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## **Movements and Distribution of Radio-Collared Caribou Across Selawik Valley, Buckland Valley and Nulato Hills, Winter of 1988-89**

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# Movements and Distribution of Radio-Collared Caribou Across Selawik Valley, Buckland Valley, and Nulato Hills, Winter of 1988-89

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## INTRODUCTION

Movements and distribution of Western Arctic Herd (WAH) caribou (*Rangifer tarandus granti*) were monitored in the Selawik Valley, Buckland Valley, and Nulato Hills by personnel from the Alaska Department of Fish and Game (ADFG), Bureau of Land Management (BLM), and U.S. Fish and Wildlife Service (FWS) during the winter of 1988-89. Locations of reindeer (*R. t. tarandus*) in Merlin Henry's allotment were also noted whenever possible. This report fulfills partial implementation of BLM's Buckland Valley Habitat Management Plan (HMP) (Adams 1983). Results from previous caribou surveys for this area were reported by Adams and Connery (1983), Smith (1984, 1985), Smith and Machida (1986), Robinson and Field (1987), and Robinson (1988). Funding was provided by each agency for its respective share of the accomplished work.

Objectives of this project are (1) to document seasonal migration patterns and winter range of WAH caribou in the Selawik Valley, Buckland Valley, and Nulato Hills and (2) to make timely information concerning caribou distribution and movements available to the public.

## STUDY AREA

The Selawik Valley lies within the Selawik National Wildlife Refuge (NWR), encompassing approximately 3,221,400 acres (2,079,600 federal acres) (FWS 1987). This area is bounded on the north by the Kobuk River and Waring

Mountains; on the east by the Sheklukshuk Range and Zane Hills; on the south by the Purcell Mountains and Selawik Hills; and on the west by Selawik Lake and Hotham Inlet (Fig. 1). The valley is characterized by river deltas and coastal wetlands. Purcell Mountain rises to 3,831 feet elevation.

The Buckland Valley and Nulato Hills lie south of the Selawik NWR and encompass approximately 6,299,000 acres of BLM lands. This area is bounded on the north by the Selawik Hills and Purcell Mountains, on the east by the Koyukuk and Yukon rivers, on the south by the Unalakleet River, and on the west by Norton Sound and the Seward Peninsula (Fig. 1). The Buckland Valley is broad in nature, but is dissected by several drainages. The Nulato Hills, generally, have rounded summits with gentle slopes dropping into narrow valleys. Debauch Mountain rises to 3,411 feet elevation.

Four domestic reindeer allotments overlap the study area (Fig. 1). The four herders are Doug Sheldon (Candle), Nathan Hadley (Buckland), Merlin Henry (Koyuk), and Palmer Sagoonick (Shaktoolik).

The areas lowest in elevation are characterized by graminoid vegetation, whereas higher, well-drained slopes are covered by low shrub scrub. The hills and mountains are covered by black spruce (*Picea mariana*) forest at lower elevations, and graminoid and low shrub scrub above tree line. Tall willows (*Salix spp.*) and white spruce (*Picea glauca*) line the riparian zone, and lush lichens grow throughout the study area.

Key wildlife species in this area are caribou, moose (*Alces alces*), grizzly bear (*Ursus arctos*), wolf (*Canis lupus*), furbearers, and waterfowl. A variety of small game and non-game species are also present. A detailed description of the study area can be found in the Buckland Valley Habitat Management Plan, the Northwest Unit Resource Analysis, the Central Yukon Resource Management Plan, and the Selawik National Wildlife Refuge Final Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review/Wild River Plan (Adams 1983, BLM 1982 and 1986, FWS 1987).

## METHODS

ADFG personnel affixed 17 new radio-transmitting collars on caribou as they crossed the Kobuk River at Onion Portage between August 31 and September 7, 1988. Two of these collars transmit signals to orbiting satellites (Fancy et al. 1988). This brought the total number of WAH caribou with active conventional radio-transmitting collars to about 85-90. Personnel from ADFG, BLM and FWS tracked movements and distribution of caribou 20 times from September 20, 1988 to May 24, 1989 (Table 1). The entire study area was flown over as high as 10,000 feet with either a Cessna 185 or 206 traveling at the airplane's cruising speed. With the exception of March 3, all flights made by FWS were in a Super Cub airplane while doing wolf radio-tracking surveys and caribou transects in the Waring Mountains burn.

**TABLE 1. Aerial Surveys of Radio-collared Caribou Across Selawik Valley, Buckland Valley, and Nulato Hills, Winter of 1988-89**

<u>Flight Number</u>	<u>Survey Date</u>	<u>Total Flight Hours</u>	<u>Total Number Relocations</u>	<u>Agency</u>	<u>Number Observers</u>
1	9/20, 22/88	11.40	Distribution	FWS	1
2	10/5/88	3.00	Distribution	FWS	1
3	10/11/88	6.60	31	ADFG	2
4	10/20/88	6.10	15	ADFG	1
5	10/25/88	6.60	45	ADFG	1
6	10/29, 11/1/88	5.60	Distribution	FWS	1
7	11/21-22/88	10.87	48	BLM	2
8	11/22-23/88	11.80	Distribution	FWS	1
9	2/22/89	5.13	38	BLM	2
10	3/3/89	4.40	8	FWS	2
11	3/14/89	6.50	31	ADFG	1
12	3/23/89	6.50	67	ADFG	1
13	3/29/89	14.45	54	BLM, ADFG	2
14	3/30-31/89	13.60	14	FWS	1
15	4/13-19/89	13.80	Distribution	FWS	1
16	4/28/89	6.50	5	FWS, ADFG	1
17	5/3/89	6.00	5	FWS, ADFG	1
18	5/9/89	7.50	21	ADFG	1
19	5/11/89	5.00	8	ADFG	1
20	5/19, 24/89	7.80	Distribution	FWS	1

NOTE: Distribution flights did not attempt to relocate radio-collared caribou. Duplicate mortality signals are not included. Includes relocations outside the study area.

