FURBEARER MANAGEMENT GUIDELINES

MARTEN

Martes americana

BRITISH COLUMBIA

Since 1926, separate trapline areas in British Columbia have been assigned and registered to individuals licensed to harvest 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 marten is a Class 1 species, which means that it has a home range that is small enough for a viable population to be contained within one trapline area and can therefore be managed on an individual trapline basis. Other Class 1 species are beaver, mink, muskrat, raccoon, squirrel, weasel, fox, and skunk.

This document is intended primarily to provide British Columbia's professional trappers, government managers and industry with information on marten 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

This small mustelid, known as "Canadian sable" in international fur markets, is about half the size of a house cat, but with the shorter legs and long supple body typical of the weasel family. It has a pointed muzzle, prominent ears, and a thick, bushy tail. The basic body colour of most martens is a shade of brown, but there is considerable variation both within and between geographical areas, with a range from pale blonde through yellows, tans, reds, greys, and dark browns to nearly black. The legs and tail are darker than the rest of the body on most specimens, and most animals also have a distinctive yellow to orange "bib" patch on the throat and chest. The pelt is relatively light, with glossy guard hairs and fine, dense underfur. Martens vary in size by locality, sex, age, and habitat quality, but adult males are generally about 600 to 630 mm in total length, the tail constituting about one-third of that, and weigh about 1 kg. Females are considerably smaller, with adults averaging about 530 to 560 mm in length (including the tail) and weighing about 650 to 700 g.

ECONOMIC CONSIDERATIONS

The marten has long been one of the primary species contributing to trapper incomes in BC, although annual provincial harvests did not exceed 15,000 animals prior to the late 1970s (Figure 1). Since the early 1980s, when average pelt values reached and then exceeded $50, this has been the bread-and-butter species for BC trappers, accounting for up to 83 percent and an average of 60 percent of annual provincial revenue from wild fur. In the 1980s, harvests were mostly in the range of 25000 to 35000 animals annually, peaking at 45130 in the 1984-85 season. Between 1984 and 1990, a period during which the average price paid for marten pelts was $77, direct annual revenue

Figure 1: REPORTED MARTEN HARVESTS AND PELT VALUES - 1920-2000

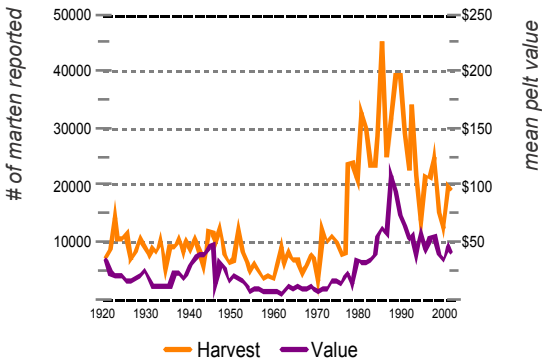
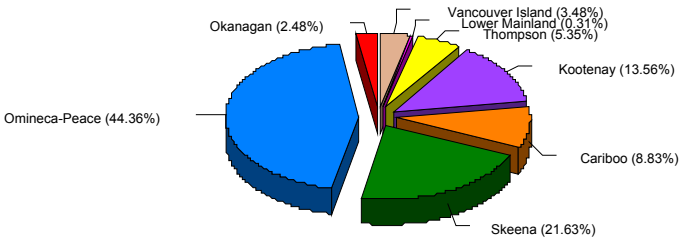


Figure 2: MARTEN HARVEST BY REGION 1985-2000



to BC from marten pelt sales was $2.7 million, with a high of $3.7 million in the 1987-88 trapping season. Since the mid-1990s, pelt prices, harvests, and total revenue from marten trapping have been at considerably lower levels although, as of 2003, there is some indication that the market is recovering.

