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Fall Sex/Age Composition, Body Condition, Disease Screening and Collaring of Northern and Southern Alaska Peninsula Caribou Herds, 1998

Final Report

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by

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Abstract: Ratios of bulls and calves:100 cows were 31 and 30 (n = 1,342), respectively, for the Northern Alaska Peninsula caribou herd (NAPCH) and 32 and 35 (n = 987), respectively, for the Southern Alaska Peninsula caribou herd (SAPCH). Although the bull:cow ratios were similar, the NAPCH had fewer "large" bulls (15% of all bulls) than did the SAPCH (36%). The difference in proportion of large bulls resulted from recent differences in hunting pressure between the herds. This is the first time in over 20 years that the SAPCH has been more productive than the NAPCH. We collared 21 and 14 immature, known-aged females in the NAPCH and SAPCH, respectively, with standard VHF radio collars. We also deployed 6 satellite collars on mature females in the extreme southern potion of Unit 9E and 8 in the extreme northern portion of Unit 9D to determine if these animals intermingle, i.e. whether the 2 herds are distinct. In addition to taking weights, measurements and blood samples from the captured animals, we collected 10 female calves from the NAPCH to further assess body condition and allow comparisons with calves from other herds.

Key words: Alaska, body condition, caribou, disease screening, lungworm, productivity, radiocollars, *Rangifer tarandus*, Satellite collars, sex/age composition.

INTRODUCTION

The NAPCH ranges throughout Game Management Units (GMU) 9C and 9E while the SAPCH resides in GMU 9D and on Unimak Island. Based on preliminary results of radiotelemetry work on the NAPCH in the early 1980s and observations of discrete calving areas, these 2 herds have been considered separate for monitoring and management purposes for the past 15 years. More intensive radiotelemetry work in recent years has not refuted the concept of distinct herds, but the relative scarcity of observations on movements of caribou using the area between Port Moller and Herendeen Bay and on the Pacific side of the Aleutian range leaves some doubt about herd affinity for these animals. Results of winter transect counts in GMU 9D by the US Fish and Wildlife Service (FWS) in 1997 and 1998 resulted in higher counts than either the FWS or Alaska Department of Fish and Game (ADF&G) arrived at in the previous several years or that were found in a joint survey by both agencies in July 1997. Based on productivity and survival of radiocollared cows, the sudden increase in herd size of the SAPCH could not reasonably be attributed to herd growth. The recent winter count data beg for explanation: is there interchange of caribou from GMUs 9E to 9D, or does the very remote and rugged country behind Port Moller and Herendeen Bay harbor a substantial number caribou that eluded surveys prior to 1997?

Historically, the size of both these herds has fluctuated widely, but recent population dynamics have not been synchronous. The SAPCH peaked in the early 1980s, and was in serious decline until the mid 1990s, while the NAPCH was at high numbers throughout the 1980s and early 1990s when it began to decline.

As the SAPCH and NAPCH began to decline, the ADF&G and FWS increased cooperative efforts to assess the population dynamics of these herds and to determine the causes of low productivity. During 1987-88, Pitcher et al. 1990 determined that poor nutrition was the primary limiting factor for the SAPCH. Even prior to the decline of the NAPCH, there was concern over the nutritional status of this herd. Several indicators, including changes in movement patterns and expanding winter range, the scarcity of lichens on the NAPCH's traditional range, and slightly lower productivity all suggested the NAPCH was facing overuse of their range.

In October 1995, 10 NAPCH calves were collected to assess nutritional condition; and lung lesions, later determined to be consistent with lungworm infection, were discovered in most of the calves. Lungworms can be a major source of mortality in bighorn sheep and other free-ranging species (Forrester 1971). In June 1996, we examined 2 dead calves (approximately 1 month old) that showed visible signs of pneumonia. Based on histologic examination, one was diagnosed as bacterial pneumonia. The other was diagnosed as verminous (parasitic) pneumonia.