Locations of individual animals were recorded, mapped and later transferred to a dBase III Plus file for storage on a PC computer at the ADFG office in Kotzebue. Whenever possible, these locations were described by township and range of the public land rectangular system of survey (BLM 1979).

Distribution was manually mapped by encompassing the outermost locations of observed caribou.

## RESULTS

For purposes of this report, location data from the satellite radio-collars were not used. Of the 85-90 conventional collars, a maximum of 67 (74-79%) were relocated on any one survey flight. Several collared caribou were not located because they inhabited portions of northwestern Alaska that were not searched.



## Selawik National Wildlife Refuge

Fall Migration. In 1988, a gradual and steady movement of small groups (less than 100 to about 1,000) used several routes during September and October (Fig. 2). This was similar to most previous years except fall 1985 when migration was sudden and more concentrated, utilizing fewer routes (Spindler 1989). A September 20-22 survey flight showed a few hundred caribou crossing the Waring Mountains east of Kiana, a few thousand moving south near Upinivik and along the upper Kugarak River, and a few hundred moving south along Kuchuk Creek. By October 6, groups of about 1,000 moved south near Noorvik and Upinivik, and a group of about 5,000 moved south from near Kiana to just west of Selawik. A group of several hundred crossed the Waring Mountains near the head of Kuchuk Creek.

Flights on October 29 and November 1 showed about 1,000 caribou south of Hotham Peak, and several hundred in and near the eastern Selawik Hills (Fig. 3). By November 22 and 23, about 200 caribou were apparently wintering on the Kobuk River delta, about 500 south of Hotham Peak, 800 between Inland Lake and the Tagagawik River, and a few hundred to possibly 1,000 in the upper Selawik Valley (Fig. 4). About 3-4,000 were in the northern Selawik Hills, and tens of thousands were in the Buckland Valley south of the refuge.

Spring Migration. Few caribou remained on the refuge during the winter and early spring of 1989, whereas a majority of the herd wintered well to the south in the Buckland Valley and Nulato Hills, with a few thousand in the Selawik Hills. A flight on March 3 revealed only a few dozen caribou in the Lockwood Hills and Purcell Mountains (two telemetry signals) with up to a few thousand in the western Selawik Hills (five signals) (Fig. 5). By March 30-31, several thousand caribou were seen slowly moving north near Ekiek, Keruluk, and Ingruksukruk creeks. A few hundred were seen moving north out of the Selawik Hills and north from Hotham Peak (Fig. 6).

A mass movement of caribou across the central Selawik Valley occurred in mid April (Fig. 7). Flights between April 13 and 19 showed two major northward routes used by tens of thousands of caribou: (1) from the Selawik Hills north, crossing the Selawik River near Nillik, thence up the Fish River to the Kiana area; and (2) from the Selawik Hills north toward Upinivik, thence along Kuchuk Creek toward Onion Portage. A third major route along the upper Kugarak River to Onion Portage, usually used in April, was not used until mid May. Smaller movements by thousands of caribou were noted north of the Purcell Mountains and near Ekiek, Keruluk, and Ingruksukruk creeks, while several hundred remained on or near Hotham Peak. For the first time in five years of spring observations, several east-west trail systems were seen paralleling the Selawik and Kugarak rivers (Spindler 1989). We do not know if this pattern was related to the Waring Mountains fire that burned in July 1988.



In mid May, groups of several thousand caribou were still milling and gradually moving north through the eastern half of the refuge, while tens of thousands had just moved north along the upper Kugarak River towards Onion Portage (Fig. 7). A few hundred were still in the Hotham Peak area. A June 5 survey showed a few thousand caribou in bull and cow/yearling groups in the northeast quarter of the refuge, however, both reindeer and caribou calves were seen (Fig. 7). The late snow melt and river breakup, and perhaps increasing composition of reindeer, could have contributed to this lingering pattern.

Population Estimates. From 1985 to 1987, one refuge-wide transect survey had been conducted each November specifically for caribou population estimation. Caribou population extrapolations for Selawik NWR have also been made in conjunction with May and September waterfowl transects and refuge-wide moose censuses in 1984 and 1985. In November 1988, a specific caribou wintering transect survey was not undertaken because of a near absence of caribou on the refuge. A summary of all caribou population estimates made on the refuge is given in Table 2. The Selawik NWR hosted between 1% and 32% of the total WAH herd, depending upon month and year, based on estimates of 229,000 caribou in 1986; 256,480 in 1987; and 330,000 in 1988. The figures in Table 2 represent estimates of the number present on any one day of the month and do not represent the total numbers moving through the refuge during the given month. Because of the high spatial and temporal variability, confidence intervals were high. If more precise estimates are needed in the future, sampling intensity will have to be higher. Sampling intensity for the above estimates was 2.8% for May and September, 3.9% for November, and 15.3% for October 1985.

