
Alaska Department of Fish and Game
Division of Wildlife Conservation

Federal Aid in Wildlife Restoration
Research Progress Report

Movement Patterns of the Porcupine Caribou Herd in Relation to Oil Development

by

Kenneth R. Whitten



Project W-23-5
Study 3.34
November 1992

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PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperator: Larry Pank, U.S. Fish and Wildlife Service

Project No.: W-23-5 Project Title: Wildlife Research and Management

Study No.: 3.34 Study Title: Movement Patterns of the Porcupine
Caribou Herd in Relation to Oil
Development

Period Covered: 1 July 1991-30 June 1992

SUMMARY

The Porcupine caribou (*Rangifer tarandus*) herd (PCH) has consistently calved at high densities on the coastal plain of the Arctic National Wildlife Refuge. Calf survival is lower when calving is displaced from this area. Since 1979, the PCH has grown steadily at a rate of about 5% per year and was estimated at 178,000 in 1989. During this reporting period, staff of the Alaska Department of Fish and Game has continued work on determining the relationships among calving distribution, forage quality, and forage availability. We examined seasonal movements, productivity, and mortality patterns of radio-collared caribou and submitted a proposal for a new study on the relationship between female caribou body condition and calf production/survival that was approved in the State of Alaska Capital Improvement Budget.

Key Words: caribou, migration, *Rangifer tarandus*, satellite radio-tracking.

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BACKGROUND

In 1980 the U.S. Congress set aside a portion of the coastal plain in the Arctic National Wildlife Refuge for oil and gas exploration. Results of the geological exploration indicate that the coastal plain (now commonly referred to as the 1002, or "ten-oh-two," area) is the best remaining onshore prospect for a major new oil discovery in North America.

Congress also mandated baseline ecological research of the 1002 area, and the Porcupine caribou (*Rangifer tarandus*) herd (PCH) ($n = 178,000$ in 1989) has thus been the subject of cooperative studies conducted by the Alaska Department of Fish and Game (ADF&G), the U.S. Fish and Wildlife Service, the Canadian Wildlife Service, and the governments of the Yukon and Northwest Territories. These studies have focused on seasonal movements of the PCH within both the U.S. and Canada. Satellite transmitter collars were found to be an effective addition to standard telemetry for following seasonal movements. Intensive tracking of both radio-collared cows and radio-collared calves yielded valuable information on timing and distribution of calving and spatial variation in calf survival. In most years, about 50-75% of the calves in the PCH are born in an area that comprises only about 25% of the overall calving grounds. Calf survival tends to be particularly high when calving occurs in the low-lying coastal plain portions of this traditional high-density calving area rather than in nearby foothills and mountains where predators are more abundant.

The 1002 area overlaps most of the coastal plain portion of the traditional calving area. All of the 1002 area is used as postcalving habitat by the PCH, and much of the western part of the 1002 area is used by the Central Arctic herd (CAH) ($n = 19,000$ in 1991) as late summer and winter range. Studies of the CAH in the Prudhoe Bay and Kuparuk Oilfield areas have indicated a potential for displacement of caribou from traditional ranges and disruption of traditional movement patterns. The overall goals of the current study are to continue to identify potential conflicts between caribou and oil development and to recommend measures for minimizing the impact of oil development on caribou and their habitat.

OBJECTIVES

To synthesize existing knowledge on migration routes between seasonal ranges, selection of calving areas on the arctic coastal plain, selection of winter ranges, and long-term natality and mortality rates of radio-collared caribou.

STUDY AREA

The study area encompasses the entire range of the PCH in northern Alaska and in the Yukon and Northwest Territories in Canada.

METHODS

Telemetry

We use two different telemetry systems to monitor caribou. All collared caribou are equipped with VHF transmitters that can be tracked from aircraft. For convenience, we use the terms "radiocollar" or "conventional collar" when discussing data from the VHF transmitters. Some caribou are also equipped with transmitters that relay signals through polar-orbiting satellites. Details of the satellite telemetry system have been reported previously (Fancy et al. 1989^{a,b}; Whitten and Fancy 1991). We refer to "satellite collars" when discussing the satellite telemetry data.

