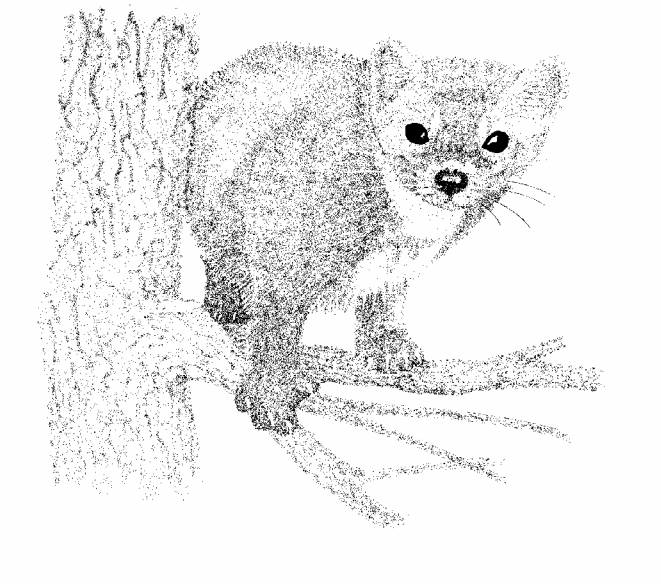
Recovery Strategy for American marten (*Martes americana*) on Cape Breton Island, Nova Scotia, Canada



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RECOVERY STRATEGY FOR AMERICAN MARTEN (*MARTES AMERICANA*) ON CAPE BRETON ISLAND, NOVA SCOTIA, CANADA

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DISCLAIMER

This draft Provincial Recovery Strategy for American marten (*Martes americana*) on Cape Breton Island, Nova Scotia in Canada has been prepared in cooperation with the members of the Nova Scotia American Marten Recovery Team and the Nova Scotia Department of Natural Resources and in consultation with (as appropriate). It defines the recovery goals, approaches and objectives that are deemed necessary to protect and recover the species. It does not necessarily represent the views of individual members of the recovery team, or the official positions of the organizations with which the individual team members are associated. The goals, objectives and recovery approaches identified in the strategy are based on the best existing knowledge and are subject to modifications resulting from new findings and revised objectives. Implementation of the plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations. Further details will be provided in one or more associated action plans.

RESPONSIBLE JURISDICTION

Legal responsibility for American marten in Nova Scotia is the Government of Nova Scotia (Department of Natural Resources), in the Endangered Species Act (1998).

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Species Information:
Common Name (population): American Marten - Cape Breton Island population
Scientific Name: *Martes Americana*
NSESA Status: Endangered (2001)
Reason for NSESA Designation: The Cape Breton population of Marten is likely less than 50 animals. At present there is no evidence of breeding and there has been extensive loss and degradation of suitable habitat. Marten were trapped extensively throughout Nova Scotia since the 1700's until the season was closed in the early 1900's due to low numbers. The species was thought to have been extirpated from the

mainland and several re-introductions have been attempted. There have been some very recent records of Marten in southwest Nova Scotia. However, the status of the Marten on the mainland is considered "data deficient." More research is required. Since this designation more marten data from the mainland of Nova Scotia have been collected. Since 1994 (the end of the Kejimkujik National Park relocation project) marten have been reported in the counties of; Kings, Annapolis, Digby, Yarmouth, Shelburne, Queens, and Lunenburg. As well, there have been marten reports in the Truro area, although these reports are believed to be captive-bred marten that escaped from the Agricultural College. Between 2003 - 2006 there have been approximately 40 incidentally trapped marten on mainland Nova Scotia (Nova Scotia Department of Natural Resources 2006), most of which are from a core region from Weymouth to the Clare District.

Canadian Occurrence:

Martes americana occur across Canada, in suitable habitats, from Newfoundland to Vancouver island, and north to the subarctic taiga. It has been eliminated in the former most southerly portions of its range in Ontario and Quebec and is now rare on Cape Breton and mainland Nova Scotia. Other eastern island populations, on Anticosti Island and Prince Edward Island, were extirpated in the late 1800s (Thompson 1991).

COSEWIC Status History:
Only COSEWIC information on American Marten pertains to the endangered Newfoundland sub-species.

The only marten population that has been given endangered status by the Committee on the Status of Endangered Wildlife in Canada (in 1998) is the Newfoundland marten *Martes americana atrata* (Forsey et al. 1995).

EXECUTIVE SUMMARY

Marten (*Martes americana*) are found from temperate to sub-arctic zones across North America, including on many offshore islands (Hall 1981). They are generally associated with conifer-dominated forests and their optimal habitat appears to be in older forests. Canada maintains approximately 95% of the range of the *americana* species, and all of the range of the endangered Cape Breton Island population. *Martes americana* occur across Canada in suitable habitats from Newfoundland to Vancouver island, and north to the subarctic taiga. It has been eliminated in the former most southerly portions of its range in Ontario and Quebec and is now rare on Cape Breton and mainland Nova Scotia.

Historically, marten were found throughout Nova Scotia but are now found, in low numbers, in only two locations. There is a re-introduced population in southwestern Nova Scotia and a small relict population in Cape Breton (Scott 2001). The marten was thought to be extirpated from the mainland of Nova Scotia by 1935. The relict Cape Breton population is an insular, fragmented population. It is probable that the Cape Breton population has been isolated from the mainland for some 10,000 years. The estimated total population size is considerably less than 100 animals.

Based on historic pelt exports, the Cape Breton population was estimated to be between 800 to 1250 animals in the late 1800s (Scott 2001). Marten populations had declined on Cape Breton Island by the early 1900s with only two records in 1935 and 1954 (Clarke 1942, Hagmeier 1956). The Cape Breton Island population was believed to have been extirpated around this time until confirmed records between 1959 and 1969 indicated that a small number of animals still survived, in the wild, in isolated areas of the Cape Breton Highlands. The Cape Breton marten meets the criteria for an IUCN classification of 'endangered' (Scott 2001), and the precarious state of the Cape Breton marten makes local extinction a strong possibility. The Cape Breton population of marten was officially listed as 'endangered' in Nova Scotia in 2001.

In general, species become at risk due to both natural and human-induced pressures and threats including excessive harvesting, loss of habitat and changes in predator prey relationships, and global effects such as climate change. Knowledge of which environmental factors have contributed to the decline and continued low numbers of marten in Cape Breton is well known. However, several questions as to how best reach the recovery goal remain.

Nova Scotians recognize that our natural heritage is an integral part of our identity and history. Therefore, when a species becomes at risk, as is clearly the case with Cape Breton marten, Nova Scotia has a responsibility through the National Accord on Species at Risk, and their own species at risk legislation and conservation mandates to protect, conserve, and recover the species.