Waring Mountains Burn. A higher intensity transect sampling procedure to quantify caribou use of the 1988 Waring Mountains burn was implemented in September 1988 and May and June 1989. Caribou densities in September and May were similar in burned and unburned habitats, but were twice as high at the edge

**TABLE 2. Caribou Population Estimates for Selawik National Wildlife Refuge, 1984-1988**

(Figures are expressed in thousands with 80% confidence intervals as percent of estimate)

<u>Year</u>	<u>May</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>
1984		5.3 (78)			48.5 (82)
1985	3.3 (79)	66.6 (50)	10.7 (58)	10.1 (56)	
1986	7.9 (94)	7.4 (67)		6.3 (63)	
1987	6.8 (60)	72.8 (68)		36.3 (62)	
1988	3.3 (60)	23.6 (76)			

bordering the two habitats. Caribou density was also highest at the edge in early June, but twice as high in the unburned as compared to the burned area (Spindler 1989).

### Buckland Valley and Nulato Hills

Three surveys were flown by ADFG personnel in October 1988 (Fig. 3). Caribou distribution stretched from the Selawik River to the Koyuk River on October 11. Twenty-three percent (N=7) of all located caribou were in the Buckland Valley and 20% (N=6) as far west as the Kiwalik and Koyuk rivers (Table 3). Forty-five percent (N=14) of all located caribou could not be linked to a specific river drainage or were outside the study area. By October 20, caribou had moved southward to the Shaktoolik River. A survey conducted on October 25 discovered caribou from the Selawik River to the Unalakleet drainage. Seventy-one percent (N=32) of all located caribou were south of the Inglutalik River. Caribou located in the Unalakleet drainage (N=14, 31%) had to travel more than 200 straight line miles from Onion Portage in eight weeks (Table 3).

**TABLE 3. Distribution of radio-collared caribou by river drainage, October-November 1988**

RIVER	10/11/88		10/20/88		10/25/88		11/21/88	
	No.	%	No.	%	No.	%	No.	%
SELAWIK	3	10	0	0	2	4	2	4
KAUK	0	0	0	0	0	0	1	2
MANGOAK	0	0	0	0	0	0	2	4
KIWALIK	3	10	0	0	0	0	2	4
BUCKLAND	7	23	0	0	3	7	12	25
TAGAGAWIK	1	3	0	0	4	9	10	21
HUSLIA	0	0	0	0	0	0	1	2
KOYUK	3	10	1	7	3	7	1	2
INGLUTALIK	0	0	0	0	0	0	6	13
KATEEL	0	0	0	0	5	11	4	8
UNGALIK	0	0	0	0	3	7	0	0
GISASA	0	0	0	0	0	0	0	0
SHAKTOOLIK	0	0	5	33	5	11	1	2
NULATO	0	0	0	0	5	11	3	6
UNALAKLEET	0	0	0	0	14	31	3	6
OTHER	14	45	9	60	1	2	0	0
TOTALS	31	100	15	100	45	100	48	100

NOTE: Duplicate mortality signals are not included.

Other: river drainage cannot be identified or is outside of study area.

BLM and FWS personnel conducted caribou surveys on November 21-23, 1988 (Fig. 4). Caribou distribution was widespread from the Selawik River (north) to the Unalakleet River (south) and from the Purcell Mountains (east) to the Kiwalik River (west). Forty-six percent (N=22) of all located caribou were in the Buckland and Tagagawik valleys and 13% (N=6) in the Inglutalik drainage (Table 3).

BLM personnel flew the next survey on February 22, 1989. Caribou distribution was from the north side of the Selawik Hills to the northern portions of the Unalakleet drainage (Fig. 5). Sixty-eight percent (N=26) of all located caribou were in the upper portions of the Inglutalik, Kateel, and Ungalik watersheds (Traverse Peak area); 14% (N=5) in the Buckland and Tagagawik valleys; and 11% (N=4) in the Kauk and Mangoak drainages (Table 4).

ADFG, BLM and FWS personnel flew three surveys in March 1989 (Fig. 6). On March 14, 90% (N=28) of all located caribou were in the Nulato Hills and 10% (N=3) in the Buckland Valley (Table 4). A more complete survey conducted on March 23 found caribou slowly moving northward. Thirty-six percent (N=25) of all located caribou were south of the Inglutalik River and 54% (N=36) were in the Buckland

**TABLE 4. Distribution of radio-collared caribou by river drainage, February-March 1989**

RIVER	02/22/89		03/14/89		03/23/89		03/29/89	
	No.	%	No.	%	No.	%	No.	%
SELAWIK	0	0	0	0	0	0	4	7
KAUK	3	8	0	0	0	0	2	4
MANGOAK	1	3	0	0	0	0	3	6
KIWALIK	0	0	0	0	0	0	2	4
BUCKLAND	4	11	3	10	32	48	11	20
TAGAGAWIK	1	3	0	0	4	6	6	11
HUSLIA	0	0	0	0	0	0	2	4
KOYUK	0	0	0	0	0	0	0	0
INGLUTALIK	7	18	0	0	0	0	1	2
KATEEL	3	8	0	0	6	9	6	11
UNGALIK	16	42	5	16	11	16	1	2
GISASA	0	0	0	0	1	1	0	0
SHAKTOOLIK	1	3	8	26	6	9	4	7
NULATO	1	3	0	0	0	0	0	0
UNALAKLEET	1	3	1	3	1	1	1	2
OTHER	0	0	14	45	6	9	11	20
TOTALS	38	100	31	100	67	100	54	100

NOTE: Duplicate mortality signals are not included.

