

Grant W-24-2
Study 3.37
October 1994

**Federal Aid in Wildlife Restoration
Research Progress Report
Investigation of Regulating and Limiting Factors in the
Delta Caribou Herd**

**by
Patrick Valkenburg**



**Alaska Department of Fish and Game
Division of Wildlife Conservation**

**Alaska Department of Fish and Game
Division of Wildlife Conservation
October 1994**

Investigation of Regulating and Limiting Factors in the Delta Caribou Herd

Patrick Valkenburg

**Federal Aid in Wildlife Restoration
Research Progress Report**

**Grant W-24-2
Study 3.37**

This is a progress report on continuing research. Information may be refined at a later date.
If using information from this report, please credit author(s) and the Alaska Department of Fish and Game.

STATE OF ALASKA
Tony Knowles, Governor

DEPARTMENT OF FISH AND GAME
Carl L. Rosier, Commissioner

DIVISION OF WILDLIFE CONSERVATION
Wayne L. Regelin, Acting Director

Persons intending to cite this material should receive permission from the author(s) and/or the Alaska Department of Fish and Game. Because most reports deal with preliminary results of continuing studies, conclusions are tentative and should be identified as such. Please give authors due credit.

Additional copies of this report and other Division of Wildlife Conservation publications are available from:

Publications Specialist
ADF&G, Wildlife Conservation
P.O. Box 25526
Juneau, AK 99802
(907) 465-4190

The Alaska Department of Fish and Game conducts all programs and activities free from discrimination on the basis of race, color, national origin, age, marital status, pregnancy, parenthood, or disability. For information on alternative formats for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-4120, (TDD) 1-800-478-3648, or FAX 907-586-6595. Any person who believes she/he has been discriminated against should write to: ADF&G, PO Box 25526, Juneau, AK 99802-5526 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: T. Boudreau, R. Tobey, J. Woolington, C. Gardner, and J. Ver Hoef, ADF&G; D. Klein and J. Bryant, University of Alaska Fairbanks; L. Adams, National Biological Survey, Anchorage; B. Dale, National Park Service, Anchorage; W. Hobgood and J. Herriges, Bureau of Land Management, Fairbanks

Project No.: W-24-2

Project Title: Wildlife Research and Management

Study No.: 3.37

Study Title: Investigation of Regulating and Limiting Factors in the Delta Caribou Herd

Period Covered: 1 July 1993-30 June 1994

SUMMARY

The decline of the Delta herd continued during 1993 and early 1994, but at a slower rate due to decreased mortality of adults over the winter. However, the population increased with the addition of the strong 1994 cohort. The herd natality rate returned to its normally high level in 1994 and initial calf mortality was low (64 calves:100 cows remained on 2 June). A census on 30 June 1994 indicated calf survival was still high with 4,341 caribou counted, compared with 3,661 the previous year. A computer model using the 1993 estimated mortality data and an estimated recruitment of about 45 calves:100 cows predicted a 1994 estimate of 4,129 caribou.

Continued low weights of 4-month-old calves in October 1993, and low natality in 3-year-olds in May 1994, indicated either nutrition was not optimal or a nutritional lag in the DCH. So few calves survived from 1993 to 1994 that we could not obtain a sample of calf weights in April 1994 with which to test a model that predicts recruitment of calves to fall from weights of 10-month-old calves in spring. Analysis of fecal samples from DCH caribou collected in late winter 1989 and 1993 indicated much of the foothill lichen range in Subunit 20A is depleted. Proportion of lichens in the diet was relatively low, and the proportion of mosses high compared with other interior herds.

The estimated mortality of radiocollared adult and yearling females fell substantially during the winter; only 3 of 35 adults died (9%), and none of 12 yearlings died. This

was not true of calves born in 1993. Of the few that survived to fall 1993, many died over the winter (30% mortality).

All radiocollared DCH caribou remained within Subunit 20A during winter 1993-94. Some Nelchina caribou (including 1 with a radiocollar) from Unit 13 moved into the lower Yanert drainage in southwestern Subunit 20A in early March and shared late winter range with the DCH. The radiocollared Nelchina female returned to the Nelchina calving area in Unit 13 sometime before calving. Most DCH females first moved to the traditional calving area near Delta Creek in April and May, but then moved to upper Wells Creek in Unit 13 to calve in mid May. Most radiocollared DCH caribou had returned to Subunit 20A by late June.

