

# FURBEARER MANAGEMENT GUIDELINES

## WOLVERINE *Gulo gulo*



Since 1926, separate trapline areas in British Columbia have been assigned and registered to individuals licensed for the purpose of harvesting the province's plentiful fur resources. To obtain a license, 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 wolverine is categorized as a Class 2 species, which means that it is considered sensitive to harvest and, because home ranges are large relative to the size of most traplines, population management cannot only be applied at the individual trapline level. Thus, while the input and cooperation of trappers are important, Class 2 species are managed primarily by application of provincial government regulations. Other Class 2 species are lynx, bobcat, river otter and fisher

This document is intended primarily to provide British Columbia's professional trappers with information on wolverine biology, and on principles to consider in the sustainable 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 wolverine is the largest non-aquatic member of the weasel family in North America. It is a medium-sized, stocky, bear-like animal with short, thick-set legs and large paws. Its tail is short and bushy, and its head is relatively large and broad with short, rounded ears and small wide-set eyes. The pelage is long, thick, glossy, and generally dark brown to black, although paler variants occur. Most wolverines are



marked with light-coloured lateral stripes that extend from the shoulders along both sides and meet at the base of the tail. The lateral stripes range from cream to yellow to shades of brown, their conspicuousness depending upon the degree of contrast with the basic body colour. Most also have a pale forehead and irregular-shaped patches (white to bright orange) at one or more locations on the chin, throat, and chest. The sexes are similar in appearance, but males are larger, with adults weighing up to 20 kg and averaging about 14 kg, in comparison to a maximum of about 14 kg and an average of 10 kg for adult females.

## ECONOMIC CONSIDERATIONS

Since the mid-1960s, British Columbia has consistently been the top producer of wolverine pelts in Canada, contributing more than 40 percent of the annual Canadian harvest and 20 to 25 percent of the total North American harvest. BC wolverine harvests generally fluctuated between 200 and 400 animals from 1920 through the late 1960s, then increased in the early 1970s to the all-time high of 634 in the 1973-74 trapping season (Figure 1). Annual harvests were mostly in the range of 200 to 300 in the 1980s, but dropped to an average of 156 animals in the 1990s and early 2000s.

The 1990s harvest decline occurred despite the fact that, during that period, wolverines were first among BC furbearers in terms of average value per pelt, peaking at \$334 in 1996. That partly reflects the effect of reduced fur prices for more abundant species such as marten and lynx at that time, which resulted in fewer trapper days afield and therefore reduced effort directed to "bonus" species such as wolverines. However, it is probably also due in part to voluntary restraint among wolverine trappers in response to information provided in the BCTA Trapper Education Program. Although of high individual value, wolverine pelts have generally contributed no more than three to four percent of annual provincial fur revenue. Most of the wolverine harvest in BC is in the two northern administrative regions (Omineca-Peace and Skeena), while the Kootenay Region is number three in that regard (Figure 2).

Wolverine fur is resistant to the build-up of frost and has long been used as trim on parkas, especially in aboriginal communities. However, the primary demand in recent years has been for taxidermy. In addition to its status as a furbearer, the wolverine is also classified as a game animal, but it is taken only incidentally by hunters, rather than by specific directed effort, and the kill is small, averaging less than three percent of the total provincial kill since the early 1990s.

Figure 1: Reported Wolverine Harvests and Pelt Values, 1920-2000.

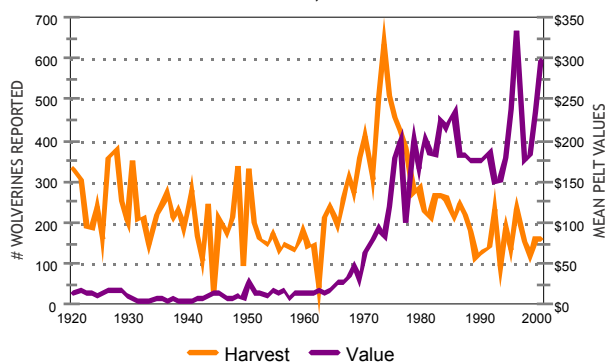
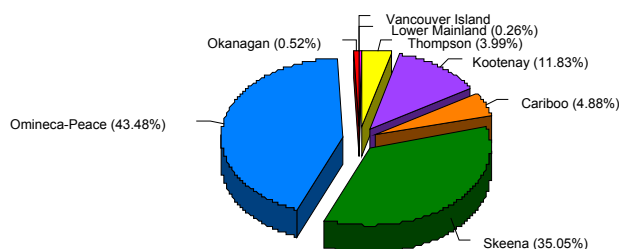


