

Breeding behavior of free-ranging wolverines (*Gulo gulo*)

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Very little concerning the breeding behavior of wolverines is known. We observed breeding behavior by 3 pairs of free-ranging wolverines in northwestern Alaska. Two breedings occurred in June and 1 in August extending the previously reported breeding season. Except for 1 male, the breeding wolverines were marked and were residents in the study area at least 4 months before breeding. Breeding pairs restricted their movements and remained together for relatively long periods of time. Behavior during pair association was generally agonistic. One instance of play behavior is described and discussed. Factors affecting the timing of copulation and the length of the breeding season are suggested. Two copulations for 1 female were documented. Females bred in consecutive years regardless if kits were produced from the previous year's breeding.

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1. Introduction

We are aware of only 1 confirmed observation of a breeding pair observed in the wild (Cooper, pers. comm.) and 2 reports of wolverines that bred in captivity (Mehrer 1975, Mohr 1938). In this paper, we describe the breeding behavior of 3 pairs of free-ranging wolverines in northwestern Alaska.

2. Material and methods

Our observations of wolverine breeding behavior were made during a radio-telemetry study of wolverine ecology in northwestern Alaska from April 1978 until April 1981. The study area is located at coordinates 68°45'N 161°00'W. The habitat consists mainly of alpine and tussock tundra communities. One member of each breeding pair wore a functional radio collar, and all but 1 of the breeding wolverines (Table 1) were marked.

Pairs were located several times a day. If copulation was in progress, the pair was observed until copulation ended. Observations were made from a PA-18 Super Cub at an altitude of 100—300 m. The circling aircraft did not appear to disturb the wolverines or affect their behavior. We used 10 × 40 binoculars for greater resolution when necessary.

3. Results

Breeding was observed once in August 1979 and twice in June 1980 (Table 2). Female F9 was observed breeding in 2 consecutive years. The marked wolverines

were known to be residents in the study area at least 4 months before breeding occurred and the breedings occurred within the known home ranges of the individuals involved. The August breeding occurred on a ridgetop; the 2 June breedings were on or adjacent to remnant snowdrifts.

Breeding pairs restricted their movements and remained together for relatively long periods of time (Table 2). While a pair rested, the male maintained a distance of 1 m or less from the female. If the female repositioned herself farther away, the male would close the distance by repositioning as well. There was no body contact during rest periods. The female usually initiated a move and took the lead when a pair traveled. The female showed interest in her surroundings, but the male focused his attention on the female. While traveling, the male often tried to approach the female. The female reacted defensively if the male approached closer than 2 m, turning abruptly to face the male and snarl or snap at him. Only once did a male (M20) appear to snarl at a female (F9). The male and female were never separated by more than a few meters except in 2 instances. Both exceptions were of brief duration and occurred near the end of pair association.

Aggressive males attempting to subdue apparently reluctant females generally resulted in agonistic interactions which characterized pair association. An exception was noted on 6 August 1979, when we first located F9 and an unidentified male together. This pair repeatedly investigated a rock outcrop together.

Table 1. Characteristics of radio-collared wolverines observed breeding in northwestern Alaska.

Wolverine	Capture dates	Average* mammas/ testes length (mm)	Age** (yrs)	Weight (kg)	Comments
F9	16 Oct 1978	0	1	10.6	No tooth wear; all mammas undeveloped; no scars
F7	29 Jun 1978	12	4	10.9	Four tooth cementum layers; teeth worn and broken; captured with 3-month-old kit
	21 Apr 1979	17	5	10.4	
	23 Mar 1980	7	6	9.5	Nursing two kits
	14 Apr 1980	7	6	9.5	No kits produced in 1980
M20	21 Feb 1980	22	2+	13.6	Tooth wear minimal; no scars
M23	28 Feb 1980	21	4+	15.4	Tail bodded; some tooth wear; scars

*Average length of developed mammas only (3+ mm).

