



September 25, 2020

Mr. Joseph Judas, Chair
Wek'èezhì Renewable Resources Board
4504 49TH AVENUE
YELLOWKNIFE NT X1A 1A7

Dear Mr. Judas:

Document Requests – 2021-2024 Wolf (Dìga) Revised Joint Management Proposal

As per the request in your letter of September 18, 2020, the Tłıchǫ Government and the Department of Environment and Natural Resources, Government of the Northwest Territories submit to the Wek'èezhì Renewable Resources Board digital copies and/or abstracts of requested documents. We also consent to the posting of the more fulsome list of Supporting Documentation.

If you have any questions, please do not hesitate to contact either of the undersigned.

Sincerely,

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Lands Protection
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Attachment

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Principal Secretary

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Deputy Minister
Environment and Natural Resources

Mr. Brett Elkin
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Mr. Bruno Croft
Superintendent, North Slave Region
Environment and Natural Resources

Grand Chief George Mackenzie
Tłıchǫ Government

Ms. Laura Duncan
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Materials and links for Requested Documents
Wolf (Dìga) Revised Joint Management Proposal

Buckland, L., J. Dragon, A. Gunn, J. Nishi, and D. Abernethy. 2000. Distribution and abundance of caribou on the northeast mainland, NWT in May 1995. Manuscript Report No. 125. Department of Resources, Wildlife and Economic Development, Yellowknife. 24 pp.
[PDF attached](#)

Carmichael, L. E., J. A. Nagy, N. C. Larter, and C. Strobeck. 2001. Prey specialization may influence patterns of gene flow in wolves of the Canadian Northwest. *Molecular Ecology* 10:2787-2798.
<https://doi.org/10.1046/j.0962-1083.2001.01408.x>

Abstract

This study characterizes population genetic structure among grey wolves (*Canis lupus*) in northwestern Canada, and discusses potential physical and biological determinants of this structure. Four hundred and ninety-one grey wolves, from nine regions in the Yukon, Northwest Territories and British Columbia, were genotyped using nine microsatellite loci. Results indicate that wolf gene flow is reduced significantly across the Mackenzie River, most likely due to the north–south migration patterns of the barren-ground caribou herds that flank it. Furthermore, although Banks and Victoria Island wolves are genetically similar, they are distinct from mainland wolf populations across the Amundsen Gulf. However, low-level island–mainland wolf migration may occur in conjunction with the movements of the Dolphin-Union caribou herd. Whereas previous authors have examined isolation-by-distance in wolves, this study is the first to demonstrate correlations between genetic structure of wolf populations and the presence of topographical barriers between them. Perhaps most interesting is the possibility that these barriers reflect prey specialization by wolves in different regions.

Carmichael, L. E., J. Krizan, J. A. Nagy, E. Fuglei, M. Dumond, D. Johnson, A. Veitch, D. Berteaux, and C. Strobeck. 2007. Historical and ecological determinants of genetic structure in arctic canids. *Molecular Ecology* 16:3466-3483.
<https://doi.org/10.1111/j.1365-294X.2007.03381.x>

Abstract

Wolves (*Canis lupus*) and arctic foxes (*Alopex lagopus*) are the only canid species found throughout the mainland tundra and arctic islands of North America. Contrasting evolutionary histories, and the contemporary ecology of each species, have combined to produce their divergent population genetic characteristics. Arctic foxes are more variable than wolves, and both island and mainland fox populations possess similarly high microsatellite variation. These differences result from larger effective population sizes in arctic foxes, and the fact that, unlike wolves, foxes were not isolated in discrete refugia during the Pleistocene. Despite the large physical distances and distinct ecotypes

represented, a single, panmictic population of arctic foxes was found which spans the Svalbard Archipelago and the North American range of the species. This pattern likely reflects both the absence of historical population bottlenecks and current, high levels of gene flow following frequent long-distance foraging movements. In contrast, genetic structure in wolves correlates strongly to transitions in habitat type, and is probably determined by natal habitat-biased dispersal. Nonrandom dispersal may be cued by relative levels of vegetation cover between tundra and forest habitats, but especially by wolf prey specialization on ungulate species of familiar type and behaviour (sedentary or migratory). Results presented here suggest that, through its influence on sea ice, vegetation, prey dynamics and distribution, continued arctic climate change may have effects as dramatic as those of the Pleistocene on the genetic structure of arctic canid species.

Caslys Consulting Ltd. 2016. Mobile Conservation Zone Generation Spatial Tool. Unpublished Report, Prepared for Environment and Natural Resources, Government of the Northwest Territories. Yellowknife, NT 21pp.

[PDF attached](#)

Clarkson, P. L, and I. S. Liepins. 1989a. Inuvialuit wildlife studies: Western Arctic wolf research project progress report, 1987- 1988. Department of Renewable Resources, Government of the Northwest Territories, Inuvik, NT.