Martens are trapped in all eight of the administrative regions of BC, but the largest numbers (about two-thirds of the total since 1985) have come from the Omineca-Peace and Skeena regions in the northern half of the province (Figure 2). Particularly with the potential for harvest and values obtained in the 1980s, marten trapping remains important to British Columbia's rural economy, especially in remote communities where little other income is available.

BIOLOGY

DISTRIBUTION AND HABITAT

Martens occur in conifer-dominated forests throughout British Columbia, including Vancouver Island, the Queen Charlottes, and some of the smaller coastal islands. They have long been considered an "old-growth dependent" species and, while it is true that they thrive in older forests, recent research has shown that it is the structural make-up of the forest, not its age, that is of greatest importance. The necessary structure includes "coarse woody debris" (downed logs, stumps, snags, litter) and sufficient overhead vegetation (shrubs, saplings, trees) to provide cover and foraging opportunities for both martens and their primary prey. In British Columbia, the best marten habitats are in relatively moist forests (spruce/balsam in the Interior and cedar/hemlock on the coast). Martens occur at all elevations along the coast and in the central and northern parts of the province, but are most common at high elevations in the southern Interior. They do not regularly subsist in open habitats such as grasslands, agricultural areas, and recent clearcuts, or thinned forest plantations with little ground cover.

FOOD

Although martens are highly opportunistic feeders, small mammals (especially voles and mice) are their primary prey in most areas, particularly during the snow-free period. Where available, larger prey species such as snowshoe hares, grouse, and squirrels are often important foods during the winter. Martens also prey upon other birds and their eggs, some amphibians, reptiles, and insects, and they eat large numbers of berries in late summer and fall. Berries may be particularly important in the support of newly independent juveniles at that time. Various birds (woodpeckers, wrens, thrushes, jays) appear to be the primary winter prey on Vancouver Island and on the Queen Charlottes. Martens readily eat carrion when it is available, and will often be found at ungulate kill sites.

SOCIAL BEHAVIOUR

Like most members of the weasel family, martens are solitary except during the breeding season, at which time a male and female may remain together for several days, and when the young-of-the-year are with their mother. Both exceptions occur primarily in summer through early fall. The animals remain solitary and separate by a "territorial" social system in which the home ranges of neighbouring residents of the same sex overlap very little. Territorial boundaries are marked with feces, urine, and musks from scent glands, and are defended with aggressive behaviour.

The distinction of "resident" martens is an important management consideration. The productive component of a marten population consists primarily of such residents, mostly adults which are relatively secure as long as their defended home range continues to provide their living requirements (food, shelter, water). The population also consists of other martens, sometimes large numbers, that do not have established home ranges. Referred to as "transients," such martens are most often juveniles that have dispersed from their birthplaces, but also include some adults that have been displaced from previously secure home ranges. Displacement occasionally occurs because a marten is unable to defend its range against a stronger intruder, but is most often a case of forced departure because the local food supply has failed or because the important features of the home range have been lost, as may occur during logging. Home range sizes vary considerably from place to place, but those documented in BC have averaged about 2 to 3 km^2 for females and about 5 km^2 for males.

ACTIVITY AND MOVEMENTS

Martens are active (hunting) mostly at night. They readily climb, and often spend the daylight hours resting on branches and witches' brooms high in trees, especially in summer, but most of their hunting and travelling is done on the ground. In winter, martens may spend considerable time under the snow for both hunting and resting, using tunnels and cavities under ground vegetation and woody debris. Although activity is usually restricted to within their home ranges, martens may cover several kilometres in back-and-forth movements while hunting. The largest movements are made by transients, especially dispersing juveniles, with documented distances of up to 80 km. The species has a fairly high capability to locate and recolonize vacant habitats, as long as forested corridors are maintained (See Habitat Management section, page 9).

REPRODUCTION

In BC martens breed in the summer, probably mostly in July and August. The pregnancy is characterized by "delayed implantation," in which the embryo is retained in a state of arrested development for seven to eight months, and the young are born in March or April, about nine months after breeding. 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 (one to five young with an average of about three). On the other hand, martens are relatively long-lived, and a female with a secure, productive home range may produce numerous litters over her lifetime. In years of food scarcity, females may produce and raise smaller litters, or pregnancies may fail altogether.

