Wolf Space Use and Predation Patterns in the High Arctic

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INTRODUCTION

Arctic wolves (*Canis lupus arctos*), a subspecies of grey wolf inhabiting the Canadian Arctic Archipelago, were classified in 1999 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Data Deficient due to insufficient information on populations, trends, and diet (Van Zyll de Jong and Carbyn 1999). They are believed to have persisted at low densities in the arctic islands, declining after population crashes of their ungulate prey (Miller and Reintjes 1995, Mech 2007), Peary caribou (*Rangifer tarandus pearyii*) and muskoxen (*Ovibos moschatus*). The interactions among wolves and their prey have been identified as a knowledge gap during the Peary caribou Recovery Strategy process under the Species at Risk Act and re-assessment of Peary caribou status by COSEWIC in fall 2015. The objective of this work is to determine baseline information like space and prey utilization by wolves in the High Arctic, which will be essential to determining predation risk for Peary caribou and how it may change across the landscape and under different conditions.

METHODS

The locations of several wolf dens, which have been used repeatedly over generations, are known on the Fosheim Peninsula and eastern Axel Heiberg Island. We check these den sites to obtain pack and litter counts in June/July, which also allows us to locate packs for collar deployments. Wolves are captured by helicopter darting or net-gunning, immobilized with Telazol, and fitted with Vectronic Vertex Iridium GPS collars (2014 collars were Lotek). Collars are equipped with automatic release mechanisms causing the collar to drop after 1 or 2 years, and collect a GPS location every 1 or 2 hours.

KILL SITE INVESTIGATIONS

We used a cluster algorithm developed for cougar kill site identification (Knopff et al. 2009), with clusters defined as 2 or more points within 175 m to locate potential kill sites. Triaxial accelerometers on collars will allow us to further refine the cluster algorithm to include activity data. Ground-truthing of accelerometer data and cluster sites is expected in summer 2016 and 2017. All kill sites investigated in 2014 and 2015 were muskoxen, although a caribou kill site not associated with a collared pack was found in 2014 and a wolf location cluster investigated in 2010 was also a caribou kill site.

Wolf ID	Date Range	Clusters Checked	Clusters associated with kills (# of kills)	Clusters associated with dens (# of dens)
W440	Jul-Sep 2014	20	8 (8 muskoxen)	5 (1)
	Apr-May 2015	21	9 (2 muskoxen)	10 (2)
W441	Jul-Sep 2014	30	6 (6 muskoxen)	8 (1)
	Sep-Oct 2014	2	2 (1 muskoxen)	0
W442	Sep 2014	10	7 (1 muskoxen)	0
	Mar-Apr 2015	6	1 (1 muskoxen)	0

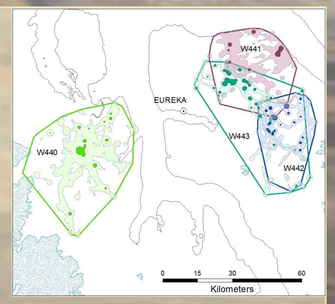
DENSITY & PACK SIZE

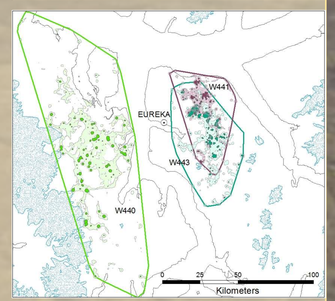
For the 8 known wolf packs in 2014 and 2015, pack counts averaged 5.3±SD3.4 wolves not including pups, or 8.8±SD4.7 including summer pup counts. Mech and Boitani (2003) review winter pack sizes, when packs are smallest, so not directly comparable to the pack sizes reported here. The High Arctic packs do appear to be smaller than packs where the main prey are very large ungulates (bison and moose), although prey size and pack size are not definitively linked. Litter size was smaller than the 4-5 pups usually reported for wolves farther south (Mech and Boitani 2003), at 3.3±SD0.5 pups in June/July. Litter sizes (based on number of pups in summer) were higher than in Greenland, where the average litter size over 22 years was 2.0 pups (Marquard-Petersen 2008). In both 2014 and 2015, the Axel Heiberg wolves had 2 dens, and the Eureka wolves had 2 lactating females in 2010 and 2015.

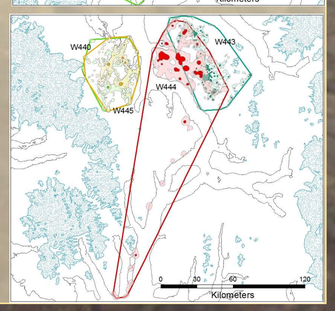
Across their North American range, wolves generally occur at densities from 2 to 40 wolves per 1,000 km^2 (Paquet and Carbyn 2003). Wolf density has not been previously investigated in the High Arctic, but Miller (1993) suggested based on limited anecdotal information that densities might be 0.3-0.5 wolves/1,000 km^2. In our study area of approximately 8,750 km^2, based on fall pack counts in 2014 and an updated pack count for the Eureka wolves in 2015, we estimate about 7 wolves/1,000 km^2 (including pups in fall but not including an assumption of 10% lone wolves, Fuller 1989). For comparison, densities on the barrenlands are generally around 2 wolves/1,000 km^2, although they can be as high as 90 wolves/1,000 km^2 where caribou congregate (Parker 1972).

HOME RANGE

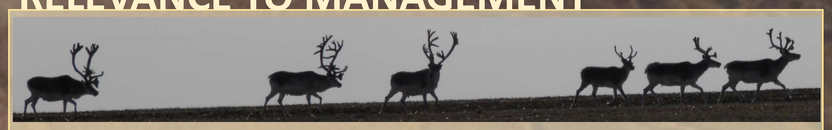
Overall, the space use of the wolves collared from 2014-2015 is that of a population maintaining territories year-round. The implications for predation dynamics are vastly different if wolves are territorial than if they exist in a nomadic state when not denning, and this could change depending on available prey resources. Wolf home ranges tend to be smaller in summer than in winter, since wolves are tied to den and rendezvous sites during the summer (Mech 1977). In North America, wolf territories range from less than 150 km^2 to larger than 1,500 km^2 in the boreal forest and tundra. The largest home range recorded was 13,000 km^2 in winter in Alaska (Mech 1970); the smallest was 18 km^2 in Algonquin (Ontario) in summer (Pimlott et al. 1969). Mech (1987, 1988) estimated home ranges could be greater than 2,500 km^2 for Ellesmere Island wolves. Seasonal ranges so far recorded for the 5 packs average 2,200 km^2 (95% minimum convex polygon) or closer to 800 km^2 (95% Brownian bridge utilization distribution).







RELEVANCE TO MANAGEMENT



A year-round, resident wolf population presents relatively constant predation risk compared to areas where wolves are only present seasonally. Wolves are the major predator of Peary caribou across their range, so understanding this dynamic will be necessary for predicting population declines and recovery. The additional information this project contributes to our knowledge of arctic wolves will also assist in any COSEWIC assessments of arctic wolves, which are currently classified as data deficient.

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