In October 1996, a wide variety of samples were collected from ten female calves. Four of the six calves had visible lesions in the lungs. Serologic tests revealed no exposure to any of the viruses which typically cause pneumonia in domestic livestock. Attempted viral isolation from trachea tissue was unsuccessful. No pathogenic bacteria were isolated from lung tissue. Fecal flotation revealed Nematodirus sp. (9/10), Moniezia sp. (7/10), coccidia (7/10), and strongyles (2/10). All

of these were considered normal inhabitants of the gastro-intestinal tract. Dorsal-spined larvae were found in one animal. These were potentially pathogenic lungworms. Histologic examination of lung tissue revealed pulmonary inflammation consistent with lungworm infection in five of the ten calves. The other five animals had hyperplastic submandibular lymph nodes which also contained eosinophilic infiltrates which indicated previous exposure but not active lung infection.

In late May and early June of 1998, radio collars were placed on 39 calves (Sellers et al. 1998). Fecal samples were collected both from recent calf mortalities and fresh off the ground. These specimens were submitted to noted wildlife parasitologist Dr. Murray Lankester of Lakehead University in Thunder Bay, Ontario. Seven of 15 fecal samples (47%) contained dorsal-spined larvae similar to *Parelaphostrongylus andersoni*. This parasite is not considered highly pathogenic. Dr. Lankester expressed skepticism that the observed lung lesions were caused by lungworms. No grossly-visible lesions were observed in 7 calves which died during the first two weeks after collaring. Three fresh calf carcasses were found in late June at separate locations. All three exhibited acute pulmonary congestion. One was diagnosed with a severe case of bronchopneumonia. A second had a bacterial infection of the nasal cavity and brain. There were no gross or histologic lesions in the third carcass. No evidence of lungworms was found in any of the three carcasses based on gross, histologic or fecal examination.

Continuing concern of the heath of both these herds prompted this cooperative effort to further evaluate their population dynamics. Objectives of this project were:

1. Capture 14 robust adult female caribou near the border of Units 9E and 9D and fit them with satellite telemetry collars to allow regular monitoring of movements to test the concept of two distinct herds.
2. Capture at least 20 and 12 female calves from the NAP and SAP herds, respectively, and fit them with conventional VHF radio telemetry collars.
3. Conduct sex and age composition surveys of both herds.
4. Collect 10 calves from the NAP herd for assessment of nutritional condition and collect samples for disease testing.
5. Retrieve shed collars from earlier project.

Results from some of this work (e.g. the satellite tracking data, assessment of body condition, evaluation of potential disease problems) will accumulate over the next several years. Consequently, this report summarizes the work accomplished in fall, 1998, and is not intended as a comprehensive evaluation of population dynamics in either herd.

METHODS

Female caribou were captured by darting (using a CO_2 pistol) from a Robinson R44 helicopter. Calves and yearlings received a mixture of 1 mg carfentanil citrate and 65 mg of xylazine hydrochloride, which was reversed with a mixture of naltrexone and yohimbine. The same drug

combinations in several dosages were used on adult females. Collections were done using 12 gauge buckshot. We took weights and standard body measurements and collected mandibles, femurs, and tissue samples from internal organs and the backstrap. Percent marrow fat was determined by the oven drying technique.

The sex/age composition surveys were done from the Robinson R44 helicopter by Valkenburg and Sellers. Caribou were classified as calves, cows, or bulls (small, medium or large - based on antler size).

RESULTS AND DISCUSSION

We collected 10 female calves and 2 yearlings from the NAPCH near Smelt Lake, approximately 58° 33' 156° 55'. After processing, carcasses were delivered to the village of South Naknek for distribution to elders. Average body weight and percent marrow fat (Table 1) were similar to fall samples from 1995-97.

The relatively low pregnancy rate of NAP caribou (Sellers et al. 1998) suggests that females have had suboptimal nutrition over summer during at least the past 3 years. This finding is corroborated by the relatively small size of calves in October (Valkenburg 1997), the high prevalence of lungworm, and the fact that caribou from the NAP increased in size when transplanted to ungrazed range on the Nushagak Peninsula (Hinkes and Van Daele 1996, ADF&G unpublished data). In addition, the fact that newborn calves weighed slightly less (Sellers et al. 1998) than calves from other herds also indicates suboptimal nutrition (Reimers 1997). Newborn calf weights in the NAP were not as low as in the Southern Alaska Peninsula Herd (Pitcher et al. 1990) or the Denali Herd during periods of rapid decline (L. Adams, pers commun).

