

ALASKA DEPARTMENT OF FISH AND GAME

JUNEAU, ALASKA

STATE OF ALASKA
Bill Sheffield, Governor

ALASKA DEPARTMENT OF FISH AND GAME
Don W. Collinsworth, Commissioner

DIVISION OF GAME
W. Lewis Pamplin, Jr., Director
Robert A. Hinman, Deputy Director

ANNUAL REPORT OF
SURVEY-INVENTORY ACTIVITIES

PART III. DEER, BISON, SMALL GAME, ELK,
MUSK-OXEN, AND WALRUS

Edited and Compiled by
Joann A. Barnett, Publications Technician

Volume XIV

Federal Aid in Wildlife Restoration

Project W-22-2, Job 2.0, 9.0, 10.0, 13.0, and 16.0

Persons intending to cite this material should obtain prior 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. Due credit would be appreciated.

(Printed April 1984)

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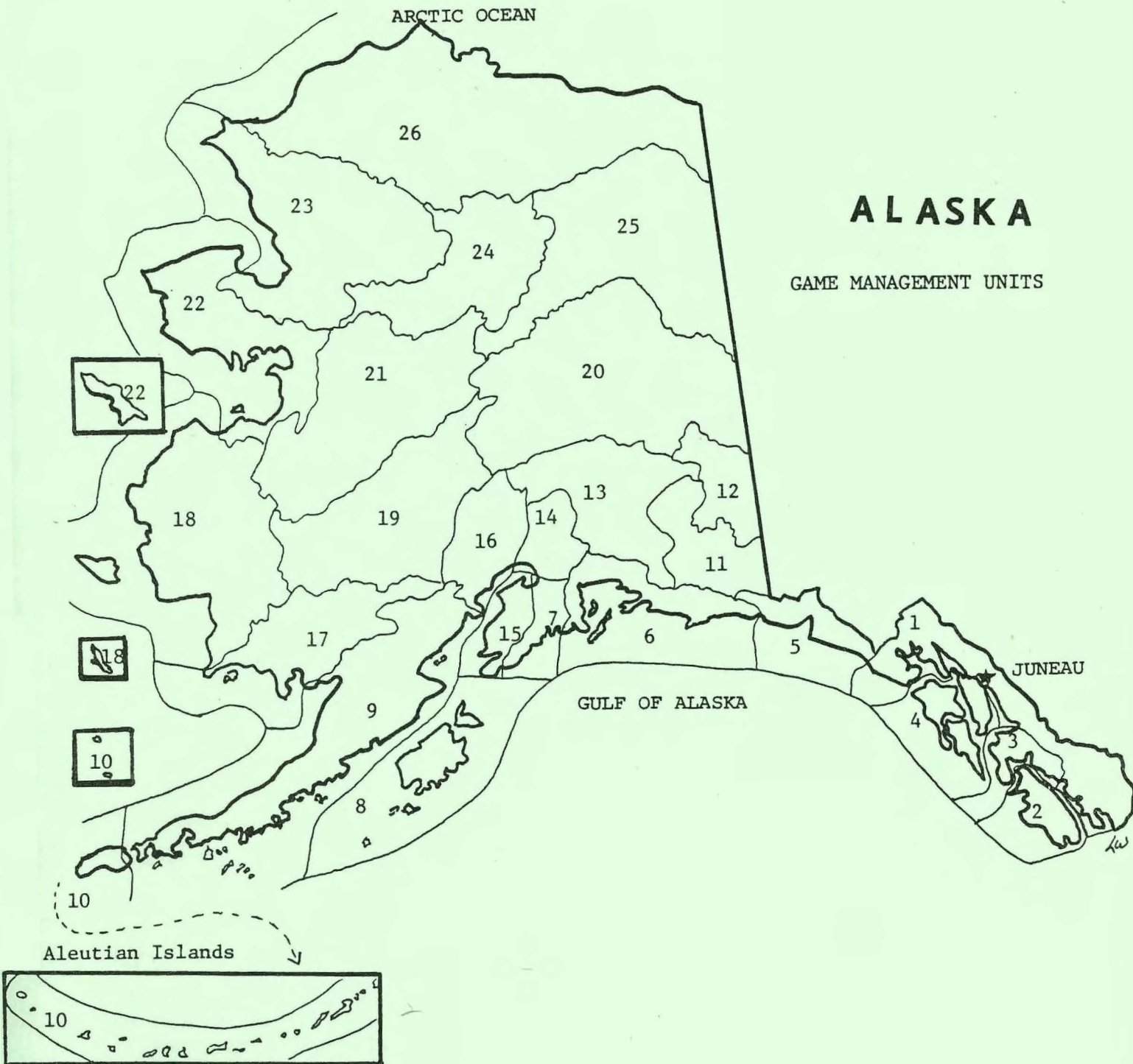
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Statewide Harvest and Population Status

Deer

For the 1st time, the deer harvest in Southeastern (Units 1-5) was estimated by a questionnaire; results are therefore not directly comparable to previous figures. In Unit 6, minimum harvest figures were obtained by interviews of Cordova hunters; in Kodiak, interview data and questionnaires were used. Results showed a low harvest in GMU's 1A, 1B and 3 as well as Subunit 1C (322, 94, and 300, respectively) and relatively high harvests in Unit 2 (1,146), Unit 4 (5,630), Unit 6 (688), and Unit 8 (6,000 or more).

The winter of 1982-83 was very mild, so survival should be excellent. Deer populations continue to be low, though locally increasing, in GMU's 1A, 1B, and 3; the population is moderate in Unit 2 and high in Units 4, 6, and 8.

Bison

Of the 4 bison herds in the State, only the Copper River herd is decreasing, for reasons unknown. Both the Farewell and Delta herds are increasing; the latter is higher than desired due to conflicts with agriculture. Total hunter harvest was 79; known mortality from sources other than legal hunting was 15 (13 in Delta, 2 in Chitina). Data are summarized below:

<u>Herd</u>	<u>Population</u>	<u>Trend</u>	<u>Legal harvest</u>
Chitina	55	Stable	2
Copper River	63	Declining	0
Farewell	157	Increasing	10
Delta	355	Increasing	67

Small Game/Upland Game

Reports are included for small game in GMU's 1D, 5, 23, and 26, and the results of the Statewide small game abundance questionnaire are presented. Harvest figures are generally unavailable.

Elk

Elk herds on Raspberry and Afognak Islands (Unit 8) are stable or increasing and are at the highest level in many years. The population numbered well over 900 animals; 963 were counted in aerial surveys. Total hunter harvest was 151 elk, the highest on record.

Musk-oxen

Musk-oxen occur on Nunivak Island, Nelson Island, Seward Peninsula, the Cape Lisburne area (Unit 23), and on the eastern Arctic Slope. Animals in the latter 4 groups result from past transplants from Nunivak Island. Populations in all transplant areas are increasing; the group on Nunivak is healthy and being held stable by controlled harvest. The following is a summary of 1983 status and harvest:

Area	Populations		Harvest		
	Precalving	Postcalving	Males	Females	Total
Nunivak Island	--	600	26	37	63
Nelson Island	--	250	25	0	25
Seward Pen.	155	--	0	0	0
Unit 23	--	92	0	0	0
Eastern Arctic	235	--	4	0	4
Total					92

Walrus

Walrus, like other marine mammals, remain under Federal jurisdiction. One report is submitted, due to the State's interest and activity in Unit 17 related to the Walrus Islands State Game Sanctuary.

Robert A. Hinman
Deputy Director

DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 1A and 2

GEOGRAPHICAL DESCRIPTION: Ketchikan Area and Prince of Wales
Island

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

Population levels in most of GMU 1A appear to be relatively stable; in the northern and western portions of GMU 2, populations appear to be increasing and are currently at a fairly high level. There are still major portions of both Units, however, where deer numbers remain at low levels.

Population Composition

No data were available.

Mortality

The winter of 1982-83 was very mild throughout both GMU 1A and 2. No significant winter mortality was expected, and the beach winter mortality transects were not walked. Field observations and other reports indicated no mortality due to winter conditions, and the few dead deer examined were in excellent condition.

Harvest information and hunter data for the 1982 hunting season were obtained from a mail survey of 32% of the 10,632 Southeast licensees who received deer harvest tickets. Three mailings were sent, and 2,182 returns (65% of the sample) were received from the 3 mailings. Sixty-five percent of all harvest ticket holders actually hunted. This year's deer hunter survey is not comparable with any of the preceding years' surveys but should be comparable with future data. Figures used in this report are estimated totals based on the 32% sample.

Tabulations were made by Unit and area. Consequently, a hunter who hunted in more than 1 area or more than 1 GMU will be tallied as a hunter in each of those GMU's or areas.

In Subunit 1A, 883 hunters spent 4,341 days in the field and killed 322 bucks. Hunter success was 28% and .36 deer per hunter. Average days hunted was 4.92, and there were .074 deer taken per hunter-day.

Chronology of the harvest was 21% in August, 9% in September, 37% in October, and 33% in November. There was no snow on the ground at any time during the season.

Within Subunit 1A, 95% of the hunter effort occurred on Revilla and Gravina Islands. Within this portion of Subunit 1A, the George Inlet, Carroll Inlet, and Thorne Arm area had the highest success rate; Gravina Island was second. The Clover Pass to Gedney Bay area had the lowest success.

In Unit 2, 1,117 hunters killed 1,146 deer in 9,244 days of hunting. Fifty-eight percent of the hunters were successful and 1.03 deer per hunter were taken. Both figures indicate much better success than in GMU 1A. Chronology of the harvest was similar to GMU 1A. Thirty-one percent of the harvest was taken in August, 16% in September, 22% in October, and 31% in November.

The majority of the GMU 2 harvest was taken from the northern half of Prince of Wales Island and coincides closely with the interconnected logging road system on the island. About 80% of the GMU 2 harvest and hunter effort took place in this area.

The best hunter success in terms of deer per hunter-day was in the outer island group of Suemez to Heceta Island. Almost 0.20 deer per hunter-day were taken in this area compared to 0.12 deer per day for the road system area. The lowest success was in the southeast part of the island with 0.074 deer per day. The deer per day figure for the road system area is low because of the high average number of days hunted in this area. Many of the hunters here work in the logging industry and hunt as they drive the roads, and this raises the number of days reported as hunted. Average days hunted per hunter in this area was 8.55 compared with an average of 4.92 for all GMU 1A. This situation is unique when compared to the rest of GMU's 1A and 2.

This roaded portion of Unit 2, while having deer populations at the same or lower levels than the outer islands of Unit 2, has a strong attraction to many hunters because of the ease of hunting from a road system. None of the problems generally associated with boat travel are involved, and the popularity of this area is shown when the hunting efforts of only Ketchikan residents are tabulated. Of the 7,546 hunter-days spent in the roaded area, 4,019 (53%) were by Ketchikan hunters. In all of Unit 2, Ketchikan hunters spent 4,812 days hunting; 84% of these were in the roaded portion of Prince of Wales Island.

Of the total hunter-days spent in all areas by Ketchikan hunters, 45% were in this roaded area of Unit 2. Considering the effort involved for Ketchikan residents in getting to the roaded section of Unit 2, these figures indicate a strong attraction for that type of hunting.

Management Summary and Recommendations

Deer populations in much of Unit 2 appear to be increasing, and some areas are already at a fairly high level. In Subunit 1A, the indications show generally stable to slightly increasing deer numbers. Range conditions appear good in all areas and, with the exception of a few smaller islands, are probably capable of supporting higher deer numbers.

The harvest is currently concentrated in the northern half of Prince of Wales Island along the road system. This concentrated effort will probably continue to remain in that area and even increase as ferry access improves and knowledge of the higher success spreads among hunters.

Some consideration will be given to recommending either-sex seasons in some of the areas of higher deer numbers.