This Recovery Strategy has been prepared by, and presents the recommendations of the Nova Scotia American Marten Recovery Team, which is comprised of wildlife managers and scientists, other experts, and major stakeholders. The Nova Scotia Department of Natural Resources (DNR) has significant legislative responsibilities and capacities in this context. The Strategy defines solutions to reverse the decline in numbers and range, and incorporates flexibility, mechanisms to engender direct action, multi-party involvement, time frames, consideration of socio-economic issues, and a framework for assessing the efficacy of the various recovery initiatives and overall success. Some of the specific actions for recovery have already begun.

This Recovery Strategy is the first part of the two-part Recovery Plan and it identifies the goal, objectives and recommended actions that are believed to be necessary to protect and recover Cape Breton marten. The need for a Recovery Plan for the Cape Breton marten, supporting rationale for the above objectives, and the methods by which they may be achieved and assessed are more fully described and prioritized in the following text. Appendices present additional, more detailed information relevant to the Recovery initiative. The second part of the Recovery Plan, termed the "Recovery Action Plan", will implement, refine as required, and report on the specific actions of the Recovery Strategy.

This Strategy incorporates the best available knowledge, is credible and science-based, has been developed in a transparent, consultative process, and presents a defensible blueprint for actions to recover the species. In general, the implementation and coordination of conservation or management objectives will achieve the recovery by governments and other concerned parties including, aboriginal groups, academics and additional stakeholders.

The goal of the Recovery Plan is: To restore a self-sustaining population of the Cape Breton marten.

The Strategy's objectives are:

Objective 1. Supplement the Cape Breton Island marten population

Objective 2: To improve knowledge important for marten recovery efforts

Objective 3: To secure habitat for the Cape Breton marten population over the next five years

Objective 4: To minimize possible accidental mortality from trapping and snaring by 2010

Objective 5. To raise public awareness of the concern for marten on Cape Breton Island and involve relevant stakeholders in stewardship activities.

Objective 6. To review the recovery plan objectives every 2 years with a view to modifying, deleting, or adding objectives based on improved knowledge.

Actions to achieve these objectives include:

Augment the CBI population through translocation of live marten from New Brunswick and captive-bred marten from Shubenacadie Wildlife Park

Assess relative threats to marten and improving knowledge of the distribution and number of marten in Cape Breton.

Ensure that a minimum area conifer-dominated and mixedwood forest habitat is available, in individual blocks on the Cape Breton Highlands

Plan, model, identify, and actively manage for future habitat on CBI (uplands and lowlands).

Test the feasibility of habitat manipulation of mature pre-commercially thinned forest habitat

Educate trappers on how to reduce the probability of incidentally capturing lynx and enforce legislation for illegal harvesting.

Plan recovery team meetings on a regular basis and maintain communication among all recovery team members.

In summary, the Cape Breton marten is listed as provincially endangered, but not a distinct sub-species. If no or insufficient action is taken, the probability that the population will become extinct is extremely high. Based on an assessment of available knowledge, the Nova Scotia American Marten Recovery Team believes that, with the proper actions, the species can be adequately protected and restored provided that the threats can be constructively dealt with and that sufficient habitat is supplied through active management over time. This Recovery Strategy outlines the steps toward that goal.

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1. BACKGROUND

1.1 Description

1.1.1 Description of the Species

Martes Americana in Cape Breton

The general taxonomic status of the *Martes* is not fully resolved because of inconsistencies between traditional classification schemes based on morphological and geographical data and more recent molecular genetic studies. On the basis of morphological characters, as many as six distinct *Martes* species (Miller 1923) and 14 subspecies (Hall and Kelson 1959) have been described globally. Carr and Hicks (1997) suggest that there are only two distinct species in North America, *Martes caurina* found in the southwestern region of the species' distribution, and the more common *Martes americana*, found across the remaining North American range from Alaska to Newfoundland. Each species contains seven subspecies. The Cape Breton population is currently considered to be of the nominate subspecies *Martes americana americana*. This is the subspecies originally occurring throughout the Maritimes, southern Quebec, Ontario and eastern Manitoba (Banfield 1974).

The marten, *Martes americana*, is a small to medium-sized member of the weasel family Mustelidae. It has a long slender body (55 - 70 cm), dark brown fur, short limbs and a long bushy tail of about 15 cm (Banfield 1974). The average male mass is usually more than 900 g, and is 35% greater than an average female mass of about 600 g. The marten has a high surface area to mass ratio, which results in a high rate of heat loss. The fur is relatively thin and there are little fat reserves to provide insulation or metabolic energy. Marten must remain active to stay warm and they require well-insulated dens in winter (Buskirk *et al.* 1989). Average longevity of marten in the wild is 5-6 years but some have been known to live as long as 14 years (Strickland and Douglas 1987).

Male marten are polygamous but are only associated with females during breeding. Mating takes place in July and August (Banfield 1974), and following delayed implantation, young are born the following March or April. Females give birth to litters averaging 2.6 (range 1 to 5). Female marten may mature as early as 6 months but most individuals take 1.5 years to reach sexual maturity, with peak productivity after 2.5 years (Thompson and Colgan 1987).

Marten home ranges vary in size depending on food resources (Thompson and Colgan 1987, Thompson 1994), and ranges among males are exclusive. Male marten home ranges are 2 to 3 times larger than those of females. Males will overlap home ranges of at least one and sometimes several females (Buskirk and McDonald 1989). Male home ranges are 3-5 km^2 in optimal habitat, while those of females are1-3 km^2; however, home ranges are much larger in suboptimal habitats (Thompson and Colgan 1987, Buskirk and McDonald 1989, Katnik et al. 1994, Payer and Harrison 2000). Payer and

Harrison (2000) found poor habitat, in their Maine study, reduced intersexual home range overlap, thus reducing productivity. Home ranges are generally smaller in untrapped protected areas than in actively managed forests (Payer and Harrison 2000).

Marten diet is catholic and most studies suggest a range of food items including small mammals, squirrels, hare, carrion, berries, and birds depending on availability. Therefore diet varies among various regions. Nevertheless, voles are a major diet item, with hare often becoming important in winter, especially where abundant in boreal forests (e.g., Bateman 1986,Thompson and Colgan 1990, Martin 1994).

The Cape Breton marten meets the criteria for an IUCN classification of 'endangered' (Scott 2001), and the precarious state of the Cape Breton marten makes local extinction a strong possibility. The Cape Breton population of marten was officially listed as 'endangered' in Nova Scotia in 2001 (there was no endangered species legislation prior to this time).