Figure 2: Wolverine Harvest by Region, 1985-2000.



## BIOLOGY

### DISTRIBUTION AND HABITAT

The present range of the wolverine in North America is essentially in the north, with southward extensions into mountainous terrain in the west. The primary populations are in Alaska, the Yukon and Northwest Territories, and British Columbia, where there has been no known change in distribution since pristine times. The species is currently not common in southern Canada east of the Alberta Rocky Mountains, and may never have been.

Within BC, wolverines occur widely and are relatively abundant in much of the northern two-thirds of the province, and there is also a centre of abundance in the Columbia Mountains of southeastern BC. The only areas of the province where wolverines do not regularly occur are the Lower Mainland, the dry sections of the Fraser and Okanagan valleys in the southern Interior, and the Queen Charlotte Islands. The known distribution includes Vancouver Island, although there is no indication that they were ever abundant there and it is unclear if documented animals were from a viable island population or were merely wanderers from the adjacent mainland. The last reported sighting on the island (unconfirmed) was in 1995.

The wolverine is generally associated with remote wilderness habitats, particularly the boreal forests and arctic tundra of the north, but it also occurs in montane forests and alpine tundra in the

southern portions of its range. Field studies have confirmed its affinity for high latitudes and high elevations (and associated tree-line forests of spruce and fir), and have documented a tendency for seasonal vertical migrations in the mountains (up in summer and down in winter). However, wolverines have been observed using a broad range of other habitats and it is generally apparent that habitat selection by individuals is keyed more to the distribution and availability of food resources than to particular topography or plant associations.

One of the most important features of the wolverine's environment is snow, and the species' occurrence in northern and upland habitats is probably at least partly reflective of that. It is well-adapted for winter conditions, with pelage renowned for its frost- and cold-repelling qualities, and relatively large feet, which provide a mobility advantage over many other species in deep or soft snow. Further, the negative effects of deep snow and cold on other species, especially ungulates, work to the benefit of wolverines with their scavenging lifestyle. Wolverine are also behaviourally adapted to snow, using its protective, insulating characteristics by creating systems of snow caves and tunnels that may be 30 m or more in length. It is in such snow caves, and mostly in late winter

### **FOOD**

The wolverine has been referred to as the "hyena of the north" because it makes a significant portion of its living as a scavenger. That is particularly the case in winter, when the primary fare is large mammal carrion -- mostly ungulates killed by other carnivores, severe climatic conditions, starvation, or accidents (e.g., avalanches), but also including beached marine mammals and spawned-out salmon in coastal areas. The wolverine is the ultimate "generalist" and opportunist when it comes to feeding, and the list of species it has been known to use is long. Summer foods include rodents (especially voles, marmots, and ground squirrels), young ungulates (mountain sheep, mountain goats, and caribou), birds and eggs, and various berries.

Following tracks in snow, one gets the impression that foraging wolverines are simply "looking for something to eat" rather than "hunting" in the usual sense. If they find something dead they eat it or cache it, and if it is alive they may try to kill it. Caching (storing) by burying food remains in snow or soil is common. Cached food is usually "marked" with musk and/or urine, a habit which is believed to reduce its attractiveness to other species and which probably helps the wolverine relocate it later. Much of the winter foraging may consist primarily of wolverines locating and digging up their own caches or those made by other animals. In addition, they often follow the tracks of lynxes, foxes, and wolves, presumably in hopes of finding prey remains left by those species. Although efficient at finding and deriving nutrition from items that other species cannot use, such as bones and bits of hide, it is apparent that occasional and sometimes intense hunger is accessory to the wolverine's lifestyle, particularly in winter, since each individual is largely reliant upon outside forces (mostly climate) and/or other carnivores to provide the next meal. The most difficult times for wolverines are during mild winters, when survival rates of ungulates such as moose, caribou, and elk are high and therefore carrion may be in short supply.