Key words: caribou, Delta herd, Denali herd, food habits, mortality, natality, Nelchina herd, nutrition, predation, *Rangifer tarandus*, weather, wolf

CONTENTS

	Page
SUMMARY	i
BACKGROUND	1
STUDY OBJECTIVES	2
Job Objectives	2
METHODS	3
RESULTS AND DISCUSSION	4
1994 Census	4
Natality Rate of the DCH and Other Herds in 1994	5
1993 Fall Composition Count	5
Weight and Size of Calves	5
Food Habits of the DCH and Other Interior Herds	6
Mortality of Radiocollared Caribou (includes ♂ calves)	6
Movements and Distribution of DCH Caribou	7
ACKNOWLEDGMENTS	7
LITERATURE CITED	8
TABLES	10

BACKGROUND

This report is the third annual progress report of a continuing long-term population dynamics study of the Delta caribou (*Rangifer tarandus*) herd (DCH) that began in 1979. The results of the first 11 years of research were presented in 8 progress reports, 2 final reports (each covering 5 years) (Davis and Valkenburg 1985, Davis *et al.* 1991), and numerous scientific papers (see Davis *et al.* 1991). Predator/prey relationships and human harvest of moose (*Alces alces*), caribou, sheep (*Ovis dalli*), grizzly bears (*Ursus arctos*), and wolves (*Canis lupus*) within the range of the DCH were reviewed by Gasaway *et al.* (1983) and Boertje *et al.* (1993).

Since this study began in 1979, the DCH has gone through 4 growth phases. Herd size rapidly grew from 1979 to 1982 ($r = 0.18$), with high recruitment and low mortality from hunting and natural causes. The herd grew slowly ($r = 0.05$) from 1982 to 1985, with moderate to high recruitment, low to moderate natural mortality,

and high hunting mortality. The herd also grew slowly ($r = 0.07$) from 1986 to 1988, with moderate recruitment, moderate to high natural mortality, and low hunting mortality. Then the herd rapidly declined ($r = -0.20$) from 1989 to 1992, with low recruitment, high natural mortality, and low hunting mortality.

In June 1993 the Board of Game approved a 3-year ground-based wolf predation control program for a portion of Subunit 20A. One of the objectives of the program, which began in October 1993, was "to reverse the decline of the Delta caribou herd and increase the midsummer population to 6,000-8,000 caribou, with a sustainable annual harvest of 300-500 caribou."

STUDY OBJECTIVES

To evaluate the influence of weather, density, food limitation, hunting, and predation on the population dynamics of the DCH and other interior herds.

Job Objectives

- Census the DCH from 1991 to 1995 annually.
- Determine the annual natality rate and timing of calving in the DCH.
- Determine recruitment from annual fall and spring composition counts.
- Monitor harvest annually.
- Collar male and female calves in fall to assess the accuracy of April composition counts and timing of mortalities.
- Determine the weight and size of calves in April to determine the influence of summer vs. winter weather on body condition, and test a model that predicts recruitment (i.e., fall calf:cow ratio) from April calf weights in the Delta, Fortymile, and Nelchina herds.
- Collar female calves in fall to maintain known-aged cohorts in the DCH.
- Determine if weather is a factor that limits growth of the DCH.
- Assess and analyze food habits of the DCH and other interior herds.
- Monitor movements, dispersal, and mortality in the DCH.
- Recollar adult females to maintain cohorts of collared, known-age females.

METHODS

We censused the DCH on 30 June 1994 with 4 aircraft, 2 of which were equipped with radiotracking gear. As in the 2 previous years, the census involved both complete visual searching of areas where aggregations were likely to be, and radiosearching to ensure all active radiocollared caribou were found. All groups larger than about 100 caribou and many smaller groups were photographed with 35mm cameras using Kodak Ektar 100 color print film.

From 16 May to 2 June we observed all yearling and 2-year-old females at least twice, and older females at least 3 times. Beginning about 20 May 1994 we radiotracked collared caribou every 2-4 days. In addition, on 2 June we used a Robinson R-22 helicopter to classify caribou in Wells Creek and Dick Creek drainages. During the survey we counted calves and classified females as parturient or nonparturient based on the presence of a distended udder.

On 25 September 1993 we used an R-22 helicopter to classify 1,525 caribou (40-50% of herd) throughout the range of the DCH to determine recruitment and sex and age ratios. Results were weighted proportionally according to the distribution of radiocollared caribou. Caribou were classified into 5 categories: large, medium, and small bulls; cows; and calves.

The caribou hunting season has been closed in Subunit 20A since 15 September 1991. A winter hunt for Nelchina caribou did occur along the Denali Highway in Unit 13. We monitored radiocollared DCH caribou, especially those wintering in the Yanert drainage during February and March, to ensure they were not harvested.