Migration Routes

Migration routes between summer and winter ranges are determined primarily from cumulative location data from satellite-collared caribou. For the purposes of analyses conducted so far, fall migration has been considered to occur during September and October and spring migration during April and May (Whitten and Fancy 1991). Extensive movements between distant ranges also occur during other times of the year, however, and future analyses may consider these other movements as well. We will compare computer printouts of migration routes with geographical features on topographic maps and with available data on vegetation, habitat type, and snow cover.

Selection of Calving Sites

We monitor movement toward calving areas using satellite-collared cows. Movement toward specific calving sites within the overall calving area is monitored by intensive (daily) tracking flights to visually locate all collared cows. General calving areas and specific calving sites are compared with topographic features, forage quality and availability, predator distribution, and annual variation in snow cover.

Selection of Winter Ranges

We will investigate selection of winter ranges by plotting distributions of satellite collared caribou (with supplemental telemetry data from conventional collars and visual observations of unmarked animals). Particular emphasis will be placed on winter distribution in relation to topographic and vegetative features and to variation in snowfall. The hypothesis that individual caribou maintain long-term fidelity to specific winter ranges will also be tested using multi-year data from

individual collared caribou and by comparing the relative numbers of collared caribou using various areas each year.

Long-term Natality Rates of Radio-collared Caribou

We determine natality of collared cows annually by extensive monitoring on the calving grounds. Parturient status is determined using a combination of observations, including presence or absence of a calf, antler condition, and udder distension. Collared cows are relocated frequently from about 28 May to 10 June because past experience has indicated that point-in-time observations may not positively identify all parturient females. Radiocollar batteries usually last 3-5 years, and we have recaptured many cows and fitted them with new collars so that a sizable sample of females with >2 years of natality data is now available for analysis.

Long-term Mortality Rates of Radio-collared Caribou

We have studied long-term mortality by using data from radio-collared calves, yearlings, 2-year-olds, and adults.

RESULTS AND DISCUSSION

A synthesis of available data on PCH calving ground use and calving site selection has confirmed traditional use of a high-density calving area overlapping the 1002 area. Survival of calves is higher when parturient cows are able to use this area and lower when they are displaced (by adverse snow conditions) to areas with more predators (Whitten et al. 1992). Researchers continue to monitor the general correlation between a more coastal calving distribution and higher calf survival. Currently, research emphasis is shifting to the role of nutrition and forage quality and quantity in calving site selection. The nutrition/habitat aspects of this work are being conducted primarily by the U.S. Fish and Wildlife Service, while ADF&G continues to be the lead agency in providing data on caribou distribution.

Calving surveys in 1992 were hampered by inclement weather and by an unusually wide distribution of calving caribou. We were unable to consistently relocate all radio-collared cows on a daily or every-other-day basis. Snowmelt occurred relatively early on the coastal plain in Alaska, which was essentially snow-free by 28 May. In contrast, record snowfalls and late melt resulted in large areas of the northern Yukon still being snow-covered into the first week of June. Roughly half the adult cows in the PCH reached the coastal plain in Alaska for calving, while the remainder were spread back along migration trails as far as the Porcupine River. Parturition among radio-collared adult cows was high (87%; $n = 78$), correlating with good body condition the previous fall (D. Russell, Canadian Wildlife Service, pers. commun.). Calves born on the coastal plain in Alaska experienced high survival. Calves born farther east and south had poor survival, with most deaths occurring early (although a precise breakdown in perinatal versus non-perinatal mortality was impossible due to the infrequency of relocations). It is unclear that the higher calf survival on the coastal plain was primarily due to scarcity of predators, especially considering the adverse weather conditions elsewhere. Overall, calf survival through the month of June was 57%, which is the lowest recorded since large numbers of radio-collared cows became available in 1983 (Whitten et al. 1992). Nevertheless, this unusually low survival was largely offset by

unusually high initial productivity, resulting in a calf:cow ratio at the end of June of about 50:100.

Budget reductions and changes in research priorities among cooperating agencies over the past 2-3 years have resulted in deployment of fewer satellite collars (generally <10 and often <5) and infrequent and incomplete tracking surveys except during summer. This has greatly slowed the accumulation of new data on migration routes and winter range use, but we are still gathering limited data and will analyze them in future reports.