PREPARED BY:

Robert E. Wood
Game Biologist III

SUBMITTED BY:

Steven R. Peterson
Acting Management Coordinator

DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 1B and 3

GEOGRAPHICAL DESCRIPTION: Subunit 1B - Mainland from Cape
Fanshaw to Lemesurier Point
on Cleveland Peninsula

Unit 3 - Islands of the
Petersburg, Kake, and
Wrangell Areas

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

Sitka black-tailed deer are found on most of the islands in Game Management Unit 3 and on the mainland area of Subunit 1B. Populations in these Units have periodically reached peaks in the past and then crashed. These declines can be attributed to many factors, and the most prominent are probably severe winter weather, predation by wolves, excessive or illegal hunting, and deterioration of the range from overpopulation and clear-cut logging.

Deer numbers in both Units are currently low, although substantial increases are being noted in some localities. There have been noticeable population gains on predator-free islands of less than 2,500 acres in size and on Mitkof Island. Populations are increasing slowly on Zarembo, Kupreanof, Kuiu, Etolin, and Wrangell Islands.

Winter surveys were not conducted during the period because the winter of 1982-83 was a mild one with little persistent snow. Deer were not forced to the beach by deep snows as they were during winter 1981-82.

Spring pellet group surveys were conducted on Level, Conclusion, Kuiu, and Coronation Islands. The survey plots measured 1 x 10 m and were positioned along a predetermined compass course.

Deer pellet group counts may not be used to determine actual populations in Unit 3 since many variables influence the data.

Problems include the following: defecation rates may vary with diet and season; persistence of pellets is not known for the sampled areas; experience and visual acuity of observers vary; visibility of pellets is affected by light conditions, vegetation and terrain; and pellets are not evenly distributed. Nevertheless, the technique can be useful for determining annual trends in the populations and for comparison of deer populations on different islands. A formula similar to that described by Overton (1971) was used to determine deer use-days per square kilometer. Population index (P) can be used for comparative purposes, and is obtained through the formula:

$$P = \frac{n(a)}{s(d)}$$

where: n = number of pellet groups counted, a = square kilometer, s = square meters sampled, and d = deposition rate multiplied by the days of use.

A use period of 180 days was assumed since deer fecal pellets have been shown to persist that long elsewhere in Southeast Alaska (Fisch 1979). Another assumption used was that the defecation rate of deer was 15 groups per day. This arbitrary figure was obtained from a maximum average reported by Rogers et al. (1958).

Pellet group counts were conducted on Coronation Island during spring 1983, when 570, 10-m² plots were searched. Counts varied from 136 pellet groups/ha (55/acre) to 784 groups/ha (317/acre). The average for Coronation Island was 399.66 groups/ha (161.81/acre). See Table 1 for a comparison of counts and population indices among selected islands. An average population index of 14.81 was computed for Coronation Island. This index compares favorably with other areas in Unit 3 which support huntable populations of deer. Coronation was not recommended for an open season in 1983 since the survey results were not available for the annual Game Board meeting. Although wolves were introduced to Coronation Island in 1960 and 1963 (Burris and McKnight 1973), there was no evidence of wolves in 1983.

Conclusion Island investigations included 168 plots (10 m²). These indicated 393.01 groups/ha (159.05/acre). Conclusion Island showed indication of recent heavy use of browse and forbs by deer. The population index computed for Conclusion Island was 14.55 (Table 1). Conclusion Island, which was closed to deer hunting in 1975, will be open for hunting in 1983.

Based on subjective field observations, Kuiu Island deer populations appear to be increasing north of the Bay of Pillars. Numbers on the southern portions of the island are not recovering at the same rate. Pellet counts in the Kell Bay area up to alpine indicated extremely low deer numbers. Less than 5 groups were found between tidewater and alpine. A search was made of

beach fringe timber at Affleck Canal and Port Beauclerc, and evidence of browsing was absent or very light. Populations are currently so low that a population index was not computed for south Kuilu.

Mitkof Island has shown evidence of increasing deer populations during the report year. An aerial survey in August 1982 of the alpine areas on Mitkof produced 1 sighting (a doe) during 1.2 hours of survey time. The deer population around Woodpecker Cove seems to be the most dense on Mitkof Island. A 20-mi (32.2-km) spotlight count was conducted on the Woodpecker Cove road in June 1983 and 4 deer were observed (1 buck, 1 doe, 2 undetermined).

The total Level Islands population stayed about the same as in 1981, but there was a shift in deer use from Little Level to Big Level. Personnel at the Federal Aviation Agency site on Big Level reported a drop in the deer population during the period, but this was contradicted by the survey data (Table 2). The shift in deer use may be attributable to a conifer thinning project in which a camp was established and chain saws used to thin trees. This disturbance could have caused a movement of deer from the island of active thinning. Deer readily move from Big Level to Little Level and back.

Population Composition

No data were collected.

Mortality

Spring beach mortality surveys were not conducted because the winter of 1982-83 was so mild. Dead deer were recorded during pellet group surveys, however. Two dead deer were found on Big Level Island, and excessive browse use was noted on both of the Level Islands. There are no predatory animals on the Level Islands. A Forest Service habitat improvement project in progress is designed to produce more browse on the Level Islands through thinning of regrowth conifers (J. G. Doerr, pers. commun.). Regrowth conifers dominate the clear-cut sites on Level Island, eliminating browse species through competition for light, space, and nutrients. Thinned sites were receiving very little deer use, as indicated by pellet groups. Sites were thinned in 1982 and 1983, and excessive slash in thinned areas appears to be a physical barrier to deer use.

The major predator on deer in Subnits 1B and Unit 3 during the report period was the wolf, with some predation by black bears. The magnitude of predation is unknown, but it is thought to be the limiting factor on deer populations during periods of mild winters. Illegal hunting is another unquantifiable factor depressing deer numbers.

To determine the legal deer harvest, a questionnaire was sent to a third of the licensed hunters who acquired deer harvest tickets in Southeast Alaska during the 1982 hunting season. The survey was designed to determine hunting success, hunting pressure, and harvest results.

The projected total legal harvest of deer in Subunit 1B and Unit 3 was 94 bucks. Area 25 (Fig. 1) was the most popular hunting area and accounted for 87.5% of the deer taken. Area 25, which includes Sokolof, Vank, and Woronkofski Islands, accounted for 75.4% of GMU's 1B and 3 hunting effort; the success rate was 29%. The overall success rate in GMU's 1B and 3 was 25%. Table 3 shows the direct results of the harvest survey by harvest area.

Management Summary and Recommendations

Population surveys indicate huntable deer numbers on Conclusion and Coronation-Spanish Islands. Conclusion Island will be open for hunting in 1983, and Coronation-Spanish Islands will be recommended for opening in 1984. The heavily cut Level Islands continue to support good numbers of deer, but populations are expected to crash during a severe winter. South Kuiu Island populations have not responded to the closed season and mild winters experienced since 1975.

At present, the major limiting factor on deer populations in Subunits 1B and Unit 3 is predation, but clear-cut logging and residential development are permanently eliminating deer winter range. The carrying capacity of GMU's 1B and 3 has been reduced through logging and associated developments.

Hunters accounted for an estimated 94 bucks during the 1982 season. The current method of sampling harvest ticket holder effort and success is working well and should be continued.

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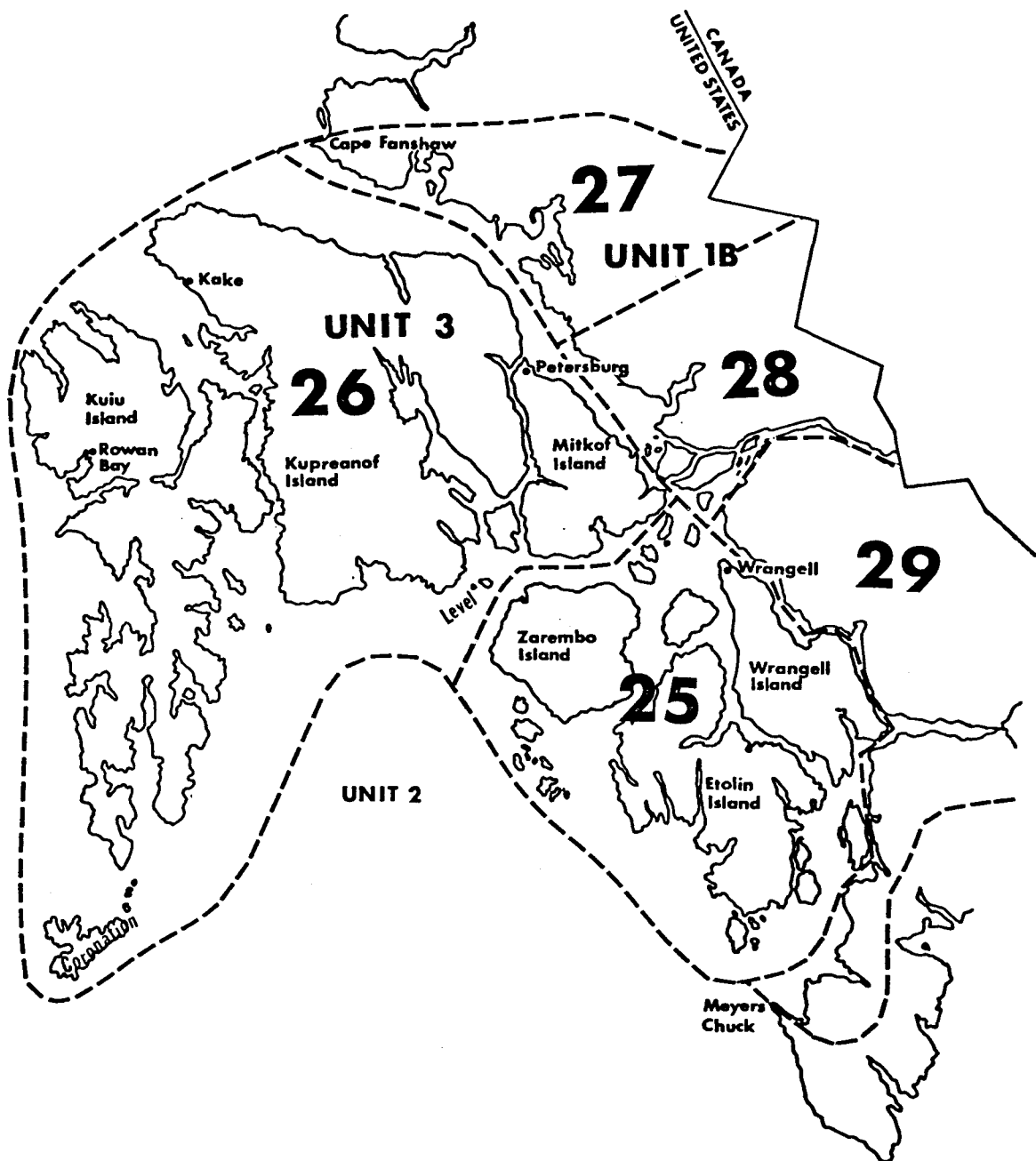


Fig. 1. Subunit 1B and Unit 3 harvest areas.

Table 1. Unit 3 deer pellet group survey results, 1983.

Island	Total area (km ²)	No. plots ^a	Population group/ha	Pop. index
Big Level	3.5 (864 acre)	672	1,308.50 (529.55/acre)	48.51
Little Level	1.3 (312 acre)	237	950.01 (384.47/acre)	35.18
Conclusion	8.2 (2,020 acre)	168	393.01 (159.05/acre)	14.55
Coronation	91.1 (22,519 acre)	570	399.83 (161.81/acre)	14.81
Spanish	5.3 (1,296 acre)	138	572.70 (231.77/acre)	21.20

^a Plot = 10 m².

Table 2. Results of deer pellet group counts, Level Islands, 1981-83.

Year	Pellet group/hectare			Pop. index ^a
	Little Level	Big Level	Average	
1981	1,225 (496/acre)	761 (308/acre)	993 (402/acre)	36.78
1982	1,299 (526/acre) ^b	N/A	1,299 (526/acre)	48.11
1983	951 (385/acre)	1,309 (530/acre)	1,131 (458/acre)	41.89
Avg.	1,161 (470/acre)	1,035 (419/acre)	1,099 (445/acre)	40.70

^a See explanation in Population Status and Trend section.

^b Doerr, J. G. 1982. Unpubl. data, U.S. Forest Service, Petersburg.

Table 3. GMU's 1B and 3 deer harvest results, 1982.