As in past years (Valkenburg 1992, 1993), we captured, weighed, measured and radiocollared 14 female calves from late September to late October. We also captured, weighed, measured, and collared 10 male calves primarily to document their distribution in April relative to the distribution of females and female calves. We changed collars on 7 8-year-old females from 25 October to 27 October and 3 yearling females that were originally collared in the western foothills of Subunit 20A by L. Adams (National Biological Survey) in March 1993. We mistook one other yearling for a calf during darting and also collared it. In April 1994 we collared 2 yearlings (mistaken for calves) and a female calf and changed collars on 2 adults to prevent battery exhaustion. Despite 5 hours of searching by helicopter, we found only 1 uncollared female calf, and were therefore unable to obtain a sample of calf weights in spring. In addition to obtaining the fall weights of DCH calves, we also captured and weighed female calves from the Fortymile herd and Galena Mountain herd in October and collected female Nelchina herd calves in April.

To determine if weather is a factor that limits growth of the DCH, we continued to analyze weather data, operated a rain gauge on the upper Wood River from 25 May

to 26 July, and established 4 snow survey stations with personnel from the Soil Conservation Service Office in Anchorage. The snow station data will be collected on or about 1 February, 1 March, and 1 April. Data were collected in 1994.

For the second year we cooperated with D. Klein of the Alaska Cooperative Wildlife Research Unit and J. Bryant of the Institute of Arctic Biology in an experiment to simulate the effect of cloudy versus sunny weather on the protein content and digestibility of diamond-leaf willow (*Salix pulchra*). Preliminary results were presented at the Sixth North American Caribou Workshop in Prince George, B. C. in March 1994. In addition, 3 graduate students with the Department of Biology and Wildlife at the University of Alaska Fairbanks are currently working on projects related to summer weather and potential effects on caribou through plant nutrition and insect harassment.

Thirty-two fecal pellet samples were analyzed by the Composition Analysis Laboratory at Fort Collins, Colorado to assess food habits. Half of the samples were from the Delta herd, and the remainder from other caribou herds. Each sample was composed of 1 pellet from each of 25 different pellet groups. Samples were preserved by adding table salt and then drying in an open plastic bag. At the Fort Collins lab each sample was mixed in a slurry, a sample placed on each of 5 microscope slides, and then 20 microscope fields per slide were examined. Results were presented as the percent relative density of discerned plant fragments (c.f. Boertje 1981, Boertje *et al.* 1985).

From late September 1993 through late July 1994 we located radiocollared DCH caribou at least monthly to determine movements, distribution, and mortality rates. From 18 May through 5 August we made flights about twice per week to locate calving areas, document age-specific natality rates, locate caribou for the census, and assist graduate student F. Moerschel in locating portions of the herd for his study of the energetics of insect harassment.

RESULTS AND DISCUSSION

1994 Census

We counted 4,341 caribou during our photocensus of the DCH on 30 June (Table 1). Hot weather in early June led us to first prepare for the census about 10 June. Caribou were suitably aggregated by about 13 June, but the day the census was scheduled, the first of a series of cold fronts arrived. The weather remained windy, rainy and cold until 29 June. On 30 June, as the weather was clearing from the west, we began the census. Initially some groups were poorly aggregated, but by late morning groups were tightly aggregated with most on snow beds. Sixty of sixty-two radiocollared caribou were located, and the 2 missing ones had intermittent signals.

There was no evidence caribou from other herds were present in Subunit 20A at the time of the census. The single radiocollared Nelchina caribou that had been associated with DCH caribou in the lower Yanert drainage in March had returned to the Nelchina herd calving area by late May. During the Nelchina census in late June approximately 45,000 caribou were counted south of the Susitna River and about 2,000 were counted in a separate group east of the upper Susitna River. These numbers were similar to counts done in previous years.

Population modeling using mortality data (from radiocollared caribou dying from July 1993 to August 1994), recruitment data (estimated to be 45 calves:100 cows), and the 1993 population estimate predicted a 1994 DCH population of 4,129 caribou (versus 4,341 counted).

These data indicate the herd grew by about 19% from 1993 due to the strength of the 1994 cohort and reduced adult mortality.

Natality Rate of the DCH and Other Herds in 1994

The trend in nutritional condition of DCH caribou, which has resulted in low pregnancy rates for young females, appears to be continuing. Twenty of thirty (67%) radiocollared females ≥ 3 years of age and 18 of 21 (86%) ≥ 4 years of age were pregnant in late May 1994 (Table 2). None of 12 radiocollared 2-year-old females were pregnant. In the adjacent Denali herd, pregnancy was higher with 83% (10/12) 3-year-olds and 2 of 4 2-year-olds pregnant (L. Adams, pers. commun.). Relative to short-term population dynamics, the difference in pregnancy rate between DCH and Denali caribou may not be significant because there are so few young females in each herd due to low recruitment over the last few years.