Preliminary pathology examinations of 11 animals revealed that all exhibited symptoms of pneumonia (7 mild, 3 moderate, and 1 severe). Segments of nematodes (lungworm) were observed in samples from 5 animals, including all of those exhibiting ~~mild~~ moderate or severe pneumonia. The fecal and backstrap samples were submitted to Dr. Lankester. Dr. Lankester was able to positively identify the adult nematode as *Parelaphostrongylus andersoni* in samples of backstrap. Twenty seven percent of fecal samples were positive for *Parelaphostrongylus andersoni* larvae. Interestingly, this parasite was not detected in any of the samples from the Mulchatna herd collected in 1998. *Parelaphostrongylus andersoni* is not considered to be the likely cause of pneumonia, but rather is commonly known as a muscle worm in ungulates. Thus there is still much to discover about the disease processes at work in the NAPCH, but it is likely that poor nutritional condition is a contributing factor to this problem.

We deployed VHF collars on known aged females in October 1998: 19 calves and 2 yearlings from the NAPCH (Figure 1) and 13 calves and 1 yearling from the SAPCH (Figure 2), (Table 2). Weights of NAPCH calves captured or collected ($\bar{x}$ = 109 lbs, n = 29) were lower than for

Nushagak Peninsula calves ($\bar{x}$ = 123 lbs, ADF&G, unpublished data) which originated from a 1988 transplant of NAPCH animals. We also found that NAPCH calves from the winter range weighed less ($\bar{x}$ = 103.7, n = 20) than those captured south of Pilot Point ($\bar{x}$ = 120.8, n = 9) (P = 0.0024, t = 3.33, d.f. = 27). This may reflect a difference in habitat quality, or a number of other variables.

We deployed satellite collars on 6 and 8 females ≥2 years old, in GMUs 9E and 9D, respectively (Figure 3), (Table 3). We attempted to distribute these satellite collars throughout the mountainous region adjacent to the GMU boundary, but weather precluded access to some areas. We recovered 3 radiocollars from caribou previously collared and found dead during October.

Since 1986 the bull:cow ratios in the NAPCH have remained above the management objective of 40 bulls:100 cows every year except 1994 (34:100) and 1998 (31:100) (Table 4). The drop in bulls counted this year may have, in part, been do to sampling error. A number of NAPCH animals apparently traveled east of Becharof Lake during the early fall (T. Vrem, pers. comm.), and were not sampled in October, 1998. These animals were in less accessible country, and consequently likely sustained lower harvest pressure during August and September than did most of the caribou classified for the sex/age composition survey. Additionally, the 1997-98 winter harvest, estimated at 1,000 animals comprised of 70 – 80% bulls, and the 1998 fall harvest, comprised almost exclusively of bulls, may have resulted in a decline in the number of bulls. The current bull:cow ratio is adequate for breeding purposes, but it does mean a reduction of allowable harvest for next year.

Hunting was closed for the SAPCH during 1993–1997, and the bull:cow ratio recovered from a low of 19:100 in 1990 to 42:100 in 1997 (Table 5). A federal subsistence hunt was opened in 1997, but accurate harvest data are not available. It is not known if the 1997-98 harvest caused the drop in the SAPCH bull:cow ratio from 42:100 in 1997 to 32:100 in 1998. However, the high proportion of large bulls (36% of all bulls) in the SAPCH suggests that harvest rate and selectivity for large bulls during 1997 and 1998 has been less than in the NAPCH where only 15 percent of bulls were classified as large.

Productivity, as measured by percent calves in the post-calving aggregations and fall calf:cow ratios, has declined slightly in the NAPCH (Table 4), but remained higher than several other herds that experienced population declines (e.g. Mentasta, Denali, Delta and SAPCH). Productivity in the SAPCH was low during the period of rapid population decline from 1984 through 1993 (Table 5). There was a slight improvement in 1994, but productivity was again low during 1995-97. A dramatic improvement was noted in 1998 when we found 35 calves:100 cows. This improved productivity, coupled with signs that nutritional condition of caribou is improving (calf body weights and antler growth) suggests that the SAPCH may be on the way to recovery.

LITERATURE CITED

FORRESTER, D.J. 1971. Bighorn sheep lungworm-pneumonia complex. Pages 158–173 *in* J.W. Davis and R.C. Anderson, editors. Parasitic diseases of wild animals. Iowa State University Press. Ames, Iowa.

