

Predation by Wolves, *Canis lupus*, on Wolverines, *Gulo gulo*, and an American Marten, *Martes americana*, in Alaska.

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We report three instances of Wolf predation on mustelids in Alaska; two involved Wolverines and another involved an American Marten. Such observations are rare and in previous studies usually have been documented indirectly. This account provides insight into the potential role of Wolves in influencing mesocarnivore communities in northern environments.

Key Words: Wolf, *Canis lupus*, Wolverine, *Gulo gulo*, Marten, *Martes americana*, predation, Alaska.

Observations of Wolf (*Canis lupus*) -carnivore interactions are rare and have generally focused on those concerning ursids (*Ursus arctos*, Grizzly Bear; and *U. americana*, Black Bear; Murie 1944; Mech 1970, Rogers and Mech 1981; Ballard 1982) and canids (*Canis latrans*, Coyotes, and *Vulpes vulpes*, Red Foxes; Stenlund 1955; Mech 1970; Berg and Chesness 1978; Peterson 1996; Crabtree and Sheldon 1999). Nevertheless, direct and indirect evidence suggests that interactions involving actual and attempted Wolf predation on mustelids (Stenlund 1955, Boles 1977, Route and Peterson 1991, Boyd et al. 1994, Paragi et al. 1996, Kohira and Rextad 1997; Mech et al. 1998) can occur at low frequency in some regions of North America and, further, may have a significant effect on mustelid populations (Palomares and Caro 1999). We report here on observations of Wolverine, *Gulo gulo*, and American Marten, *Martes americana*, predation by Wolves in Alaska.

Account 1: On 20 March 1983 (1330 PST), during an aerial sex and age composition survey for Moose (*Alces alces*), we observed an adult Wolverine in the top of a large cottonwood (*Populus trichocarpa*) tree along the Chilkat River near Haines in southeastern Alaska (59° 37'N, 135° 55'W). Near the base of the tree was a pack of at least five Wolves in an area of blood-stained snow where the Wolves appeared to have been digging. One Wolf was observed with a juvenile Wolverine in its mouth. A few of the other Wolves were digging in the snow at what we suspected was a Wolverine den site, while another Wolf was lying down a short distance from the activity. Our impression was that the Wolves found the Wolverine den by chance and were in the process of

digging it out to get to the kits. We were unable to determine if the Wolves actually consumed any of the kits, but judging from the extent and dispersion of blood on the snow, more than one kit had been killed.

Account 2: We believe Wolves were responsible for the death of a yearling female Wolverine in an area of light spruce (*Picea* spp.) forest and tundra vegetation in the Nelchina Basin in southcentral Alaska (62° 41'N, 147° 45'W). On 1 June 1997, while radio-tracking Wolverines as part of a population ecology study (Golden 1997), we observed a Wolf circling a yearling female Wolverine whose radio collar was on mortality mode and which showed no sign of movement (S. D. Bowen, Alaska Department of Fish and Game, personal communication). This was the first day we had detected her radio signal on mortality mode since she was last seen alive on 15 May 1997. We retrieved the carcass by helicopter on 2 June 1997. While the carcass was being loaded onto the helicopter, two Wolves stood within 300 m barking and howling (J. W. Testa, Alaska Department of Fish and Game, personal communication). The necropsy revealed five puncture holes in the skin, three in the chest and two in the groin, which may have been made by canine teeth of Wolves. Its chest was crushed laterally on the ventral side, resulting in several broken ribs. Although the carcass was in an advanced state of decomposition, it was intact and no part of it had been consumed. These observations plus the behavior of the Wolves and the timing of the death in late May suggest Wolves attacked and killed the Wolverine, possibly in defense of a wolf den site.

Account 3: On 8 June 2000 (1222 ADT) during a telemetry re-location flight, we observed a radio-

collared, solitary female Wolf in mixed-spruce (*P. glauca* and *P. mariana*) forest vigorously digging in moss-covered, hummocky soil, near Old Man Lake, Alaska (62° 31'N, 146° 81'W). As we circled the Wolf, we noticed one American Marten escaping through the forest ~15 m away as the Wolf continued digging in the original location. Subsequently, after ~2 minutes of digging, we observed the Wolf drag another Marten with its jaws from the underground cavity that it had been excavating. The Wolf then repeatedly bit, shook and dropped the Marten 4–5 times until the Marten stopped moving, at which time it was presumed dead. The Wolf first stood guarding, and then rolled on the carcass until we terminated our observation at 1231 (ADT).

