe some of those considerations that may apply. Note that for any particular local situation, some of these factors may conflict with each other and decisions about which are the most important will require use of common sense.

TIMING Coyote pelts generally prime up by early-November, and tend to go off-prime sometime between mid-January and early February, depending upon latitude and local climate (later farther north and in colder climates). Thus, maximizing the financial return for effort expended will likely involve concentrating most harvest activity in the indicated 10- to 12-week period.

DEPREDATIONS Trappers are encouraged to concentrate coyote harvest activity near areas with chronic human conflict situations or ongoing impacts on species at risk (e.g., bighorn sheep) wherever possible.

HARVEST MONITORING AND ASSESSMENT Assessment of the coyote harvest by provincial managers is done primarily in reference to fur sales, although there is potential for acquiring additional information through the provincial Trapper Questionnaire. At the individual trapline level, there are three kinds of information that individual harvesters are advised to keep track of both for within-season assessment and planning of harvest activities, and for long-term management interest:

SEX AND AGE OF ANIMALS CAUGHT This information is important for determining the degree to which the two strategic objectives are being met. Field determination of age can be difficult, particularly later in the winter as juveniles continue to mature, but is best done in relation to body size and robustness and degree of tooth wear. Among males, juveniles appear more slender than adults, and are likely to have whiter and sharper canine teeth. Canine teeth that are discoloured (grey or yellowish) or are worn flat at the tips are indicative of adults. Among females, adults are best distinguished by the presence of conspicuous nipples, often ringed by bare patches caused by rubbing during suckling.

LOCATION AND DATE OF HARVEST This information can be useful over the long term in identifying important patterns of occurrence. For example, locations and/or seasonal timing that consistently produce adults can be avoided in future operations if that is desired, and those that most regularly produce young animals can be re-used with some confidence.

PHYSICAL CONDITION OF THE ANIMALS CAUGHT Determined primarily by the amount of body fat observed on the skinned carcass, this is a good indirect measure of how the population and local prey populations may be doing.

RECORD KEEPING Although it is possible to conduct the above monitoring and assessments on an informal, non-permanent basis, it is strongly recommended that the information be recorded on paper. That will provide more accurate information and a better record for demonstrating long-term patterns.

Trappers are also encouraged to share information on changes in the perceived abundance of coyotes and their prey by responding to the annual provincial Trapper Questionnaire. Such responses are an important component of the management of furbearers in British Columbia.

HARVESTING STRATEGIES AND SYSTEMS

At the operational level on individual traplines, there are three main approaches that may be used to harvest coyotes:

QUOTA SYSTEM This system identifies a harvest goal of a certain number of animals, and harvesting activities are stopped when that goal is reached. Such self-imposed quotas are usually based on long-term experience in which the particular number has been demonstrably sustainable. The problem with a quota system is that it is not sensitive to actual productivity in a particular year. For example, an underharvest both shortchanges the trapper and may reduce an area's long-term productivity by failing to help keep the species and its prey in optimal balance.

TIME-BASED SYSTEM Based either on long-term experience in a particular area or on practical considerations relating to time available, pelt primeness, and normal vulnerability patterns, this system develops a schedule in which traps are left set only for a pre-determined period, which is shorter than the actual open season. Although similar to the quota system in most respects, including the potential problems, it is less likely to result in a significant under-harvest in years of high production and juvenile survival. That is especially true if used in conjunction with harvest monitoring, which would enable shortening or extending the originally determined schedule based on the sex, age, and condition of the animals being caught.

AREA-BASED SYSTEM Also referred to as a "refuge" system, the basis for this approach is that a portion of the available coyote habitat on the trapline is left unharvested, with the expectation that it will serve as a source for animals dispersing to areas where trapping does occur. As has been emphasized throughout this account, it is difficult to cause a decline in coyote populations and the formal designation of refuge areas will be unnecessary in most areas.

HABITAT MANAGEMENT

There appears to be no barrier to coyote expansion in areas where adequate food is available and winter snow depths are not excessive. The high level of adaptability of the species to new conditions, its broad and adaptable feeding habits, broad range of habitat occupancy, and high reproductive rates indicate that specific habitat enhancement recommendations on its behalf are not needed. The coyote has expanded its range throughout North America largely in response to forest clearing and cutting, and those activities are ongoing in British Columbia.

SPECIAL NOTE: HUMAN HEALTH CONCERNS

Trappers, hunters and other people who handle coyotes should be aware of the diseases that may affect coyotes, especially distemper and sarcoptic mange, both of which can infect domestic dogs. In addition, mange mites can cause a skin rash in humans who handle affected animals without gloves.

There is also some risk of hydatid disease, which is caused by the larval form of the canid tapeworm, *Echinococcus granulosus*. Mammals, including humans, can develop this disease by the accidental ingestion of tapeworm eggs, which are passed in canid droppings. The eggs, which are very resistant and can be viable for months, may be transported in dust or soil picked up on an animal's feet or fur. Once inhaled or ingested by a herbivore (or human), they develop into hollow cysts in the internal organs, especially the liver and lungs. In humans, this is a potentially serious disease and is thought to be most often acquired from infected dogs that were fed uncooked, infected tissues of game animals.

Trappers and hunters are encouraged to bring any animal that looks unhealthy to a local conservation officer or regional office, and should always take special precautions to prevent contamination of their hands and clothing with infectious materials. Most importantly, they are advised to handle these animals with gloves and/or wash their hands carefully before handling food, and to avoid inhaling dust that may be raised when brushing or shaking out a coyote's fur.

SUMMARY

Coyotes are very efficient and effective predators which, combined with their high reproductive potential, high dispersal capability, great intelligence, and adaptability to a broad range of both natural and human-made habitats, puts them in frequent conflict with human interests. Those same characteristics also make them resistant to attempts to significantly reduce populations over the long term and very resilient to harvesting by trapping and hunting. Therefore, management considerations for the species are generally not directed at the issue of sustainability. Rather, the goal in most cases will be to keep numbers low enough so that conflict situations with humans are minimized, the risk of widespread disease outbreaks is reduced, and the pressure on local prey populations and competition with other furbearers is not excessive. Due to natural vulnerability patterns in coyote populations, most of the harvest will be composed of animals (mostly juveniles) that are the least secure and least likely to survive under natural conditions in any case, which is an automatic contributor to sustainable use.

To contribute to more informed, long-term management of coyote populations, trappers are urged to keep accurate personal records on harvest of the species and on relative abundance of prey species such as hares and voles, and to respond to government requests for information.

BY: David F. Hatler, Kim G. Poole and Alison M.M. Beal
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PHOTOGRAPHY: David F. Hatler
RESEARCH, LAYOUT AND GRAPHICS: Wildeor Wildlife Research and Consulting
wildeor@junction.net

SOURCES FOR ADDITIONAL READING

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NOTE: *This document has been formatted for insertion into the British Columbia Trappers Association Trapper Education Training Manual and for inclusion in print documents intended for government managers and industry representatives who are involved in furbearer management in British Columbia.*