HINKES M.T. AND L.J. VAN DAELE. 1996. Population growth and status of the Nushagak Peninsula caribou herd in southwest Alaska following reintroduction, 1988–1993. *Rangifer* Special Issue 9:301–309.

PITCHER, K.W., C. DAU, D. JOHNSON, D. SELLERS, R. WEST. 1990. Causes of low calf recruitment in the Southern Alaska Peninsula caribou herd and recent herd history. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Progress Report. Juneau.

REIMERS, E. 1997. Rangifer population ecology: a Scandinavian perspective. *Rangifer* 17:105–118.

SELLERS, R.A., P. VALKENBURG, R.L. ZARNKE, R.C. SQUIBB. 1998. Natality and early calf mortality of Northern Alaska Peninsula Caribou. Final Report. Cooperative Agreement 98-079. 11pp.

VALKENBURG, P. 1997. Investigation of regulating and limiting factors in the Delta Caribou Herd. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Final Report. Study 3.37.

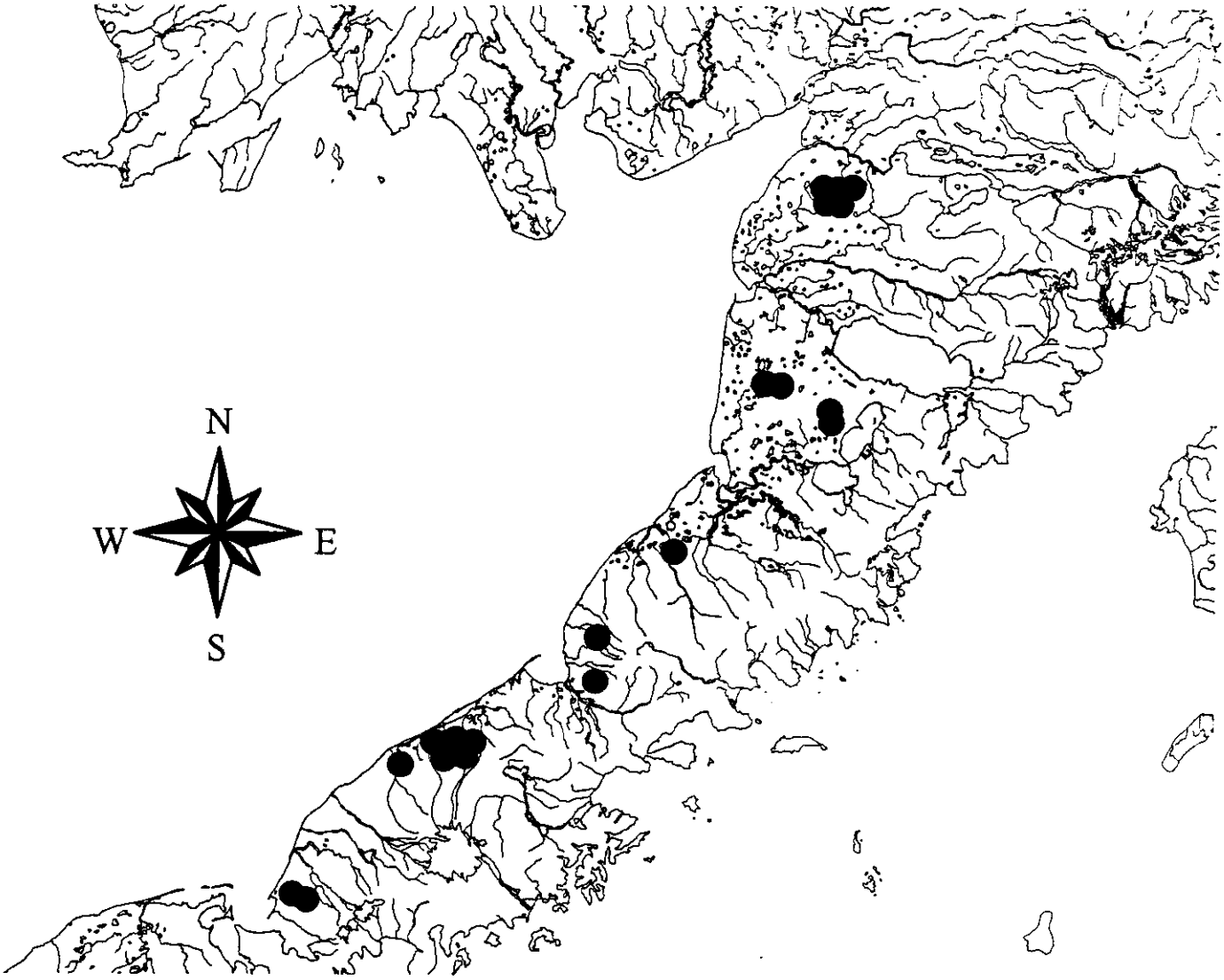

Figure 1. Capture locations of caribou from NAPCH fitted with VHF radiocollars, October, 1998.