Other: river drainage cannot be identified or is outside of study area.

and Tagagawik valleys (Table 4). This was a noticeable shift since the February survey. The survey conducted on March 29-31 showed caribou to be as widely distributed as during the November survey. Fifteen percent (N=8) of all located caribou were in the upper portions of the Inglutalik, Kateel, and Ungalik watersheds (Traverse Peak area); 31% (N=17) in the Buckland and Tagagawik valleys; and 10% (N=5) in the Kauk and Mangoak drainages (Table 4). This was a noticeable shift from the previous week.

A nine percent (8 out of 85-90) sample of caribou (two collared in 1985, one in 1986, three in 1987, and two in 1988) was used to examine movements of individual caribou during the winter (Table 5). These animals are part of large groups of caribou. Straight line distances of travel ranged from 57.5 to 180 miles (average=135 miles) during the 21.8 week period from October 25, 1988 to March 29, 1989. The average net distance traveled per week was 6.4 miles. These distances are subject to error due to the description of many locations. Caribou may not travel along these straight lines; actual distances may be much greater.

When reading the following description of caribou movements, the reader should remain aware that these caribou crossed the Kobuk River between late August and early October.

A general trend showed that many caribou moved quickly to their southern-most distribution by late October and gradually moved northward during the winter. The distance from the Kobuk River to the North Fork Unalakleet River is greater than 200 miles. All collaring activity (1985-89) was conducted on the Kobuk River.

Caribou no. 650, collared in 1985, returned to the study area for the fourth consecutive winter. This year, it moved 103 miles in 20.9 weeks. Its journey was recorded from the middle Ungalik River in October, to the upper South Fork Buckland River in November, to the upper Inglutalik River in February, and to the Tagagawik River in March.

Caribou no. 690, collared in 1985, also returned to the study area for the fourth consecutive winter. This year, it moved 57.5 miles in 21.8 weeks. It spent the entire time from October 25, 1988 to March 29, 1989 in the upper portions of the Kateel, Inglutalik, and Ungalik watersheds.

Caribou no. 1320, collared in 1986, returned to the study area for the third consecutive winter. This year, it moved 143 miles in 21.8 weeks. Its recorded journey began in the Shaktoolik drainage in October, moved northward to the West Fork Buckland River in November, and returned by way of the upper Ungalik River in February to the Shaktoolik River in March.

Caribou no. 230, collared in 1987, returned to the study area for the second consecutive winter. This year, it moved 165 miles in 20.9 weeks. Its recorded

journey began in the North Fork Unalakleet drainage in October and ended in the South Fork Buckland River drainage in March, by way of the Box River (Kateel River tributary) in November and upper Ungalik River in February.

Caribou no. 480, collared in 1987, also returned to the study area for the second consecutive winter. This year, it moved 115 miles in 21.8 weeks. It began in the South Fork Buckland drainage in October, spent most of the winter in the upper Ungalik and Kateel watersheds, and moved to the Tagagawik Valley in late March.

Caribou no. 510, collared in 1987, also returned to the study area for the second consecutive winter. This year, it moved 162 miles in 21.8 weeks. Along with caribou no. 230, no. 510 began its recorded journey in the North Fork Unalakleet drainage in October. It then moved to the upper Nulato River in November, middle Inglutalik River in February, and Shaktoolik River and South Fork Buckland River in March.

Caribou no. 3970, collared in 1988, traveled from the Kobuk River on 2 September 1988 to the North Fork Unalakleet River on October 25 (7.6 weeks). It then moved 180 miles in the next 20.9 weeks: Derby Creek (Tagagawik River tributary) in November and the upper Ungalik River in February and March.

Caribou no. 3980, collared in 1988, traveled from the Kobuk River on September 1, 1988 to Christmas Mountain (divide between lower Shaktoolik and lower Ungalik rivers) on October 25 (7.7 weeks). It then moved 158 miles in 21.0 weeks: Talik Ridge (divide between Buckland and Inglutalik rivers) in November and the upper Ungalik and Shaktoolik rivers in February and March.

We made no attempt to estimate the number of caribou occupying the Buckland Valley and Nulato Hills. However, while conducting moose surveys in the Kateel and South Fork Huslia drainages on December 1 and 2, 1988, we counted 3,582 caribou on 579,000 acres (3.96 caribou/square mile). During a moose survey of the Shaktoolik drainage on March 15-17, 1989, we counted 4,636 caribou on 259,000 acres (11.46 caribou/square mile). By comparison, caribou density estimates on the Selawik NWR for early winter ranged from a low of 1.2 caribou/square mile in November 1986 to a high of 3.9 caribou/square mile in November 1984. Maximum density observed was 13.9 caribou/square mile during fall migration in September 1987. Conclusively, many tens of thousands of caribou inhabited the Buckland Valley and Nulato Hills during the winter of 1988-89.

### **Reindeer Activity**

On October 5, 1988, Merlin Henry notified the BLM that he intended to move his reindeer herd into winter management unit no. 1 as identified in his Allotment Management Plan (Field 1986). This area is in the lower region of the Inglutalik River. His animals were located immediately east of the village of Koyuk, where they had spent the summer: this area was delineated as the summer management unit.