We believe the parturition rate is better estimated from the 2 June helicopter survey in which we classified 981 females in Wells Creek and Dick Creek drainages. Eighty-six percent of these had distended udders, and 64% were accompanied by a calf. Calving peaked about 20 May, which was the earliest peak since 1988.

1993 Fall Composition Count

The fall calf:cow ratio in the DCH was the lowest recorded since 1974 (Table 3). The bull:cow ratio (35:100) probably increased as did the proportion of large bulls (26% of bulls), suggesting that mortality of bulls was lower than that of cows in recent years and reflecting the increasing mean age of bulls due to low recruitment.

Weight and Size of Calves

In fall 1993 mean weight of 4-month-old calves continued to be low compared with previous spring weights (Valkenburg 1993) (Table 4). The fall sample was difficult

to obtain because there were so few calves in the herd. In April 1994, despite an extensive search of major wintering areas, we located only 1 uncollared female calf. This observation corroborated the high estimated mortality rate of calves based on those collared in fall 1993 (see Mortality of Adults and Calves).

The continued low body weight of calves in fall was somewhat unexpected because the growing season in 1993 was probably one of the longest on record. Greenup occurred in Fairbanks around 1 May and DCH caribou were already feeding on new *Eriophorum* flowers on 22 April. Summer and fall weather in 1993 appeared normal but data have not been analyzed.

Food Habits of the DCH and Other Interior Herds

Fecal samples collected from DCH caribou in March 1989 just prior to the population decline and prior to the onset of severe winters indicate some lichen ranges in the foothills of Subunit 20A may be depleted. The proportion of lichens in some samples was low and the proportion of mosses was high, particularly in samples from the foothills (Table 5). However, in some other areas of Subunit 20A, particularly the western Tanana Flats, proportions of lichens were high and mosses low. Samples collected in March 1993 also showed that caribou obtained few lichens in many foothill ranges in Subunit 20A (Table 6). In 1993 and in 1989 shrubs (primarily Labrador tea, *Ledum* spp.) were a substantial component of the DCH diet. For comparison, fecal samples were also collected from other caribou ranges (Tables 7 and 8). Generally, in the low density White Mountains herd, lichens made up a higher proportion of the diet than in the Delta herd, while mosses made up a lower proportion. As reported previously (Boertje *et al.* 1985) Western Arctic caribou used more shrubs and sedges in winter than most other caribou herds (Table 8).

Mortality of Radiocollared Caribou (includes ♂ calves)

There was a marked decline in the mortality of radiocollared adult female (>16 mo) DCH caribou. Only 9% (3/35) of these collared females died between 1 October 1993 and 31 July 1994, compared with (6/30) 20% from October 1992 to October 1993 (Table 9). Mortality of yearling females was also probably low; none of 12 died between 1 October 1993 and 31 July 1994. However, mortality of male and female calves (caribou born in 1993) continued to be high; 30% (7/23) died during the same period.

Of the 3 adults that died, 1 was killed by wolves, 1 died of an unknown cause, and the third collar had not been retrieved by the time this report was written. Of the 7 calves that died, 5 were killed by wolves (including the 1 male that died), 1 was poached near a gold mining area in early August, and 1 died of an unknown cause.

A wolf predation control program began in late October 1993, and about 70 wolves were killed by the department and public by late November. By the end of April department trappers had taken 98 wolves, and public trappers had taken 62 wolves. In April about 110-120 wolves remained in Subunit 20A. To the south in Unit 13, in the course of normal hunting and trapping, more than 150 wolves were killed over the winter including 6 of 9 from a pack in Wells Creek. The influence of the wolf predation control program on DCH population dynamics will continue to be evaluated over the coming year.

Movements and Distribution of DCH Caribou

All radiocollared DCH caribou remained within Subunit 20A during winter 1993-94. The herd wintered primarily in 2 areas; the lower Yanert River drainage and the northern foothills of the Alaska Range between Walker Dome and the Delta River, especially in the drainages of the Little Delta River. Four to five thousand Nelchina caribou (including 1 with a radiocollar) wintered in the Cantwell area and moved into the lower Yanert drainage in early March. The radiocollared Nelchina caribou subsequently returned to the Nelchina calving area by late May.