**Age was estimated from mammas or tested development, tooth wear, and/or tooth cementum deposition.

Table 2. Summary of wolverine breeding behavior in northwestern Alaska.

Wolverine pair	Data and time of first location	Minimum time of pair association (days)	Number of times located during pair association	Distance** moved during pair association (km)	Date and time of copulation	Minimum duration of copulation (minutes)
F9/Un*	6 Aug 1979 1220	2.3	12	3.8	6 Aug 1979 2042	12
F9/M20	11 Jun 1980 1100	0.9	7	1.5	11 Jun 1980 1830	20
F7/M23	5 June 1980 0926	1.5	7	4.5	5 Jun 1980 0926 1300	56 20

*Unidentified male.

**Straightline distance between first location and last location of pair association.

Occasionally, F9 would suddenly dash away with the male pursuing her. F9 would then turn quickly to face the male, her forelegs spread apart and her rump raised. She would swish her tail rapidly from side to side then run back to the outcrop. Both periodically rolled over and over separated by only a meter or so. Sometimes the female rolled then the male approached the spot after she moves away. He sniffed the spot then rolled there himself. Once the female approached the male from behind and sniffed at his rump. When he showed no reaction, she swung around and bumped against him. The behavior of the 2 wolverines was decidedly playful in nature. Their play ended in a rest period at the end of an hour. When we returned to the site 7 hr later, copulation was in progress.

We never observed initiation of copulation. Copulation was similar in all cases. The male had

mounted the female from behind, his forelegs clasping the female's sides. Often the male grasped the scruff of the female's neck, particularly if the female attempted to move. This neck bite was not always maintained. The pair rolled onto their sides periodically, and once F9 and the unidentified male rolled completely onto their backs while still clasped together. Several times, F7 succeeded in breaking away from M23's grasp momentarily. No thrusting was apparent during the copulations we observed. After copulation, the separated wolverines rolled vigorously.

4. Discussion

Our description of breeding behavior is in general agreement with Cooper (pers. comm.). Cooper observed

a pair of breeding wolverines on 9 June 1981 in southcentral Alaska. Two differences were noted, however. Cooper witnessed vigorous and relatively continuous thrusting by the male during the first 50 minutes of copulation followed by intermittent thrusting for 49 minutes. Our observations of copulation were shorter in duration (Table 2) and we observed no thrusting. Long vigorous bouts of thrusting would have been detectable from the aircraft. For this reason, we believe that copulation had been underway for some time before we arrived. Intermittent, less vigorous thrusting may not have been visible from the air. However, we could see the male periodically re-establish his hold on the female and at these times, thrusting may have occurred.

The pair of wolverines observed by Cooper was engaged in agonistic behavior ("screaming" and "wristling") before initiation of copulation. The apparently playful behavior of F9 and the unidentified male which we observed was decidedly different from Cooper's observation and our other observations.

1) One or both of the wolverines may have been inexperienced and behaviorally immature. F9 was a young-aged female and almost certainly a first-time breeder. Sexual inexperience has been recognized in male mink and resulted in prolonged precopulatory behavior (MacLennon & Bailey 1972); however, the authors did not describe playful behavior.

2) Interactions at the beginning of pair association may be less agonistic and more solicitous. The playful behavior we observed occurred the first time the pair was sighted. The duration of the pair's association (2.3 days) was the longest observed, suggesting that we encountered the pair during the initial stages of their association.

Our observations on wolverine breeding behavior substantiate Rausch & Pearson's (1972) conclusions from carcass analysis that wolverines breed during the summer and that the breeding season is several months long. However, they stated that wolverines apparently breed in May, June, and July while our observations indicate that August should also be included.

We found no evidence of female wolverines undergoing more than 1 breeding episode in a season as reported for marten (Markley & Bassett 1942); however, 2 copulations separated by 3.5 hr did occur during 1 episode. Also, female wolverines can and do breed in consecutive years regardless if kits are produced from the previous year's breeding.

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