American Marten
(Martes americana)

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Martens are small- to medium-sized carnivores of the weasel family (Fig 1). Martens may weigh up to 3.7 lb (1.7 kg), and males are about 40% larger than females. Martens occur throughout most of the northern conifer forests of North America from New England and eastern Canada to the Pacific Coast from northern California through northern Alaska. Generally solitary animals, martens are closely affiliated with mature or old-growth forests across their range. The marten has luxurious fur ranging in color from light tan to dark brown, and is one of the most highly valued and heavily trapped furbearers in the North.

FIG 1. Marten occur throughout forested habitats throughout the mainland and many islands of southeastern Alaska. (Bob Armstrong)

STATUS IN SOUTHEASTERN ALASKA

Distribution

Martens occur throughout most of the forested areas of Alaska and are distributed along the mainland coast of southeastern Alaska (Southeast) and many of the islands of the Alexander Archipelago (MacDonald and Cook 1999) (Fig 2). Martens are endemic to Admiralty, Etolin, Gravina, Kuiu, Kupreanof, Mitkof, Revillagigedo, Woewodski, and Wrangell islands (MacDonald and Cook 1999). Introduced populations also occur on Prince of Wales (POW), Baranof, and Chichagof islands as well as a number of smaller islands near the larger islands of Prince of Wales, Baranof, and Chichagof (MacDonald and Cook 1999).

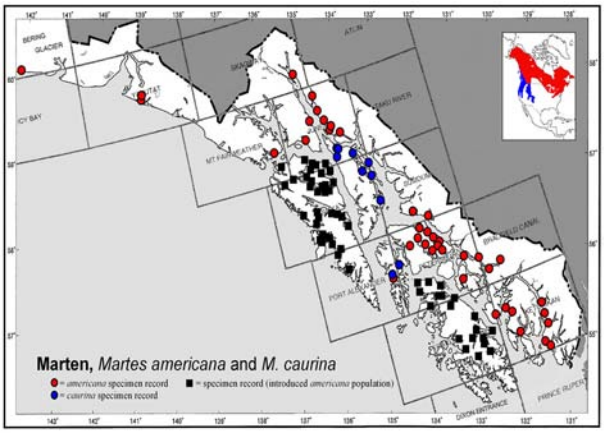

FIG 2. Range map showing the specimen records for martens throughout southeastern Alaska (from MacDonald and Cook in press). Note the distribution is broader than the specimen records indicate.

Abundance

Marten densities vary throughout their range in Southeast, depending on habitat conditions, prey densities, and trapping pressure. Flynn et al. (2004) reported female marten densities in Southeast ranging

from 0.12 per 1,000 acres (0.3/1,000 hectares) to 0.69 per 1,000 acres (1.7/1,000 hectares). The highest densities occurred on Chichagof Island, and the lowest densities occurred on Etolin and Kuiu islands. Marten densities varied substantially during a 10-year period on Chichagof Island and male-to-female ratios also varied. Marten densities were generally highest in the fall, and the biomass of long-tailed voles *(Microtus longicaudas)* were the best predictors of marten density (Flynn et al. 2004).

Taxonomic Considerations

Two distinct lineages of martens occur in Southeast, corresponding to the coastal M. a. caurina and continental M. a. americana lineages (Cook et al. 2001). Recent molecular data suggest that these lineages should be considered distinct species (Small et al. 2003). The caurina lineage occurs on only two islands in the Alexander Archipelago, Admiralty and Kuiu; the Haida Gwaii (Queen Charlotte Islands) off the northern British Columbia coast; Vancouver Island; and portions of the western United States (Cook et al. 2001). For further information on endemic mammals in Southeast, refer to Chapter 6.7.