Figure 2. Capture locations of caribou from SAPCH fitted with VHF radiocollars, October, 1998.

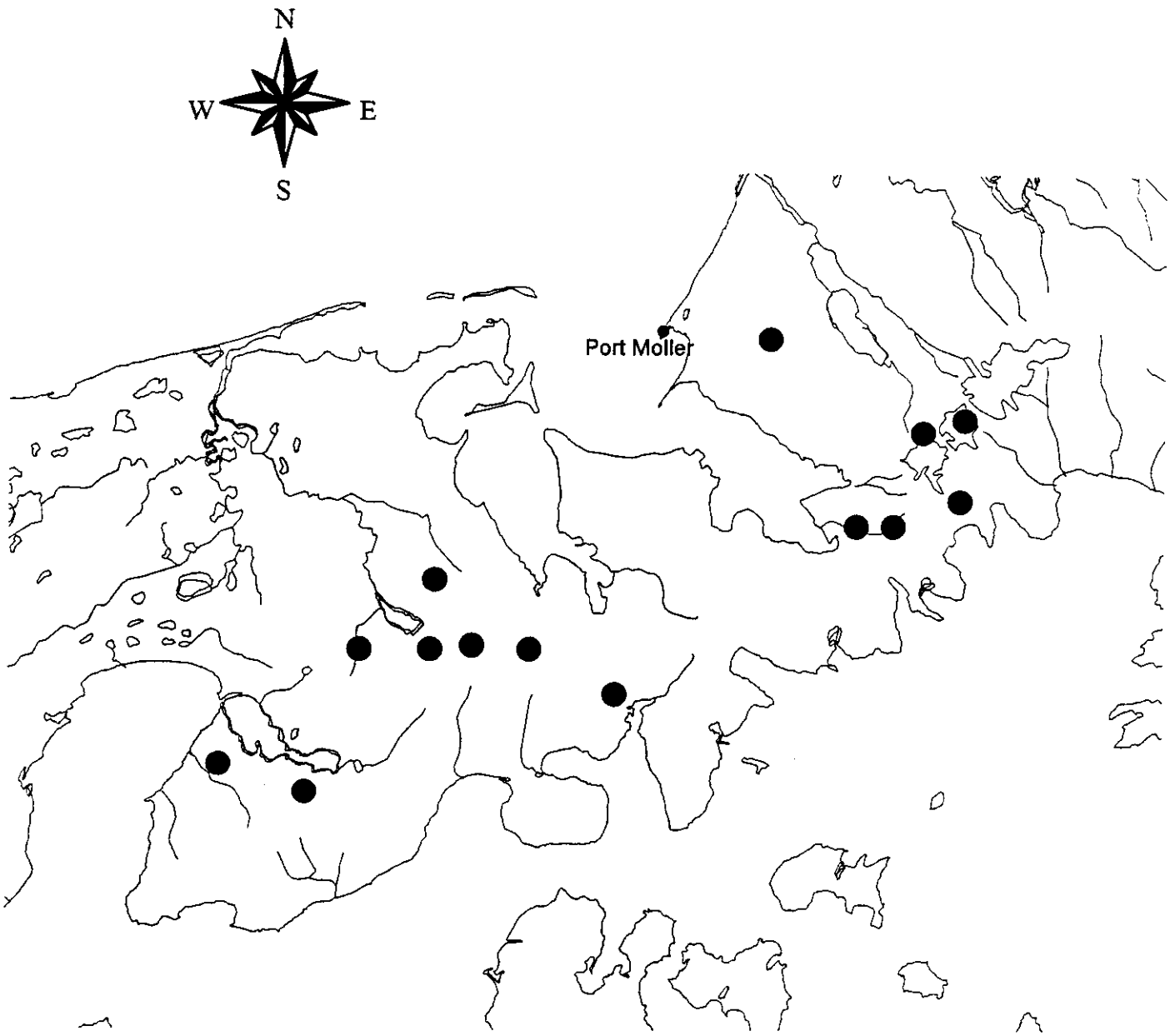

Figure 3. Capture locations for caribou fitted with satellite radiocollars, October, 1998.

