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FOOD CACHING AND HANDLING BY MARTEN

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Various studies provide evidence of food caching by marten (*Martes americana*). Marten have been seen uncovering or retrieving food items (Murie 1961, Simon 1980, Buskirk 1983), but whether these items were initially cached by marten was unknown. Hawbecker (1945) and Thompson (1986) documented food concealment by marten, but neither reported subsequent recovery of prey. Due to lack of evidence, Stordeur (1986) concluded that caching of food is uncommon in marten. Prey caching has important implications for foraging frequency and energetics of marten.

Study Area and Methods

The primary objective of our research was to quantify changes in marten home range characteristics and habitat use following the fragmentation of a subalpine coniferous forest. An ancillary research objective was to describe the characteristics of marten resting sites. Our study area was in the Medicine Bow National Forest, 18 km south of Encampment, Wyoming. The area was characterized by stands of lodgepole pine (*Pinus contorta*), Engelmann spruce (*Picea engelmannii*), and subalpine fir (*Abies lasiocarpa*). Small meadows and rock outcrops were interspersed throughout the area. Elevations at the observation sites ranged from 2935 to 3387 m.

Most observations were made during field efforts to locate resting sites of radio-collared marten. Resting sites were defined as locations in which a marten remained stationary and inactive for at least 0.5 h. The radio-signal strength was monitored for 0.4–1.5 h from a distance of at least 70 m. After the signal indicated inactivity, the potential resting site was quietly approached on foot to avoid alerting the marten or causing it to flee. Precautions were made to minimize the observer's influence in order to maximize observations of natural behavior. These precautions included reduction of receiver volume, concealment of the observer, and removal of shoes if necessary.

Observations

Case 1.—9 June 1987, 1445 h. Adult male marten M3 was seen carrying the hind half of a snowshoe hare (*Lepus americanus*) for about 20 m near a known resting site. He cached the hare under a leaning stump and then foraged within 400 m for about 0.5 h before returning to the hare and carrying it away.

Case 2.—8 July 1987, 1015 h. M3 was seen foraging in and around a rock outcrop. After 5 min the marten emerged from the rocks, grasping a juvenile yellow-bellied marmot (*Marmota flaviventris*) by the neck. He immediately carried the prey approximately 550 m, deposited it in a rock crevice in a road fill, and then left the site. There were six marten scats at the entrance of this den, indicating prior use by this or other marten.

Case 3.—1 September 1987, 1900 h. M3 was found resting in a bushy-tailed wood rat (*Neotoma cinerea*) nest in a rock outcrop. He growled a few times and then ran away, carrying an unidentified mammal.

Case 4.—9 September 1987, 1730 h. M24 was found resting in a rock outcrop. As the observer approached, the marten peered from a crevice before disappearing back into the rocks. After a few seconds he emerged and fled, carrying a chipmunk (*Tamias* spp.).

Case 5.—22 September 1987, 1300 h. M3 was seen feeding on a freshly killed Blue Grouse (*Dendragapus obscurus*) next

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to a large log. The marten carried the grouse about 40 m and cached it in branches of a recently felled pine, then retreated to a nearby resting site under a different log. Two Blue Grouse feathers, one Northern Flicker (*Colaptes auratus*) feather, and two Gray Jay (*Perisoreus canadensis*) feathers were found at the entrance to the resting site. After 25 min the marten ran from the den, took the grouse, and headed downslope.

CASE 6.—27 July 1988, 1605 h. The observer heard F28 killing a juvenile Blue Grouse in an alder (*Alnus tenuifolia*) bog. A few minutes later she was observed eating the grouse inside a hollow log approximately 25 m from the kill site. During this time an adult grouse was heard giving the brood-gathering call. When one of the young responded with a call, the marten left the dead grouse in the log and stalked the live young. It located a young grouse in a tree and made an unsuccessful attempt to catch it. Upon returning to the original prey, the marten saw the observer and left without the cached grouse. The prey had been removed from the log by 1400 h the following day.

CASE 7.—31 January 1989, 1240 h. M35 found a piece of beaver meat (trap bait) at our field camp. He carried the meat 15 m away, climbed up a tree, and moved out onto a limb heavily laden with snow. He dug a hole in the snow, placed the meat in it, and then covered the meat with snow before descending the tree. He continued to move about the camp area, searching for additional food.

CASE 8.—26 July 1989, 0710 h. A hidden observer witnessed M35 cache a red squirrel (*Tamiasciurus hudsonicus*) under a shelter at the field camp. After caching, the marten immediately left. Approximately 12 h later (1930 h), M35 was observed retrieving the squirrel.

CASE 9.—3 August 1989, 1050 h. Red squirrels were heard scolding F37 at their midden. At 1115 h the marten was seen at the base of a snag 150 m from the midden. She had a squirrel forearm in her mouth as she ascended into the broken top of the snag. Within moments she descended without the forearm and left the area. Inside the snag was found the squirrel forearm and the hind one-third of a squirrel. Within an hour the marten was out of telemetry range.

DISCUSSION

For our purposes "caching" is defined as the act of concealing food for later consumption. Marten meet the criteria for "cachers" (Macdonald 1976); viz., they are solitary hunters with fixed home ranges, and they are not large enough to protect their prey from larger scavengers. Our observations show that marten will cache large prey items, and cases 1, 5, and 8 are rare documentation that the same individual that made the cache had subsequently returned to it. In addition, these observations show that sometimes the cache site also serves as a resting site or den. We have also documented hunting behavior that is generally associated with surplus killing.

Small rodents are consumed quickly by marten, and they are not necessarily removed from the kill site (Pulliainen 1981b). However, it has been reported that marten readily carry larger prey from 9 m to several hundreds of meters away from kill sites (Murie 1961, Hargis 1981, Pulliainen 1981b, Raine 1981, Spencer and Zielinski 1983). Our observations (cases 1, 2, 5, 7, 8, 9) demonstrate that marten cache food at varying distances from kill sites, especially if the prey is too large for one meal. We suggest that the removal of prey from capture sites may provide security for marten. The noise of the pursuit and kill (e.g., cases 6 and 9) and the distress calls of the prey could alert competitors or predators to the location of a marten and its kill. This is consistent with observations made by Simon (1980), who found that marten typically consume food in secluded cover.

Cases 2, 3, and 4 are similar to the findings of Pulliainen (1981a), Raine (1981), and Spencer (1981), who also observed that marten sometimes carry prey items to their resting sites. The selection of a resting site may depend upon the proximity to the kill site (Marshall 1951, Buskirk 1984) and the amount of protection afforded. When a marten uses a specific rest site on consecutive days (e.g., Steventon 1979), it may be because of cached food.

In Finland, Pulliainen (1981b) found surplus killing of prey by European pine marten (*M. martes*). Our observations (cases 1, 6, 7, 8, 9) suggest that marten participate in surplus killing. Animals that we observed resumed an apparent foraging activity after caching.

Marten meet the criteria for species prone toward surplus killing, suggested by Oksanen et al. (1985), because they are small members of a predator guild in a cool, dry environment (at least throughout portions of their range). However, there is no evidence suggesting that marten are involved in surplus killing or hoarding to the same extent as other mustelids (e.g., Johnsen 1969 [as cited in Oksanen 1983] reported a stoat's [*Mustela erminea*] single cache of 153 lemmings and a shrew). Important knowledge of marten ecology would be gained if researchers could devise a way to examine the interior of resting sites to determine if food caches vary seasonally.

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