

## Notes

### Defense of One Twin Calf against Wolves, *Canis lupus*, by a Female Moose, *Alces alces*

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Three Wolves (*Canis lupus*) were observed attacking an adult cow Moose (*Alces alces*) with neonatal twins on the Copper River Delta, Alaska, during summer 1993. The cow successfully defended one calf from predation but the other was killed in a stream after fleeing from the cow. The cow and the remaining surviving calf moved to the stream and established a superior defensive position and both survived the Wolf attack.

Key Words: Wolf, *Canis lupus*, Moose, *Alces alces*, calf, predation, predator avoidance, behavior, Alaska.

Although Brown Bears (*Ursus arctos*) are believed to be the primary predator of neonatal Moose (*Alces alces*) calves on the Copper River Delta (MacCracken 1992) and other areas of Alaska (Ballard et al. 1981), Wolf predation of Moose calves is common in some areas of Alaska (Gasaway et al. 1983). However, we know of only two published observations of Wolf predation on neonatal Moose calves (Atwell 1964; Shelton 1966) and none of predation on neonatal twins. Observations of Wolf predation on Moose calves during winter are rare but occur more frequently (Mech 1970) due to the greater frequency of winter flying by biologists and improved sightability on snow-covered ground. Observations of predation can provide insight into the mechanisms resulting in successful or failed attempts by predators and escape behavior of prey.

The attack described here occurred on 3 June 1993 on the Copper River Delta, located adjacent to eastern Prince William Sound, Alaska, between 60° and 60°30'N latitude and 144°W longitude. MacCracken (1992) provided a detailed description of the study area.

#### Observations

The first author observed three Wolves from a Cessna 185 fixed-wing aircraft in the process of attacking a cow Moose with neonatal twins (approximately one-week old). Of the three Wolves, one was a radio-collared female black Wolf (Number 01), one was a radio-collared female gray Wolf (Number 02), and one was an uncollared gray Wolf (Number 03; sex unknown). The two radio-collared Wolves had been captured in March 1993 and at that time the gray female had a preexisting severely dislocated

tibiotalar joint, with the bone protruding through the skin; based on her age and future locations at a den (at which pups were produced) she appeared to be the alpha female. At capture, the black female was either a pup or yearling.

At 20:21, three Wolves encircled a cow Moose with twins and alternately and/or jointly rushed them. The Moose were in a low willow (*Salix* spp.)/Sweetgale (*Myrica gale*) habitat type, adjacent to a small circular patch of tall closed Alder (*Alnus crispa*)/willow. The dam diligently kept the twins together and defended them by rushing the Wolves and kicking with her forelegs.

After 2 min., one Wolf rushed in, grabbed one calf, and knocked it down but was immediately chased away by the dam. The Wolves continued the attack and were periodically pursued by the dam up to 10–20 m from the twins. The dam distanced herself from the twins more frequently in pursuit of the Wolves and may have occasionally lost sight of the twins. However, she primarily stood over the twins. As time passed, the dam's frequency of pursuit of the Wolves increased as did separation of the twins. Occasionally, one calf tried to follow the dam.

At 20:31, while the dam was in pursuit of a Wolf, one calf fled toward a large glacial stream located 100 m to the east. The Wolves appeared not to detect this movement, but Wolf 02 began to follow it about the time the calf reached the stream. As the calf swam across the stream, the Wolf quickly swam after it. The Wolf soon reached the calf but it swam downstream about 30 m before the Wolf reached it again. Then, the calf escaped and swam upstream 10 m before the Wolf seized it by the neck, and with some effort, pulled it over to a silt beach.

The Wolf then began consuming the calf which was still alive and moving its legs. During the Wolf's pursuit and capture of the calf, the two remaining Wolves unsuccessfully continued their harassment of the other Moose. The dam, now with a single calf, was more successful at keeping the calf under her and protecting it. The Wolf dragged the dead calf about 50 m west into willow/Sweetgale (WISW) and continued feeding.