Table 1. Data from female calves collected from the Northern Alaska Peninsula caribou herd on 10/1/98.

Accession number	Whole body weight (pounds)	Gutted body weight (pounds)	Metatarsus length (cm)	Heart girth (cm)	Total length (cm)	Jaw length (cm)	Condition rating	Percent femur fat
105562	103	68	32.6	91	161	21.7	3	53
105563	132	81	34.6	98	163	21.8	2	61
105565	87	59	33.4	87	133	19.4	2	28
105566	90	62	32.6	85	132	19.7	4	54
105567	107	72	35.0	88	143	21.1	3	55
105568	81	52	33.6	78	144	20.2	3	55
105569	98	65	32.3	85	142	18.8	3	50
105570	86	56	33.2	86	153	19.9	2	19
105571	110	78	33.1	92	150	20.5	4	52
105573	108	77	34.9	91	144	20.2	3	45
Mean	100.3	67	33.5	88.1	147	20.3	3.2	47
SE	4.6	3	0.3	1.6	3.1	0.3	0.2	4.2

Table 2. Data from female calves captured from the Northern and Southern Alaska Peninsula caribou herds in October, 1998.

Herd	Age	Visual collar number	Whole body weight (pounds)	Metatarsus length (cm)	Heart girth (cm)	Total length (cm)	Jaw length (cm)	Condition rating
NAPCH	Calf	O13	128	34.4	95	156	21	3
NAPCH	Calf	O15	118	33.7	89	150		3
NAPCH	Calf	O14	103	32.9	89	148	20.3	3
NAPCH	Calf	R20	112	34.2	90	150	20	2
NAPCH	Calf	O12	109	33.9	93	154	21.2	3
NAPCH	Calf	O13	108	33.3	93	145	19.9	3
NAPCH	Calf	O 9	126	35.3	90	161	21.1	3
NAPCH	Calf	O 8	130	34.4	96	163	21.7	3
NAPCH	Calf	O11	106	35.2	89	152	19.9	3
NAPCH	Calf	O10	131	34.5	101	157	21.7	4
NAPCH	Calf	O18	99	32.2	88	148	20.6	3
NAPCH	Calf	O25	98	33.7	90	151	19.2	3
NAPCH	Calf	O20	111	33.9	93	154	21	3
NAPCH	Calf	R72	118	34.4	90	156	20.7	3
NAPCH	Calf	O22	130	35	99	164	21.6	3
NAPCH	Calf	O19	133	35.2	97	164	21.8	3
NAPCH	Calf	O23	97	34.4	87	147	20.3	2
NAPCH	Calf	R91	128	33.7	97	159	21.8	3
NAPCH	Calf	O24	115	32.9	89	148	19.7	3
	Mean		115.8	34.1	92.4	154.1	20.8	2.9
	SD		12.2	0.8	4.1	6.0	0.8	0.4
NAPCH	Yearling	O16		36.9	97	166	23.9	2
NAPCH	Yearling	O17	137	36.2	95	160	23.2	2
SAPCH	Calf	B15	117	35.3	96	166	21	3
SAPCH	Calf	B22	115	34.3	88	160	20.1	2
SAPCH	Calf	B23	116	33.0	91	150	21	4
SAPCH	Calf	B16	116	32.3	92	159	20.9	4
SAPCH	Calf	B21	116	33.7	91	148	21.4	3
SAPCH	Calf	G47	97	32.7	87	150	19.4	4
SAPCH	Calf	B13	115	34.5	90	154	21.3	3
SAPCH	Calf	B20	124	34.2	96	154	21.4	3
SAPCH	Calf	G75	111	33.3	90	155	20.4	3
SAPCH	Calf	B18	118	33.8	90	150	20.4	3
SAPCH	Calf	B14	136	35.1	94	156	21.8	3
SAPCH	Calf	G86	117	34.0	93	151	21.9	3
SAPCH	Calf	O21	133	35.0	95	156	21.3	3
	Mean		117.8	33.9	91.8	154.5	20.9	3.2
	SD		9.2	0.9	2.8	4.8	0.7	0.5
SAPCH	Yearling	B25	nd	nd	nd	nd	nd	nd

Table 3. Data from adult females fitted with satellite collars on the Alaska Peninsula, October 1998.