Significance to the Region and Tongass National Forest

The marten is the most important furbearer in Southeast and contributes to the annual income of a number of individuals, particularly from smaller towns in Southeast. The average annual number of martens trapped in Southeast from 1999 through 2003 was 2,537, with an average pelt value of $36.86 (Peltier 2005). From 1991 to 2002, the mean annual marten harvests varied from 224 martens per year on north central Prince of Wales Island to only three martens per year on northern Kuiu Island (Flynn et al. 2004). The total estimated value of marten furs in Alaska was $588,075 during 2003–2004 (Peltier 2005).

Martens were designated a Management Indicator Species (MIS) under the U.S. Forest Service (USFS) 1997 Tongass National Forest Land and Resource Management Plan (TLMP) (USFS 1997a). MISs are selected by the USFS for emphasis in planning and are monitored during forest plan implementation to assess the effects of management activities on their populations and the populations of other species with habitat needs that are similar to those represented by the MIS (USFS 1997b). Martens were also chosen as a "design" species for medium-sized old-growth reserves (10,000–40,000 acres [4,047–16,188 hectares]) in the 1997 TLMP (USFSa) conservation strategy. This designation was made because of the spatial requirements of the marten and the close relationship of the marten with old-growth forests throughout its range in Southeast (Suring et al. 1993, Flynn et al. 2004). The assumptions were that old-growth reserves (OGRs) would provide adequate habitat to ensure well-distributed, viable populations and the managed forest would provide dispersal habitat among OGRs.

HABITAT RELATIONSHIPS

The median home range of radio-collared martens on northeast Chichagof Island was 1,310 acres (530 hectares) for females and 1,920 acres (777 hectares) for males (Flynn and Schumacher 1993, Flynn et al. 2004). Maximum dispersal distances for martens in Southeast ranged up to 62 mi (100 km) (Flynn and Schumacher 1997). The marten mates during July and August, but implantation of the egg is delayed for up to eight months. Litters averaging three young are born in April or May, and young martens are able to forage independently by autumn. Denning occurs within cavities found in large trees, snags, and hollow logs as well as under the roots of trees or snags (Schumacher 1999, Flynn and Schumacher 2001). In winter, martens prefer resting in root cavities, snags, and underground sites that provide protection from the elements (Flynn and Schumacher 1999).

Flynn and Schumacher (2001) summarized a long-term ecological study of martens on northeastern Chichagof Island in an area encompassing a mix of old-growth forests and clearcuts. In that study, radio-collared martens on Chichagof Island made extensive use (82%) of forested habitats and limited use of shrub fields (7.5%), recent clearcuts (6.8%), and sparsely vegetated habitats (4.2%). Within the forest habitat, radio-collared martens primarily used large-tree and medium-tree old growth (48%); scrub forests (12%) and second-growth stands (3%) were used less often. Martens strongly selected for large-tree old growth, particularly during the winter season (Flynn and Schumacher 1999, 2001). About 68% of radiotelemetry locations of martens occurred below 820 ft (250 m) (Flynn and Schumacher 2001). Similar to marten studies in other regions of North America (Buskirk and Ruggiero 1994, Chapin et al. 1997), old-growth forests represented the most heavily used habitats by martens in Southeast (Fig 3). Marten densities are also higher in intact forests with less fragmentation (Chapin et al. 1998, Hargis et al. 1999, Flynn et al. 2004).

FIG 3. Old-growth forests are diverse and structurally complex and are used extensively by marten as feeding and denning habitats throughout their distribution in southeastern Alaska. (John Schoen)

Seasonal movements and habitat use are strongly influenced by food availability. Martens are considered a generalist predator and consume a variety of prey, including small mammals, birds, fish, carrion, and berries (Martin 1994, Ben-David et al. 1997). The most substantial study of marten diets in Southeast was conducted on northeastern Chichagof Island using stable isotope analysis (Ben-David et al. 1997). In summer, marten diets consisted of berries (13–22%), small rodents (17–21%), birds (30–47%), and squirrels (22–35%) (Ben-David et al. 1997). Many migratory and resident songbirds are available from early May until September. These included the migratory dark-eye junco *(Junco hyemalis)*, robin *(Turdus migratorius)*, varied thrush (*Ixoreus naevius*), hermit thrush *(Catharus guttatus)*, Swainson's thrush *(Catharus ustulatus)*, resident Steller's Jay *(Cyanocitta stelleri)*, blue grouse *(Dendragapus obscurus)*, and winter wren *(Troglodytes troglodytes)* (Ben-David et al. 1997). Mammal prey included Keen's deer mice (*Peromyscus keeni*), long-tailed voles (*Microtus longicaudus*), and red squirrel *(Tamiasciurus hudsonicus)*.