At 20:45, Wolves 01 and 03 ceased intensive harassment of the Moose but remained within 40 m of them. The Moose were still in their initial location in WISW, adjacent to the closed Alder/willow (CAW) stand. Wolf 01 trotted over to the stream where Wolf 02 had pursued the calf into the water, travelled the bank downstream to where she had removed the calf from the stream and proceeded directly to where Wolf 02 was feeding on the calf. Wolf 01 tried to feed and was minimally tolerated by Wolf 02. Wolf 01 then returned to the location of the adult and calf Moose. Meanwhile, Wolf 03 sat and observed the Moose from a distance of 50 m. As Wolf 01 approached the dam, she was immediately and forcefully repelled.

At 20:54, the dam began to move her calf toward the stream, but after travelling 30 m, Wolf 03 resumed pursuit and the Moose, now in open low WISW, retreated to taller WISW. Shortly thereafter, all three Wolves returned to harass the Moose. However, after another 2 min., Wolf 01 ran to the unattended calf carcass, fed, then dragged the carcass 50 m west into dense WISW where she was no longer visible to us. Within 3 min., Wolf 02 returned to the location where it had left the calf carcass, then headed into the dense WISW. Wolf 03 departed from the vicinity of the Moose and disappeared in willow while travelling west; it was not observed in the vicinity of the calf carcass.

At 21:08, the dam began to depart for the stream but the calf appeared reluctant to cross the more open WISW and stayed back. However, after 2 min. of hesitation, the dam and the calf walked over to the stream and stepped into the edge of the water. Two min. later, Wolf 02 travelled up the creek bank and walked around the Moose who remained in the stream. Continuous observation ceased at 21:17 because none of the Wolves were visible and the Moose remained in the stream.

Wolves 01 and 02 remained in the vicinity of the cow and calf Moose up to 22:30. At that time Wolf 01 was mildly harassing the cow from the bank. The cow soon rushed out of the water, chased Wolf 01 away, and returned to the calf. Wolf 02 was not visible but her signal came from the vicinity of the calf carcass. The cow and the calf were still standing in the stream when we departed at 22:35. No Wolves were visible.

## Discussion

The departure of the calf from its mother suggests one event leading to successful Moose calf capture by Wolves. If the calf had remained with its mother, she may have been successful in defending both calves. Alternatively, trying to defend both may have resulted in both calves being lost. The calf that ran could have successfully escaped only to hide and rejoin the dam later. However, for a calf of this age that scenario seems unlikely. Escape behavior by very young calves should be selected against in species such as Moose that are capable of defending offspring.

This attack provides additional insight into habitat selection as it relates to predator avoidance and evasion. When the attack occurred, the Moose remained adjacent to the CAW habitat type. Although this was a small stand, it limited the number of directions from which the Wolves could attack. The dense structure of alder and willow stems probably made it difficult for Wolves to rush the cow, and to rapidly escape her charges.

The dam and the calf both hesitated when crossing the less dense WISW to reach the stream bank. Once the edge of the stream was reached, the Moose were in a superior defensive position. It is unlikely that Wolves would try to attack from the stream side (as indicated by the behavior of these Wolves), especially by swimming. Thus, the Moose needed to defend an arc of only 180°. Therefore, it appears that use of stream banks by cows with calves is advantageous in terms of predator defense. Moose have been documented using open water to escape Wolf predation (Mech 1970; Gasaway et al. 1983). However, there are disadvantages to remaining along stream banks on the Copper River Delta because they are commonly used travel corridors (due to the better drainage, less standing water, and greater shrub hiding cover) by many species, particularly mammalian predators (unpublished data). Therefore, use of stream banks might increase the probability of detection. Clearly, there are trade-offs between predator defense and avoidance.

This incident also documents the ability of Wolves to recover from disabling injuries in the wild. The recovery and subsequent predatory success of the gray collared female (02) is notable. Her speed in avoiding the charges of the adult Moose, and in pursuing and capturing the calf, revealed minimal disability from her previous injury. Furthermore, the three Wolves involved in this attack belonged to a pack of five adults which concurrently occupied a den that produced a minimum of four pups. Although the alpha female was injured and nursing pups, she was also very capable of obtaining food for the pack.

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