CARE AND DEVELOPMENT OF YOUNG

The dens used by female martens for giving birth and raising young include cavities high in large trees, stumps, and hollow logs, as well as piles of debris, rock crevices, and underground burrows. At birth the young are blind, sparsely furred and helpless, weighing about 28 g, but they grow and develop quickly. As with other mustelids, the female is the sole provider for the kits until they are relatively independent and able to hunt on their own. She begins bringing them solid food and weaning them at about six weeks, and they are near full size and following her outside the den by 12 weeks. Juvenile martens start becoming independent in the fall, at about 18 weeks, and usually begin dispersing from their mother's home range at that time.

MORTALITY, PARASITES, AND DISEASE

Martens often host external parasites, such as fleas, lice, and ticks, and harbour various tapeworms and roundworms internally, but neither those nor the few diseases that have been diagnosed in the species are known to seriously affect populations. With their high metabolic rate and typically small fat reserves, martens are particularly subject to nutritional difficulties. Inadequate food supplies cause individuals to become increasingly susceptible to parasites and disease because of their declining physical condition. They also become increasingly vulnerable to predation because of both weakened condition and the extra exposure resulting from their need to increase time and area coverage while hunting. Finally, the combination of increased energy expenditure in looking for food and decreased intake when little is found often results in death by starvation. These problems may affect most members of a population in some years, particularly as winter progresses, but are most common for those that do not have secure home ranges, particularly dispersing juveniles.

Known marten predators include large owls and hawks, fishers, lynxes, bobcats, coyotes, and wolves, and, in extreme situations, other martens. Some of those, and other species such as weasels and smaller raptors, also compete with martens by using the same prey species. Although wild martens have been known to live as long as 14 years, relatively few live longer than five years.

POPULATIONS

Within any given year, marten numbers are usually highest in early fall when the year's output of young is present, and lowest in late winter or early spring after many juveniles, and some of the adults, have died or dispersed. There are also changes between years. In BC, particularly in the north, trappers are well aware that marten populations may fluctuate dramatically, with several years of relative abundance followed by a period of one or two years when there are few juveniles and overall sign is scarce. The last year before such a scarcity is often characterized by widespread dispersal, which results in increased observations of martens in unusual habitats such as in expanses of deciduous forest and even lowland agricultural areas. It is apparent that food supply is a major determinant of population levels, with production of young and overall numbers of marten generally increasing when small mammals used as prey are abundant and decreasing when they are not.

Among the factors involved in prey population changes are natural cycles (about four years between peaks for various voles and 10 years for hares), the effects of which are an unavoidable part of the management environment that trappers must contend with. There are also shorter-term, less predictable effects due to weather. For example, a period of extended snow cover during a late spring may suppress the production of both small mammals and berry crops. In regard to prey populations over the longer term, the most important agent of habitat change in much of the marten's range is logging, particularly that which results in large cutover areas with little or no coarse woody debris or other cover left behind.

Recognizing that there are also differences between areas, measured population densities of martens over most of North American have been in the range of 0.4 to 2.4 animals per 1 km^2, the lower figure obtained in the spring during a year of prey scarcity and the higher in the fall during a year of relative prey abundance. Thus, a trapline with 200 km^2 of marten habitat might support a population of up to 480 animals at the start of the winter in a good food year, but probably would not be able to sustain that number for long because they would likely deplete their prey base.