### **SOCIAL BEHAVIOUR**

Although the extreme movements of some wolverines have suggested a generally nomadic existence, radio tracking studies have confirmed that individuals do remain in particular areas (home ranges) for months or even years. Home range sizes in those studies have varied considerably, but the general pattern has been for males to have larger ranges than females, and for females without kits to have larger ranges than those with (averages of about 500 km<sup>2</sup>, 300 km<sup>2</sup>, and 100 km<sup>2</sup>, respectively). Most study animals maintained different areas of activity in different seasons, and range boundaries were not necessarily the same from year to year for each individual, likely reflecting differences in local food availability over time.

Wolverine populations consist of a stable core of adults with distinct home ranges (residents), and varying numbers of less established animals referred to as transients. Transient wolverines are mostly dispersing young, but may also include older animals that have abandoned their home ranges because of injury, old age, or inadequate food supplies. Males are more mobile than females and are more common in the transient class. Transients are less secure than residents, often travelling in unfamiliar terrain. They are more regularly exposed to extreme hunger and are generally the most likely to encounter trap sets or to come into conflict with humans.

Based on the radio-tracking results, the normal spacing pattern among residents involves considerable home range overlap between the sexes, but very little within. Biologists have speculated that female spatial organization is determined primarily by the distribution of food, but that of males is determined primarily by the distribution of females. The maintenance of these separate territories appears to be accomplished primarily by indirect means rather than by actual confrontation. Wolverines produce a variety of odorous substances that are believed to be important in territorial communication.



### **ACTIVITY AND MOVEMENTS**

Except for brief periods when animals are together as mated pairs or females with young, wolverines travel and forage alone. They are among the most day-active of the carnivores, a feature that may be of benefit in giving them access to cues, such as raven activity, to help locate carrion, and may reduce the chances for dangerous encounters with other large carnivores that are more nocturnal in their habits.

Daily movements of 30 km or more are known, but the extent of wolverine movements over most of the year depends upon food availability and foraging success. A wolverine that has located a concentrated food source, such as an ungulate carcass, may remain at that site with little movement for three to four weeks, while an individual having difficulty finding food may travel well beyond the boundaries of its usual area of activity. There is also some evidence that adult females may undertake a period of extensive travel in late January and early February, in search of a suitable den site and/or reliable food source (e.g., an ungulate carcass) in preparation for producing and supporting the young.

In addition to normal movements within and temporary excursions from established home ranges, transient wolverines may travel longer distances in search of vacant home range areas. The longest recorded movement of a tagged wolverine is 378 km, which took a young male from south-central Alaska to a location in the Yukon Territory. However, much longer movements than that undoubtedly occur, as wolverines occasionally show up far from areas of regular occurrence. An example of that is a female killed by a farmer in an Iowa cornfield in 1960.

### **REPRODUCTION**

Wolverines mate in the summer, probably mostly in June and July, and the young are born in the winter, apparently mostly in February and March. That long gestation period of up to 270 days is the result of delayed implantation, in which the embryos are retained in a state of arrested development for six to seven months. The actual length of pregnancy once implantation occurs is believed to be 30 to 40 days. The reproductive potential of the species is relatively low, since females cannot produce their first litters until they are two years old and litter sizes are relatively small, averaging fewer than three young. Reproductive success is variable and appears to be related mostly to nutritional factors. In years of food scarcity, females may produce and raise smaller litters, or implantation may not occur and pregnancies may fail altogether. Biologists speculate that the primary reason for the species' reproductive schedule, which results in birth of the young in the most extreme part of winter, relates to the fairly predictable availability of carrion from predator- and winter-killed ungulates at that time.