**TABLE 5. Movements of eight radio-collared caribou, winter of 1988-89**

CARIBOU NUMBER	CAPTURE YEAR	DATES MOVED	DISTANCE MOVED(MI)	TIME (WEEKS)	MILES PER WK
650	1985	10/25-11/22	42.0	3.7	11.4
		11/22-02/22	22.0	13.1	1.7
		02/22-03/23	39.0	4.1	9.5
		TOTAL	103.0	20.9	4.9
690	1985	10/25-11/22	19.0	3.7	5.1
		11/22-02/22	12.0	13.1	0.9
		02/22-03/23	18.5	4.1	4.5
		03/23-03/29	8.0	0.9	8.9
		TOTAL	57.5	21.8	2.6
1320	1986	10/25-11/22	64.0	3.7	17.3
		11/22-02/22	46.5	13.1	3.5
		02/22-03/23	25.5	4.1	6.2
		03/23-03/29	7.0	0.9	7.8
		TOTAL	143.0	21.8	6.6
230	1987	10/25-11/22	88.0	3.7	23.8
		11/22-02/22	34.0	13.1	2.6
		02/22-03/23	43.0	4.1	10.5
		TOTAL	165.0	20.9	7.9
480	1987	10/25-11/21	51.0	3.6	14.2
		11/21-02/22	6.5	13.2	0.5
		02/22-03/23	11.0	4.1	2.7
		03/23-03/29	46.5	0.9	51.7
		TOTAL	115.0	21.8	5.3
510	1987	10/25-11/21	25.0	3.6	6.9
		11/21-02/22	40.0	13.2	3.0
		02/22-03/14	28.0	2.9	9.7
		03/14-03/29	69.0	2.1	32.9
		TOTAL	162.0	21.8	7.4
3970	1988	10/25-11/22	116.0	3.7	31.4
		11/22-02/22	54.0	13.1	4.1
		02/22-03/23	10.0	4.1	2.4
		TOTAL	180.0	20.9	8.6
3980	1988	10/25-11/22	58.0	3.7	15.7
		11/22-02/22	35.0	13.1	2.7
		02/22-03/14	29.0	2.9	10.0
		03/14-03/23	36.0	1.3	27.7
		TOTAL	158.0	21.0	7.5

Distances are measured along straight lines.



John Coady (ADFG-Nome) and Mr. Henry flew his reindeer allotment on October 25 to locate his animals and to survey the remainder of his allotment relative to caribou distribution. Mr. Henry's reindeer were west of the Koyuk River and north of the village, and caribou were east of the Koyuk River. Approximately 1.5 weeks earlier, Mr. Henry saw 500-600 caribou near the confluence of the East Fork and Koyuk River. He observed scattered caribou within approximately six miles of his reindeer herd.

On November 21, Mr. Henry's reindeer remained west of the Koyuk River, approximately six miles upstream from the village, in an attempt to stay separated from caribou that were occupying the area. He indicated that some major northerly movements of caribou near the Inlitalik River had recently occurred.

On March 1, 1989, Mr. Henry reported that his reindeer were approximately eight miles from the village of Koyuk on the east side of the Koyuk River. He estimated that he lost at least 100 reindeer to caribou that continued to occupy his grazing allotment; a major concentration of caribou (4,000-5,000 animals) was along the East Fork Koyuk River.

## DISCUSSION

Buckland Valley has been an important winter range of WAH caribou since the 1950s (Adams 1983). Tens of thousands of caribou have been known to occupy it in past winters. Caribou began moving into the Nulato Hills and Seward Peninsula in the early 1980s (Smith 1984). Smith (1985) reported caribou as far south as the Koyuk, Shaktolik and Kateel rivers during the winter of 1984-85. During this same winter, David James (ADFG-Kotzebue, personal communication) and John Trent (ADFG-Barrow, personal communication) reported substantial numbers of caribou in the Brooks Range and on the North Slope. Smith and Machida (1986) reported "substantial numbers of caribou" migrated southward to the upper Anvik River and "several thousand caribou" migrated westward to the Kiwalik and Koyuk drainages during the winter of 1985-86. Robinson and Field (1987) reported caribou migrating along the Tagagawik River to spend most of the winter of 1986-87 in the Nulato Hills. Robinson (1988) reported caribou distributed from the Selawik Hills south to the North Fork Unalakleet River during the winter of 1987-88. Many tens of thousands of caribou occupied this same area during the winter of 1988-89. Many of the same caribou return to the study area annually.

Caribou must first cross the Buckland Valley before reaching the Nulato Hills and again during their return trip north. In addition to being used as transition range, Buckland Valley also served as winter range in 1988-89. This range expansion parallels population growth of the herd from 75,000 animals in 1976 to 330,000 in 1988.

Buckland Valley has been used for reindeer grazing in past years (Adams and Robus 1981). Where ranges of caribou and reindeer overlap, resident reindeer will

link with transient caribou. NANA lost several thousand reindeer during the 1982-83 and 1983-84 winters, but none were reported lost during the 1984-85 winter (Smith 1984, 1985). During fiscal year 1986, NANA lost approximately \$375,000 in the value of their herd due to reindeer migrating away with caribou and sold the herd in fiscal year 1987 (NANA 1986, 1988). This year, caribou moved within close range of Merlin Henry's reindeer for the fourth consecutive year. Some reindeer were lost during the first year (Smith and Machida 1986), none during the second and third years, and at least 100 animals this past winter. Obviously, economic hardship to reindeer herders can occur when their animals leave with migrating caribou.

As a means of resolving this conflict, BLM will accept a permit application for reindeer grazing in Buckland Valley only after five consecutive years of non-use by caribou (BLM 1982, Adams 1983). ADFG (1984) will recommend against issuing additional reindeer permits on ranges currently occupied by caribou or with a high probability of being occupied by caribou in the future.

