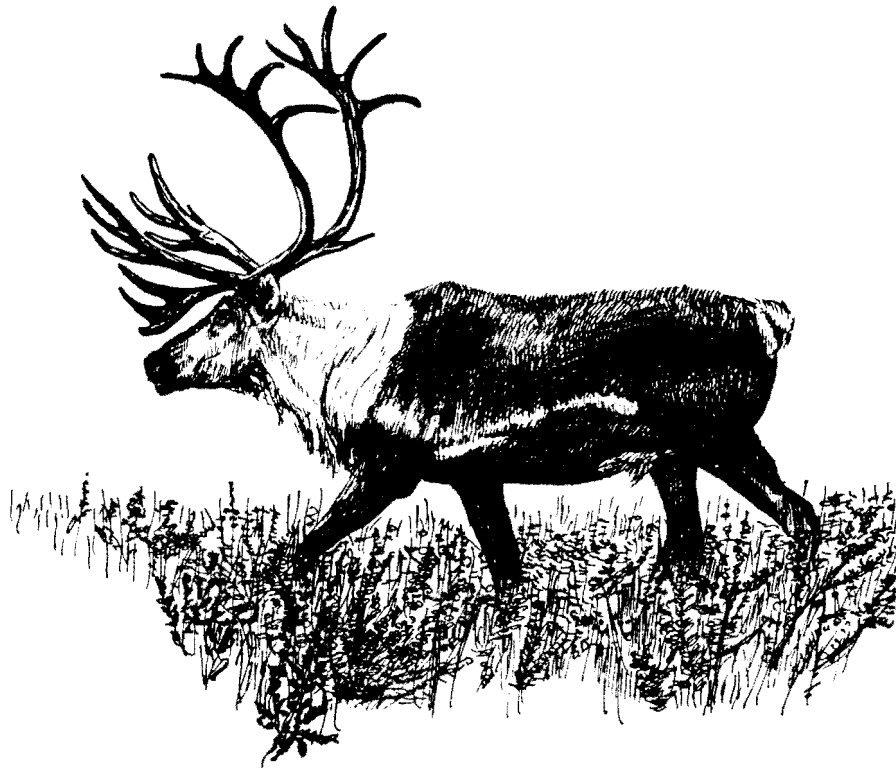


Alaska Department of Fish and Game
Division of Game
Federal Aid in Wildlife Restoration
Research Progress Report

MOVEMENT PATTERNS OF THE
PORCUPINE CARIBOU HERD IN
RELATION TO OIL DEVELOPMENT



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SUMMARY

Eight to 11 caribou (Rangifer tarandus) in the Porcupine Caribou Herd (PCH) and 2-10 in the Central Arctic Herd (CAH) have been successfully relocated several times per day since March 1985 by a satellite tracking system. Movement patterns in relation to topographic features and broad habitat types are being determined and compared between the 2 herds. Movements in relation to petroleum production facilities and activities will be determined for CAH caribou, and these data will be used to predict effects of potential development on the PCH. Data are currently being collected and analyzed.

Key words: caribou, migration, satellite radio-tracking.

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BACKGROUND

The Porcupine Caribou (Rangifer tarandus) Herd (PCH), numbering approximately 180,000, migrates seasonally between wintering areas in the boreal forests of northwestern Canada and northeastern Alaska and calving grounds on the arctic coastal plain within both Yukon Territory and Alaska. Large-scale development of nonrenewable resources is planned throughout this resource-rich area. Concerns about the impact of development on the PCH have been expressed by numerous government agencies, environmental groups, and subsistence users. International concern is exemplified by efforts to develop an International Agreement between the U.S. and Canadian governments to protect the PCH and its habitat.