In spring 1994 radiocollared DCH caribou spent time in Subunit 20A and 13. In late April the caribou that wintered in the northern foothills of the Alaska Range moved east to the traditional calving area around Delta Creek. Breakup was early, and new *Eriophorum* flowers were available to caribou by 1 May. About 10 May the DCH began a concerted movement over the Alaska Range to upper Wells Creek in Unit 13 via the Wood River, Dick Creek, and Louis Creek. Most calving occurred in upper Wells Creek. By the time of the census on 30 June, only 2 radiocollared caribou remained in the Wells Creek drainage; the remainder of the herd returned north.

During July 1994 major aggregations occurred in 2 primary areas. In the west they occurred around Bonnifield, Gold King, and Moose Creeks and the upper Tatlanika River. In the east they occurred in upper Buchanan Creek, Little Delta River drainages, and on Iowa Ridge.

The distribution of radiocollared male calves seemed similar to the distribution of female calves and adults in April, but data are still being analyzed and will be presented in the next progress report.

ACKNOWLEDGMENTS

We thank D. Reed for editorial assistance, funding, and project organization and coordination. We also thank R. Hunter, B. Scotton, and L. Larrivee for help with fieldwork.

LITERATURE CITED

- Boertje, R. D. 1981. Nutritional ecology of the Denali Caribou herd. M. S. Thesis. Univ. of Alaska, Fairbanks. 294pp.
- _____, J. L. Davis, and P. Valkenburg. 1985. Uses and limitations of fecal pellet analyses in *Rangifer* studies. Pages 307-316 in T. C. Meredeth and A. M. Martell, eds., Proc. Second North Am. Caribou Workshop, Val Morin, Quebec. McGill Subarctic Research Paper No. 40.
- _____, M. E. McNay, and P. Valkenburg. 1993. A decade later: interrelationships of predators, ungulates, and humans following wolf reductions in an interior study site. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Final Rep. W-24-1. Study 1.43. Juneau 18pp.
- Davis, J. L., and P. Valkenburg. 1985. Demography of the Delta caribou herd under varying rates of natural mortality or harvest by humans. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Final Rep. Proj. W-21-2, W-22-1, W-22-2, W-22-3, and W-22-4. Juneau. 50pp.
- _____, _____, M. E. McNay, R. M. Beasley, and V. L. Tutterrow. 1991. Demography of the Delta caribou herd under varying rates of natural mortality and human harvest and assessment of field techniques for acquiring demographic data. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Final Rep. Proj. W-22-5, W-23-1, W-23-2, and W-23-3. Juneau. 112pp.
- Gasaway, W. C., R. O. Stephenson, J. L. Davis, P. E. K. Shepherd, and O. E. Burris. 1983. Interrelationships of wolves, prey, and man in interior Alaska. Wildl. Monogr. 84. 50pp.
- Valkenburg, P. 1992. Investigation of regulating and limiting factors in the Delta caribou herd. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-23-5. Juneau. 21pp.
- _____. 1993. Investigation of regulating and limiting factors in the Delta caribou herd. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-24-1. Juneau. 19pp.

Prepared by:

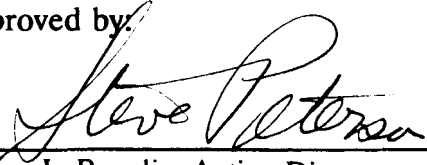
Patrick Valkenburg
Wildlife Biologist III

Robin M. Eagan
Wildlife Biologist III

Submitted by:

Daniel J. Reed
Research Coordinator

Approved by:


Wayne L. Regelin, Acting Director
Division of Wildlife Conservation

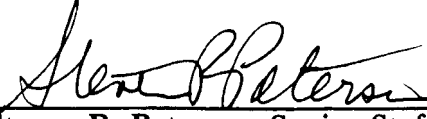

Steven R. Peterson, Senior Staff Biologist
Division of Wildlife Conservation

Table 1. Distribution of caribou seen during the photocensus of the Delta herd, 30 June 1994.

Number seen	% of total	Number of radios	Location
1,079	43	18	Mystic Creek
769			Gold King benches
1,132	26	14	Buchanan Creek
490	11	7	Chute Creek, Sheep Creek, Dry Creek
317	7	9	Other areas W&S of Wood R. and N of Yanert R.
258	6	3	Upper West Fork of Little Delta
116	3	4	South of Yanert R. in Unit 20A
118	3	2	Upper Wells Creek in Unit 13E
53	1	1	100-Mile Creek
<u>9</u>	<1	<u>2</u>	Hayes Glacier vicinity
4,341		60	

Table 2. Late May natality rates of radiocollared Delta herd caribou, 1984-94.