## CONCLUSIONS AND RECOMMENDATIONS

Western Arctic caribou have used the Selawik NWR during fall and spring migration, with up to 32% of the herd crossing the refuge at any one time. Numbers of caribou wintering on the refuge have been variable, but usually less than 10,000. The original objective of determining caribou abundance on the Selawik NWR during migration was attained. Future use of low-intensity transects for caribou estimates is recommended if large numbers of caribou are present and there is need to document wintering numbers. Surveys of higher intensity are recommended to answer specific questions such as use in reindeer grazing areas or the 1988 Waring Mountains burn.

Western Arctic caribou have traditionally used the Buckland Valley as winter range. For the fifth consecutive year, locations of radio-collared animals have demonstrated caribou migrating across Buckland Valley to spend a major portion of the winter in the Nulato Hills. Many caribou also inhabited Buckland Valley during the winter of 1988-89. Migrating caribou continued to threaten the integrity of adjacent reindeer herds. BLM should continue working with ADFG and FWS to monitor movements and distribution of WAH caribou in future years.

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CHUKCHI SEA

KOTZEBUE

KOBUK RIVER

Onion Portage

Selawik Nar.

Kuchuk Creek

Pan. Riv.

Selawik River

Koyuk River

Tagdagan River

Sheld. Riv.

Hadley's Riv.

Sagoonick's Riv.

North River

Unalakleet River

Koyuk River

Inglutalik River

Uegalik River

Kotel River

Giasa River

Nulato River

Shaktolik River

North River

Unalakleet River

Koyuk River

YUKON RIVER

Seward Peninsula

SELAWIK HILLS

PURCELL MOUNTAINS

Koyuk

NOME

GALENA

NORTON SOUND

UNALAKLEET

Fig.1 Caribou Study Area

- Selawik NWR
- Buckland HMP area
- Sheldon's Allotment
- Hadley's Allotment
- Henry's Allotment
- Sagoonick's Allotment

Scale in Miles  
0 10 20 30 40 50







CHUKCHI SEA

KOTZEBUE

KOBUK RIVER

Selawik Nat.

Wildlife Refuge

Onion Portage

SELAWIK  
HILLS

PURCELL  
MOUNTAINS

Seward Peninsula

Koyuk

NOME

NORTON SOUND

UNALAKLEET

GALENA

YUKON  
RIVER

Fig. 2 Migration Routes of WAH Caribou

9/20-22/1988  
10/6/1988

Scale in Miles  
0 10 20 30 40 50





CHUKCHI SEA

KOTZEBUE

KOBUK RIVER

Onion Portage

Selawik Nat.

Wildlife Refuge

Selawik River

Koyuk River

SELAWIK  
HILLSPURCELL  
MOUNTAINS

Seward Peninsula

Koyuk

NOME

NORTON SOUND

UNALAKLEET

YUKON  
RIVER

Koyuk River

Inglutalik River

Ungalik River

Katal River

Gisasa River

Nulato River

North Fork

Unalakleet River

KOTZEBUK RIVER

GALENA

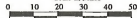
Fig. 3 Distribution of WAH Caribou

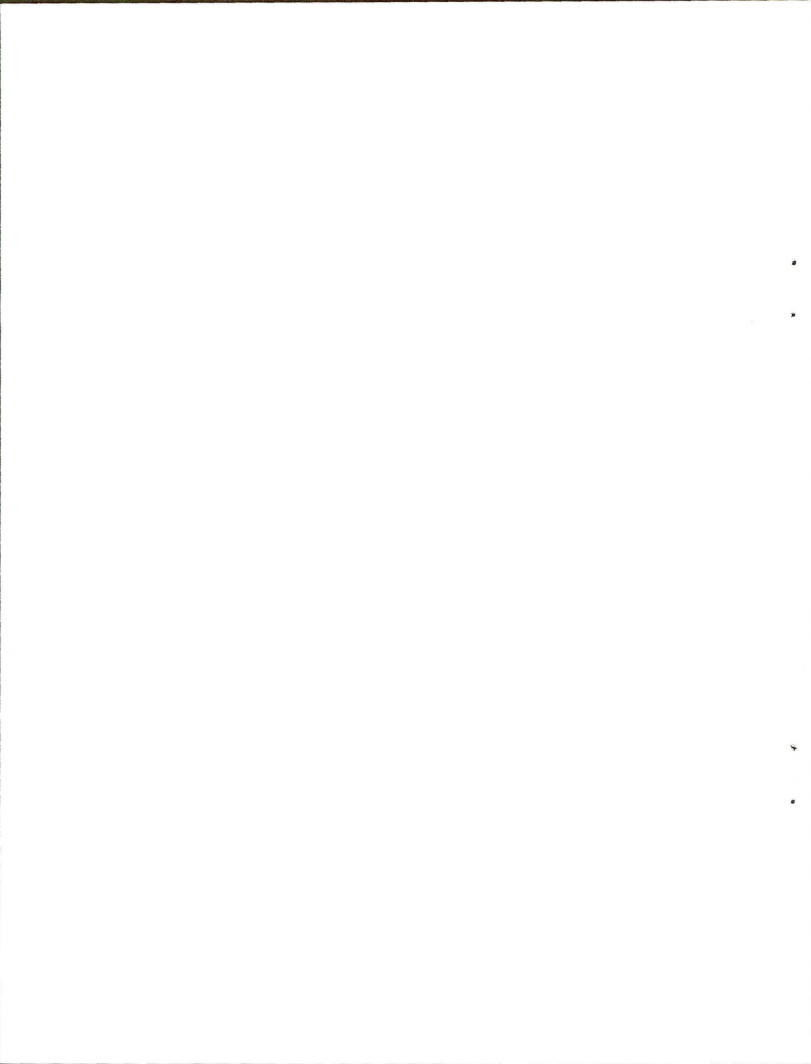
10/11/1988

10/20/1988

10/25 to 11/1/1988

Scale in Miles





CHUKCHI SEA

KOTZEBUE

KOBUK RIVER

Onion Portage

Selawik Nat.