Date Captured	ID number	Estimated Age	Subunit	Latitude	Longitude	Metatarsus length	Jaw length
10/5/98	10498	8	9D	55 44.86	160 58.122	39.3	27.5
10/5/98	10468	4	9E	56 02.56	160 20.034	40.5	28.0
10/6/98	10497	10	9E	55 55	160 07.3	40.9	28.2
10/6/98	10787	6	9E	55 55	160 07.3		
10/6/98	10788	6	9D	55 36.792	160 45.99	39.0	27.8
10/6/98	10479	3	9D	55 30.25	161 10.67	38.7	26.4
10/6/98	10478	4	9D	55 38.8	161 10.195	38.0	26.7
10/6/98	10469	4	9D	55 32	161 23	41.2	26.7
10/7/98	10683	9	9E	55 48	160 09	39.3	27.9
10/7/98	10470	8	9E	55 47.74	160 09.39		
10/7/98	10685	6	9D	55 40	160 57	38.6	26.9
10/7/98	10496	7	9D	55 39	160 58	38.2	27.5
10/8/98	10477	7	9D	55 36.5	160 38	39.0	28.1
10/8/98	10684	2	9E	55 49	160 02	40.5	25.8

Table 4. Nothern Alaska Peninsula caribou composition counts and estimated population size, 1970-98.

Year	Bulls: 100 cows	Calves: 100 cows	Small bulls (% of bulls)	Medium bulls (% of bulls)	Large bulls (% of bulls)	Total bulls (%)	Summer Calves(%)	Fall Calves(%)	Total caribou observed	Estimated population size
1970	48	46						23		
1975	33	45						25		10,340
1976										11,368
1978	48	55						25		
1980	53	56						27		
1981	34	39					28	23		18,000
1982	43	52				22	27	26	1,392	18,000
1983	39	27	51	25	24	24	29	16	1,410	19,000
1984	39	39	67	16	17	22	25	22	1,087	20,000
1985	n/a	n/a	n/a	n/a	n/a	n/a	27	n/a		20,000
1986	51	34	46	39	17	27	28	18	2,540	17,000
1987	54	51	51	32	17	26	30	25	1,536	17,000
1988	49	48	46	34	20	25	30	26	1,156	20,000
1989	n/a	n/a	n/a	n/a	n/a	n/a	33	n/a		20,000
1990	41	29	NA	NA	NA	24	23	17	1,484	17,000
1991	42	47	54	34	12	22	29	25	1,639	17,000
1992	40	44	44	38	19	22	31	24	2,766	17,500
1993	44	40	52	29	19	24	30	22	3,021	16,000
1994	34	34	58	28	14	20	25	20	1,857	12,500
1995	41	24	49	29	22	25	21	15	2,907	12,000
1996	48	38	71	19	10	26	25	19	2,572	12,000
1997	47	27	54	31	14	27	24	16	1,064	10,000
1998	31	30	57	28	15	19	24	19	1,342	9,200

Table 5. Southern Alaska Peninsula caribou composition and survey results, 1983-98.

Year	Bulls: 100 cows	Calves: 100 cows	Small bulls (% of bulls)	Medium bulls (% of bulls)	Large bulls (% of bulls)	Summer calves (%)	Fall calves (%)	INWR[a] counts
1983							15[a]	10,203
1984						17[a]	15[a]	7,500
1985						6[a]	9[a]	4,044
1986	32	20	59	28	13	17	13	4,543
1987	36	26	54	25	21	12	16	6,401
1988	41	19	61	37	4	16	12	
1989						17	5[b]	3,957
1990	19	12				14	9	3,300
1991	28	19	53	33	14	18	13	2,830
1992	22	22	46	32	21	15	15	
1993	30	24	59	24	17	16	16	1,929
1994	29	28	46	27	27	21	18	
1995						11		1,806
1996						10[a]		1,403
1997	42	19	36	36	27	15	12	3,240
1998	32	35	42	23	36		21	3,120

[a] Counts by Izembek National Wildlife Refuge staff
[b] Counts from supercub