Year	Percent parturient (proportion)	
	≥ 36 months old	≥ 48 months old
1984	90 (28/31)	92 (22/24)
1985	93 (38/41)	94 (29/31)
1986	83 (33/40)	77 (24/31)
1987 ^a		89 (25/28)
1988	88 (28/32)	90 (27/30)
1989	83 (25/30)	92 (22/24)
1990	72 (28/39)	76 (22/29)
1991	71 (25/35)	79 (22/28)
1992 ^a		96 (27/28)
1993	30 (7/23)	39 (7/18)
1994	66 (20/30)	86 (18/21)

^a No 3-year-olds in the sample of radiocollared cows.

Table 3. Fall composition counts in the Delta caribou herd, 1970-93.

Survey date	Bulls:100 cows	Calves: 100 cows	Calves %	Cows %	Small bulls % of bulls	Medium bulls % of bulls	Large bulls % of bulls	Total bulls %	Composition sample size
10/21-23/70 ^a	77	34	14	43	--	--	--	33	896
10/29-31/71 ^a	29	15	10	65	--	--	--	19	1,139
10/27-31/72 ^a	33	11	7	67	--	--	--	22	1,185
10/23-24/73 ^a	29	10	7	70	--	--	--	20	1,050
10/23-25/74 ^a	28	2	1	76	--	--	--	21	1,141
10/29-31/76 ^{a,b}	38	45	24	54	--	--	--	21	1,055
10/26-31/77 ^a	33	42	23	55	--	--	--	18	1,365
10/26/78	75	39	17	45	--	--	--	33	725
12/7/79	39	65	32	49	--	--	--	19	361
10/25/80	85	49	21	43	--	--	--	36	1,369
10/2/81	46	41	22	53	47	3	50	25	1,451
10/8/82 ^c	42	31	18	58	48	4	48	24	1,565
10/4/83	35	46	25	55	59	6	36	20	1,208
10/17/84	42	36	20	56	28	32	40	24	1,093
10/9-12/85	49	36	20	54	57	24	19	26	1,164
10/22/86	41	29	17	59	49	30	21	24	1,934
10/05/87	32	31	19	61	53	23	24	20	1,682
10/14/88	33	35	21	60	50	38	12	20	3,003
10/10/89	27	36	22	62	64	28	7	16	1,965
10/4/90	38	17	11	65	45	39	16	24	2,411
10/1/91	29	8	6	73	55	29	16	21	1,705
9/28/92	25	11	8	74	46	43	11	19	1,240
9/25/93 ^d	35	6	3	73	43	30	26	24	1,525

^a Indicates ratios may not be comparable because yearlings were classified in this count.

^b Wolf control began in 1975.

^c Wolf control ended in 1982.

^d Weighted according to distribution of radiocollars.

Table 4. Weights (pounds) of female Delta herd caribou calves, fall 1991-93.

	Year		
	1991	1992	1993
		139	138
	152	138	136
	137	137	136
	134	127	134
	133	124	127
	128	121	125
	124	117	124
	124	116	122
	124	116	122
	123	114	118
	121	113	115
	118	111	113
	118	110	105
	<u>116</u>	<u>102</u>	<u>98</u>
Mean	127.6	120.4	122.4
SE	2.5	2.9	3.2
<i>n</i>	14	14	14

Table 5. Proportions of discerned plant fragments in 9 fecal samples collected from the Delta caribou herd in Subunit 20A, March 1989.

Sample #	Location	Proportion of discerned plant fragments by group							Total
		Lichens	Mosses	Shrubs	Grass/sedge	Equisetum	Forbs	Other	
103647	20A (foothills)	28	45	20	5	1	0	1	100
103649	20A (foothills)	53	33	10	3	0	1	0	100
103653A	20A (foothills)	51	28	13	2	2	0	4	100
103653B	20A (foothills)	78	1	6	5	8	0	2	100
103651	20A (foothills)	29	61	6	2	0	0	2	100
103654	Cody Creek	53	21	12	5	5	0	4	100
103659	Fish Creek (W flats)	83	3	7	0	5	0	2	100
103662	Fish Creek (W flats)	82	4	7	0	4	2	4	100
103950	Yanert	74	15	9	0	0	2	0	100
Mean \pm SD		59 \pm 21	23 \pm 21	10 \pm 5	2 \pm 2	3 \pm 3	1 \pm 1	2 \pm 2	100

Table 6. Proportions of discerned plant fragments in 7 fecal samples collected from the Delta caribou herd in Subunits 20A and 20B, March 1993.