Wildlife Refuge

Seward Peninsula

SELAWIK  
HILLSPURCELL  
MOUNTAINS

NOME

Koyuk

NORTON SOUND

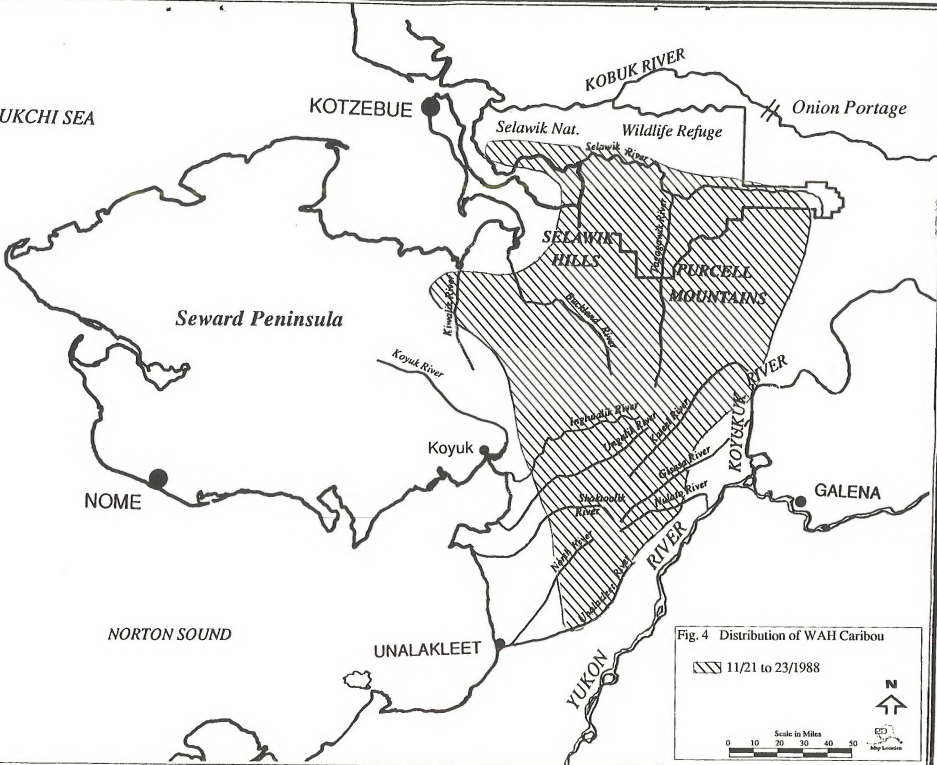
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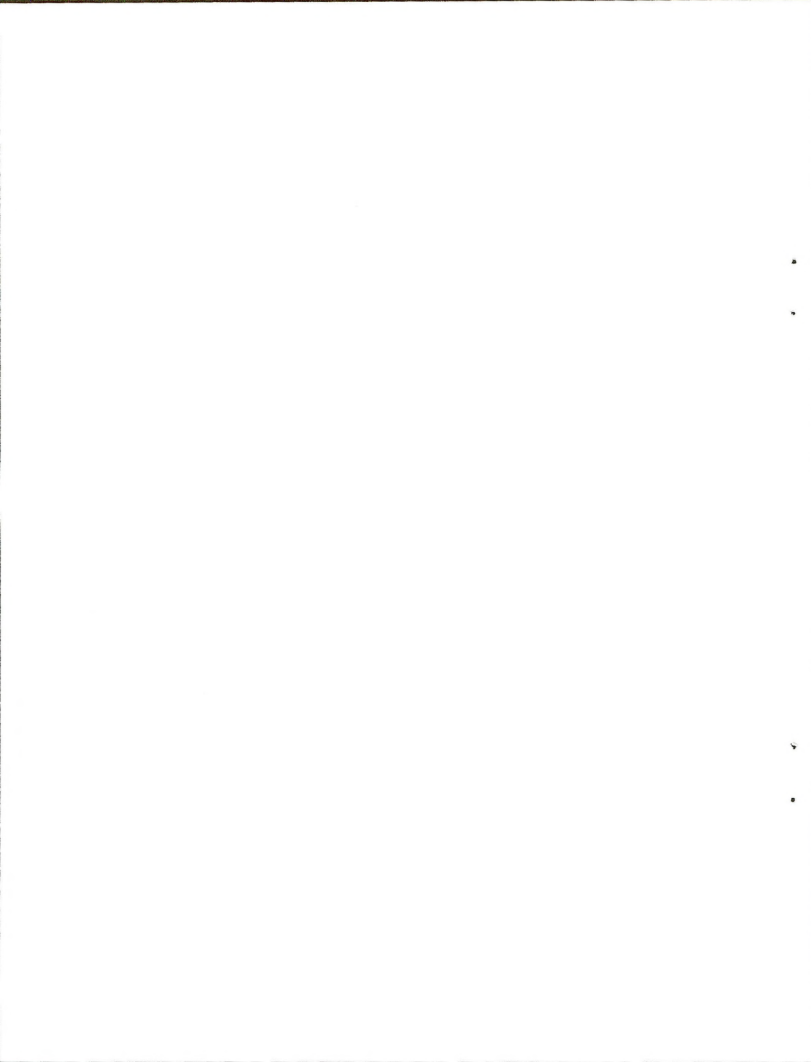
GALENA

YUKON RIVER

Fig. 4 Distribution of WAH Caribou

11/21 to 23/1988

Scale in Miles  
0 10 20 30 40 50





CHUKCHI SEA

KOTZEBUE

KOBUK RIVER

Selawik Nat.