Populations and Distribution

Global Range

Martes americana is only found in North America. Marten inhabit temperate to sub-arctic zones across North America, including many offshore islands (Hall 1981). However, the major part of their distribution is in the boreal and taiga zones (Buskirk and Ruggiero 1994). They are generally associated with conifer-dominated forests and optimal habitat appears to be in older forests.

Canadian Range

Martes americana occurs across Canada in suitable habitats from Newfoundland to Vancouver island, and north to the subarctic taiga. It has been eliminated in the former most southerly portions of its range in Ontario and Quebec and is now rare on Cape Breton and mainland Nova Scotia. Other eastern island populations, on Anticosti Island and Prince Edward Island, were extirpated in the late 1800s (Thompson 1991).

Percent of Global Distribution in Canada

Canada maintains approximately 95% of the range of the *americana* species, and all of the range of the endangered Cape Breton Island population.

Nationally Significant Populations

The only marten population that has been given endangered status by the Committee on the Status of Endangered Wildlife in Canada (in 1998) is the Newfoundland marten (*Martes americana atrata)* (Forsey et al. 1995). The subspecific status of that population is still unresolved.

The Cape Breton Island population has been separated from mainland populations by the Strait of Canso since the strait was flooded some 10,000 years BP (Scott 2001). This would have presented a potential barrier to marten during this post-glacial period, owing to fast currents that prevented the strait from freezing in winter. Nevertheless, since the building of the Canso Causeway in 1955, the strait west of the causeway has frozen over each winter, providing a more-likely migration route. Currently, several species (raccoon, mink, bobcat, coyote, porcupine, and fisher) which were absent from Cape Breton Island prior to the construction of the causeway now occur, thus, supporting the idea that the island was previously geographically isolated. However, there has also been progressive development since the building of the causeway, along both shores, eliminating any marten habitat on either side of the strait. Lastly, no molecular genetic markers have been identified that distinguish CBI marten from mainland NS populations (Johnson et al. In Prep.).

Population Size and Trends

Historically, marten were found throughout Nova Scotia but are now found, in low numbers, in only two locations. There is a re-introduced population in southwestern Nova Scotia and a small relict population in Cape Breton (Scott 2001). Marten were thought to be extirpated from the mainland of Nova Scotia by 1935, but one was trapped in 1979 in the Weymouth, Digby county area (Scott 2001). The present mainland population is, at least partially, the result of a re-introduction program whereby 116 animals from New Brunswick were released in Kejimikujik National Park between 1987 and 1994. The population appears stable and may be expanding slightly to the western coast of Nova Scotia. The relict Cape Breton population is insular and fragmented, and it is probable that this population has been isolated from the mainland for some 10,000 years. The estimated total population size is considerably less than 100 animals and animals may exist in at least two disjunct subpopulations, one in the northwestern Cape Breton Highlands and the other in southeastern Victoria County. The latter consists of two and possibly three isolated groups.

Marten were considered to be widespread and relatively common in Nova Scotia, including Cape Breton Island, in the late 1800s. At this time, based on historic pelt exports, the Cape Breton population was estimated to be between 800 to 1250 animals (Scott 2001). Marten populations had declined drastically on Cape Breton Island by the early 1900s with only two records in 1935 and 1954 (Clarke 1942, Hagmeier 1956). The Cape Breton Island population was believed to have been extirpated around this time until confirmed records in the period between 1959 and 1969 indicated that a small number of animals inhabited isolated areas in the Cape Breton Highlands.

The distribution of the present population is highly fragmented with a small sub-population on the northwest side of the highlands, largely inside the boundaries of the Cape Breton Highlands National Park, and a second sub-population in the southeastern highlands. The separation is wide enough to reduce the probability that there is significant movement of animals between the two areas. Each of these sub-populations is further fragmented by habitat patchiness. This separation has occurred within the last

25 to 30 years and is the result of habitat alteration from timber salvage operations following a massive spruce budworm infestation. Remaining marten habitat remains fragmented and under threat of harvesting. It is unknown whether marten are forced to choose suboptimal habitats as home ranges and/or move between isolated areas of suitable forest through suboptimal habitats.

Between 1997 and 2003, systematic searching by live trapping, camera trapping, and track plate surveys confirmed that numbers were extremely low and that marten were likely absent from large areas of apparently suitable range (Table 1). A comparison with returns for normal wild populations (e.g, Soutiere 1979, Evans 1986, Thompson and Colgan 1987) suggests that these numbers would project a density almost 2 orders of magnitude lower, indicating that the Cape Breton Island populations are critically low (Scott 2001, Nocera *et al.* 1999a,b). While the current population size is unknown and officially estimated to be less than 100 individuals (Nocera *et al.* 1999a,b), Scott (2001) suggested that as few as 15-30 animals may exist.

Table 1. Marten sampling effort, 1997-2003 (Scott 1998; Nocera et al. 1999a,b; Miner 2000; Austin-Smith 2002, Austin-Smith 2003)

Year	Sampling Method	Effort	Captures	Visits	% Success
1997	bait stations	656 checks	-	2	0.031
1998	bait stations	503 checks	-	4	0.079
1999	traps bait stations	965 trap-nights 57 checks	2	0 0	0.021 0
2002	remote camera hair-snag track-plate	411 nights 462 nights 140 nights		0 0 0	0 0 0
2003	live-traps	452 nights		0	0

In southwestern Nova Scotia, since 1998, marten sightings, tracks and accidentally trapped animals have been reported from the area bounded by Digby, Weymouth and Yarmouth, with most reports from Weymouth to the Clare District. In the last four years, approximately 40 incidentally trapped marten have been reported from this area (Nova Scotia Department of Natural Resources 2006). There have been marten reports from Kings, Annapolis, Digby, Yarmouth, Shelburne, Queens, and Lunenburg counties, as well as around the Truro area. Reports near Truro are believed to be captive-bred marten that escaped from the Agricultural College.

1.1.2 Description of the Species' Needs

Biological Needs, Ecological Role and Limiting Factors

Ecological Role

Marten are predators.

Limiting Factors

Marten population growth is limited by their low rate of productivity. Individual females are only maximally productive after 2.5 years (Strickland and Douglas 1987), and individual litter sizes are generally less than four (Strickland and Douglas 1987, Thompson and Colgan 1987). Further, although marten are carnivores, they are also subject to predation by other mammals (e.g., fox, coyote, other marten, fisher) as well as avian predators (Strickland and Douglas 1987, Thompson and Colgan 1987).