### **CARE AND DEVELOPMENT OF YOUNG**

Although males have occasionally been seen near active natal dens, there is no evidence that they ever participate in parental care of the kits. The young, which are reportedly pale to white at birth and weigh 80 to 90 g, grow quickly. They are weaned at about seven to eight weeks, and may

begin to accompany the mother on foraging trips by 10 to 12 weeks. They are of adult size by 6 to 7 months and some, particularly males, may commence dispersal movements at that time, in late fall to early winter.

### **MORTALITY, PARASITES AND DISEASE**

Wolverines are known to host a number of different parasites, including a tapeworm obtained from eating porcupines. However, there are no records of any chronic disease or parasite disorders that affect population numbers, in part because their solitary nature and naturally low density of wolverine occurrence are not conducive to the spread of disease. In studies of radio-collared wolverines in North America, the largest overall source of mortality has been harvest by trappers and hunters, which has been directed mostly to transient and/or dispersing young males. The most frequent causes of natural mortality have been starvation and predation, the latter primarily by wolves. There are also cases in which wolverines have been killed but not consumed by wolves, sometimes near ungulate carcasses, and those may represent competitive defence of food sources rather than true predation. In general, it appears that wolverines have a tense relationship with larger carnivores, being both partially dependent upon them for food and in danger from them as predators and competitors. Wolverine in captivity have survived to 17 years of age and there is a record of a 13-year-old from the wild, but few wild-caught individuals are more than eight years old.

### **POPULATIONS**

British Columbia may be the continental centre of abundance for wolverines, with an official "minimum estimate" of about 5000 animals in 1987. However, the species naturally occurs at low density and it is difficult to obtain accurate census information, particularly over large areas. Using a variety of methods over the past two decades, researchers have calculated densities ranging from one animal/65 km<sup>2</sup> (Montana) to one per/177 km<sup>2</sup> (Yukon Territory), but those estimates probably do not fully account for transient animals. There is evidence for recent population increases and range expansions in the mountains of the western United States, particularly in Montana, Washington, and Oregon, and dispersal from viable populations in British Columbia appears to have contributed to those increases.

## **HARVEST MANAGEMENT**

### **GENERAL CONSIDERATIONS AND OBJECTIVES**

The wolverine is classified both as a furbearer and as a game species in British Columbia. It is identified as a Class 2 furbearer under BC's Fur Management Program, and harvests are officially regulated (methods, seasons, bag limits, quotas) at the regional level, in consultation with local trapper and hunter organizations. Since 1994, the wolverine has also been included on the provincial "Blue List," a rating indicating that it is considered vulnerable and of high management priority. There are no open seasons for either trapping or hunting in the Vancouver Island, Lower Mainland, and Okanagan regions (where wolverines rarely occur), or for hunting in the Thompson and Cariboo regions. For those regions in which hunting of wolverines is allowed, season lengths range from eight weeks (1 November to 31 January) in the Kootenay Region to 20 weeks (15 September to 15 January) in the Skeena Region, and a bag limit of one applies in all areas. Open trapping seasons for wolverines in British Columbia are 8 to 12 weeks long, beginning on 1 November and ending on 31 January in the southern and central portions of the province (Thompson, Kootenay, and Cariboo regions), and on 28 February in most of the north (Skeena and Omineca-Peace regions). All areas open to trapping provide for unlimited harvest (a trapper may take any number), although quotas may be imposed if required.

While the final responsibility for management lies with the provincial government, trappers and hunters may play a vital role in the management process by maintaining a level of practice that does not generate or contribute a cause for concern, and by providing information and specimen material if and when requested. In regard to the former, the overall harvest management plan should address two strategic objectives:

**1) SUBSTITUTING HARVEST FOR NATURAL MORTALITY WHEREVER POSSIBLE** Transient animals, mostly dispersing juveniles, are the least likely to survive the winter and are therefore the component of the population that naturally falls into the category as primary targets in relation to this objective. However, it may also include adults in late winter of some years, especially in years with mild weather conditions (during which ungulate carrion may be relatively unavailable) or following major declines of prey such as snowshoe hares.