The fall diet of martens included berries (14–31%), small rodents (37–45%), salmon (7–33%), and squirrels (15–22%) (Ben-David et al. 1997). High variability of individual marten diets was observed during autumn. In years when small rodents were abundant, most marten diets included higher proportions of small rodents; in years when rodents were less abundant, some martens consumed higher percentages of salmon (Ben-David et al. 1997, Flynn et al. 2004).

The diet of martens in spring consisted of deer *(Odocoileus hemionus)* carcasses (26–32%), small rodents (33–37%), salmon (8–14%), squirrels (16–17%), and crabs (8–9%) (Ben-David et al. 1997). Winter-kill carcasses of black-tailed deer represented a significant portion of marten diet in winter that was unavailable at other times of the year. Optimal winter deer habitat is generally found in large- and medium-tree old growth below 1,000 ft (305 m).

FOREST ECOLOGY AND MANAGEMENT

Forest Composition and Timber Harvest

Temperate coniferous rainforests cover more than 11 million acres (4.5 million hectares), or about 46%, of the land area of Southeast (Hutchison and LaBau 1975, Harris and Farr 1979). The majority of the forested land in Southeast occurs in the Tongass National Forest, which makes up 80% of the Southeast land base (USFS 2003). About two-thirds of the Tongass is forested, although productive old growth encompasses only 5 million acres (2 million hectares) (~30%) of the land area in Southeast (USFS 2003). The USFS (2003) defines productive old growth as "…forest capable of producing at least 20 cubic ft of wood fiber per acre per year."

Old-growth forests are diverse and highly variable in structure. Productive old-growth forest (where all commercial logging occurs) represents about one-third of the land base of the Tongass. Productive old growth below 800 ft (244 m) represents only 18% of the Tongass (USFS 2003). This old growth is the most important marten habitat. The most productive stands of large-tree old growth are rare in Southeast, representing only 3% of the Tongass land base (USFS 2003). For more description of the ecological structure and composition of old growth, see Chapter 5.

Clearcutting is the dominant timber harvest method in Southeast (USFS 1997). Forest succession in Southeast following clearcutting has been described by Harris (1974), Harris and Farr (1974, 1979), Wallmo and Schoen (1980), and Alaback (1982). In general, herbs, ferns, and shrubs grow abundantly several years after logging and peak at about 15 to 20 years. At about 20 to 30 years, young conifers begin to overtop shrubs and dominate the second-growth stand. After 35 years, young conifers completely dominate second growth, the forest floor is continually shaded, and most vascular understory plants disappear, resulting in poor foraging habitat for herbivores and lower prey densities for carnivores (Fig 4). Young second growth has less

structural diversity (including fewer large trees and snags) and generally lower wildlife habitat values than old growth. It takes several centuries before second-growth stands begin to develop the ecological characteristics of old growth. For more detailed information on forest succession, see Chapter 5.

IMPLICATIONS FOR CONSERVATION

The density of marten populations is related to habitat quality, prey density, and trapping pressure. Although martens are widely distributed throughout the northern forests of North America, the impacts of clearcutting forest habitat on marten populations is relatively consistent (Buskirk 1992, Buskirk and Ruggiero 1994, Flynn et al. 2004). Martens preference for the complex structure of mature and old-growth forests has been observed in populations throughout their geographic range, including Newfoundland (Thompson and Curran 1995), Maine (Chapin et al. 1997; Soutiere 1979), Utah (Hargis et al. 1999), and Southeast Alaska (Flynn et al. 2004). And forests with less fragmentation generally have higher marten densities than those that have been fragmented by timber harvest (Chapin et al. 1998, Hargis et al. 1999, Flynn et al. 2004).