Their somewhat curious disposition makes them highly susceptible to trapping by humans and there is evidence of trapping pressure being sufficiently severe to eliminate local populations (de Vos 1952, Quick 1956, Dodds and Martell 1971). Accidental trapping also occurs, as marten are attracted to many types of trap sets, including sets for mink, squirrels and fisher. They are also readily captured in snares set for hare.

Most abundant marten populations are found in old conifer-dominated mixed forests (Soutiere 1979, Thompson and Colgan 1987, Forsey et al. 1995). Although marten are not as restricted to late successional forest as once thought, it is clear that they require forests characterized by complex physical structure which tends to accumulate with age; they generally avoid most successional stands younger than 30 years (Buskirk and Powell 1994, Thompson and Harestad 1994, Chapin et al. 1997a,b, Payer and Harrison 2000).

Socio-economic Considerations

Cape Breton is predominately a rural region with a heavy reliance on natural resource industries such as forestry, fishing, and tourism. Long-term sustainability of these industries and the resources, on which they collectively rely, is extremely important and management for marten must be seen against this background. Only through strong integrated partnerships, and clear scientifically-grounded objectives can NSDNR be in a position to increase the population level of the Cape Breton marten.

First Nations

Living in harmony with nature, Aboriginal peoples in Canada have been harvesting animals for thousands of years as a necessary part of their survival. Their understanding of animal behavior, combined with hunting knowledge and skills accumulated over many generations, enabled indigenous people to capture a variety of animals for food, shelter, clothing, tools and trade.

Across North America there are various legends that involve the marten. The Algonquin, among others, talk of “Why the Marten has a White Spot on His Breast” (Hamilton and

Hamilton 2006). In the Mi'kmaq creation story, legend has it that Kluskap called on Marten (Abistanooj) to give his life so that Kluskap's grandmother could live and that for this sacrifice he would make Marten his brother. From that point on the animals would be brother and friend to Kluskap, and would provide food and clothing, shelter and tools but must always be treated with the respect given a brother and friend because they would only provide what is necessary for life (Welker 2007).

Beyond legend, there is little current information, historic or otherwise, on the value or importance marten and marten fur may have played in traditional Mi'kmaq life, though it is likely that fur was important for use as clothing and trade.

Habitat Needs

Marten are frequently reported to require late-successional conifer dominated forests (Soutiere 1979, Buskirk and Powell 1994, Thompson and Colgan 1994, Thompson and Harestad 1994). Recent work in Maine and Quebec has suggested that animals also occupy younger mixedwood and conifer-dominated habitats, so long as certain structural requirements are met (Chapin et al. 1997, Potvin et al. 2000, Payer and Harrison 2000).

There are three main hypotheses as to why marten choose older forests (Thompson and Harestad 1994): 1) predator avoidance - the dense canopy provides cover from avian predators such as goshawks and owls. The main mammalian predators of marten including fisher, fox and lynx, are less abundant in older forests compared to successional stands. Tall trees also provide elevated escape cover from coyotes (Payer and Harrison 1999); 2) Special habitat features - stumps, logs, brush and root balls (all forms of coarse woody debris), enabling subnivean access to hunt small mammals, are most plentiful in older forests and large diameter resting and denning trees. Chapin et al. (1997) and Payer and Harrison (2000) found that these structures also existed in younger stands that had been affected by spruce budworm in Maine, resulting in regular use by marten; 3) Prey abundance - marten are most successful hunting in old forest, but it is not clear whether the habitat offers more prey or the physical structure renders prey easier to catch. In Newfoundland, marten were closely tied to mature forests undoubtedly due to the limited availability of meadow voles (*Microtus pennsylvanicus*) in second growth balsam fir, up to 60 years after logging (Thompson and Curran 1995).

Payer and Harrison (2000) did not observe a higher selectivity for mature conifer over mature mixed stands or certain younger conifer stands (pole-sized) in central Maine. They suggested that Acadian forest provides complex physical structure and overhead cover in a wider variety of forest types than in western U.S.A. or in boreal forest. They noted that Lachowski (1997) found red-backed voles and deer mice more abundant in deciduous and mixed stands than coniferous stands in the northeast. Chapin et al. (1997) reported that 9 of 10 females, with less than 36% mature coniferous cover in their home ranges, were lactating in the spring. The Maine researchers suggest that

their findings support the hypothesis that vertical and horizontal structure may be more important habitat components than age alone, or species composition of the forest overstory.

Katnik (1992) found that marten avoided regenerating clearcuts at the landscape scale, but that within home ranges, regenerating clearcuts were used in proportion to availability. However, use was concentrated near edges of the harvest blocks and regenerating stands. Thompson and Colgan (1994), Bissonette et al. (1997), Potvin et al. (2000), and Payer and Harrison (2000a), found home ranges that included harvested forest were larger than those with only uncut forest. Thompson and Colgan (1987) found only 2 of 10 logged sites consistently contained marten whereas marten always occurred in uncut stands in Ontario. Potvin et al. (2000) found marten avoided clear cut patches in the boreal forest where the shrub layer and coniferous regeneration were scattered. Buskirk and Powell (1994) reported an increased preference for conifers and increased avoidance of open areas from summer to winter.

Payer and Harrison (1999) found the marten population in an uncut, untrapped Maine forest reserve were five times that in an adjacent industrial forest. In the industrial forest, forest characteristics related to stand maturity (taller trees, greater snag volume, and higher live-tree basal areas, particularly of deciduous trees) separated used and unused harvested sites. Unused sites had been clearcut 20 - 25 years previously and treated with glyphosate to control broad leaf plants. These stands had open overhead canopies, dense growth in the shrub layer but lacked tall trees and snags, and had an average tree height of 6.6 m and compared to stands used by marten where mean height was 10.3 m.

Thompson and Harestad (1994), Bissonette et al. (1997), Hargis et al. (1999), and Payer and Harrison (2000) suggested that there is a threshold response by marten to forest harvesting, and that the population response is abrupt and nonlinear when the threshold is exceeded. Payer and Harrison (2000) believed marten density and productivity would decline steeply when >40% of a landscape is converted from mature forest to early successional forest by clearcutting. Katnik (1992) and Chapin et al. (1998) found a median of 20% clearcuts within individual marten home ranges. Bissonette et al. (1997) found no female marten territories occurred where >31% of the residual forest had been removed. In Newfoundland, no adult marten occupied territories where >40% of the residual forest had been removed (Bissonette et al. 1997). Even at these levels of fragmentation, tall forest cover is still abundant in the landscape matrix, and marten could move about the landscape and not cross an opening.