**2) MINIMIZING THE CATCH OF ADULT FEMALES** Resident adult females with secure, productive home ranges are the core of population productivity. As described below, protecting them is partly a matter of the timing and extent of trapping activity, but may also involve specific knowledge of female ranges or den locations

### **PLANNING AND INFORMATION CONSIDERATIONS**

Although they generally have low levels of natural mortality, wolverines also have a relatively low reproductive potential. Of all of BC's furbearers, they are considered by managers to be among the least resilient to harvesting pressure, possibly able to sustain harvest rates of 10 percent or less of the fall population. Since harvesters and managers almost never have specific information on local population size, planning and managing for a sustainable harvest involves more indirect considerations. With the above two Strategic Objectives as the general background, the following sections describe some of those considerations. 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 application of common sense.

**VULNERABILITY TO HARVEST** Addressing the two management objectives while harvesting wolverines is assisted by natural vulnerability patterns within the wolverine population. The most expendable (transient) members of the population are generally less secure and more likely to be moving extensively in search of food than are established residents. They are therefore the ones that are most likely to find and enter baited traps or be detected by hunters (Objective 1). Adult females are somewhat less likely than transients (either sex) or adult males to encounter traps (Objective 2), because they generally have smaller ranges. However, the vulnerability of adult females increases in late winter, from late January onward, because of increased activity and food needs associated with denning and caring for dependent young.

**TRAP SETS** To take advantage of the natural vulnerability patterns described above, trappers should concentrate on the use of sets such as baited cubbies that may take inexperienced young or particularly hungry adult wolverines, which are the animals least likely to survive. Traps and snare sets designed to take the wariest animals should be avoided, particularly in late winter.

**TIMING OF TRAPPING ACTIVITY** Wolverine pelts are not fully prime when the harvesting season opens in early November, but are generally near full value from mid- or late November through late January. It generally makes sense to concentrate trapping activity during the period when the animals will provide the highest value per pelt. However, particularly if food availability is poor, waiting too long to start may result in missed opportunities for transient animals which may already be leaving the area or succumbing to starvation and predation. The decision about when to stop trapping in a particular year relates primarily to the increased vulnerability of adult females in late winter. Particularly in high-elevation areas where most of the young are born, trapping beyond early February is not recommended.

**COMPETITION FOR HARVEST** The Registered Trapline system specifies who may set traps for wolverines in particular areas of Crown land, but the boundaries of a functional wolverine population may result in its being harvested on several traplines, on one or more guide-outfitter territories, and by numbers of resident hunters simultaneously. It is the total, combined harvest by all of those interests, not that of any one of them, that is the reference for sustainability, so it is advisable for all parties to be aware of and in communication with each other and, if necessary, to work out practical ways to avoid negatively impacting each other or the population.

**HARVEST MONITORING AND ASSESSMENT** Currently, assessment of the wolverine harvest by provincial managers is done primarily in reference to fur sales data and information provided directly by trappers and hunters through Compulsory Reporting (required province-wide for all hunter and trapper kills). Wolverines taken accidentally by trappers in the Lower Mainland, Vancouver Island, and Okanagan regions must be submitted (pelts and intact carcass) to a designated Compulsory Inspection authority within 30 days of the kill.

There are three kinds of information that individual harvesters are either required or advised to keep track of, both for official management purposes in the long-term and for within-season assessment and ongoing planning of harvest activities.

**SEX AND AGE OF ANIMALS CAUGHT** This information is required for Compulsory Reporting and is essential for determining the degree to which the two strategic objectives (above) are being met. The external sex organs of wolverines are conspicuous and sex determination is straight-forward. Determination of age is more difficult, because young wolverines may attain adult measurements and weights fairly quickly in areas with high food abundance. Adults of both sexes can often be recognized on the basis of greater tooth wear, but adult females are best distinguished by the presence of conspicuous nipples, often ringed by bare patches caused by rubbing during suckling. Among males, in addition to greater tooth wear, adults are generally more robust around the head and neck, their bacula (penis bones) are thicker and heavier than those of juveniles, and they generally have a large sagittal crest (a bony protrusion on the top and towards the back of the skull).