Exploration for oil and gas is currently underway on the traditional calving grounds of the PCH on the arctic coastal plain. It is highly likely that development will occur in the near future. PCH wintering areas in the Ogilvie and Richardson Mountains in Canada and on Venetie tribal lands in Alaska are also subject to intensive oil and mineral exploration. A road has already been built between Dawson and the MacKenzie River Delta (Dempster Highway). Protection of habitats on calving grounds and key winter ranges, and mitigation of the impacts of development require detailed knowledge of habitat use, movement patterns, and travel corridors.

The large size, remote location, and international movements of the PCH make it difficult and costly to study this herd. Monitoring of movements and habitat use through direct observation or by relocating caribou equipped with conventional radio collars has proven difficult. The feasibility of using satellite radio collars to monitor daily movements of caribou in the PCH was tested in 1984. The prototype satellite radio collars (called PTT's for "platform terminal transmitters") provided accurate and reliable data at a reasonable cost. A 2nd generation satellite transmitter was

developed and deployed in 1985; 8 PTT's were placed on PCH females and 2 on CAH females in April. Preliminary results demonstrated a capability for describing migration routes and movement patterns in greater detail than was previously possible. In particular, we noted extensive mid- and late summer movements in 1984, 1985, and 1986 such as have not previously been reported. Also, activity recorders in the PTT's have the potential to provide data on daily activity patterns of caribou. Additional collars were deployed in October 1986 and March, May, and June 1987 to increase sample sizes to 11 PCH females and 10 CAH females. Collars on CAH females allow comparisons of relatively sedentary caribou with the highly migratory PCH. CAH caribou also provide an opportunity to describe caribou reactions to existing oil field development.

This study is 1 component of a cooperative program between the Alaska Office of Research, U.S. Fish and Wildlife Service, and the Alaska Department of Fish and Game. The overall goals of this cooperative study are 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 identify migration routes between summer and winter ranges and to determine movement patterns on the arctic coastal plain in relation to topographic features, broad habitat types, and existing or potential petroleum production and transportation facilities. The U.S. Fish and Wildlife Service is the lead agency in determining habitat utilization and preferences and daily activity budgets. Objectives that are the primary responsibility of the U.S. Fish and Wildlife Service are not addressed in this report.

METHODS

Eleven adult female caribou from the PCH and 10 from the CAH are currently equipped with collars bearing both PTT and standard transmitters. Each PTT transmits 6 hr/day, provides 2-5 locations daily, and functions for approximately 1 year. Each collared caribou is monitored as long as possible; that is, until it dies or can no longer be located due to failure of both the PTT and standard transmitters. When a PTT expires or is near the end of its projected battery life, that caribou is located and recaptured using the standard transmitter, the old collar is reclaimed, and a new collar is attached. When a collared caribou dies, the collar is retrieved, refurbished as necessary, and placed on a different caribou.

Migration Routes

All PTT locations are plotted on digitized terrain maps so migration routes and distances traveled each day can be correlated with slope, aspect, and major geographical features. Satellite locations are supplemented by fixed-wing tracking of standard radio-collared caribou. Trail systems are noted during tracking flights as well as at the time of general reconnaissance surveys during migration periods. Trails are clearly visible in snow, and fresh trails can also be distinguished along river bars and in tundra vegetation during summer and fall. In this way, data from satellite relocations can be compared with routes used by other members of the herd. Various migration paths can thus be compared for distances traveled, elevation changes, and rates of movement. Estimates of numbers, composition, and group sizes of caribou using various routes are then possible, such as could not result from use of the PTT's alone.

Calving Areas

PTT locations during calving are plotted on digitized terrain and habitat maps. Location of calving is correlated with habitat types and terrain features to determine if preferences occur. Time of calving for PTT-collared caribou is determined by observation from fixed-wing aircraft. Again, tracking of standard radio collars and general reconnaissance flights provides comparative data on numbers and composition of caribou using the calving grounds.

Insect Relief Habitat

Periods of severe insect harassment of caribou are identified from local weather records of wind and temperature conditions favorable to insect activity, from concurrent studies by U.S. Fish and Wildlife Service on insect activity and abundance in the Arctic National Wildlife Refuge, and/or from direct field observations.