Potvin et al. (2000) found open canopy regenerating clearcuts were avoided and made up <20% of male winter home ranges. Open and closed canopy regeneration sites combined made up <30 - 35% of home ranges. In Quebec, Potvin et al. (2000) found typical winter home ranges had <30 - 35% clearcuts and >40 - 50% uncut forest. Marten may avoid landscapes with abundant openings due to increased energetic costs of foraging, maintaining and defending territories (Thompson and Colgan 1994, Thompson

and Harestad 1994). Payer and Harrison (2000a) found marten selected for mature softwood, hardwood and mixedwood >9 m tall and against young stands, <6 m tall.

Several studies have examined marten use of forests after a budworm infestation, most finding that these stands are used and often preferred. Payer and Harrison (2000) found Maine budworm stands had the highest selection index ([use - availability] / availability) by marten. Chapin et al. (1997) showed budworm stands were chosen in proportion to their availability. Potvin et al. (2000) showed Quebec marten preferred mixedwood stands with a dense coniferous shrub layer resulting from budworm infestations 15 - 20 years earlier, over coniferous stands. Sturtevant et al. (1996) and Payer and Harrison (2000a) suggest vertical structure provided by snags, offsets the reduced availability of live trees particularly where coarse woody debris and understory vegetation are plentiful. Payer and Harrison (2000) described Maine and Newfoundland budworm stands having a poor overstory (<50% crown closure) but a well-developed horizontal and vertical structure that was suitable for marten. Payer and Harrison (1999) thought that the coarse woody debris, shrub understory and low-hanging branches in a budworm stand provided escape from predators, denning sites, thermoneutral resting sites, and access to prey.

Coarse woody debris (snags, downed logs, exposed root masses and stumps) plays an important role for marten in hunting and thermo-regulation (Buskirk and Powell 1994, Thompson and Colgan 1994, Chapin et al. 1997). They use subterranean or subnivean sites during winter for thermoregulation. In the mountains of Wyoming, Wilbert et al. (2000) studied resting sites in a harsh winter environment and found that marten preferred subnivean sites 75% of the time, especially when it was cold and snowfall had been heavy (but not settled or crusted). In spring, subnivean sites were used only 33% of the time with the animals preferring supranivean resting in sites exposed to the sun.

Buskirk and Powell (1994) describe marten as foraging close to structurally complex stands when snow depths are greatest, hunting by investigating (scenting) subnivean access points. When prey live above the snow, e.g., snowshoe hare, subnivean structure may be less important. Thompson and Colgan (1994) studying winter hunting of Ontario marten, found that despite less subnivean access points and fewer investigations in logged forests, marten hunted beneath the snow with similar frequencies to uncut forest. This implies that coarse woody debris was not a limiting factor in that area, and supports the thesis that marten hunt mostly for snowshoe hare in winter and take small mammals incidentally (Thompson and Colgan 1990). Most studies suggest that coarse woody debris levels must be above some minimum threshold. Gosse et al. (in press) found Terra Nova National Park marten used stands in proportion to their availability and did not select for stands with higher debris volumes. They explain that snowshoe hare populations were unusually high during the study so marten may not have needed subnivean access. Their coarse woody debris volumes averaged 29.75 m^3/ha. Payer and Harrison (1999) and Bissonette et al. (1997) point out that debris is above minimum thresholds in all Maine forests >12 m. Chapin et al. (1997b) observed marten showed no cover-type selection when choosing resting sites suggesting coarse woody debris levels surpassed threshold levels in all sites.

Payer and Harrison (1999) found that resident adult marten did not use 20 - 25 year old regenerating clear cuts with open over-head canopies, even though these sites did not differ in volumes of downed logs or exposed root masses from residual forests that marten used. They concluded that despite provision of coarse woody debris, marten will not use regenerating clearcuts until a threshold of overstory development is reached (between 14 and 18 m^3/ha). However, they point out these regenerating stands may be used by immature or transient marten. Snag volume was greater in used areas than unused areas of the industrial forest primarily due to snag height. It may be the height, offering escape cover that differentiates the two levels of use.

An important deficiency in most of the recent studies is the lack of consideration that habitat may be optimal or suboptimal, or that a range of habitat conditions occur. The possibility exists that marten 'make do' with available habitats, but have lower net annual productivity and shorter lifespans. There is a clear danger in confusing presence with selection. For example, in data from Quebec, no females were included, so no estimates of individual productivity were possible. The situation in Maine is confounded by a metapopulation situation involving a large source population in the untrapped, unmanaged state park. The home range sizes reported in Quebec, Maine and Newfoundland were all substantially larger than those from preferred habitats in Ontario, suggesting that the animals occupied less than optimal habitat. Further, much of the evidence suggests that there are local idiosyncrasies to marten habitat use, making generalization difficult without a comprehensive understanding of local conditions. Habitat use by marten in Cape Breton is not well known because no in-depth studies have been accomplished.

Recovery Habitat

Thompson and Harestad (1994) suggested that a minimum viable population of 240 marten would require about 600 km^2 of suitable habitat. They based this calculation on boreal forests that are likely typical of the Cape Breton Highlands.

Survival Habitat

Marten in Cape Breton are likely surviving in less than 200 km^2 of suitable habitat, or roughly one third of that required to maintain a viable population.

Habitat Trends

Habitat for marten in Cape Breton has declined since the first European settlement (Dodds and Martell 1971), and has declined dramatically as a result of a budworm infestation and subsequent salvage logging in the early to mid-1970's. Stora Enso (2002) predicts a further decline in available habitat in the next decade before new habitat grows sufficiently to maintain marten.

Habitat Protection / ownership

Much of Cape Breton is privately owned, except in the Highlands where the majority of lands are held by the Federal Government in Cape Breton Highlands National Park, and the Government of Nova Scotia for Provincial Crown lands. Most of the latter is under long-term lease to Stora Enso for forest management.

Residence

1.2 Threats

1.2.1 Loss of Habitat Quality and Quantity

According to Banks (1992) forest conditions in the central Cape Breton Highlands have changed radically since the mid-1970s when an outbreak of spruce budworm (*Choristoneura fumiferana* Clem.) reached epidemic proportions, killing 87% of the mature balsam fir stems by 1984 (MacLean and Ostaff 1995). This mortality translated to an estimated loss of 32 million m^3 of merchantable spruce and fir between 1974 and 1990 (NSDLF, 1994). Three large outbreaks such as this have occurred in North America over the last century, each time with devastating effect.

Between 1976 and 1987, a massive fibre salvage operation recovered 1,555,000 cords of dead and damaged softwood, or about 77,500 acres at 20 cords/acre. Art Lynds (pers. comm.) suggested that most of the salvaged areas were cleared of coarse woody debris, sprayed for competing vegetation, and replanted if there was insufficient balsam fir regeneration. During this period, considerable harvesting of yellow birch was also done, and many previous forestry operations have selected against yellow birch mixedwoods, replacing them with softwood forests. As marten generally prefer conifer-dominated mixedwood forests throughout their boreal range (Thompson and Colgan 1987, Potvin et al. 2000), consideration needs to be given to restoration of some of the mixedwood forest areas that previously occupied the southern Cape Breton Highlands.