[PDF attached](#)

Clarkson, P. L, and I. S. Liepins. 1989b. Inuvialuit wildlife studies: Western Arctic wolf research project progress report, 1988-1989. Department of Renewable Resources, Government of the Northwest Territories, Inuvik, NT.

[PDF attached](#)

Cluff, D. 2019. Wolf Harvest Report 2018-2019, North Slave Region, Unpublished Report. Department of Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT. 10 pp.

[PDF attached](#)

Cluff, D. 2020. Wolf Harvest Report 2019-2020, North Slave Region, Unpublished Report, Department of Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT. 7 pp.

[PDF attached](#)

Dale, B. W., L. G. Adams, and R. T. Bowyer. 1994. Functional response of wolves preying on barrenground caribou in a multiple-prey ecosystem. *Journal of Animal Ecology* 63:644-652.

[DOI 10.2307/5230](https://doi.org/10.2307/5230)

Abstract

1. We investigated the functional response of wolves (*Canis lupus*) to varying abundance of ungulate prey to test the hypothesis that switching from alternate prey to preferred prey results in regulation of a caribou (*Rangifer tarandus*) population at low densities.
2. We determined prey selection, kill rates, and prey abundance for four wolf packs during three 30-day periods in March 1989, March 1990 and November 1990, and created a simple discrete model to evaluate the potential for the expected numerical and observed functional responses of wolves to regulate caribou populations.
3. We observed a quickly decelerating type II functional response that, in the absence of a numerical response, implicates an anti-regulatory effect of wolf predation on barren-ground caribou dynamics.
4. There was little potential for regulation caused by the multiplicative effect of increasing functional and numerical responses because of the presence of alternative prey. This resulted in high wolf: caribou ratios at low prey densities which precluded the effects of an increasing functional response.
5. Inversely density-dependent predation by other predators, such as bears, reduces the potential for predators to regulate caribou populations at low densities, and small reductions in predation by one predator may have disproportionately large effects on the total predation rate.

Fuller, T.K. 1989. Population dynamics of wolves in northcentral Minnesota. Wildlife Monographs 105: 3–41. <https://www.jstor.org/stable/3830614>

Abstract

During September 1980–December 1986, 81 radio-collared wolves (*Canis lupus*) were monitored in and near the 839-km² Bearville Study Area (BSA) in north-central Minnesota. Each year winter-territory size averaged 78–153 km²; no territories had road densities >0.72 km/km². From zero to 30% of radio-marked pup, yearling, or adult wolves left their territories each month. Pups left natal packs during January–March and older wolves left frequently during September–April. Wolves temporarily leaving territories moved 5–105 km away and were absent 3–118 days; up to 6 exploratory moves were made prior to dispersal. Dispersing wolves traveled 5–100 km away during periods of 1–265 days. One disperser joined an established pack, but 16 others formed new packs. Annual dispersal rates were about 0.17 for adults, 0.49 for yearlings, and 0.10 for pups. Each year mean pack size ranged from 5–9 in November–December to 4–6 in March. Annual wolf density (including 16% lone wolves) ranged from 39–59 wolves/1,000 km² in November–December to 29–40 wolves/1,000 km² in March. Annual immigration was 7%. The observed mean annual finite rate of increase was 1.02,

and annual rates of increase were correlated with mean number of pups per pack in November. Litters averaged 6.6 pups at birth and 3.2 by mid-November, at which time pups made up 46% of pack members. Annual survival of radio-marked wolves >5 months old was 0.64. Despite legal protection, 80% of identified wolf mortality was human caused (30% shot, 12% snared, 11% hit by vehicles, 6% killed by government trappers, and 21% killed by humans in some undetermined manner); 10% of wolves that died were killed by other wolves. During sample periods in 2 winters, wolves were located twice daily to estimate predation rates on white-tailed deer (*Odocoileus virginianus*). Estimated minimum kill rates during January-February ($\bar{x}$ = 21 days/kill/wolf) did not differ between winters with differing snow depths. Winter consumption averaged 2.0 kg deer/wolf/day (6% wolf body wt/day). Scat analyses indicated deer were the primary prey in winter and spring, but beaver (*Castor canadensis*) were an important secondary prey (20-47% of items in scats) during April-May. Neonatal deer fawns occurred in 25-60% of scats during June-July whereas the occurrence of beaver declined markedly. Overall, deer provided 79-98% of biomass consumed each month. Adult wolves consumed an estimated 19 deer/year of which 11 were fawns. A review of North American studies indicates that wolf numbers are directly related to ungulate biomass. Where deer are primary prey, territory size is related to deer density. Per capita biomass availability likely affects pup survival, the major factor in wolf population growth. Annual rates of increase of exploited populations vary directly with mortality rates, and harvests exceeding 28% of the winter population often result in declines. Management decisions concerning wolf and ungulate densities and ungulate harvests by humans can be made using equations that incorporate estimates of wolf density, annual ungulate kill per wolf, ungulate densities, potential rates of increase for ungulates, and harvest.