**LOCATION AND DATE OF HARVEST, AND OF SIGHTINGS OR SIGN (TRACKS) OF FAMILY GROUPS (FEMALES WITH YOUNG)** Only the location and date of harvest is required for Compulsory Reporting, but sightings and sign are potentially useful in identifying important patterns of occurrence. For example, locations or particular trap sets that consistently produce adult females can be avoided in future operations, and those that most regularly produce young animals or adult males can be re-used with some confidence.

**PHYSICAL CONDITION OF ANIMALS CAUGHT** Determined primarily by the amount of body fat observed on the skinned carcass, this is not required for official reporting purposes, but is a good indirect measure of how the population may be doing. If most of the animals caught have little or no fat, and if that corresponds with observations that prey species appear to be scarce, it is likely that the population is under stress. If there are few or no young animals as well, it is advisable to stop harvesting in deference to Strategic Objective 2 (protecting adult females), but if the harvest is primarily juveniles, continued harvesting in response to Objective 1 (substituting harvest for natural mortality) and to reduce competition for food supplies is probably justified.

**RECORD KEEPING AND COMPULSORY REPORTING** 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 for Compulsory Reporting requirements, and a better record for demonstrating long-term patterns.

Compulsory Reporting may be done by mail, telephone, or in person, and must be completed within 15 days following the end of the trapping season. As of the 2002-03 season, the basic Compulsory Reporting and Compulsory Inspection information required from both trappers and hunters, in addition to personal contact and licence data, is date, location, and sex of kill. Additional data required from trappers are age of kill, type of trap used, and number of days the trap was set before the animal was caught.

Trappers are also encouraged to share information on changes in the perceived abundance of wolverines by responding to the annual Trapper Questionnaire, and to provide specimen material when requested. Such cooperation is an important component of the management of all furbearers in British Columbia.

## **HARVESTING STRATEGIES AND SYSTEMS**

At the operational level, there are three main approaches that trappers may use to harvest wolverines sustainably, as follows:

**QUOTA SYSTEM** This system identifies a harvest goal of a certain number of animals, and harvesting activities are stopped when that goal is reached. For cases in which that goal is a limit or quota imposed by government regulation or regional policy, there can be no other consideration. Some trappers work under self-imposed quotas, which are usually based on long-term experience in which a particular number of wolverines has been harvested without apparent effect on the population year after year. The problem with a quota system is that it is not sensitive to actual productivity in a particular year, especially if the sex and age of animals caught are not monitored. In years of poor production, even a conservative quota may be too high, and in years of good production it will almost certainly be too low.

**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. That is especially true if used in conjunction with harvest monitoring, which would enable shortening or extending the originally designated schedule based on the sex and age characteristics of the catch. Note, in this regard, that an apparent dramatic increase in wolverine occurrence on a trapline in a particular year may signal population stress due to food shortage, rather than an actual population increase. That would likely be the case if the animals caught are not mostly juveniles, in which case an extended trapping schedule is not recommended.

**AREA-BASED SYSTEM** Also referred to as a “refuge” system, the basis for this approach is that a portion of the available wolverine habitat is left unharvested, with the expectation that it will serve as a source for animals dispersing to areas where trapping or hunting does occur. For many BC traplines, the maintenance of extensive refuge areas is easily accomplished and, in fact, is unavoidable because of topographic and other constraints to human travel in winter. The size requirement for an effective refuge has not been determined, but it clearly must be large enough to fully enclose the home range of at least one adult female, i.e., possibly 100 km<sup>2</sup> or larger. Although the usual concept is that habitat designated as refuge will remain so permanently, an alternative where most of the available habitat is accessible is to divide it into two or three roughly equal-sized parcels and trap each only once in a two or three year period. A rotating system may have better potential for reducing competition and maintaining productivity within the wolverine population. While the primary focus of a refuge system is to provide for the maintenance of a stable breeding stock (mainly adult females), it cannot be safely assumed that those animals will not move out of the refuge areas late in some or most years. In short, even with the refuge system it is recommended that the characteristics of the harvest be closely monitored and ongoing trapping plans and activities be modified accordingly.