The 1997 TLMP (USFS 1997b) states “old-growth forests have the highest value” to martens “because they intercept snow, provide cover and denning sites, and provide habitat for prey species used by martens.” In Southeast, sites for resting and denning are important for marten conservation. The large trees, snags, and logs utilized by martens for dens and resting areas are found primarily in old-growth forests (Flynn and Schumacher 1999). Roadless old-growth areas also provide refugia from trapping pressure. The natural fragmentation and island biogeography of Southeast introduce unique conservation concerns on the inability of martens to replenish overtrapped or diminished populations through immigration. Populations that have become isolated or reduced in size face increased risks of extirpation from inbreeding, genetic drift, and random environmental events (Flynn and Schumacher 1997).

Martens survive harsh winter conditions by selectively using the structurally complex habitat of old-growth forests. Key structural components of old-growth forests include cavities in the boles and roots of large trees, living branches, fallen logs, and woody debris. This complex forest structure offers martens refuge from predators and deep snow accumulations, as well as access to prey living beneath the snow, while minimizing energy expenditure (Buskirk 1992). Clearcuts and forest openings reduce forest cover, exposing martens to much higher snow accumulations, predation risks, and reduced denning and resting habitats. Flynn et al. (2004) suggested that partial harvesting that retains >50% of the basal area of a stand consisting of variable sized trees as an alternative to clearcutting. Partial harvesting would maintain

FIG 4. Second-growth forests like this 50 year-old stand provide lower habitat values for marten in southeastern Alaska. (John Schoen)

important marten denning and resting areas (such as snags and hollow logs) that would be diminished by clearcutting. Partial harvesting would also retain structural features of the habitat that support productive prey populations and access to subnivean (beneath the snow) foraging areas.

The marten was a design species in development of the TLMP conservation strategy and the system of medium and large old-growth reserves (OGR). The TLMP conservation strategy assumed that in years of low prey abundance, medium and large OGRs would support 5 and 25 resident female martens, respectively. Flynn et al. (2004) tested that assumption and determined that it is unlikely that large OGRs would support 25 female martens in all areas. They suggested increasing the size of OGRs and the proportion of high-quality habitat within reserves and the matrix to support higher densities of martens and meet the goals of the conservation strategy.

Prey availability is a significant factor in maintaining healthy marten populations. Wide fluctuations have been observed in marten prey populations in Southeast, and marten abundance was best predicted by the abundance of long-tailed voles (Flynn and Schumacher 2001, Flynn et al. 2004).

When small-mammal prey populations are low or not readily available, martens switched to alternative prey such as salmon carcasses (Flynn and Schumacher 2001). Therefore, protecting salmon spawning runs and the adjacent riparian habitats may provide an important conservation tool for sustaining marten populations through periodic declines of small-mammal populations (Flynn et al. 2004).

One of the most significant concerns for sustaining marten populations is the indirect effects logging roads have on increasing trapping pressure on marten populations, which can lead to overharvesting (USFS 1997, Flynn et al. 2004). Helicopter logging provides an alternative to road construction and would minimize the indirect impacts of increased access to marten populations by maintaining refugia from trapping (Flynn et al. 2004).

In summary, the most effective approach for maintaining viable marten populations that are well distributed throughout their range in Southeast would be to maintain a sufficient number of intact watersheds within island populations, biogeographic provinces, or both where martens occur. Protecting a sample of roadless watersheds with a diversity of old-growth forest habitats, including large- and medium-tree stands, would maximize the availability of high-quality marten habitat at low elevations and minimize forest fragmentation and trapping pressure from logging roads. Providing dispersal corridors among habitat reserves would also increase conservation options.

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