Area	No. total hunters	No. success. (%)	Days hunted	Deer killed
25	49	14 (29)	173	14
26	6	1 (17)	28	1
27	2	0	2	0
28	4	1 (25)	25	1
29	4	0	14	0
Totals	65	16 (25)	242	16

DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 1C

GEOGRAPHICAL DESCRIPTION: Mainland from Cape Fanshaw to
Latitude of Eldred Rock

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

Available information indicates that deer populations were probably reduced during the moderately severe winter of 1981-82. Good survival was expected during the mild winter of 1982-83, and recovery of any reduction is anticipated. Field investigations of portions of known deer wintering areas on Shelter Island were made in spring 1983. Deer sign and pellet groups were observed in moderate numbers in these areas. No mortalities were observed.

Population Composition

No data were collected.

Mortality

A third of all deer harvest ticket holders in Southeastern Alaska were selected at random and mailed questionnaires to assess harvest and hunter pressure. Although 4 mailings were scheduled (3 to nonrespondents), the results of only the 1st 2 mailings were available at this writing. Based on 54% of this sample ($N = 3,529$ harvest ticket holders) and 17% of the total number of harvest ticket holders ($N = 10,632$), it is estimated that 1,050 hunters spent a total of 4,050 days hunting deer in Subunit 1C in 1982 and took 300 deer (165 males and 135 females), averaging 0.29 deer per hunter and 0.074 deer per day hunted. The mean number of days spent hunting deer by each hunter was 3.89 days. Nineteen percent of the hunters were successful in taking at least 1 deer.

Distribution of hunter effort and success for Subunit 1C for 1982-83 showed Douglas Island, Favorite Channel Islands, and the mainland area near Juneau as the most heavily hunted areas. The final results of the mail questionnaire survey will be presented in a subsequent report.

Management Summary and Recommendations

The moderately severe winter prior to the 1982 hunting season in Subunit 1C appeared to have reduced deer numbers, as harvest data indicate a significant decrease in the percentage of males in the harvest from about 69% (1980 and 1981) to 55% (1982). The status of deer population is not fully known in Subunit 1C; however, the winter following the 1982 hunting season was exceptionally mild and recovery from any population reduction is expected.

The loss of deer habitat in Subunit 1C due to urbanization and logging will reduce deer populations in those areas affected.

The assessment of deer harvest and hunter pressure on an annual basis by randomly selecting deer harvest ticket holders appears encouraging in obtaining consistent and reliable information.

Changes in season or bag limit were not recommended.

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SUBMITTED BY:

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Regional Supervisor

DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 4

GEOGRAPHICAL DESCRIPTION: Admiralty, Baranof, Chichagof, and
Adjacent Islands

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

Spring mortality transects have shown that significant winter mortality has occurred in 2 of the past 7 winters, 1981-82 and 1978-79. Winter losses during 1981-82 were among the most severe in recent years. However, they occurred at a high in the deer population, and the carcasses examined showed that fawns and old animals were primarily affected. The overall impact of the 1981-82 losses was less significant than the winter mortalities of the early 1970's. Winter 1982-83 was mild with no natural losses documented. Consequently, the Unit 4 deer population is presently at or near the carrying capacity of its range.

Population Composition

No data were available.

Mortality

Spot checks were made in spring 1983 on 7 of the 23 permanent mortality transects. No instances of winter mortality were observed, so no additional transects were examined. In view of the mild 1982-83 winter, no mortality was anticipated.

The sport harvest was estimated on the basis of a random sample of hunters that obtained deer harvest tickets in Southeast Alaska during 1982. A harvest questionnaire was sent to 3,529 (33%) of these harvest ticket holders. Following 2 reminder letters, 65% of the questionnaires were returned. Thus, information was obtained from 20.5% of all harvest ticket holders. Harvest statistics were extrapolated from the results obtained from this sample of hunters. An estimated 4,190 hunters expended 26,000 hunter-days to harvest 5,630 deer (4,050 bucks, 1,580 does). Thirty-five percent of the respondents did not hunt. The average active hunter took 4.7 days to harvest 1 deer.

These harvest figures are about average for Unit 4. A slight reduction in the Unit 4 kill had been expected because the yearling age class, which typically makes up a high percentage of the harvest from Unit 4, was reduced in abundance by winter kill in 1981-82. Harvest data are shown in Tables 1 and 2.

Management Summary and Recommendations

The mild winter of 1982-83 was favorable for overwinter survival. Mild weather late in the hunting season likely reduced the harvest substantially because deer were less vulnerable to hunting. These 2 factors should have allowed the Unit 4 deer population to rebound from the slight reduction it experienced during winter 1981-82.

The current regulations (1983-84) are reasonably commensurate with the deer population, although they are perhaps overly conservative in the area around Sitka. Winter mortality and accelerated timber harvests, which are concentrated in the critical high-volume stands of old-growth timber, are the only serious impacts on deer numbers in Unit 4.

No changes in seasons or bag limits were recommended.

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SUBMITTED BY:

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Steven R. Peterson
Acting Management Coordinator

Table 1. Game Management Unit 4 deer harvests by community, 1982.

Community	No. harvest tickets issued	No. hunters	Estimated harvest
Sitka	2,224	1,490	2,200
Juneau	3,010	1,580	1,600
Petersburg	606	260	530
Ketchikan + 1A & 2 residents	2,923	100	130
Wrangell	639	100	100
Hoonah	307	220	480
Angoon	98	80	210
Pelican	92	55	100
Kake	89	40	40
Port Alexander	15	10	15
Tenakee Springs	51	35	40
Gustavus	57	40	50
Haines/Skagway	165	60	70
Elfin Cove	8	5	5
Funter Bay	5	5	15
Other	343	110	45
Totals	10,632	4,190	5,630

Table 2. Game Management Unit 4 deer mortality data, 1969-1982.

Year	Total kill ^a	% males	Hunter-day/ deer harvested	Deer/ hunter	Winter mortality/ mile of transect
1982	5,630	72	4.7	1.3	0.00 ^b
1981	5,700 ^c	77	3.8	1.5	1.25
1980	4,500	75	6.7	1.4	0.00
1979	950	70	4.5	1.0	0.00
1978	2,024	70	2.5	1.1	0.72
1977	2,945	NA	1.6	1.2	0.00
1976	1,475	67	7.5	0.7	0.00
1975	4,247 ^d	57	2.2 ^e	2.1 ^e	0.96
1974	7,118	57	3.1	2.3	0.41
1973	7,000	67	3.5	2.5	0.78
1972	2,500	54	4.9	1.4	0.64
1971	3,040	NA	3.3	1.7	1.11
1970	4,040	56	NA	2.1	1.61
1969	1,756	45	8.0	0.8	0.00

^a Hunter questionnaire 1980-1982; harvest ticket/report data 1975-79; hunter interview through 1974.

^b Only 7 transects examined.

^c Range 4,190-7,227.

^d Hunter interview data calculated harvest of 14,700.

^e Data for Sitka hunters only after this year.

DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 6

GEOGRAPHICAL DESCRIPTION: Prince William Sound

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

The Prince William Sound deer population is at a high level. A series of mild winters has allowed this population to rebound from low levels in the early 1970's.

Population Composition

No data were available.

Mortality

Harvest data from Cordova hunters were obtained by interviewing 100 license holders (Table 1). The data revealed a harvest of 688 deer by 528 hunters who went afield. Males composed 62% of the harvest. There were 1.3 deer harvested per hunter afield, whereas successful hunters averaged 2.7 deer. Cordova hunters primarily hunted Hawkins Island, and most of the harvest occurred in October and November. A sample of 67 deer jaws was obtained from Cordova hunters and provided the following information on age composition of the harvest: fawns (13.4%, $N = 9$); 1-year-olds (40.3%, $N = 27$); 2-year-olds (11.9%, $N = 8$); 3-year-olds (16.4%, $N = 11$); 4-year-olds (7.5%, $N = 5$); and 5-year-olds (10.5%, $N = 7$).

Management Summary and Recommendations

The Cordova hunter interview data should be considered as a crude indicator of harvest trend. The taking of approximately 700 deer is considered a modest harvest. Snow depth did not move the deer onto timbered beach fringe areas during the season. Thus, hunting was poor and only the more avid hunters went afield. The 1982 harvest was approximately 25% smaller than the previous year.

The increase in bag limit, from 4 deer to 5 deer per year, was the 1st change in bag limits since 1964. The increased bag limit had little effect on the total kill. Only 4 of 100 Cordova hunters interviewed took 5 deer.

The 1982 harvest by Cordova hunters was typical, with the exception of the small harvest occurring in December. Usually, one-third of the harvest occurs in December; however, lack of snow prevented easy access to deer.

A field trip in late February indicated Prince William Sound deer herds to be in excellent physical condition. Most of the Vaccinium had been lightly browsed with the exception of those on Montague Island which showed moderately heavy use.

No regulatory changes were recommended.

PREPARED BY:

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SUBMITTED BY:

Leland P. Glenn
Survey-Inventory Coordinator

Table 1. Deer harvest information obtained from a sample of Cordova hunters, 1982.

Item	Interview sample	Est. no.	%
Hunters	100	800	100.0
Hunters afield	66	528	66.0
Unsuccessful	34	272	51.5
Successful	32	256	48.5
Deer harvested	86	688	
Males harvested	53	424	61.6
Deer/hunters afield	1.3	1.3	
Deer/successful hunter	2.7	2.7	
Days afield	375	3,000	
Harvested: 1 deer	7	56	21.9
2 deer	11	88	34.4
3 deer	3	24	9.4
4 deer	7	56	21.9
5 deer	4	32	12.5
Chronology: August	3	24	3.5
September	12	96	14.0
October	27	216	31.4
November	37	296	43.0
December	7	56	8.1
Location: Montague	26	208	30.2
Hinchinbrook	23	184	26.7
Hawkins	33	264	38.4
Mainland	0	0	0.0
Other islands	4	32	4.7

^a Approximately 800 Cordova hunters obtained deer harvest tickets in 1982. Thus, the sample was expanded by 8 to give estimated harvest figures.

DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 8

GEOGRAPHICAL DESCRIPTION: Kodiak and Adjacent Islands

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

The deer population was stable to increasing on Kodiak and adjacent islands. A moderate decline occurred on Shuyak and Afognak Islands.

Deer numbers in the extreme southern and southwestern part of Kodiak Island, including the Olga Bay, Deadman Bay, Halibut Bay, and Sturgeon River areas, continued to increase. Deer were relatively rare in these areas until the mid-1970's.

Population Composition

No data were available.

Mortality

A record harvest estimated at over 6,000 deer was taken in the 1982-83 hunting season. Harvest data were obtained from hunter questionnaires and personal interviews with hunters. Questionnaires were distributed during the season at local transportation services and through Department offices to sample hunters who resided outside Unit 8. Questionnaires were also mailed to 33% of the Unit 8 residents who purchased hunting licenses locally. Results of the 2 hunter questionnaire surveys are shown in Table 1.

A minimum of 2.3 deer were killed per hunter afield. High selectivity for bucks was indicated by 69% of the local hunters and 76% of the nonlocal hunters.

Both surveys indicated that 30% of the harvest was taken from Shuyak, Afognak, and Raspberry Island (Table 2). The western drainages of Kodiak Island accounted for about 40% of the kill. The survey also indicated that 9% of the local hunters took 6 deer each and 9% took 7 deer each.

Natural mortality during the winter of 1982-83 was apparently low. Snow accumulations were light in coastal wintering areas,

and deer appeared to be in excellent condition throughout the winter.

Management Summary and Recommendations

Raising the bag limit from 5 to 7 deer in 1982 stimulated additional hunting pressure by mainland Alaskan hunters. The increased hunting effort and a continued overall increase in the deer population resulted in a record harvest conservatively estimated at over 6,000 deer. Hunter questionnaires and interviews provided information on the distribution and sex composition of the kill, but these methods did not provide statistically valid data on hunter numbers or actual harvest.

Some Kodiak residents complained about increased hunting pressure, citing concerns about possible wanton waste and overcrowded hunting conditions. Local businesses catering to hunters continued to expand, welcoming the economic stimulus.