Our observations indicated, to the extent possible, that Wolves did not feed on the carcasses of the Wolverines they had killed, a behavior noted by others (Burkholder 1962, Boles 1977). We can only speculate on the basis of that behavior, but ultimate explanations might include: elimination of competitors, defense of offspring, availability of prey, or disturbance by human observers.

The role of Wolves in structuring mesocarnivore communities is suspected to be significant though not fully understood. In areas where Wolves are recolonizing historic ranges following prolonged absences, behavioral and ecological modifications of mesocarnivores can be dramatic (Crabtree and Sheldon 1999). Such changes underscore the importance of Wolves in influencing ecosystem dynamics in such areas. While Wolf populations have fluctuated historically in Alaska, their presence has remained constant and their role in influencing ungulate populations has been studied extensively (Gasaway et al. 1983; Ballard et al. 1992; Dale et al. 1994; Adams et al. 1995), though their interactions with mesocarnivores has received little attention. When considering species such as Wolverines that typically occur at low density, it is important to recognize the role that even limited predation might exert on their population dynamics. Thus, in such cases, anecdotal accounts of predator-specific mortality provide valuable insights into the range of influence that Wolves might exert on mesocarnivore communities in relatively undisturbed northern environments.

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Meek's Halfbeak, *Hyporhamphus meeki*, and Flying Gurnard, *Dactylopterus volitans*, captured in the Annapolis Basin, Nova Scotia

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We report the capture of several unusual fish at a hydroelectric generating station, Annapolis Royal, in the Annapolis Basin, Nova Scotia, during the fall of 1999. These include a Meek's Halfbeak, *Hyporhamphus meeki*, that is either the first or second Canadian record for this species and a Flying Gurnard, *Dactylopterus volitans*, that is a first record for the Bay of Fundy. Additionally, three Bluefish, *Pomatomus saltatrix*, and a Fourbeard Rockling, *Enchelyopus cimbrius*, were reported for the first time from the Annapolis Estuary during 1999.

Key Words: Meek's Halfbeak, *Hyporhamphus meeki*, Flying Gurnard, *Dactylopterus volitans*, Bluefish, *Pomatomus saltatrix*, Fourbeard Rockling, *Enchelyopus cimbrius*, Annapolis River, Bay of Fundy, Nova Scotia, distribution.

The Annapolis Basin in Nova Scotia is home to the western hemisphere's only tidal hydroelectric generating station, located in Annapolis Royal (44° 45'N, 65° 31'W). As such, fish assemblages within the estuary are well studied, during both pre-operational stock assessments and surveys (e.g., Melvin et al. 1985; Jessop 1976), and several assessments of fish passage facilities at the generating station (e.g., Gibson 1996). During 1999, several unusual fish specimens were captured while testing the effectiveness of an ultrasound fish diversion system at the station (Gibson and Myers 2000). A Meek's Halfbeak, *Hyporhamphus meeki*, captured on 23 September, 1999, is either the first or second record of this species in Canada, and is the first record in 50 years. A Flying Gurnard, *Dactylopterus volitans*, captured 28 September 1999, is a first record for the Bay of Fundy. Other unusual specimens captured at this location during September 1999 include three Bluefish, *Pomatomus saltatrix* and one Fourbeard rockling, *Enchelyopus cimbrius*. While these latter species occur regularly in the Bay of Fundy (Scott and Scott 1988), these species have not been reported previously in the Annapolis Estuary.

Hyporhamphus spp. are planktivorous fish characterised by a very long lower jaw and short upper jaw. The taxonomic status of western Atlantic *Hyporhamphus* was clarified by the description of a new species, *Hyporhamphus meeki*, by Banford and Collette (1993). This species ranges north from the Gulf of Mexico, and is a rare stray into the Gulf of Maine. It usually can be distinguished from its southern relative, *Hyporhamphus unifasciatus*, by having a greater number of total gill rakers on the first (31 to 40) and second arches (20 to 30), and having a ratio of preorbital length to orbit diameter greater than 0.70 (Banford and Collette 1993). Contreras-Balderas et al. (1997) suggest the species can be distinguished using the shape of the lateral band. The specimen reported herein is unusual in having 29 gill rakers on right first arch and 23 gill rakers on the right second arch, both of which are low for this species. The identifying characteristic for this specimen is the ratio of preorbital length to orbit diameter, which equals to 0.74 (Bruce Collette, personal communication).

One previous record of *Hyporhamphus* sp. exists for eastern Canada. This specimen, reported as *Hyporhamphus unifasciatus*, was captured in a