Wildlife Refuge

Onion Portage

Selawik River

Tagewik River

SELAWIK  
HILLSPURCELL  
MOUNTAINS

Seward Peninsula

Kivalik River

Koyuk River

NOME

Ingluvik River

Ungalik River

Gwasa River

Shikook River

North River

Unalakleet River

KORYUK RIVER

GALENA

NORTON SOUND

UNALAKLEET

YUKON RIVER

Fig. 5 Distribution of WAH Caribou

2/22/1989  
3/3/1989



Scale in Miles  
0 10 20 30 40 50





CHUKCHI SEA

KOTZEBUE

KOBUK RIVER

Onion Portage

Selawik Nat.

Wildlife Refuge

Selawik River

Piggenid River

SELAWIK  
HILLSPURCELL  
MOUNTAINS

Seward Peninsula

Kiwituk River

Koyuk River

Koyuk

NOME

Kotled River

KOTLEK RIVER

Gisass River

Nulato River

GALENA

NORTON SOUND

UNALAKLEET

YUKON RIVER

Fig. 6 Distribution of WAH Caribou

3/14/1989

3/23/1989

3/29-31/1989

Scale in Miles



Map Location



CHUKCHI SEA

KOTZEBUE

Selawik Narrows

KOYUK RIVER

Onion Portage

SELAWIK  
HILLS

PURCELL  
MOUNTAINS

*Seward Peninsula*

Kiwalik River

Tagewalik River

Buckland River

Koyuk River

NOME

Koyuk

Inghualik River

Ungalik River

Kotel River

Gisnoo River

Shaktoolik River

Nudato River

GALENA

NORTON SOUND

UNALAKLEET

YUKON RIVER

Fig. 7 Migration Routes of WAH Caribou

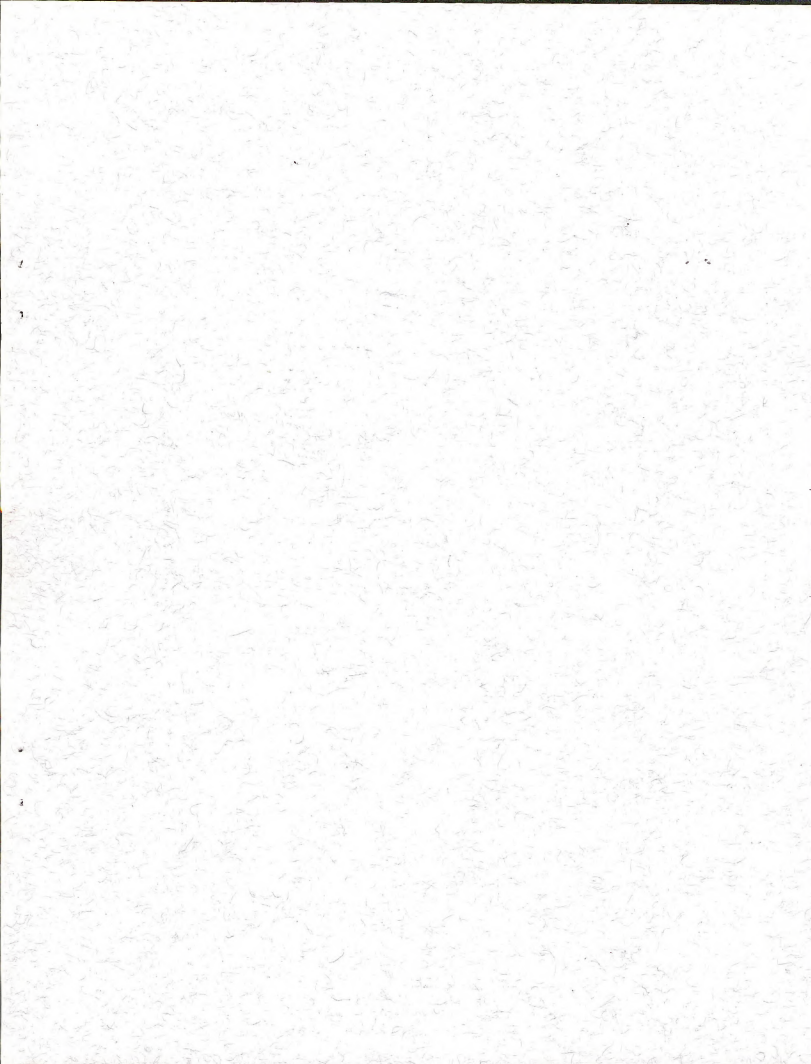
- 4/13-19/1989
- 5/19-24/1989
- 6/5/1989

Scale in Miles  
0 10 20 30 40 50



MADE IN U.S.A.







#### **BLM Mission Statement**

The Bureau of Land Management is responsible for the balanced management of the public lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based upon the principles of multiple-use and sustained yield; a combination of uses that takes into account the long term needs of future generations for renewable and non-renewable resources. These resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness, and natural, scientific and cultural values.