The continued growth of deer hunting in Unit 8 and its increased importance to the local economy require that better methods of documenting hunting pressure and harvest be developed. Increased competition between local and nonlocal hunters will inevitably result in public pressures for more regulations on deer hunting. The deer population will continue to be regulated chiefly by winter severity, but the public's perception of trends in the deer population are often attributed to impacts of hunting. A mandatory harvest report or a statistically valid hunter questionnaire method should be developed to provide reliable harvest data.

Although the deer population continued to expand in most of Unit 8, a decline occurred on Afognak and Shuyak Islands. It is recommended that a uniform bag limit not to exceed 5 deer should be set for Afognak, Shuyak, and Raspberry Islands and the northwestern portion of Kodiak Island. The bag limit on the remainder of Kodiak Island should remain 7 deer.

PREPARED BY:

SUBMITTED BY:

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Leland P. Glenn
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Table 1. Estimated Unit 8 deer harvest from 2 hunter questionnaire methods, 1982-83.

Item	Mail question. ^a		Interview/voluntary question. ^b	
	No.	%	No.	%
Hunters afield	1,648	--	383	--
Female kill	944	24	275	31
Male kill	3,056	76	612	69
Total kill	4,000	100	887	100
Deer/hunter afield	2.4	--	2.3	--

^a Results from the extrapolation of 148 questionnaires representing a 7% sample of Kodiak hunting license buyers.

^b Results from 275 questionnaires and 25 interviews; includes some questionnaires which reported for more than 1 hunter.

Table 2. Distribution of Unit 8 deer harvest, 1982-83.

Subunit/ area	Local mail question.		Nonlocal question./ interview	
	No. deer	%	No. deer	%
8-1	0	--	14	2
8-2	625	16	109	12
8-3	333	8	118	13
8-4	253	6	26	3
8-5	66	2	7	1
8-6	678	17	103	12
8-7	186	5	120	13
8-8	186	5	7	1
8-9	40	1	0	--
8-10	133	3	3	--
8-11	265	7	10	1
8-12	359	9	115	13
8-13	199	5	34	4
8-14	677	17	209	24
8-15	0	--	4	--
8-Unk.	0	--	8	1

BISON

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 11

GEOGRAPHICAL DESCRIPTION: Chitina River

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulation No. 23.

Population Status and Trend

The Chitina bison herd, estimated at 55 animals, did not show an appreciable change in numbers from last year. This apparent herd stabilization is in contrast to an increase seen from 1980 to 1981 (42 to 56).

Population Composition

Forty-three bison, 38 adults and 5 calves, were counted during an aerial survey conducted in August. A 2nd count by the National Park Service yielded 55 bison. No composition data were obtained during that survey.

Mortality

Two bison, an adult male and female, were killed during the hunting season. Twelve permits were issued, but only 3 permittees participated in the hunt. In addition, 2 adult bulls were poached.

Management Summary and Recommendations

Twelve permits should be issued for the next regulatory year. The number of permits should be increased if the herd size increases. In 1982, only 3 of 12 permittees participated in the hunt. Apparently, permittees were discouraged from hunting when they learned of the hunt conditions, including restrictive National Park access regulations.

The current population exceeds the population guideline of 30 bison established in the Chitina Bison Management Plan. However, this guideline was established knowing horses were also being grazed within the Chitina bison's home range. Heavy grazing was noted during a June 1982 range inspection. During the past 2 years, approximately 30 of the 40 horses grazed in this area have been removed. Over the short term, some recovery of the range

conditions may occur. If range conditions do improve, the Chitina Bison Management Plan should be reexamined to accommodate an increase in herd size.

PREPARED BY:

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SUBMITTED BY:

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BISON

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 11

GEOGRAPHICAL DESCRIPTION: Copper River

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulation No. 23.

Population Status and Trend

Sixty-three bison were counted in 1982, down from last year's count of 75. Surveys conducted during the last 3 years indicated a declining population trend. Composition data from 1973 through 1982 are summarized in Table 1.

Population Composition

Fifty-two adults and 11 calves were counted on 23-24 June 1982. An earlier survey on 22 February found 53 adults and no calves (age 9 months).

Mortality

The Copper River bison hunt was canceled by emergency order in 1982, after surveys indicated the bison population were below the minimum number (60) recommended in the Copper River Bison Management Plan. There were no reports or evidence of bison being taken illegally or of predation on bison by wolves or bears.

Management Summary and Recommendations

The reason for the recent decline in the recruitment of bison is unknown. Survey data collected during the spring of 1981 and 1982 indicated a slight decline in the number of neonatal calves compared to prior years. Additionally, there appeared to be no overwinter survival from the 1981 calf cohort. While wolves and grizzly bears are numerous in the area, no observations of predation have been made. In addition, there was no evidence to indicate that bison had dispersed out of the count area or that hunting had been a significant factor influencing the declining population trend.

The Copper River bison herd should be closely monitored, especially for calf production and survival. There should be no rescheduling of a hunt until the number of overwintering adult bison increases to 60.

PREPARED BY:

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SUBMITTED BY:

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Table 1. The number of bison counted in the Copper River herd during summer surveys and the number killed during fall hunting seasons, 1973-1982.

Year	No. counted		No. killed
	Calves	Total bison	
1973	18	97	16
1974	14	111	22
1975	13	89	8
1976	14	78	9
1977	18	90	6
1978	17	94	15
1979	23	97	15
1980	15	86	15
1981	10	75	8
1982	11	63	0

BISON

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 19C and 19D

GEOGRAPHICAL DESCRIPTION: South Fork Kuskokwim River

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

The Farewell bison herd is thought to number 157 animals. On 19 May 1982, BLM and Department personnel counted 97 adults and 15 calves on the South Fork of the Kuskokwim. Of these, 62 adults and 8 calves were in a single group on a river bar near Egypt Mountain. On the same day, an additional 29 adults and 16 calves were counted in the Bear Creek burn. The 157 animals (126 adults and 31 calves) are the greatest number of bison ever counted in the Farewell group. On 20 May, 29 bison (26 adults and 3 calves) were seen at the mouth of Post River, an area not surveyed on 19 May. Because this area is not far from where bison were observed during the previous day's survey, these bison were probably counted along with others in the South Fork group on 19 May. Nevertheless, there is a possibility that these animals were not included in the survey, in which case the Farewell herd would number 186 bison.

The Farewell bison herd originated from transplants of animals from the Delta herd in 1965 and 1968. The herd became established along the South Fork of the Kuskokwim and has grown at an average annual rate of 21% (range 13-26%). In 1977, a large area adjacent to the South Fork burned (Bear Creek burn). In the southeastern portion of the burned area, establishment of grass and sedge communities has greatly increased the amount of available bison habitat. This may be a major factor in contributing to population increases observed in recent years. Observations indicate that this area is used extensively by bison, particularly during fall and winter.

Population Composition

The May survey revealed a population of 126 adults and 31 calves (20% calves in the herd). A posthunt population for winter 1982-83 was 116 adults and 31 calves.

Mortality

One adult bison that had been killed by wolves on the South Fork was found in December 1982. At least 2 wolf packs are known to

use the area occupied by the herd. An average of 1-2 bison have been reported killed by wolves during each of the past few winters.

Hunting is the principal mortality factor affecting the Farewell herd. Seven hundred eighty-one hunters applied for the 20 permits, making the odds 1 in 39 of obtaining a permit. Residency of the 20 permittees was as follows: Anchorage, 8; Palmer, 3; Fairbanks, 3; Wasilla, 2; Eagle River, 1; Kenai, 1; Big Lake, 1; and McGrath, 1. Of the 20 permit holders, 16 hunted. Among the permittees who did not hunt, 2 were from Anchorage, and 1 each from Palmer and Fairbanks.

Sixteen hunters took 8 bulls and 2 cows for a hunter success of 63%. Unlike the 1981 season when 9 of the 11 bison taken came from the Bear Creek burn, only 3 of the bulls were taken on the burn during 1982. The residency of the successful hunters was as follows: Anchorage, 4; Palmer, 2; Fairbanks, 1; Wasilla, 1; Eagle River, 1; and McGrath, 1. Successful hunters averaged 3.3 days hunting while most unsuccessful hunters only hunted 1-2 days.

Management Summary and Recommendations

The Farewell bison herd continues to increase, and the Bear Creek burn is now being used extensively. If the burned area can be maintained in an early seral stage, the herd should be allowed to expand to 250-350 bison. There is considerable interest in hunting bison, and a larger population will provide for greater hunting opportunity.

Unfortunately, hunter access is limited to gravel bars along the South Fork of the Kuskokwim. Much of the burned area is difficult to traverse because of downed timber. Many applicants and permittees are unaware of the difficulty of packing out a bison until they see the area. This year at least 4 hunters decided it would be too difficult and returned home after hunting only 1-2 days. There were several bison in the burned area during the 1st 2 hunt periods, but by the 3rd 10-day hunt most bison had left the burn.

Before significantly more bison can be taken without considerable waste of meat, access within the burn will have to be developed. Small strips could be improved on the glacial moraines enabling hunters to more easily pack their animals. At the present rate of growth (21% annually), the herd will reach nearly 300 animals in 4 years. Most of the Bear Creek burn is under BLM or State management which will require cooperation in access development. Because the burn is used by moose extensively during the rut, access improvements will have to be carefully planned and managed to prevent excessive moose harvests.

PREPARED BY:

SUBMITTED BY:

Robert E. Pegau
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Jerry D. McGowan
Survey-Inventory Coordinator

BISON

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 20A and 20D

GEOGRAPHICAL DESCRIPTION: Delta Junction Area

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

The 1983 precalving population of the Delta bison herd is estimated to be 355. Precalving population estimates for 1982 and 1981 were 325 and 310, respectively. The herd has grown beyond the precalving level of 275 suggested in the Delta Bison Management Plan.

Population Composition

A ground composition count was conducted on 20 October 1982. Bison groups containing radio-collared cow bison were located in advance of the count to decrease search time. Over 400 bison were observed, 368 of which were classified. Composition of the herd was 18% males, 36% females, 18% yearlings, and 28% calves. Known mortality between 1 July 1982 and the date of the count was 14 bulls, 20 cows, and 2 yearlings.

Yearling data may be somewhat biased because of the long period during which calves are born. Newborn calves have been observed as early as 22 April and as late as early October. Bison born unusually early or late in the season are difficult to accurately classify as 2-year-olds or adults during subsequent years' surveys. However, the error in misclassification is probably small because early and late parturition constitutes a small fraction of total births.

Mortality

Between March 1982 and February 1983, 80 bison were known to have died; 67 of these were legally taken by sport hunters (Table 1). Seventy-five permittees were selected for the fall 1982 hunt from among the 8,105 applicants. Forty permits were for bull bison and 35 for cows. Seventy-three hunters participated in the hunt, and 67 were successful. One hunter accepted a bison that had been confiscated from a hunting party that shot an extra animal. Total known mortality is summarized in Table 1.

Range and Habitat

Bison summer range improvement, started in summer 1981, was continued. The U.S. Army provided 30,000 lb of fertilizer and the Department of Fish and Game contracted services of an aerial fertilizer applicator. Fertilizer was applied at the rate of 42 lb of nitrogen, 51 lb of potassium, and 15 lb of phosphorus per acre. On a grassland west of the Delta River, 120 acres were fertilized. This is an area traditionally used by bison for calving.

The Soil Conservation Service and the U.S. Army cooperated with the Department in follow-up studies on the fertilized area. Preliminary results suggest that fertilization increased forage production, and that the forage was heavily utilized by bison.

In 1981, a 20-acre plot was treated with a herbicide to kill woody vegetation. Although pioneer grasses have become established, the treated area has received very little use by bison. The area may become more attractive to bison as more of the standing dead trees are downed and access to the forage is improved.

The purposes of habitat improvement are to increase the amount of bison summer range and to delay the fall migration. To date, improvements on the summer range have not delayed fall migration. In 1982, bison left the calving area 10 days earlier than in 1981.