Long-term data on population dynamics, including changes in population size, natality, and mortality, continue to be gathered on a routine basis. An aerial photocensus of the PCH was attempted in July 1991, but the quality of the photographs was poor, and one large group of caribou was not completely covered by photo transects. Therefore, a large but unknown number of caribou was missed, and the photo counts were incomplete. We will attempt a census again in July 1992.

Preliminary analyses of long-term mortality rates among radio-collared PCH animals have already been published (Fancy et al. 1992). Work is continuing on refining these results, and specifically on the problems involved in using data sets in which not all animals can be accounted for in each survey. Published procedures for handling staggered entry of animals into the data set and for censoring data from individuals with unknown or uncertain fate (e.g., Pollock et al. 1989) have so far been unwieldy to apply in our particular situation.

Papers on field techniques for determining natality in free-ranging caribou and on long-term reproductive histories of individual females are nearing completion and will be submitted soon for publication in professional journals.

The following article was published during the current reporting period:

Whitten, K. R., G. W. Garner, F. J. Mauer, and R. B. Harris. 1992.
Calf survival in the Porcupine Caribou Herd. *J. Wildl. Manage.*
56:201-212.

We prepared and submitted a research proposal to study the relationship between female body condition and calf production and survival that was approved under the State of Alaska Capital Improvement Projects program. Results of this project should provide background information on PCH physiological condition and reproductive potential under undisturbed conditions and will aid in detecting the occurrence and magnitude of the effects of any future development.

ACKNOWLEDGMENTS

Valuable assistance to this project was provided by Larry Pank, Noreen Walsh, Brad Griffith, and Tom McCabe of the U.S. Fish and Wildlife Service; Dan Reed and Pat Valkenburg of the Alaska Department of Fish and Game; Don Russell and Debbie van de Wetering of the Canadian Wildlife Service; Cor Smits and Dorothy Cooley of the Yukon Department of Renewable Resources; and Karen Gerhart of the University of Alaska-Fairbanks.

LITERATURE CITED

- Fancy, S. G., L. F. Pank, D. C. Douglas, C. H. Curby, G. W. Garner, S. C. Amstrup, and W. L. Regelin. 1989a. Satellite telemetry: a new tool for wildlife research and management. U.S. Fish and Wildl. Serv. Resour. Publ. No. 172. 54pp.
- _____, _____, K. R. Whitten, and W. L. Regelin. 1989b. Seasonal movements of caribou in arctic Alaska as determined by satellite. *Can. J. Zool.* 67:644-650.
- _____, K. R. Whitten, N. E. Walsh, and R. D. Cameron. 1992. Population dynamics and demographics of caribou in developed and undeveloped areas of the arctic coastal plain. Pages 1-20 in T. R. McCabe, B. Griffith, N. E. Walsh, and D. D. Young, eds. *Terrestrial research: 1002 area--Arctic National Wildlife Refuge, Interim Rep., 1988-1990.* U.S. Fish and Wildl. Serv., Anchorage, AK. 392pp.
- Pollock, K. H., S. R. Winterstein, C. M. Bunck, and P. D. Curtis. 1989. Survival analysis in telemetry studies: the staggered entry design. *J. Wildl. Manage.* 53:7-15.
- Whitten, K. R., and S. G. Fancy. 1991. Movement patterns of the Porcupine Caribou Herd in relation to oil development. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-23-3. Juneau. 43pp.
- _____, _____, and N. E. Walsh. 1992. Effect of potential displacement of caribou from the 1002 area on mortality rates of calves. Pages 21-36 in T. R. McCabe, B. Griffith, N. E. Walsh, and D. D. Young, eds. *Terrestrial research: 1002 area--Arctic National Wildlife Refuge, Interim Rep., 1988-1990.* U. S. Fish and Wildl. Serv., Anchorage, AK. 392pp.