The loss of suitable marten habitat on Cape Breton Island, both in terms of quality and quantity, as a result of previous logging and salvage logging following the mortality caused by spruce budworm, has been severe. Within 190,000 ha of land in western Cape Breton (Victoria County), <1% can be considered good or optimal marten habitat (Nocera *et al* 1999a). Based on modeling conducted by Stora Enso, over the next 10-20 years there will continue to be serious habitat shortages. Any hopes at recovering the marten population must include working closely with the forest industry to ensure that the remaining few areas of critical habitat are secured and protected and that present and future forestry plans allow for the continued availability of marten habitat.

The influence of forestry activities extends beyond habitat loss and disturbance. A large network of roads required to accomplish the salvage operations has resulted in a dramatic increase in recreational activities by humans, including trappers, on the Highlands. Expanding road networks associated with forest management can increase

trapper access in remote areas (Soukkala 1983, Thompson 1988) and may accelerate population declines. Exploited marten populations are vulnerable to overharvesting because of their low natality and high rates of capture (Strickland and Douglas 1987). In fact, extirpation of marten from much of their historic range has been linked to overtrapping (Yeager 1950, Thompson 1991). Marten were nearly eliminated from Maine by the 1930s (Aldous and Mendall 1941) prior to the enforcement of a trapping moratorium from 1937 to 1972. Further, marten are also readily caught in sets for other animals, especially hare, red squirrels and mink. Increased road access may also have made movements by some marten predators and competitors, such as fox and coyote, easier within the marten habitat that is available.

The Cape Breton Highlands plateau area is an extremely susceptible area to spruce budworm because of the high density of uniformly-aged balsam fir. This area, the only boreal forest ecoregion in the Maritime Provinces (Rowe 1972), is composed almost entirely of balsam fir, and, due to the previous outbreak and subsequent salvage; most of the area is 20-30 years old. Past attempts to increase species diversity in the area through planting met with little success due to the dominance of balsam fir in this eco-region. While it must be accepted that balsam fir will always dominate this area, it is possible to break up the age class structure, at a landscape scale across the Highlands, through planned management. Such management would have the effect of reducing the size of contiguous areas susceptible to budworm attack, and help to minimize the impact when future outbreaks do occur. A modelling exercise by Stora Enso (2002) based on past outbreaks, has provided a prediction of when another outbreak will likely occur based on extrapolation of past outbreak frequencies for the Cape Breton Highlands area.

The roughly 30 year predicted time between outbreak occurrences agrees with research findings for other areas (*e.g.* Royama, 1984). It should be noted that only the timing of outbreaks was modelled, not their predicted severity. This assumes that outbreaks may occur regardless of forest conditions, and that severity depends on forest conditions at the time.

1.2.2 Incidental Loss to Fur Harvesters

Since 2000, it has been illegal to trap for marten in Cape Breton. However, marten can and have been caught in traps that are legally set for other species including snowshoe hare, coyote, mink, red squirrel, and ermine throughout their range. In Newfoundland, incidental by-catch of marten in hare snares is a serious cause for concern (Forsey et al. 1995). There have been no reports of marten by-catch from Cape Breton fur harvesters since 1991. However, this lack of documentation does not mean incidental loss has not occurred. Any traps set for other species are potential risks to marten. In small populations, the consequences of accidental can be severe. The loss of even a few breeding adults (especially females) could have serious implications for the future of the Cape Breton marten.

1.2.3 Loss of Genetic Variation and stochastic events leading to local extinction

The small, localized population of marten on Cape Breton Island is highly vulnerable to stochastic events such as disease, forest fires, and extreme weather events (e.g., ice storms or excessive snow). Natural events such as consecutive low food years or increased predation risk could cause mortality to exceed production. The population level is so low that any additive decline in population numbers could lead to the extirpation of this population.

Given the high degree of fragmentation of optimal habitat on Cape Breton, and extreme low population level, it is possible that Allee effects are occurring if adults are isolated from potential mates and therefore reproductively inactive (Scott 2001). Furthermore, a scenario of a very small and isolated population increases the probability of a loss of genetic variability due to inbreeding and stochastic events. Seven marten from CBI showed extremely reduced levels of microsatellite size variation (seven loci typed) and mitochondrial DNA sequence variation (1140 bp of cytochrome b) relative to mainland NS and other mainlaind marten populations (Johnson et al. 2006, In Prep, or Personal Communication). The potential effect of deleterious genetic loading on the population is unknown, but must be considered a threat. It should be noted that with even an optimistic population size of 30-50 animals, the likelihood of local extinction of the CBI marten population due to a combination of demographic, genetic, and stochastic events (the extinction vortex) in the near future is very high. The most plausible solution to this threat would be to increase the wild marten population size and distribution, through increased habitat connectivity to foster dispersal and gene flow from nearby populations and to physically introduce marten from other populations to CBI.

1.2.4. Lack of public awareness.

The success of recovery efforts will depend on an informed and engaged public that is aware of the threats facing marten populations on Cape Breton and will participate in, or at least not impede, recovery efforts. Recent work to increase the public's awareness of the plight of the Cape Breton marten population has focused on stakeholder groups, such as fur harvesters and forest practitioners, who can have an impact on the population, individuals within the population and their habitat. Other initiatives have involved holding workshops and meetings with local interest groups and communities, the publication of brochures, newspaper and magazine articles, and radio interviews.

1.2.5. Knowledge gaps

The most significant knowledge gaps impeding prospects for marten recovery in Nova Scotia are: 1) relative importance of threats facing the Cape Breton population; 2) incomplete knowledge on the distribution and population size of Cape Breton and mainland populations; and 3) baseline ecological information specific to all Nova Scotia marten populations, including habitat associations, home range size, dispersal, and seasonal movements of Cape Breton marten.