Sample #	Location	Proportion of discerned plant fragments by group							Total
		Lichens	Mosses	Shrubs	Grass/sedge	Equisetum	Forbs	Other	
103971	Iowa Ridge (foothills)	26	40	27	6	0	0	1	100
104200	20A (foothills)	85	5	4	1	1	1	3	100
104200	Liberty Bell Mine (foothills)	41	38	13	4	2	1	1	100
104202	U of A (20B)	65	3	11	3	11	1	5	100
104205	Eielson AFB (20B)	63	23	8	0	5	1	0	100
104206	Little Delta (foothills)	61	15	21	1	1	1	0	100
104210	Granite Tors (20B)	78	11	4	2	1	1	3	100
Mean \pm SD		60 \pm 20	19 \pm 15	13 \pm 9	2 \pm 2	3 \pm 4	1 \pm 0	2 \pm 2	100

Table 7. Proportions of discerned plant fragments in 5 fecal samples collected from the White Mountains caribou herd in Subunit 20B, April 1992.

Sample #	Location	Proportion of discerned plant fragments by group							Total
		Lichens	Mosses	Shrubs	Grass/sedge	Equisetum	Forbs	Other	
103961	VABM Beaver	79	13	4	2	0	0	2	100
103962	N. of VABM Beaver	72	3	14	7	0	1	3	100
103963	Noodor Dome	61	6	3	9	2	17	2	100
103964	VABM Duncan	72	4	22	1	1	0	0	100
103965	VABM Beaver	76	11	10	2	0	1	0	100
Mean \pm SD		72 \pm 7	7 \pm 4	11 \pm 8	4 \pm 4	1 \pm 1	4 \pm 7.4	1 \pm 1	100

Table 8. Proportions of discerned plant fragments in 11 fecal samples collected from various herds in Interior Alaska, March and April 1992-93.

Herd	Sample #	Mean percent of discerned plant fragments by group								Comments
		Lichens	Mosses	Shrubs	Grass/sedge	Equisetum	Forbs	Other	Total	
Big River	104212	62	18	10	1	5	0	4	100	March 1993, Submarine Lake
Nelchina	104211	63	19	9	5	1	3	0	100	April 1993, eastern Denali Hwy.
Nelchina	103969	83	1	3	0	10	0	3	100	April 1992, Northway
Nelchina	103970	88	2	3	1	5	0	1	100	April 1992, Gardner Creek
Nelchina	103967	62	5	16	0	6	0	11	100	April 1992, Lake Louise Flats
Ray Mountains	103954	81	8	9	1	0	0	1	100	March 1992, Kilo Hot Springs
Upper Susitna	103960	78	10	9	3	0	0	0	100	March 1992, Cantwell
Upper Susitna	103972	89	3	7	0	0	0	1	100	March 1993, western Denali Hwy.
Western Arctic	103951	54	3	11	24	1	1	6	100	April 1992, Pah Flats
Western Arctic	104203	59	11	23	1	0	0	6	100	April 1993, Indian R. Flats
Western Arctic	104207	74	2	21	3	0	0	0	100	March 1993, Indian R. Flats