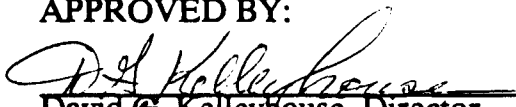
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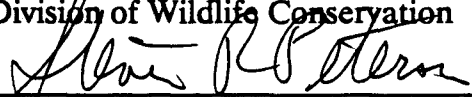
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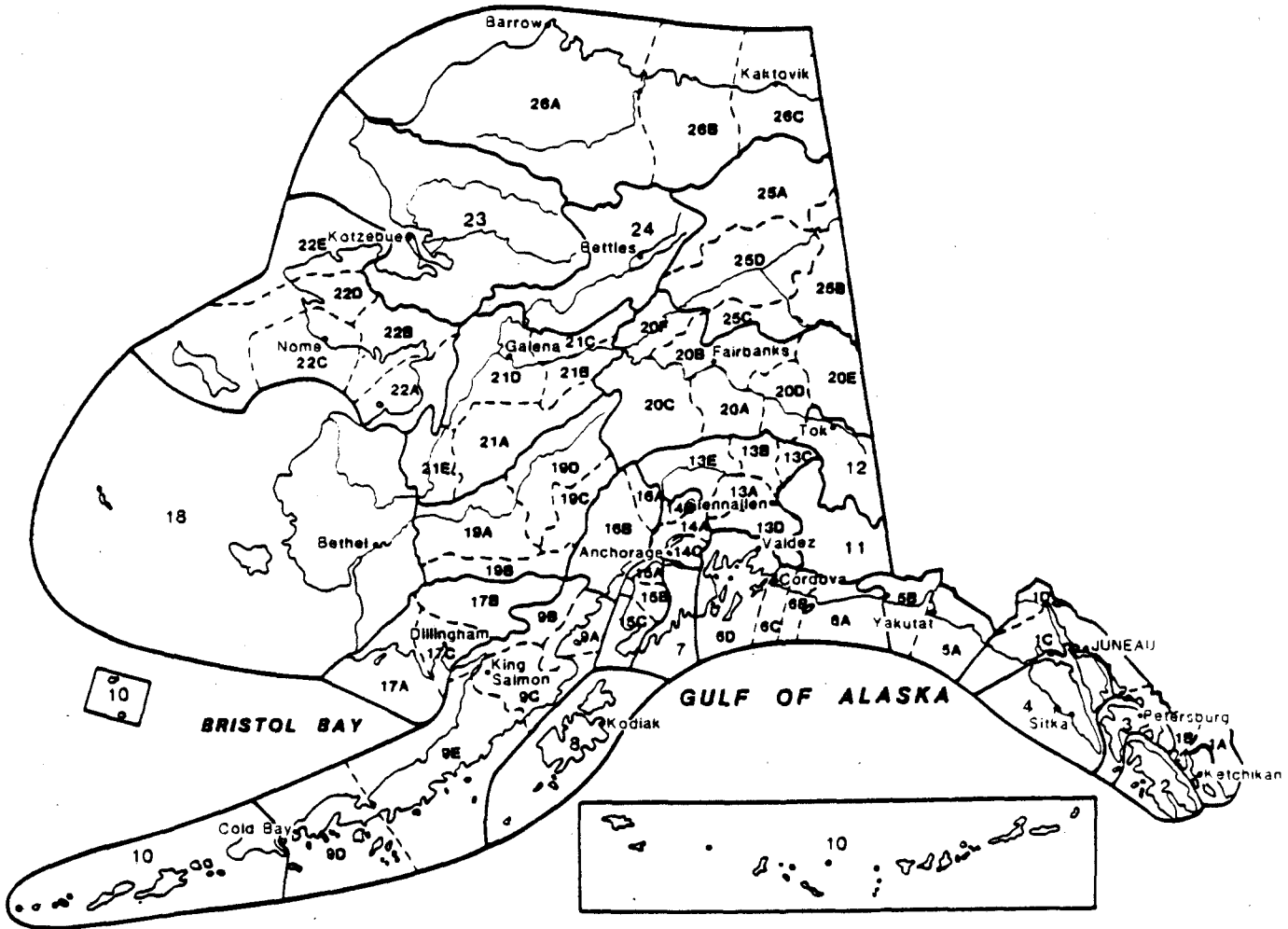


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