The bison summer range is very heavily grazed, and estimates suggest that 80-90% of the grassland forage is being utilized by bison. A prescribed fire is planned for early summer 1983, and this burn should produce additional forage by eliminating the overstory and stimulating growth of grasses.

One hundred fifty acres of Weal barley, Manchar brome, and Garrison creeping foxtail were planted on the Delta Junction Bison Range in July 1982. Twenty acres of test plots, including mixtures of barley and field peas, barley and clover, and wheat and other grasses were planted. The barley was planted as a cover crop to protect the perennial grasses. The plots will be refertilized in spring 1983 to develop a hay crop. This will leave the 2nd cutting high in protein for the bison when they arrive in August.

Management Summary and Recommendations

Habitat improvement on the summer range should be continued. The range appears inadequate to carry a herd of the existing size with a comfortable margin for years of poor forage production.

Range improvement on the Delta Junction Bison Range should also be continued to provide alternate forage for bison during fall and winter. Planned prescribed burning should be used on the range to stimulate development of grasses.

The herd should be reduced to the precalving population of 275 animals. A total of 75 bison including 50 cows and 25 bulls should be harvested in 1983. This will reduce the number of cows in the herd to near the precalving goal of 115 cows.

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Table 1. Delta bison herd known mortality, March 1982 through February 1983.

Mortality source	Bull	Cow	Yearling	Calf	Total
Hunting	30	28	8	1	67
Illegal (hunting related)	1	2	1	0	4
Alleged defense of life or property ^a	0	1	0	0	1
Poaching	0	1	0	0	1
Road kills	3	2	0	0	5
Collected ^b	0	1	0	1	2
Totals	34	35	9	2	80

^a Farmer shot 1 cow on 12 September 1982.

^b One cow died during collaring operation; 1 seriously diseased calf was collected for scientific study.

SMALL GAME
SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 1D

GEOGRAPHICAL DESCRIPTION: Haines-Skagway Area

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

Little information was available on the trends in grouse, hare, and ptarmigan populations. Interviews with local trappers and hunters indicated that snowshoe hare numbers began increasing noticeably 3 years ago and may have now reached a population peak. In the course of conducting moose surveys, biologists noticed high numbers of hares in riparian habitats, especially associated with stands of cottonwood. Grouse and ptarmigan numbers were felt to be similar to recent years.

Population Composition

No data were available.

Mortality

The only information available for the reporting period was that hunting effort for blue grouse was high in the areas near Chilkoot Lake and to the north of the Haines Highway. No quantification of harvest was available.

Management Summary and Recommendations

No changes in seasons or bag limits were recommended.

PREPARED BY:

SUBMITTED BY:

W. Bruce Dinneford
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SMALL GAME

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 5

GEOGRAPHICAL DESCRIPTION: Yakutat and Malaspina Forelands, Gulf of Alaska

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

Information on the numbers and distribution of grouse, hare, and ptarmigan in Unit 5 is scarce. Department field staff and local hunters did notice an apparent increase in blue grouse numbers in the Dry Bay area in summer 1983. This is in the area where 1 of 2 previously documented sightings was made in the Unit, thus exploitation of good habitat may be occurring.

Hare numbers were apparently reduced, compared to summer 1981 when showshoes were commonly observed. However, this population had probably not "crashed," as lynx numbers in the reported harvest appeared higher than in the previous 2 years.

Population Composition

No data were available.

Management Summary and Recommendations

No changes in seasons or bag limits were recommended.

PREPARED BY:

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SMALL GAME
SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 23

GEOGRAPHICAL DESCRIPTION: Kotzebue Sound

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

Ptarmigan populations were low throughout the Unit during the reporting period. Only occasional small flocks of ptarmigan were observed during moose, caribou, and wolf surveys.

Snowshoe hare populations continued to decline to low levels in most areas of the Unit. Low-to-moderate snowshoe hare densities still persist along drainages of the northern Seward Peninsula.

Arctic hare populations remained moderately high in the Seward Peninsula drainages of Unit 23. Large concentrations were observed along the Goodhope River in March. Arctic hares were also numerous throughout the willow-covered tailing piles near Candle, and more arctic hares were reported on the Baldwin Peninsula near Kotzebue than in past years.

Mortality

No estimate of the amount of small game taken by local residents for human food and dog food is available. Hunting probably has little impact on small game populations in Unit 23.

Management Summary and Recommendations

No changes in season or bag limits were recommended.

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SUBMITTED BY:

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David A. Anderson
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SMALL GAME

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 26

GEOGRAPHICAL DESCRIPTION: Arctic Slope

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

Small game species in Unit 26 are primarily limited to willow ptarmigan. These birds inhabit willow bottoms on the Colville River and its tributaries, primarily those flowing from the north. Observations on abundance were obtained by informal telephone interviews with Nolan Soloman (Kaktovik, 26 April 1983); Bob Savenko (Anaktuvuk Pass, 26 April 1983), and Amos Morry (Anaktuvuk Pass; 27 April 1983). I also discussed ptarmigan abundance with Jay Smith at Umiat. The consensus in Umiat and Anaktuvuk Pass was that there were fewer ptarmigan in spring 1983 than in the previous year. It is not clear whether this was also the case at Kaktovik.

Mortality

Only residents of Anaktuvuk Pass and Umiat live near ptarmigan habitat. However, people from Kaktovik in Subunit 26C do travel into mountain valleys to the south to hunt ptarmigan. At the time I talked with Nolan Solomon, some birds were being shot within 5 mi of Kaktovik, but most hunters had not yet returned from their spring hunting trips.

Management Summary and Recommendations

Some ptarmigan hunting occurred near Kaktovik this spring, but hunting mortality is probably insignificant Unitwide. No changes in seasons or bag limits were recommended.

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UPLAND GAME ABUNDANCE
SURVEY-INVENTORY PROGRESS REPORT

STATEWIDE

PERIOD COVERED: 1 July 1982-30 June 1983

Techniques

The standard small game abundance questionnaire was mailed in early January 1983 to 350 people throughout the State, and by the end of March 1983, 190 replies had been received. As in the past, the bulk of replies came from the Interior and Gulf regions. Replies were tabulated and analyzed as in previous years (see Game Bird Report, March 1966, Pages 3-4 in Fed. Aid in Wildl. Rest. Rep. Vol. VII, Proj. W-6-R-6, Work Plan I and Proj. W-13-R-1, Work Plan B). A summary of responses was mailed to cooperators. Replies to the questionnaire are summarized in Table 1.

Findings

Replies to the 1982-83 questionnaire indicated that grouse populations were low throughout most of the State and that populations were declining in most areas. In the Gulf region, however, spruce grouse populations were reported to have remained at moderate levels. Blue grouse, found only in Southeast, were reported to be moderately abundant with little decline from 1981-82 numbers.

Numbers of ptarmigan (all species) were reported to be moderately low to low in most areas. Ptarmigan populations remained at much the same level in the Southeast, Gulf, and Kodiak areas, but declined in other regions.

Hunters noticed that ptarmigan were quite scarce in the Fairbanks vicinity, especially during fall and winter. Ptarmigan counts conducted at Eagle Summit in spring suggested breeding rock ptarmigan were also scarce in that area.

On a Statewide basis, hare populations were reported to be moderately low and unchanged from 1981-82 levels. However, in the Gulf region hares were moderately abundant and more numerous than reported in 1981-82.

Cooperators from the Interior, Alaska Peninsula, western Alaska, and Brooks Range reported moderately low and declining hare populations. Kodiak Island reports indicated a moderately low and increasing population.

Management Summary and Conclusions

The standard small game abundance questionnaire has repeatedly indicated that grouse, ptarmigan, and hare populations fluctuate considerably throughout the State. Hunting pressure has little effect on fluctuations over broad geographical regions of Alaska. The management goals of providing the maximum opportunity to participate in small game hunting are being met under the current long seasons and liberal bag limits. Therefore, no changes in the current approach to small game management were recommended.

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SUBMITTED BY:

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Survey-Inventory Coordinator

Table 1. Summary of replies to questionnaire on grouse, ptarmigan, and hare populations, 1982-83.

Area and Species	Present Abundance ^a				Comparison with 1981 ^a			
	High	Mod.	Low	Index ^b	More	Same	Fewer	Index ^b
Brooks Range-7 replies								
Grouse (general)	0	0	3	1.0	0	2	1	3.7
Spruce Grouse	0	1	1	3.0	0	1	1	3.0
Ptarmigan (general)	0	1	4	1.8	0	3	2	3.4
Rock Ptarmigan	0	0	1	1.0	0	0	1	1.0
Willow Ptarmigan	0	2	1	3.7	0	1	2	2.3
Snowshoe Hare	0	2	1	3.7	0	0	3	1.0
Western-21 replies								
Grouse (general)	1	3	9	2.5	0	6	5	3.2
Spruce Grouse	0	2	6	1.3	0	4	3	3.3
Ptarmigan (general)	2	6	10	3.2	2	5	10	3.1
Willow Ptarmigan	1	5	4	3.8	0	5	4	2.7
Snowshoe Hare	4	3	9	3.8	4	4	10	3.7
Alaska Peninsula-20 replies								
Ptarmigan (general)	1	2	10	2.2	2	3	7	3.3
Willow Ptarmigan	0	3	8	2.1	1	5	5	3.5
Snowshoe Hare	2	4	10	3.0	3	5	7	3.9
Kodiak-7 replies								
Ptarmigan (general)	0	1	4	2.0	1	4	1	5.0
Snowshoe Hare	0	4	2	3.7	3	3	0	7.0
Southeastern-16 replies								
Grouse (general)	0	6	6	3.0	0	9	3	4.0
Spruce Grouse	0	1	8	1.4	0	5	4	3.2
Blue Grouse	1	8	3	4.3	1	7	4	4.0
Ptarmigan (general)	0	3	6	2.3	1	4	2	4.4
Willow Ptarmigan	1	1	2	4.0	0	3	1	4.0
Snowshoe Hare	0	0	4	1.0	0	0	4	1.0
Gulf-46 replies								
Grouse (general)	0	14	8	3.5	3	8	8	3.9
Ruffed Grouse	0	2	4	2.3	0	4	2	3.7
Spruce Grouse	2	22	8	4.3	7	15	9	4.7
Sharp-tailed Grouse	0	0	3	1.0	0	5	2	2.3
Ptarmigan (general)	1	13	10	3.5	5	11	4	5.2
Rock Ptarmigan	0	5	7	2.7	1	7	3	4.3
Willow Ptarmigan	1	12	13	3.2	7	13	6	3.0
White-tailed								
Ptarmigan	0	2	3	2.6	0	5	1	4.3
Snowshoe Hare	11	22	8	5.2	23	13	3	7.1

Table 1. Continued.

Area and Species	Present Abundance ^a				Comparison with 1981 ^a			
	High	Mod.	Low	Index ^b	More	Same	Fewer	Index ^b
Interior-70 replies								
Grouse (general)	0	14	47	1.9	2	19	40	2.5
Ruffed Grouse	0	9	38	2.2	0	16	27	2.5
Spruce Grouse	1	17	37	2.4	2	19	31	2.5
Sharp-tailed Grouse	0	4	29	1.5	1	8	22	2.3
Ptarmigan (general)	0	8	45	1.6	0	19	31	2.5
Rock Ptarmigan	0	4	26	1.5	0	12	18	2.6
Willow Ptarmigan	0	3	31	1.4	0	14	19	2.7
White-tailed Ptarmigan	0	1	12	1.3	0	5	8	2.5
Showshoe Hare	0	28	33	2.8	10	17	34	3.4
Statewide-187								
Grouse (general)	1	37	73	3.3	5	44	57	3.0
Ruffed grouse	0	12	52	1.8	0	22	38	2.5
Spruce Grouse	3	43	60	2.8	9	39	48	3.4
Sharp-tailed Grouse	0	4	32	1.4	1	9	24	2.3
Ptarmigan (general)	3	32	79	2.3	9	46	50	3.4
Rock Ptarmigan	2	11	41	2.1	1	26	25	3.2
Willow Ptarmigan	4	26	61	2.5	8	43	37	3.7
White-tailed Ptarmigan	2	4	16	2.5	1	13	9	3.6
Snowshoe Hare	17	63	67	3.6	43	42	61	4.5

^a Based on the number of answers to each question; not all cooperators answered questions.