Hampton, J. O., P. M. Fisher, and B. Warburton. 2020. Reconsidering humaneness. *Conservation Biology*.

doi.org/10.1111/cobi.13489.

Abstract

Animal welfare is increasingly important in the understanding of how human activity affects wildlife, but the conservation community is still grappling with meaningful terminology when communicating this aspect of their work. One example is the use of the terms “humane” and “inhumane.” These terms are used in scientific contexts, but they also have legal and social definitions. Without reference to a defined technical standard, describing an action or outcome as humane (or inhumane) constrains science communication because the terms have variable definitions; establish a binary (something is either humane or inhumane); and imply underlying values reflecting a moral prescription. Invoking the term “humane,” and especially the strong antithesis “inhumane,” can infer a normative judgment of how animals ought to be treated (humane) or ought not to be treated (inhumane). The consequences of applying this terminology are not just academic. Publicizing certain practices as humane can create blurred lines around contentious animal welfare questions and, perhaps intentionally,

defer scrutiny of actual welfare outcomes. Labeling other practices as inhumane can be used cynically to erode their public support. We suggest that, if this normative language is used in science, it should always be accompanied by a clear, contextual definition of what is meant by humane.

Hampton, J.O., B.D. Cowled, A.L. Perry, C.J. Miller, B. Jones, and Q. Hart. 2014. Quantitative analysis of animal welfare outcomes in helicopter shooting: a case study of feral dromedary camels (*Camelus dromedarius*). Wildlife Research
<http://dx.doi.org/10.1071/WR13216>.

Abstract

The Australian Feral Camel Management Project (AFCMP) was initiated in 2009 to manage the growing impacts of feral camels (*Camelus dromedarius*) in Australia. One of the most important considerations for the project was achieving high standards of animal welfare and demonstrating this to stakeholders and the public. The novelty of feral camels as an invasive species meant that relatively little was known about the animal welfare aspects of the available management techniques. To address this knowledge gap, quantitative animal-based assessment tools were developed to allow independent observers to perform repeatable in situ field auditing of the two main control methods used: aerial (helicopter) shooting and live capture (mustering and transport for slaughter). Although observation protocols allowed most stages of aerial shooting (in situ killing) to be assessed, not all stages of live capture operations could be assessed (namely transport and slaughter at ex situ abattoirs) due to the limitations of the jurisdiction of the Australian Feral Camel Management Project. For assessments that were performed, audit results were made available to project partners to allow procedures to be reviewed and published through peer-reviewed literature to improve transparency. Empirical evidence produced through the audit system was also used to refine humaneness ranking assessments comparing management methods. We present the lessons learnt through the animal welfare approach of the AFCMP to assist future wild herbivore management programs

Kelsall, J. P. 1968. The migratory barren-ground caribou of Canada. Canadian Wildlife Service Monograph, 3:1-340.

Book – Copyright protected (A copy is available to review, at the Legislative Library.)

Orians, G. H., P. A. Cochran, J. W. Duffield, T. K. Fuller, R. J. Gutierrez, W. M. Hanemann, F. C. James, P. M. Kareiva, S. R. Kellert, D. R. Klein, B. N. McLellan, P. D. Olson, and G. Yaska. 1997. Wolves, Bears, and Their Prey in Alaska: Biological and Social Challenges in Wildlife Management. The National Academies Press.

Book – Copyright protected

Parker, G. R. 1973. Distribution and densities of wolves within barren-ground caribou range in northern mainland Canada. Journal of Mammalogy 54:341-348.

<https://doi.org/10.2307/1379121>

Abstract

Observations of wolves (*Canis lupus*) were recorded during aerial surveys of barren-ground caribou (*Rangifer tarandus groenlandicus*) from May 1966 to October 1968 over portions of northern Manitoba, northeastern Saskatchewan, and southeastern District of Keewatin, Northwest Territories. These observations were made over the entire range of the Kaminuriak population of caribou. There was a close association between the distribution of wolves and caribou. The average size of wolf packs was larger in autumn and winter (3.0) than in summer (1.7), and there was little change in the monthly mean sizes of packs from October to April. The area used by caribou wintering in northwestern Manitoba and northeastern Saskatchewan, decreased from 3594 square miles in January to 682 square miles in April 1968, with a consequent increase in caribou density from 14 to 68.5 per square mile. A corresponding increase in wolf density during that period within the same area was not detected. Wolf densities appeared to maximize at approximately one wolf per 7 to 8 square miles and remain stable. Estimated wolf numbers in the area of high caribou density decreased from 258 in January to 60 in April.