Among the potential threats to marten on Cape Breton that requires better documentation is the extent of accidental mortality in commercial traps and hare snares and how significant a role this threat plays relative to that of habitat availability. Given the small population, any mortality is significant and so it is important to determine whether such mortality is regularly occurring. There is incomplete knowledge about marten distribution in Nova Scotia, and as a result, considerable uncertainty regarding population numbers, particularly within the Cape Breton populations, which could number as few as 10-50 individuals. Several areas are difficult to work in owing to topographical, logistical and weather (snow depth) limitations. These areas, predominantly river valleys, as well as other wooded areas of the lowlands need to be surveyed and monitored throughout the recovery process. Finally, availability of habitat as a significant factor impacting recovery prospects for marten on Cape Breton Island needs to be better understood. Marten habitat use is often ecosystem-specific and improved knowledge about specific habitats preferred on Cape Breton and the mainland is required. For example, given that marten were once found throughout the Island, including the lowlands, it is possible that today's distribution on the Highlands is only that of a remnant population in a relatively protected reservoir (M. O'Brien, NSDNR, pers. comm.). Also, a better understanding of marten habitat associations in western Nova Scotia has important potential applications for improvement of marten recovery on Cape Breton.

1.3 Critical Habitat

1.3.1 Identification of the Species' Critical Habitat (proposed*)

In 2004, the Recovery Team accepted the Marten Special Management Practices (SMPs) put forward by the Habitat sub-committee. These guidelines included a Marten Habitat Management Zone (MHMZ) derived from modelling, local experience, and the inclusion of some of the old moratoria areas.

These SMPs are designed: 1) to minimize threats to marten populations concurrent with ensuring no further declines in the currently estimated population of 20 to 30 marten over the next five years; 2) to foster an increase in free-living marten population of Cape Breton Island to a level such that the species is not threatened with extirpation, by achieving sufficient habitat to support a population of 30+ marten in 2010, a population of 100+ marten by 2030 (75 in the highlands and 25 on other holdings), with a goal of 250 marten in the highlands, with an additional 100 marten in the lowlands by 2040; 3) to ensure that a minimum of 20,000 ha marten forest habitat is available, in individual blocks as large as possible, and no smaller than 500 ha during the next 10 years on the CBH through various protection measures, such as harvesting and road construction restrictions, and proactive management of insect infestations; 5) to plan, model, identify, and actively manage for future habitat to enable a minimum of 50,000 ha of marten habitat on Cape Breton (uplands and lowlands), including planning habitat mosaics on the landscape to reduce the probability of insect infestations to as low as possible, while enabling functional connectivity for marten among core habitat areas.

Marten Habitat Management Zone (MHMZ) and SMP approach

Within the MHMZ: 30 home range patches identified immediately, with an additional 25 home range patches developed for year 2030, for a total of 55 home range patches present in 2030. Guidelines for home range patches include; a minimum of 500 ha and circular in shape; contain a minimum of 60% (300 ha) marten habitat, and patches may migrate over time and space.

Special Harvesting Practices on the Cape Breton Highlands

- 12-14 per hectare standing or down whole green trees (not processed) must be left evenly spaced throughout the harvest site.
- All other practices with regards to the Wildlife and Watercourse Protection Regulations must be followed.
- Large yellow birch trees should be left standing.

1.3.2 Examples of Activities that are Likely to Result in the Destruction of Critical Habitat

Under revision.

1.3.3 Existing and Recommended Approaches to Habitat Protection [Optional]

Marten Habitat Management Zone, Cape Breton Highlands National Park, Wilderness Protected Areas

1.3.4 Schedule of Studies

Under revision.

1.4 Actions Already Completed or Underway

Separate document - Under revision.

1.5 Knowledge Gaps

Important knowledge gaps impacting recovery of marten in Nova Scotia are listed in the threats section above, Apart from this, there is sufficient general understanding of marten population dynamics and habitat needs to enable recovery of the species on Cape Breton.

2. RECOVERY

The Recovery Strategy is the first part of the two-part Recovery Plan and presents a strategic framework of the goal and objectives necessary to protect and recover American marten. The Recovery Strategy includes goals, objectives, and approaches

and how they interact in the process to recover marten on Cape Breton Island. These are strategic in nature and are used to guide the development of recovery actions. This section also includes a brief assessment of potential management impacts on other species and ecological processes, and a description of the process for overall evaluation.

2.1 Recovery Feasibility

For the next decade, recovery of marten (without direct human intervention) to a viable level is at best uncertain and highly problematic. The dearth of available habitat makes survival of the population highly uncertain. However, recovery is highly feasible with re-introductions starting within 5 years, whether from raised captive marten, or marten taken from New Brunswick (for example).

Anticipated Conflicts or Challenges
The main conflict about maintaining marten habitat is continued harvesting of forest resources on the Highlands over the next 10 years. After that time, as more habitat becomes available conflicts over resource use will ease. Another potential conflict will arise should the Recovery Team deem it essential to close various areas of the Highlands to hare-snaring to eliminate accidental mortality. A similar conflict will result with mink and squirrel trappers should sets unlikely to also capture marten be required.

2.2 Recovery Goal

To restore a self-sustaining population of American marten on Cape Breton Island.
The persistence of small populations is often doubtful, but small populations do not necessarily go extinct. Nevertheless, problems facing small populations are considerable and may include various Allee effects, and a high probability that mortality from disease and predation will exceed recruitment. Thompson and Harestad (1994) suggested that a minimum viable population (MVP) (persistence for 200 years) for marten was about 240 animals and all evidence suggests that the current CBI population is far below this level. The Recovery Committee believes that considerable effort must go towards maintaining and enhancing existing habitats, and eliminating accidental mortality, if the species is to survive.

To foster an increase in the free-living marten population of Cape Breton Island (CBI) to a level such that the species is not threatened with extirpation, by achieving sufficient habitat to support a population of 30+ marten in 2010, a population of 100+ marten by 2030 (75 in the highlands and 25 on other holdings), with a goal of a MVP of 250 marten in the highlands, with an additional 100 marten in the lowlands by 2040.
The projected numbers (the population goal of 250) are based on the habitat projections done by StoraEnso (2002), coupled with estimated possible production. The StoraEnso model was based on growth modelling for balsam fir forests, and harvesting projections in their current planning cycle.

2.3 Recovery Objectives (including population and distribution objectives)

Objective 1. Supplement the Cape Breton Island marten population.

> Objective 1a. Develop and act on an augmentation plan for the Cape Breton Island marten to foster a long-term increase in population to a level such that the species is not threatened with extirpation, by maintaining a population of 30+ marten by 2010, a population of 100+ marten by 2030 (75 in the highlands and 25 on other holdings), with a goal of a MVP of 250 marten in the highlands, with an additional 100 marten in the lowlands by 2040, in conjunction with the habitat supply in objectives 2a and b.