HARVEST MANAGEMENT

GENERAL CONSIDERATIONS AND OBJECTIVES

Although the numbers of marten tracks encountered during the beginning of the trapping season may provide an indication of the species' relative abundance in a particular year, there is no practical way to assess numbers in sufficient detail to pre-determine the level of harvest to be applied. As outlined below, there are several different ways to operate a marten trapline in relation to the species' conservation needs, but all should include continuing assessment of the catch as the season progresses. The overall harvest management plan should address three strategic objectives:

1) SUBSTITUTING HARVEST FOR NATURAL MORTALITY WHEREVER POSSIBLE Since transient animals, mostly dispersing juveniles, are the least likely component of the population to survive the winter, they should be the primary targets in relation to this objective.

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 location and extent of trapping activity, and partly a matter of timing.

3) CONTROLLING ANIMAL NUMBERS TO REDUCE PRESSURE ON PREY POPULATIONS The likelihood of reducing a prey population to a level below where it can sustain local marten use increases with the number of predators (both martens and others) that are preying on that population. The notion that marten populations can be continuously "built up" by not trapping them over a number of years fails to consider this important point.

Addressing the three management objectives listed above while trapping is assisted by natural vulnerability patterns within the marten population. Specifically, the most expendable members of the population (transients) are generally less secure and more likely to be travelling extensively in search of food than are established residents, and are therefore the ones that are most likely to find and enter baited traps (Objective 1). Further, they are the most likely to compete with established residents for the local food supply (Objective 3). Finally, because they generally have smaller ranges than either transients (both sexes) or resident adult males, adult females are the least likely to encounter traps (Objective 2). It is important to understand that the vulnerability of adult females often increases as the winter progresses. As their food supply is depleted or becomes less accessible, they may wander more or even leave the boundaries of their home ranges, and are more likely to encounter traps under such circumstances.

TRAPLINE CHARACTERISTICS

While the broad objectives outlined above should form the background for the planning of trapline activities, the level and sustainability of those activities also depends upon a number of physical and other factors that must be considered and assessed for each trapline including:

HABITAT QUALITY AND QUANTITY A trapline with an area of several hundred square kilometres within its official boundaries may be all pristine marten habitat or largely unforested. Thus, two traplines of the same size may have very different potentials for marten production. Further, some traplines have two or more patches of marten habitat that are separated from each other by large expanses of open (often logged) country or lowland barriers, such as large bodies of water. In such cases, trapping strategies and assessments should be directed to the separate blocks rather than to the trapline as a whole.

IMMIGRATION POTENTIAL The removal of resident martens during trapping operations leaves territories open for transient animals to claim before the next trapping season. On a trapline where the marten habitat is separate and isolated from the next nearest patch of viable habitat, the likelihood of immigration is low and there is increased potential for population decline. On the other hand, a trapline with productive marten habitat that is continuous with similar habitat outside its boundaries may be very resilient to harvest, particularly if the area outside is not being heavily trapped. Indeed, less productive traplines that are so situated may sustain moderate harvests based almost entirely on immigration of transients from the better areas outside.

TRAPPER ACCESS AND LOGISTICS The amount and distribution of trapping pressure that can be directed to a local marten population is dependent upon the trapper's ability to get around on the trapline. In many areas of BC, the combination of steep, rugged topography and normal patterns of snow accumulation may preclude operations in some or even most of the marten habitat on a particular trapline. In others, easier terrain or extensive forestry or other road networks may make virtually every marten home range on the trapline potentially accessible.

PLANNING AND INFORMATION CONSIDERATIONS

TIMING Regardless of which of the trapping strategies described below is followed, a decision common to all relates to the timing of operations. Although the legal trapping season for marten begins on 1 November and ends in mid- to late February in most of BC, it will rarely (if ever) be advisable to trap marten over that entire period. At the beginning of the season, some pelts are not fully prime and taking them may be wasteful in terms of value. However, the primary targets, dispersing juveniles, may be moving from the area or dying at the beginning of the season, and the longer one waits to begin trapping them, the more will be missed. The decision on start-up should be based on local experience in regard to pelt primeness, and consideration of weather patterns in the year involved. If conditions up to early November are mild, juvenile survival will likely be high and their movements less extensive, and a later than usual start may be justified. Note that in most areas, the period of maximum pelt primeness is from mid-November to mid-January.