^b Index values range from 1.0 through 9.0 and were derived by giving an arbitrary value of 9.0, 5.0, and 1.0 to each "High" (More), "Moderate" (Same), and "Low" (Fewer) answer, respectively. The total value of the answers to each question for each species was divided by the number of answers to that question. An index of 9.0 indicates High (More), 5.0 indicates Moderate (Same), and 1.0 indicates Low (Fewer).

ELK

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 8

GEOGRAPHICAL DESCRIPTION: Kodiak and Adjacent Islands

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

The elk herds on Afognak and Raspberry Islands range from stable to increasing in size.

Population Composition

Elk composition surveys were flown in August 1982. There were 963 elk classified in 8.3 hours of aerial surveys. A calf:cow ratio of 36:100 and a bull:cow ratio of 12:100 were recorded.

Composition data from Raspberry Island allowed classifications of 149 elk (11 bulls, 103 cows, and 35 calves). This count was the highest recorded on Raspberry Island since 1965.

Only 116 elk (3 bulls, 81 cows, and 32 calves) were classified on southwest Afognak. A large segment of this herd was apparently missed based on reports received during the hunting season.

On the remainder of Afognak, total of 698 elk (67 bulls, 466 cows, and 165 calves) were classified. Elk herds were observed in the Tonki Cape Peninsula, Izhut Bay, Duck Mountain, Paramanof Bay, Malina Bay, and Kazakof Bay areas.

Mortality

Hunters killed 151 elk from Afognak and Raspberry Islands in 1982. Composition of the harvest was 104 males (69%) and 47 females (31%). Hunter success was 21% for the 705 permittees who reported hunting.

Ninety-five permits were issued for Drawing Hunt 702 on Raspberry Island. Twenty permittees hunted and took 11 elk, including 10 males and 1 female. Hunter success was 55%.

On southwest Afognak Island (Registration Hunt 751), 31 elk were killed, including 21 males (68%) and 10 females (32%). Ninety-eight permittees reported hunting, and 32% were successful. This

hunt was closed by emergency order 5 days after the season opened when field checks of hunting camps indicated that the quota (35 elk) would be taken. Excellent hunting weather and easy access to the herd on opening day contributed to the rapid harvest.

On the remainder of Afognak Island (Registration Hunt 750), hunters killed 109 elk, including 73 males (67%) and 36 females (33%). Hunting success was 19% of the 587 permittees who reported hunting. Distribution of the harvest was as follows: Waterfall Lake/Bay (9), Paramanof/Malina Bays (36), Tonki Bay/Seal Bay/E. Izhut Bay (31), Discoverer Bay/Duck Mtn./W. Izhut Bay (25), and unknown locations (8).

No natural mortalities of elk were observed or reported during the winter of 1981-82.

Management Summary and Recommendations

The kill of 151 elk was higher than the previous record kill of 142 in 1965. A record 705 permittees reported hunting in 1982, a 14% increase from the 619 reported hunting in 1981. Hunters continued to be selective for trophies since 69% of the elk killed were bulls.

The Raspberry Island herd continued to increase and probably numbered over 150 animals before the hunt. Although the number of permits were increased from 65 in 1981 to 95 in 1982, the number of permittees who actually hunted declined from 25 to 20, respectively. The harvest remained low (11) and comparable to the 1981 harvest (9). Because this herd occupies a relatively small range, it is recommended that it not be allowed to exceed a pre-season size of 200 animals. Since the Board of Game considers elk regulations only in alternate years, flexibility in determining the numbers of permits should be allowed to provide a more responsive annual harvest strategy.

For the 2nd successive year, the southwest Afognak elk season was closed early when the harvest quota was about to be reached. Several hunters expressed dissatisfaction with the hunt, citing poor ethical standards by some hunters who shot into elk herds and high hunter densities as factors most displeasing to them. A permit drawing hunt or a later season opening date would disperse hunting effort more effectively. These alternatives should be considered for future hunts.

The harvest from the remainder of Afognak increased 58%, from 69 elk in 1981 to 109 elk in 1982. Hunting pressure in this area increased 40%, from 420 hunters in 1981 to 587 hunters in 1982. Considerably more hunting effort occurred in the Malina/Paramanof Bay area. Hunting along the road system connecting Kazakof, Discoverer, and Izhut Bays also increased noticeably.

The elk population in the northwestern part of Afognak Island from Malina Bay to Waterfall Lake probably number in excess of 500 animals. The Duck Mountain, Tonki Cape Peninsula, and Izhut/Seal Bay herds appeared to be stable although composition counts were not complete for these herds.

If hunting pressure continues to increase in 1983 at a rate comparable to 1982, more intensive composition surveys should be conducted for herds which are accessible to hunters from both the coast and the road systems. Continued expansion of logging roads will further increase the vulnerability of several herds to hunting. The potential, therefore, exists for overharvesting individual herds.

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MUSK-OXEN
SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 18

GEOGRAPHICAL DESCRIPTION: Yukon-Kuskokwim Delta

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

Nunivak Island:

The Nunivak Island musk-ox population was estimated at 600 animals following calving in spring 1983. A census in late February 1983 enumerated 483 animals, not including an estimated 30 animals that were missed and 33 animals that were harvested prior to the census. Thus, the prehunt, precalving population was approximately 546 animals. A spring harvest of 55 animals reduced the precalving population to an estimated 491 musk-oxen (Table 1).

Nelson Island:

The prehunt, precalving population was determined by aerial surveys to be approximately 230 animals. Spring hunting reduced this number to 205, and subsequent calving brought the herd to about 250. We classified 127 animals by sex and age during ground censuses 7-8 March 1983. The posthunt population (excluding calves) was then prorated to those results (Table 2).

Emigration of musk-oxen from Nelson Island to mainland areas of Unit 18 continues. Although the number of animals inhabiting the mainland is unknown, 1 solitary adult bull was observed near Chevak in December 1982, and 9 musk-oxen were observed west of Tuntutuliak in early February. The area between the Yukon and Kuskokwim Rivers may have been occupied by 15-20 musk-oxen following breakup in 1983.

Population Composition

Nunivak Island:

No fall aerial surveys were conducted during the reporting period.

The annual ground census was conducted on 23-27 February 1983. Game Division and Fish and Wildlife Service staff classified 483 animals in 40 herds, ranging in size from 1 to 48 (Table 3).

Most animals were located in the southcentral area of the island this year, probably reflecting lower than normal snow levels in the island's interior. Concentrations of animals were also observed south of Mount Roberts and southwest of Twin Mountains.

Weather during the census varied from blowing snow and partial whiteout to clear with excellent visibility. Discussions with hunters and Mekoryuk residents indicated that 30-40 animals were missed during ground counts. Additionally, 33 musk-oxen were harvested by hunters prior to the census; thus, the prehunt population was approximately 550 animals. Census results since 1976 are given in Table 4.

The posthunt population exhibited a breeding bull (4+ age class) to breeding cow (2, 3, and 4+ age class) ratio of 45:100. The postcalving population was therefore expected to be about 600, assuming normal calf recruitment.

Nelson Island:

An aerial survey on 7 March, followed by ground censuses on 7 and 9 March, accounted for about 210 musk-oxen. Twenty animals were harvested prior to the survey. Fifteen herds, ranging in size from 4 to 44 animals (Table 5), were observed during the 2-hour survey. All animals were sited in 4 locations: Chakchak Creek, Erchakrtuk Mountain, Killinupak Mountain, and Cape Vancouver.

A breeding bull to cow ratio of 74:100 was calculated following the spring hunting season. The postcalving population was therefore expected to be about 255 animals, assuming normal calf recruitment.

An interesting finding during the March ground census was the apparent low number of cows in the 2-year age class. Four-plus and 3-year age classes also showed a skewed sex ratio favoring bulls, though to a lesser extent than in the 2-year cohort. Intrauterine examination of 16 pregnant cows harvested in spring 1981 showed a similar pattern; 10 males, 5 females, and 1 fetus of undetermined sex were found (Dinneford, unpubl. data). However, this result is easily attributed to sampling error.

Mortality

Nunivak Island:

Twenty-five hunters (19 residents and 6 nonresidents) applied for the 5 bull musk-ox permits available for fall 1982 (Hunt No. 1001). Four bulls were harvested, 2 by resident and 2 by non-resident permittees; one nonresident permittee did not hunt. No applications were received for the 5 nonresident cow permits available in the fall (Hunt No. 1002), and only 4 of 10 available fall cow registration permits were purchased by resident hunters (Hunt No. 1060). All 4 permittees successfully harvested cows.

Bull musk-ox hunting continued to be popular in spring 1983; 84 applications were received for Hunt No. 1003, 16 of which were from nonresidents. Twenty-six permits were available because 1 fall bull permit was not issued. Twenty bulls in the 4+ age class and 2, 3-year-old bulls were harvested during the spring season (Table 6). The 3-year-old bulls were shot by hunters holding cow permits. Two permittees did not purchase tags or hunt, and 1 permittee who had purchased a tag did not hunt. Three other applicants never responded to initial letters notifying them that they were selected. Five nonresident and 17 resident hunters killed bulls (Table 7). Many more hunters canceled hunts this season than in past years; the last permittee contacted regarding hunting was the 61st drawn.

Two applications were received for the spring nonresident cow season (Hunt No. 1004). Both applicants were Alaska residents who were consequently ineligible.

Registration permits were issued on 31 January at Fish and Game offices in Anchorage, Bethel, and Fairbanks, and at the office of the city of Mekoryuk. Six permits were available in Fairbanks, 6 in Anchorage, 12 in Bethel, and 12 in Mekoryuk; 36 permits were available because 6 fall permits were not issued. Interest in musk-ox hunting was low in Anchorage and Fairbanks, with only 4 permits issued at each of those locations. In Mekoryuk, 12 applicants were on hand for the 12 permits. Interest in Bethel was high, where 26 applicants were on hand for 12 permits. The 4 permits not issued at Anchorage and Fairbanks were made available to the 1st Bethel alternates.

Thirty-three cows (20 in the 4+ age class, 12 in the 3-year age class, and 1 of unknown age) were harvested by resident musk-ox hunters. One permittee hunted but failed to take an animal, and 2 permittees mistakenly killed bulls rather than cows. Twenty-two of 33 cows (67%) were pregnant, 8 (24%) were barren, and 3 (9%) were of unknown status. Six fetuses were male, 8 were female, and 8 were of undetermined sex. No twin fetuses were observed.

In March 1982, the Board of Game created a permit system for the taking of musk-oxen stranded on drifting sea ice. Permits were distributed to village council presidents in Mekoryuk, Toksook Bay, and Tununak in March 1983. No animals had been taken on these permits by the time of writing.

Nelson Island:

Permits for the Nelson Island musk-ox season were issued in Nightmute on 11 February 1983. Thirty-seven applicants were present at the Nightmute Community Center at the appointed hour. Residency of applicants was as follows: Nightmute, 13; Tununak, 8; Toksook Bay, 6; Newtok, 5; Hooper Bay, 2; and Anchorage, Bethel, and Kipnuk, 1 each. The 25 available bull permits were

distributed as follows: Nightmute, 7; Newtok and Tununak, 5 each; Toksook Bay, 4; and Anchorage, Bethel, Hooper Bay, and Kipnuk, 1 each.

All permittees were successful in harvesting bull musk-oxen (Table 7). Three of the harvested bulls were 3-year-olds, and the remainder were in the 4+ age class. All 3-year-old bulls were taken by residents of Tununak.

One solitary adult bull, which had apparently immigrated to the Chevak area from Nelson Island, was shot and killed in the middle of December. Nine other adult and subadult animals were observed by Game Division staff west of Tuntutuliak (southeast of Nelson Island). Reports of poaching in this locale were unconfirmed.

Management Summary and Recommendations

Nunivak Island:

The Nunivak Island population is approximately at the level called for in management plans and in the memorandum of understanding between ADF&G and USFWS. Thus, fall 1983/spring 1984 quotas of 30 bull and 45 cow musk-oxen are appropriate harvest goals.