## **HABITAT MANAGEMENT**

Individual wolverines travel and forage over large areas, using a wide variety of habitat types while doing so. Mountainous environments are clearly important for the species in British Columbia, but that may relate primarily to the wide variety of food items that may be available from peak to valley in those areas. In short, habitat management for wolverines is not simple and requires attention to the total ecosystem, perhaps more so than for any other species. The reduction of remote “wilderness” through access and alienation for timber and mineral extraction, the flooding of ungulate winter ranges for hydroelectric development, wildfire suppression, and logging or

silvicultural practices that reduce biological diversity are all potentially negative for the species. In effect, maintenance of wolverine habitat will require a broadly focused, integrated approach to land management that promotes and protects biological diversity and richness, and maintains the remote wilderness refuges that play a key role in population dynamics as centres of dispersal to surrounding areas.

The primary role of trappers and hunters in habitat management for wolverines is in providing information about where the animals occur, since forest and habitat managers do not routinely gather that information. Ungulate winter ranges are regularly visited by wolverines in their search for carrion, and trappers should make sure that such areas are identified in resource development plans. In addition, written records of harvest locations and sightings of either animals or “sign” (tracks) are useful for documenting areas of occurrence. In addition to providing information, trappers and hunters can contribute to habitat protection for wolverines by supporting biodiversity initiatives and the maintenance of habitats for other wilderness species such as grizzly bears and caribou.

Given the size of wolverine home ranges, it would be difficult for trappers to enhance or modify habitat directly on a scale sufficient to benefit populations, but there is some potential for enhancing the living situation of individual animals. The return of carcasses of trapped animals or road-killed ungulates to the trapline can provide an important food source during winter, particularly in those years when conditions are mild and carrion from winter-killed animals is scarce.

## SUMMARY

British Columbia is part of the centre of abundance for wolverines in North America, and the species’ primary area of distribution in the province is not known to have changed significantly since historic times. However, wolverines naturally occur at low density, have a relatively low reproductive potential, and are believed to have the lowest resilience to harvesting pressure of all the province’s furbearers. Classified as both a furbearer and a game animal, the wolverine is taken primarily by trappers in BC. Functional wolverine populations generally span several traplines, and it is the combined harvest of all of the trappers and hunters operating in the area involved that must be considered in relation to sustainability.

The primary objective in trapline management for wolverines is to protect the breeding population, and a key to predicting the health of the population is understanding that reproduction is tied to the food supply. As scavengers, wolverines require large home range areas with diverse habitats that support many types of prey species. When food is scarce, such as in mild winters when ungulate survival is high and therefore the carrion supply is low, wolverines do not reproduce and some may die from starvation. Strategies for sustainable harvesting involve substituting harvest for natural mortality wherever possible, and minimizing the catch of adult females. Accomplishing those objectives requires attention to winter conditions and prey abundance, together with ongoing monitoring and assessment of the catch. With those considerations always at the fore, potentially useful harvesting systems may be at least partly time-based, focusing on a balance between pelt primeness and adult female vulnerability patterns, but area-based systems employing untrapped “refuge” areas are strongly recommended.

To contribute to more informed, long-term management of wolverine populations, trappers and hunters are urged to keep accurate personal records of harvest and sighting locations of the species, to respond to trapper questionnaires and requests for specimens, and to attend meetings and workshops where cooperative management of this resource can be discussed. To help maintain habitat, wolverine trappers and hunters are advised to be active in providing information and input to resource development plans in their areas of interest, and to support an integrated approach to land management that promotes and protects biological diversity, and maintains the remote refuges important to wolverines and other wide-ranging wilderness species such as grizzly bears and caribou.

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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.***