Rationale: Recent genetic analyses based on mitochondrial DNA sequence analysis and microsatellite size variation at nine loci, conducted by the Laboratory of Genomic Diversity, National Cancer Institute (USA), have found no diagnostic differences between CBI marten and mainland populations. This low level of differentiation with populations from Ontario and Quebec suggest that these existing populations have been isolated for a relatively short time (Johnson et al. 2006 OR Personal Communication).Now, a clear option exists to re-populate the Cape Breton area with marten through re-introduction of marten to the area. Reintroductions of marten have been successful in many areas of North America (Strickland and Douglas 1987). Recent habitat analysis suggests that over 100,000ha of marten habitat is available, but is patchy and highly fragmented. However, approximately 30,000 ha of this is considered suitable in terms of size, contiguousness, and protection given the management regimes in place.

Objective 2: To improve knowledge important for marten recovery efforts

> *Objective 2a.* To complete an assessment of relative threats to Cape Breton marten and to determine, so far as possible, the relative contributions of various threats to the existing and future marten population by 2007.
>
> *Objective 2b.* To improve knowledge of distribution and number of the CBI population.

Rationale: The status and relative contribution of short-term and long-term threats to the Cape Breton marten must be determined as a part of the planning process. While the recovery team believes that marten are limited by habitat availability and fragmentation at the present time, other short-term threats such as accidental mortality and disease may be important in the population and limit its growth. Further, the task of determining the number and distribution of marten throughout Cape Breton must be continued.

Objective 3: To secure habitat for the Cape Breton marten population over the next five years

Objective 3a. To ensure that a minimum of 20,000 ha marten conifer-dominated and mixedwood forest habitat is available, in individual blocks as large as possible, and no smaller than 500 ha ***during the next 10 years*** on the Cape Breton Highlands

Objective 3b. To plan, model, identify, and actively manage for future (i.e., beyond 10 years) habitat to enable a minimum of 50,000 ha of marten habitat on CBI (uplands and lowlands), including planning habitat mosaics on the landscape to reduce the probability of an insect infestation to as low as possible, while enabling functional connectivity for marten among core habitat areas.

Rationale: The persistence of small populations is often doubtful, but small populations do not necessarily go extinct, although the probability is high that they will. Nevertheless, problems facing small populations are considerable, include various Allee effects, and a high probability that mortality from disease and predation will exceed recruitment. Thompson and Harestad (1994) suggested that a minimum viable population (MVP) (persistence for 200 years) for marten was about 240 animals and all evidence suggests that the current CBI population is far below this level. Continued loss of genetic variation can only be addressed by combining efforts to supplement marten with mechanisms ensuring sufficient connectivity exists among habitat areas across the CB landscape. Protection measures would include harvesting and road construction restrictions, and proactive management of insect infestations.

The recovery prospects for the species in the short term are problematic because of an exceptionally low population and possible genetic factors resulting from decreased genetic variability. We hypothesize that the main problem facing the existence of the species is the current lack of optimal habitat. Based on modelling data from StoraEnso (B. Locke, 2002), this habitat bottleneck will last for another 10-20 years. Therefore the initial focus of the plan must be to maintain the existing habitat, and to improve other available but sub-optimal habitat on the Cape Breton Highlands (CBH) and in the surrounding areas. The size of areas suggested in objective 3a represents areas that may be possible, based on availability, during the next decade.

Deleted:

Although the most pressing activities are to protect and manage current habitats, the future habitat supply must be considered now, so that another habitat bottleneck does not occur in time. Salvage logging of budworm-logged areas is not part of the solution and work from Maine clearly suggests that budworm killed areas do make suitable marten habitat (Payer and Harrison 2000a).

Objective3c. To test the feasibility of habitat manipulation of mature pre-commercially thinned forest habitat

Rationale: Considerable areas of intensively managed balsam fir forest exist in the Cape Breton Highlands. It is the opinion of marten biologists (field visit, 2000) that these

stands currently lack the necessary structure to be other than marginal marten habitat throughout the mature stage. However, it may be possible to increase the quality of these stands to marten by creating downed woody material, and small openings to enhance prey populations, to which marten may respond. If this occurs it would be possible to increase the amount of currently available habitat during the next decade. The committee recommends that the feasibility of this approach be tested to determine if this tool could be used to improve its quality for prey and marten and monitor responses of prey and marten through 2006, with a view to expanding the efforts to large areas in 2007, followed by subsequent modelling to determine effectiveness at a landscape scale.

Objective 4: To minimize to the extent possible accidental mortality from trapping and snaring by 2010.

Rationale: Any mortality in small populations is consequential and is a constant short-term threat to the remaining Cape Breton marten. Obviously certain natural mortality through predation, disease, accidents, and old age cannot be controlled, but mortality caused directly by humans can be reduced through legislation and management. Often, in rural areas, fur-trapping and hare snaring are important cultural and income-supplementing activities. For example, in Newfoundland hare snaring is an extremely common activity, but one that has been recognized as an important source of mortality for marten (Forsey et al. 1995). There is no recent evidence of accidental mortality of marten by snaring or trapping in Cape Breton. Still it is important to minimize potential for accidental mortality.

Objective 5. To raise public awareness of the concern for marten on Cape Breton Island and involve relevant stakeholders in stewardship activities.

Rationale: Public awareness and support from stakeholders is advantageous for marten recovery on Cape Breton Island. Stakeholders can provide useful information on local sightings and help with stewardship activities such as land management and public education, beneficial to marten recovery. Furthermore, trapper education can help reduce/eliminate incidental captures of marten. Marten recovery on CBI requires a joint effort from both public and stakeholders alike.

Objective 6. To review the recovery plan objectives every 2 years with a view to modifying, deleting, or adding objectives based on improved knowledge.

Rationale: Any of these objectives may become obsolete, or need to be changed as a result of changing circumstance or improved knowledge and information. It is important to periodically review the objectives and to add and delete objectives through time.

2.4 Activities to Meet Recovery Objectives

Under revision.

STEPDOWN LIST OF OBJECTIVES, ACTIONS & PRIORITIES:

Under revision.

2.5 Recommended Approach for Recovery

Uncertain knowledge about the status of other older forest species in Cape Breton excludes approaches other than single species. At this time and within this plan our approach is directed toward restoration of a single species. As new information becomes available other species and recovery planning actions/approaches (multi-species etc) may be considered in future.

2.6 Effects on Other Species

Management to maintain marten should have benefits for other late successional forest species but would reduce total habitat availability for early successional forest species. However, with planning at the large landscape scale to maintain forest types and ages, all species should be maintained with a continual objective for a certain percentage of older forest sufficient to maintain older forest species.

2.7 Evaluation

Success of the program can be determined by indexing (monitoring) the marten population over time including tracks and live captures. The advantages and success versus the costs of such an undertaking are questionable given such a small marten population.

2.8 Statement of When One or More Action Plans in Relation to the Recovery Strategy will be Completed

Separate document - Under revision.

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