Nonresident cow permits not applied for should be available to resident hunters, as is the case with Tok Management Area sheep.

If transplants from Nunivak Island to the mainland are undertaken in the future, harvest quotas should be reduced to accommodate the removal of animals from the Island.

Nelson Island:

Seasons and bag limits for Nelson Island were changed by the Board of Game in March 1983. Effective in 1984, the Board adopted a 1 February-25 March season and a quota of 15 bulls and 15 cows. In light of the skewed sex ratio of the 2-year-old cohort observed in spring 1983, the 3-year-old cohort should be monitored carefully in spring 1984. If preliminary observations are correct, cows should not be harvested in 1985 to prevent the further reduction of females in this cohort.

The effect on the Nelson Island population of emigration to the mainland and the potential of those emigrants for establishing viable mainland herds should be evaluated. Communication with local residents, range evaluation, and herd surveys should all be included in efforts to better understand, and resolve conflicts associated with, these movements.

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Table 1. Structure of the Nunivak Island spring musk-ox hunt, 1983.

Chronology	Age (yr)						Yrlg	Total
	4+		3		2			
	M	F	M	F	M	F		
Prehunt herd	120	117	45	80	42	52	90	546
Spring harvest	20	21	2	12	0	0	0	55
Posthunt herd	100	96	43	68	42	52	90	491

Table 2. Posthunt structure of Nelson Island musk-ox population, 1983.^a

4+		Age (yr)		2		Yrlg	Total ^b
		3		M	F		
M	F	M	F	M	F		
43	40	34	21	34	4	29	205

^a Composition determined by prorating total population to classes determined from a ground count of 127 animals.

^b Computed by subtracting known harvest from results of prehunt aerial census.

Table 3. Nunivak Island musk-ox herd sizes and locations, 23-27 February 1983.

Herd No.	Herd size	Location
1	8	Central Interior
2	1	Mikisagimiut
3	8	Dooksook River
4	17	" "
5	4	" "
6	4	Kiyakyaliksamiut River
7	3	" "
8	3	" "
9	3	Kikdooli Butte
10	2	VABM 213
11	2	Binujoaksmiut River
12	20	" "
13	29	Ingrijoak Hill
14	2	Bangookthleet Dunes
15	30	Southcentral Interior
16	18	" "
17	12	" "
18	4	" "
19	11	" "
20	8	" "
21	17	" "
22	15	" "
23	17	" "
24	4	" "
25	28	" "
26	22	" "
27	37	" "
28	7	North Oongalambingoi Dune
29	3	" " "
30	48	" " "
31	6	West Cape Corwin
32	3	Twin Mountain
33	14	West Twin Mountain
34	5	Northeast Nanwaksjiak Crater
35	25	Roberts Mountain
36	8	North Roberts Mountain
37	12	" " "
38	8	West Ingrimiut
39	10	West Seemalik Butte
40	5	East Nanwaksjiak Crater
Total	483	

Table 4. Sex and age composition of musk-oxen observed during spring censuses, Nunivak Island, 1976-83.

Year	Age (yr)						Yrlg	Unclass.	Total
	4+		3		2				
	M	F	M	F	M	F			
1976	175	89	51	64	37	27	71	40	554
1977	164	144	41	72	32	44	100	53	650
1978	94	142	34	88	19	19	92	11	499
1979	82	160	12	43	35	38	114	45	529
1980	63	215	33	42	64	54	121	9	601
1981	105	169	63	84	49	70	134	28	702
1982	76	99	44	79	34	38	90	46	506
1983	80	78	30	53	28	35	60	119	483

Table 5. Musk-ox herd sizes and locations during Nelson Island aerial survey, 7 March 1983.

Herd No.	Herd size	Location
1	7	Chakchak Creek
2	5	" "
3	6	" "
4	42	" "
5	9	Erchakrtuk Mountain
6	12	" "
7	20	Killinupak Mountain
8	4	" "
9	6	Toksook River
10	5	Cape Vancouver
11	9	" "
12	44	" "
13	16	" "
14	17	" "
15	8	" "
Total	210	

Table 6. Chronology of Nelson and Nunivak Island musk-ox harvests, spring 1983.

Date	Nunivak Island				Nelson Island	
	Cows		Bulls		Bulls	
	No.	%	No.	%	No.	%
2/1-2/7	2	6	--	--	--	--
2/8-2/14	5	15	--	--	--	--
2/15-2/21	7	21	4	18	12	46
2/22-2/28	8	24	7	32	1	4
3/1-3/7	9	28	8	36	9	35
3/8-3/15	2	6	3	14	4	15
Totals	33	100	22	100	26	100

Table 7. Residency of successful musk-ox hunters on Nunivak and Nelson Islands, spring 1983.

Residency	Nunivak Island		Nelson Island
	Cows	Bulls	Cows
Nonresidents	0	5	NA
Fairbanks	3	0	0
Palmer	0	2	0
Anchorage	3	8	1
Kodiak	0	2	0
Chugiak	0	2	0
Tok	0	2	0
Bethel	12	1	1
Mekoryuk	13	0	0
Tuntutuliak	1	0	0
Quinhagak	1	0	0
Hooper Bay	0	0	1
Kipnuk	0	0	1
Newtok	0	0	5
Toksook Bay	0	0	4
Tununak	0	0	5
Nightmute	0	0	7
Totals	33	22	25

MUSK-OXEN

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 22

GEOGRAPHICAL DESCRIPTION: Seward Peninsula

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Status and Trend

Musk-oxen were once indigenous to the Seward Peninsula, but were probably extirpated by human hunters in the early 1800's (Smith 1983). Beginning in 1968, the Department began an experimental transplant program to reestablish musk-oxen to historical ranges using Nunivak Island as a stocking source (Burris and McKnight 1973). As part of this effort, 36 musk-oxen (6 adults and 30 yearlings) were transplanted to the Seward Peninsula on 22-23 March 1970 and released on the Feather River 48 km northwest of Nome (Fig. 1). During the 1st 6 weeks, most musk-oxen remained near the release site in several scattered groups, the largest containing 12 animals. In mid-May, 2 groups joined to form a herd of 22 animals. During the next 9 months, this group traveled a path of approximately 170 km and spent the late winter near Black Mountain, a straight-line distance of 80 km northwest of the transplant site. Subsequently, this herd split into 2 groups; 1 group took up permanent residency near Black Mountain and the other on the Nuluk River 25 km farther north (Fig. 1). Two distinct musk-ox herds have resided in these areas to the present, although interchange between the 2 herds has certainly occurred.

The breeding success of the Black Mountain and Nuluk River herds and their fidelity to the area resulted in the release of an additional 35 musk-oxen (10 males and 25 females) near Black Mountain on 4 March 1981. The new transplants were shepherded to within 3 km of the resident herd in the hope that the 2 groups would unite. Colored ear streamers helped distinguish new transplants from resident animals. By September, we could only account for 10 marked musk-oxen that joined either the Black Mountain or Nuluk River herds. I believe most of the transplanted musk-oxen left the immediate area; the movements of 4 radio-collared adult cows are indicative of what might have happened. Two of the 4 cows moved 350 km to the east and died from unknown causes. One cow and 4 yearlings moved a straight-line distance of 145 km and have remained 22 km north of Nome since then. The other cow moved 73 km east of the release site, but within a year returned to the vicinity of Black Mountain. We know that at

least 11 yearlings were involved in these movements; therefore, I speculate that most of the musk-oxen from the 1981 transplant dispersed away from the release site.

To help determine herd size, composition, and movements, 6 resident musk-oxen (1 from Black Mountain and 5 from the Nuluk River herd) were radio-collared on 23 June 1982. All instrumented musk-oxen have remained within the home range of the herd in which they were collared, although each of the 2 herds has fractured into smaller groups and/or united into larger groups at least once during the year.

Aerial surveys to determine the number of musk-oxen on the Seward Peninsula have been conducted at least once annually since 1970. However, it was not always possible to obtain complete counts because locating several small groups of free-ranging animals in expansive and diverse terrain was often not practical nor economically feasible. Aerial surveys from 1970 to the present at best provide minimum estimates of the population (Table 1). Radio-collared animals proved to be a valuable aid in locating musk-ox herds, and the 1982-83 counts are the most complete to date. The 1983 precalving population numbered 155-156 musk-oxen, including the small herd residing near Nome. In addition, I believe an unknown number of single animals or groups of 2-4 are scattered throughout Unit 22. Because we have been unable to account for all of the musk-oxen from the 1981 transplant, it is also possible that 1 or more groups of 5-15 may occur in areas not yet intensively surveyed.

Annual rate of increase of the Black Mountain and Nuluk River herds can be computed in several ways depending on assumptions made about initial population size and breeding status (Table 2). Prior to the 1981 transplant, the most reliable population assessment was made in spring 1980 when 104 musk-oxen were counted. Assuming an initial population of 36 musk-oxen in 1970, the mean annual rate of increase over a 10-year period was 11%. I believe it is better to assume that the Black Mountain and Nuluk herds started with approximately 22 animals. Using this value, the annual rate of increase to 1980 was 17%. However, most of the transplanted animals were yearlings and did not attain breeding age until 1972-73. Using 1972 as the year when breeding first occurred, the annual rate of increase was 21% (1972-80). The minimum precalving population of the Black Mountain and Nuluk herds was 146 musk-oxen and at least 6 of these came from the 1981 transplant. If we assume a resident population of 140 musk-oxen, the rate of increase from 1980 to 1982 was 16% (104 to 140). The combined growth data indicate that the sustained rate of increase from 1972 to the present falls between 16% and 21%.

Population Composition

In October 1982, composition counts were conducted on approximately 65% of the Black Mountain herd, and about 95% of the Nuluk

River herd was classified in April 1983 (Table 3). Of 123 animals counted in the combined herds, 23 (19%) were calves. However, the ratio of calves to breeding-age cows was 72:100, indicating good productivity and survival in both herds.

Mortality

Two radio-collared cows from the 1981 transplant were found dead in the Tagagawik River drainage 350 km east of Black Mountain. Mortality phase radio signals were heard in December 1982, but the carcasses were not recovered until spring. By then, all that remained were scattered bones from which the cause of death could not be determined. Some solitary musk-oxen were scattered in remote locations throughout the Seward Peninsula, a situation that probably increases susceptibility to predation by grizzly bears and wolves. However, no other deaths were documented, and natural mortality in the established herds appears to be very low.

Management Summary and Recommendations

When musk-oxen were transplanted to the Seward Peninsula, they did not increase as rapidly as hoped, primarily because many single animals dispersed away from the transplant site. Five to 6 years passed before the Black Mountain and Nuluk River herds attained a size equal to that of the 1970 transplant. The 1981 transplant increased the population, but fewer musk-oxen than expected joined resident herds (no more than 30% of those transplanted). Prospects for future growth of the Black Mountain and Nuluk River herds are good; the combined herds now number at least 146. Most breeding-age cows are bearing young each year, and yearling survival is high. If this trend continues, the 2 herds should collectively exceed 200 animals within the next 3 years.

A band of 5 musk-oxen from the 1981 transplant has resided just north of Nome since September 1981. In the fall of 1982, they were joined by 2 mature bulls. At least 1 calf was born in spring 1983. These encouraging signs suggest that a herd may become established in the Nome area.

Musk-ox population information acquired during 1982-83 is the best obtained to date. Radio telemetry has been largely responsible for this success. Additional musk-oxen should be radio-collared to facilitate population monitoring.

Many Alaska residents, particularly those from the Seward Peninsula, have expressed an interest in hunting musk-oxen. A few bulls could probably be harvested now without curtailing herd growth. However, I recommend not establishing a hunting season

until the combined Seward Peninsula population is at least 200 musk-oxen. Data collected over the next 2 years will improve our understanding of musk-ox movements and population dynamics, and will allow us to better manage the herd.