The primary consideration for ending trapping operations is the increasing vulnerability of adult females as the winter progresses. In most years and areas, adult females are likely to start appearing in the harvest in about mid-January, and it is wise to plan on ceasing operations by that time. The exact timing can be fine-tuned in relation to knowledge gained from assessing the sex and age of the animals being caught (see Harvest Monitoring below).

HARVEST MONITORING Regardless of the harvesting plan or system, it is advisable to examine the animals trapped on a regular basis throughout the season. That is important in the early part of the season to assess the year's population potential, and later to detect changes in vulnerability among adults. Ideally, the early harvest should be mostly juveniles. If the first 20 animals taken include more than seven adults (35 percent), it is highly likely that the year's reproduction has been poor and an early termination of trapping activity may be indicated.

That is particularly the case if there are females among the adults, and if most specimens show very low levels of body fat.

Note: On a trapline which has not been trapped for many years, the populations may be in a relatively stagnant or unproductive state characterized by an unbalanced sex ratio (heavy to males). In such a case, where the early harvest consists of few juveniles but is mostly males, continued but judicious trapping may be indicated.

Clearly, harvest monitoring requires the ability to distinguish the ages of the animals caught. The following features and descriptions apply:

MALES

DEGREE OF TOOTH WEAR The upper canine teeth of juveniles are usually bright and sharply pointed, while those of adults may be somewhat discoloured and distinctly duller (the point worn flat). Age is indicated but not confirmed by this feature.

SIZE OF BACULUM (PENIS BONE) The bacula of juveniles are considerably smaller than those of adults, particularly in the early part of the season, but the difference is not always clear and it takes some experience to make the assessment.

PRESENCE OF SAGITTAL CREST An adult has a small, bony protrusion or ridge on top of and at the rear of the skull. It can usually be felt by rubbing the top of the head in that area on an unskinned (but not frozen) specimen. The heads of juveniles are generally smooth (no bony protrusions) from front to back.

TEMPORAL MUSCLE CLOSURE This is the most reliable age determination feature for males, and can be observed immediately upon removing the hide from the skull. The temporal muscles, which lie on top of the skull on both sides of the centre line, grow toward the centre and join there as the animals get older. On juveniles, especially early in the season, there may be no connection and the bare skull is exposed in a "channel" from an area just behind the eyes to the rear of the skull. Specimens with less than 15 mm of muscle connection, measured from the point at the rear of the skull, are probably also juveniles, and the other features (tooth wear, baculum size) may help to confirm that. On adult specimens, temporal muscle closure extends at least 25 mm from the rear, and is often in the range of 30 to 40 mm (Figure 3).

FEMALES

DEGREE OF TOOTH WEAR Same considerations and reliability as for males, above.