PTT locations are plotted on digitized terrain maps and again compared with supplemental data from standard radio collars and general aerial surveys. Specific areas or types of habitats consistently used during insect harassment periods can then be compared, and any distinguishing characteristics such as vegetation type, elevation, temperature, and wind conditions will be noted.

RESULTS AND DISCUSSION

Tables 1 and 2 show capture dates, recaptures for collar replacement, and current status of satellite radio-collared caribou. All PCH caribou were captured in Alaska, but have

subsequently dispersed throughout the range of the PCH. PTT's in the CAH have been deployed so that some collared caribou are likely to frequently encounter oil field facilities (i.e., captured in or near the Prudhoe Bay and Kuparuk Oil Fields), while others are likely to encounter development only infrequently (i.e., captured in the Canning River/Sadlerochit Mountains area far east of the oil field).

Each location fix for each caribou is entered into a computerized mapping system. An attribute file for that fix is then automatically created that includes location, date, slope, aspect, vegetation type, ambient temperature, and activity of the caribou. Slope, aspect, and vegetation data are obtained from LANDSAT imagery while temperature and animal activity are provided by sensors in the PTT. The data are in the process of being analyzed.

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Table 1. Deployment date and current status of satellite radio collars (PTT's) on female caribou from the Porcupine Caribou Herd.

I.D. No.	Capture date	Recapture for collar replacement	Comments and current status (June 1987)
S8	4/85	3/86, 10/86	Still alive; PTT transmitting.
S9	4/85	3/86, 5/86	PTT failed 5/86; recollared with conventional transmitter 6/86; died of unknown causes 12/86.
S10	4/85	3/86, 3/87	Still alive; PTT transmitting.
S11	4/85	3/86, 3/87	Still alive; PTT failed 5/87.
S12	4/85	3/86	Died of unknown causes 12/86; PTT retrieved.
S13	4/85	3/86, 10/86	Still alive; PTT transmitting.
S14	4/85	3/86, 10/86, 3/87	Still alive; PTT transmitting.
S15	4/85		Killed by bear (along with calf) 6/85; PTT retrieved.
S16	6/85		Killed by wolves 11/85; PTT retrieved.
S17	3/86		Died of unknown causes 5/86; PTT retrieved.
S18	10/86		Killed by wolves 2/87; PTT retrieved.
S19	10/86		Still alive; PTT transmitting.
S20	10/86		Still alive; PTT transmitting.

Table 1. Continued.

I.D. No.	Capture date	Recapture for collar replacement	Comments and current status (June 1987)
S29	10/86		Still alive; PTT transmitting.
S30	3/87		Died 4/87, apparent capture mortality; PTT retrieved.
S31	3/87		Still alive; PTT transmitting.
S32	3/87		Still alive; PTT transmitting.
S34	6/87		Still alive; PTT transmitting.

Table 2. Deployment dates and current status of satellite radio collars (PTT's) on female caribou from the Central Arctic Caribou Herd.

I.D. No.	Capture date	Recapture for collar replacement	Comments and current status (June 1987)
S5	4/85	3/86	Presumed alive; PTT batteries exhausted 3/87 and standard transmitter failed. No longer trackable. Collar not retrieved.
S6	4/85	3/86, 3/87	Died of unknown causes 6/87; PTT transmitting.
S21	10/86		Still alive; PTT transmitting.
S22	10/86		Still alive; PTT transmitting.
S23	10/86	11/86, 3/87	Still alive; PTT transmitting.
S24	10/86		Still alive; PTT transmitting.
S25	10/86		Still alive; PTT transmitting.
S26	10/86		Still alive; PTT transmitting.
S27	10/86		Still alive; PTT transmitting.
S28	10/86		Still alive; PTT transmitting.
S33	5/87		Still alive; PTT transmitting.