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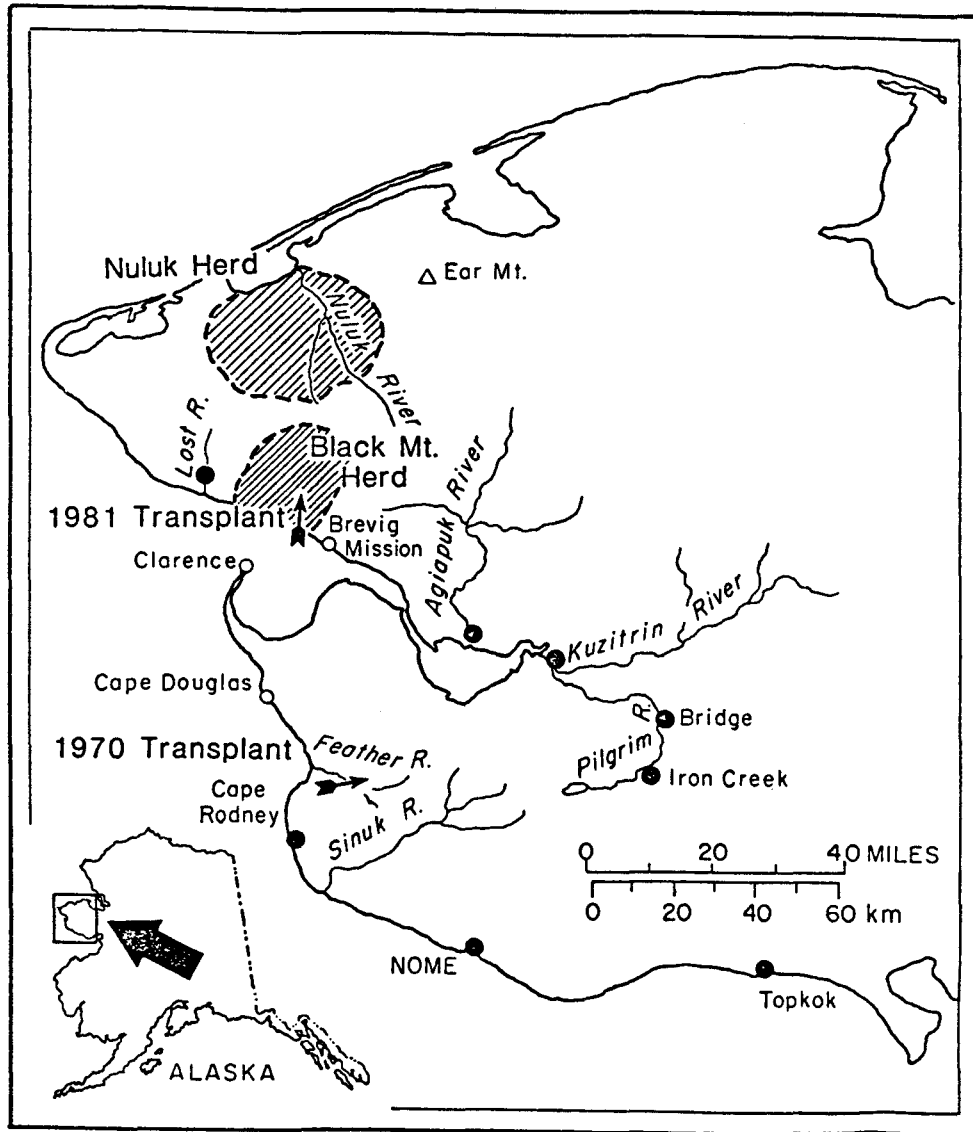


Fig. 1. Seward Peninsula musk-ox transplant sites and home ranges of Black Mountain and Nuluk River herds.

Table 1. Population status of the Black Mountain and Nuluk River musk-ox herds, Seward Peninsula, 1970-83.^a

Year	Adults and subadults	Calves	Total
1970	21	1	22
1971	21	0	21
1972	21	1	22
1973	17	6	23
1974	24	3	27
1975	26	7	33
1976	31	11	42
1977 ^b	39?	6	45?
1978	?	?	50?
1979	40	15	55?
1980	83	21	104
1981 ^b	118?	22	140?
1982	123	23	146
Mar. 1983			146

^a Values represent minimum estimates.

^b Thirty-five musk-oxen were released near the Black Mountain herd in 1981.

Table 2. Annual growth rates of the Black Mountain and Nuluk River musk-ox herds, Seward Peninsula, based on varying initial population sizes.

Population size		Date		Mean annual growth rate (%)
Initial	Final	Initial	Final	
36 ^a	104	1970	1980	11
22 ^b	104	1970	1980	17
22	104 ^d	1972 ^c	1980	21
104	146 ^d	1980	1982	18
104	140 ^e	1980	1982	16 ^f
22	140	1972 ^c	1982	20 ^f

a Includes all musk-oxen transplanted in 1970.

b Represents probable initial herd size.

c Assumed date of 1st breeding.

d Includes 6 musk-oxen from 1981 transplant.

e Includes resident musk-oxen only.

f Most probable long-term growth rate.

Table 3. Sex and age composition of Black Mountain and Nuluk River musk-ox herds, October 1982.

Herd	Age (yr)								Calves	Totals
	4+		4		3		2			
	M	F	M	F	M	F	M	F		
Black Mt.	2	12	0	2	5	5	3	6	7	42
Nuluk R.	14	12	6	6	5	8	8	6	16	81
Totals	16	24	6	8	10	13	11	12	23 ^a	123

^a Represents 19% calves, or 72 calves/100 cows 4 years of age or older.

MUSK-OXEN

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 23

GEOGRAPHICAL DESCRIPTION: Kotzebue Sound

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulations No. 23.

Population Composition

Two musk-ox surveys were conducted in the Lisburne Hills, and 1 survey was conducted in the Mulgrave Hills during the reporting period. In addition, members of the public, biologists, and environmental consultants reported several miscellaneous sightings of musk-oxen. Because of the difficulty in locating scattered bands of musk-oxen without the use of radio telemetry, survey results are expected to vary between years.

The Lisburne Hills surveys on 23 June 1982 and 21 April 1983 revealed 3 distinct productive musk-ox herds plus several small groups of bulls for a total of 80 animals. The June survey produced 66 adults and 14 calves.

A group of 8 adults and a group of 4 adults were sighted in the Mulgrave Hills on 2 April 1983. Prior to this survey, it was thought that only 1 group of 8 musk-oxen inhabited the Mulgrave Hills.

Mortality

No musk-ox mortality was documented during the reporting period.

Management Summary and Recommendations

Survey results, plus numerous miscellaneous sightings, suggest a growing and dispersing musk-ox population in Unit 23. The core herds in the Lisburne Hills appear to be recruiting approximately 15 calves per year. The establishment of a harvestable musk-ox population in Unit 23 and adjacent portions of Unit 26 depends upon the protection of the animals in the Lisburne Hills.

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MUSK-OXEN

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 26B AND 26C

GEOGRAPHICAL DESCRIPTION: Eastern Arctic Slope

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

See Hunting Regulation No. 23.

Population Status and Trend

Survey data obtained by the U.S. Fish and Wildlife Service indicate that the musk-ox population on the eastern Arctic Slope continued to increase. However, the rate of increase between 1982 and 1983 (7%) was less than the calculated average rate of increase since intensive census effort was initiated in 1978 (more than 20%). The precalving population was estimated as 219 in April 1982, while surveys in 1983 located 235 animals. Visual estimates of herd size were verified by aerial photography, and field personnel were reasonably confident of the accuracy of the total population estimate (P. Reynolds, USFWS, Fairbanks, pers. commun.). Partial composition data obtained in April 1983 indicated a yearling cohort of 39 animals ($N = 134$), or a minimum of 17% of the estimated population of 235. Assuming that some yearlings were included in the 100 animals not classified indicates an even greater discrepancy between observed and inferred productivity. Future surveys will be required to identify the cause of the small increase in herd size between 1982-83.

Population Composition

Fifty-seven percent of the 235 animals counted in April were identified according to sex and age classes (Table 1). Poor weather hampered ground observations at the time of the precalving survey.

Additional composition data obtained in mid-June 1983 after most calf production had occurred allowed classification of 234 animals in mixed-sex herds. The addition of lone bulls and animals in all male groups would increase the total count and the proportion of adult bulls in the sample. Reproductive performance (56 calves/100 cows 3 years of age or older) was lower than reported in the past, but is still within the range of normal values for this species.

Mortality

Resident hunters killed 4 adult bulls in the 1st musk-ox hunt conducted on the Arctic National Wildlife Refuge. One permit holder traveled to Nuiqsut late in the season but was unable to hunt because of bad weather. Predation and other forms of natural mortality are apparently low, even though wolves and grizzly bears occur on the same range with musk-oxen.

Management Summary and Recommendations

The reintroduced musk-ox population on the eastern Arctic Slope was transplanted to an area where dispersal is essentially unrestricted. Musk-oxen have been sighted from the Trans-Alaska Pipeline to the Malcolm River in the Yukon Territory (K. Whitten, pers. commun.). Increasing numbers of animals have been seen far from the traditional core areas on the Tamayariak, Sadlerochit, and Okerokovik Rivers where survey efforts have been concentrated. The musk-ox population may be expanding its range by colonizing new areas, hence the inconsistent survey data. A radio telemetry study initiated by the USFWS in 1982 will provide valuable data on the movements of these animals as the population continues to expand its range and increase in size. Fourteen musk-oxen were instrumented in spring 1982, and an additional 12 animals were radio-collared in 1983. At the time this report was prepared, 20 radio collars were functioning. Early findings from this project have invalidated several widely reported assumptions concerning herd stability of musk-oxen in the ANWR. Future results from this study should have broad application for management of musk-oxen throughout the State.

Rapidly expanding oil exploration and development activities on the eastern North Slope potentially impact all species of wildlife.

Musk-oxen may be particularly vulnerable to this type of disturbance because their numbers are small and their distribution is limited. The Department should continue to monitor industrial developments and oppose those in areas which are important to musk-oxen.

Management considerations for the eastern Arctic Slope musk-ox population are significantly different than in other areas where hunting has been conducted. Unlike Nunivak or Nelson Islands, musk-oxen in the eastern Arctic are not range-limited. A conservative approach to harvest quotas and close monitoring of the effects of hunting are required. Population census and movement studies should be continued. Radical distortion of adult sex ratios and age structure of the population should be avoided.

Hunting in the spring is appropriate to avoid disruption of breeding which would occur if hunting took place in the fall. In addition, hunter access with aircraft and snowmachines is facilitated, and trophy quality is high. Increased harvest or harvest of cows is not recommended at this time due to the lack of information necessary to predict potential effects on the musk-ox population.

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Table 1. Sex and age composition of musk-oxen observed in the Arctic National Wildlife Refuge, spring 1983.^a

Survey	Age (yr)						Yrlg	Calf	Unclass.	Total
	4+		3		2					
	M	F	M	F	M	F				
Precalving, April 1983	28	18	12	18	11	9	39		100	235
Postcalving, mid-June 1983 ^b	16	43	24	34	17	21	36	43		234

^a Data from USFWS surveys.

^b Only mixed-sex herds included.

WALRUS

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 17

GEOGRAPHICAL DESCRIPTION: Northern Bristol Bay

PERIOD COVERED: 1 July 1982-30 June 1983

Season and Bag Limit

Marine mammal management was under Federal jurisdiction during this regulatory year. Federal regulations allowed unlimited harvests of walrus by Natives for subsistence or use in handicrafts.

Population Status and Trend

General observations by field staff indicated that 10,000-12,000 walrus utilized Round Island during peak haulouts in 1982, but numbers declined significantly in 1983. Several observations of large numbers of walrus hauled out at Nanvak Bay were reported during summer 1983. Observations of major haulout activity in this area in recent years were first reported by Togiak Refuge Fish and Wildlife Service personnel in November 1981.

Mortality

No mortality studies were conducted.

Management Summary and Recommendations

Air and boat traffic near Round Island as well as visitor use of the sanctuary are increasing. Stampedes of walrus herds from the beaches are occurring more frequently, and noticeably fewer walruses were using Round Island as a hauling grounds during summer 1983. Enforcement of sanctuary regulations or permit conditions is difficult under present law. Permit conditions are not presently enforceable in criminal court, as there is no penalty clause for sanctuary or refuge permits. Permit conditions should be put under Miscellaneous Game Regulations to correct this problem.

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