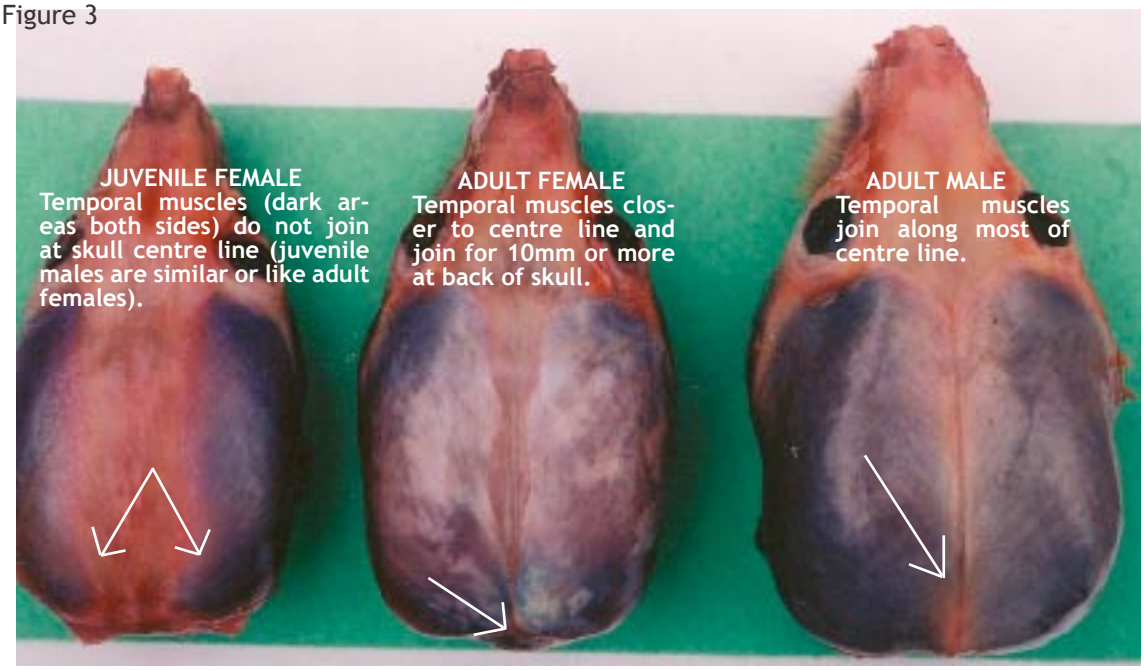
PRESENCE OF MAMMAE (NIPPLES) The nipples on winter-caught females are not conspicuous, so some effort is required to locate them. The procedure is to lay the thawed animal on its back and blow into the fur along the lower belly, lightly rubbing a finger in that area at the same time. In general, nothing will be seen or felt on juvenile specimens, while one or more nipples of at least 3 mm in length will usually be present on adults.

PRESENCE OF SAGITTAL CREST See account for males. The protrusion, if present, is usually smaller on females than on males.

TEMPORAL MUSCLE CLOSURE The description for males applies, except that the degree of muscle development is much less for females. Juvenile females have no muscle closure and often a wide area of bare skull showing from front to back. Adult females usually have only a small area of muscle closure, extending forward about 5 to 10 mm along the midline from the rear of the skull (Figure 3).

CONDITION It is also recommended that trappers monitor and keep track of animal condition as indicated by the amount of body fat. That is easily done using a four point scale,(e.g.: 0 = no fat, 1 = little fat, 2 = moderate fate, 3 = much fat) and may provide a base for comparison of areas and years, as well as to help judge the current year's population status.

Figure 3



NUMBER OF TRAP SETS The rate of catch (number of martens per trapline check) generally increases with the number of traps that are set. Further, the degree of success in catching dispersing juveniles before they die or leave the trapline is likely to be higher when more traps are in place to intercept them. On the other hand, a larger number of traps increases the potential for catching more adults than is desirable should they suddenly become vulnerable or in years of poor productivity. It is understood that individual trappers will use the number of traps that they can afford and can manage in their particular situations, but close monitoring of the harvest becomes more important as the number of trap sets increases.

RECORD KEEPING Written records on weather conditions, the performance of particular trap sets, and the date, sex, age, location, and condition of catches are useful over the long term to make trapping activities more efficient and effective. For example, records over several years may show that a particular set almost always catches adult females, and should be discontinued. Written records are also important when a trapper needs to demonstrate the importance of particular areas on the trapline in relation to logging plans or for related habitat protection purposes.

TRAPPING STRATEGIES AND SYSTEMS

At the operational level, trappers use variations of three main systems to harvest martens sustainably, as follows:

QUOTA SYSTEM Based either on long-term experience in which a particular number of martens has been harvested without apparent effect on the population year after year, or on theoretical considerations relating to area, assumed density, and a

harvest rate of 20 to 25 percent, this system identifies a harvest goal and trapping is stopped when that goal is reached. The problem 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. An underharvest both shortchanges the trapper and may reduce an area's long-term productivity by failing to keep the species and its prey in optimal balance.