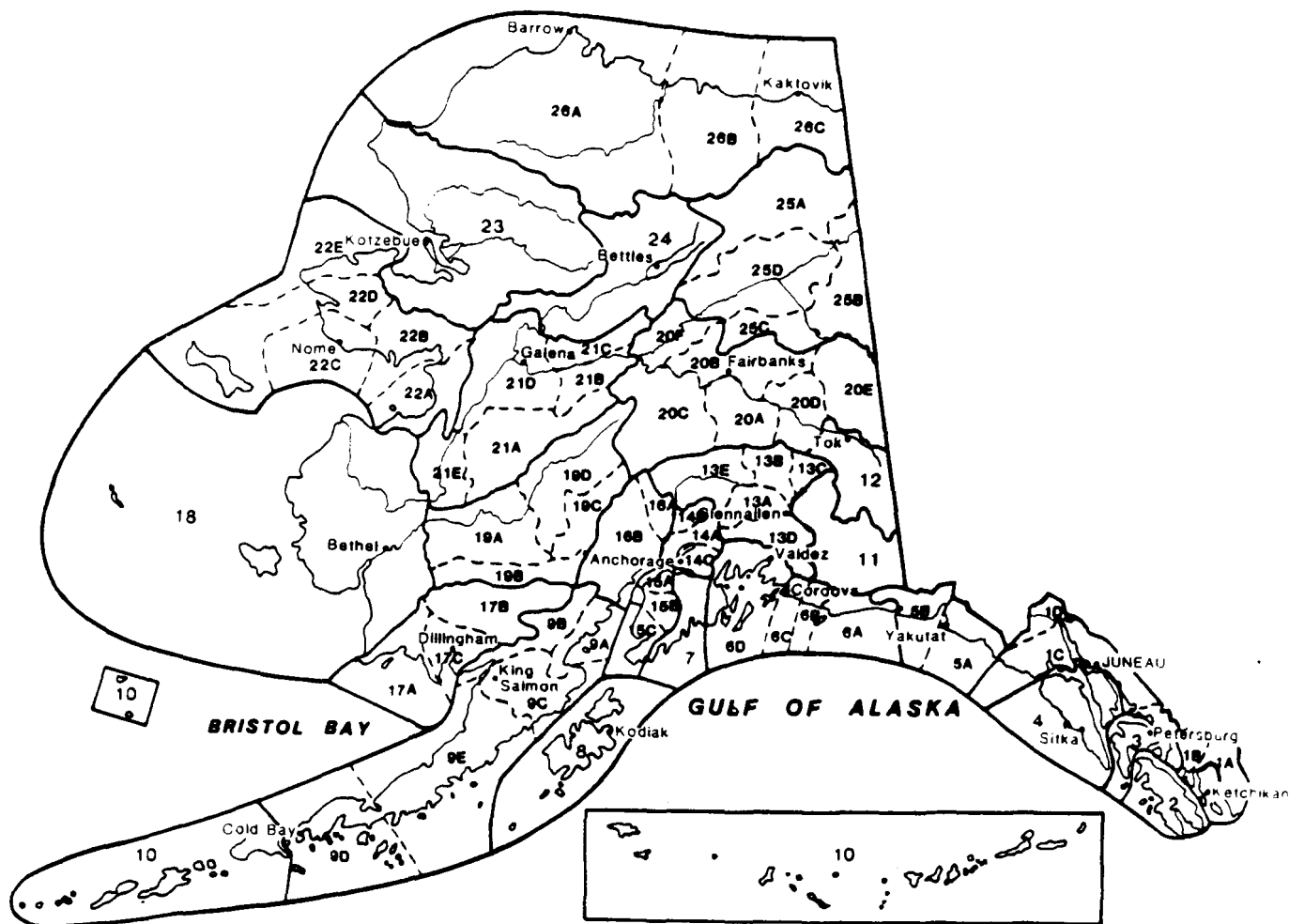
Table 9. Annual total mortality rates of radiocollared female caribou older than 16 months.

Year ^a	Number on the air	Number dying	Percent mortality
1979-80	11	0	0
1980-81	29	0	0
1981-82	39	0	0
1982-83	47	3	7
1983-84	55	2	4
1984-85	50	2	4
1985-86	48	9	22
1986-87	39	4	10
1987-88	43	4	10
1988-89	46	7	15
1989-90	48	5	11
1990-91	40	6	15
1991-92	40	9	23
1992-93	30	6	20
1993-94 ^b	35	3	9 ^b

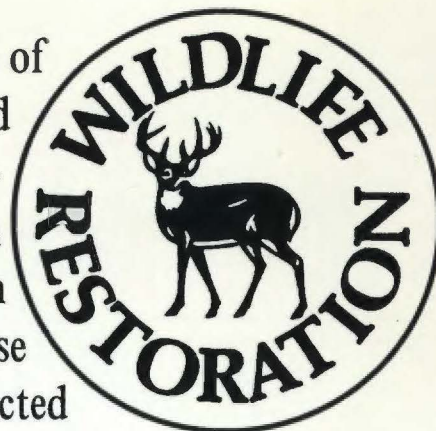
^a 1 October to 30 September.

^b 1 October 1993 to 31 July 1994.

Alaska's Game Management Units



The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sales of handguns, sporting rifles, shotguns, ammunition, and archery equipment. The Federal Aid program distributes funds to states using a formula based on each state's geographic area and number of paid hunting license holders. Alaska receives a maximum of 5% of revenues collected each year. The Alaska Department of Fish and Game uses its funds to help restore, conserve, and manage wild birds and mammals. These funds are also used to educate hunters to develop skills and attitudes for responsible hunting. Federal Aid funds paid for 75% of this study.



The Alaska Department of Fish and Game administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information please write to ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, Suite 300 Webb, Arlington, VA 22203 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

For information on alternative formats for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-6077, (TDD) 907-465-3646, or (FAX) 907-465-6078.