TIME-BASED SYSTEM Based almost entirely on long-term experience in a particular area, this system develops a schedule in which traps are left set only for a pre-determined period or specified number of trap checks. Although similar to the quota system in most respects, including the potential problems, it is less likely to generate a significant under-harvest in years of high production. If used in conjunction with harvest monitoring, which would enable shortening or extending the originally designated schedule based on the sex, age and condition characteristics of the catch, this system has merit.

AREA-BASED SYSTEM Also referred to as a "refuge" system, the basis for this approach is that a portion of the available marten habitat is left untrapped, with the expectation that it will serve as a continuing source for martens that are captured in other parts of the trapline. For many BC traplines, the maintenance of extensive refuge areas is easily accomplished and, in fact, unavoidable because of topographic and other constraints to human travel in winter. Where that is not the case, some authorities recommend designating blocks of up to two-thirds of the available marten habitat as no-trap areas, or spacing lines of traps at least 6 km apart to ensure that "untouched" adult female home ranges can be provided between them. While the primary focus of the refuge system is protecting the 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, and the prey populations in refuge areas may become depleted over the long term or in years when the number of transient martens is high. 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

The single most important consideration for maintaining a viable, harvestable marten population on one's trapline is the amount and quality of forest habitat available. It is well known that the largest negative influence on marten habitat in most areas has been due to activities of the forest industry. While that is still the case, attitudes and emphasis are changing such that forest and habitat managers are now more receptive to concerns for resources other than trees. Therefore, it is very important for trappers to establish and maintain good working relationships with the managers and operators on their areas, and to take every opportunity to provide input and advice on logging and silviculture plans affecting their traplines.

Trappers need to be prepared to identify areas known to support concentrated use by martens, but should also be alert to potentially sensitive areas for other species. Modification of a cutting plan to accommodate the needs of grizzly bears or caribou might also benefit the local marten population. In regard to input specifically on behalf of marten, things to look for in cutting plans are provision for ecosystem networks (to be useful for marten, forested "corridors" should

connect known habitat patches), opportunities to alter cutblock boundaries in cases where better habitat can be protected by so doing, and opportunities to move plan features such as "wildlife tree patches" to locations that would make them more useful to martens. On behalf of marten populations, trappers should encourage forest managers to use selective logging practices or very small cutblocks in sensitive areas, to refrain from very large cutblocks that do not provide adequate travel corridors for dispersal of animals up and down slopes and between patches of viable habitat, and to leave as much coarse woody debris scattered across blocks as possible.

The interest in marten habitat needs and forestry relationships is widespread, and research on the subject is being undertaken in many areas. Thus, it is important for trappers to maintain contacts, either with the Ministry of Water, Land and Air Protection or the British Columbia Trappers Association, so they can become aware of new habitat management and protection information as it becomes available.

On a smaller scale, for trappers wishing to undertake more direct efforts to benefit martens, potential measures include the provision of brush and debris piles within or near forest areas accessible to martens, and "feeding" martens in late winter by delivering furbearer and roadkill carcasses to refuges and other strategic locations.

SUMMARY

The marten is one of the most important furbearers for BC trappers. The species has a relatively low reproductive potential, with females not producing young until they are two years old and with litter sizes averaging about three. Productivity varies from year to year depending upon climatic and biological factors, primarily as they affect food supply. Strategies for sustainable harvesting involve substituting harvest for natural mortality wherever possible, minimizing the catch of adult females, and controlling animal numbers to reduce pressure on prey populations. Accomplishing those objectives requires continuous monitoring and assessment of the catch to support informed decisions about the level of trapping to be maintained in a particular trapping season.

The most important negative influence on marten populations in many areas is removal and alteration of habitat during logging operations. Thus, it is important for trappers to become involved in the habitat management planning and decision-making process to the extent possible.

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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.