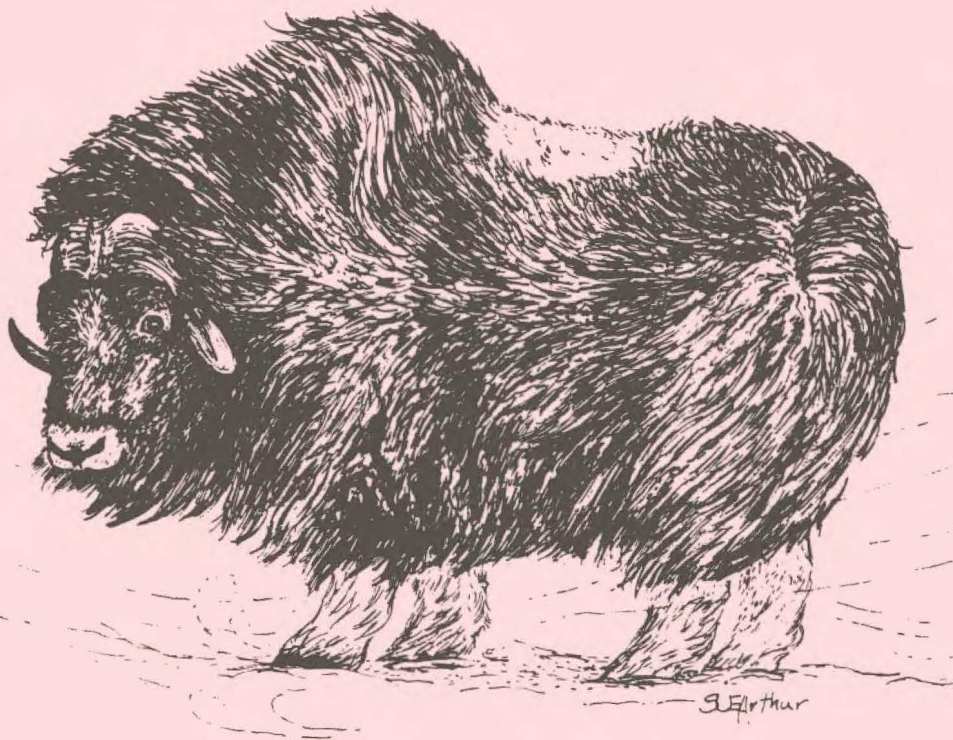


Alaska Department of Fish and Game  
Division of Game  
Federal Aid in Wildlife Restoration  
Annual Report of Survey—Inventory Activities

# MUSKOX



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## STATEWIDE HARVEST AND POPULATION STATUS

Muskox populations are found in Alaska on (1) Nunivak and Nelson Islands (Unit 18), (2) the Seward Peninsula (GMU 22), (3) the northwest coast near point Hope (GMU 23); and (4) the eastern Arctic Slope (Subunits 26B and 26C). All herds (except the one on Nunivak) are the result of transplants between 1967 and 1970 from Nunivak Island. As a result of emigration from Nelson Island, additional animals are found on the Yukon-Kuskokwim mainland.

Herds on Nelson Island, the Seward Peninsula, and the eastern Arctic Slope are flourishing and well established. The herd in Unit 23, although established, is still of questionable viability. The parent herd on Nunivak Island is healthy and near the desired population level.

Hunting is authorized on 3 herds: Nunivak Island, Nelson Island, and the eastern Arctic. Harvest quotas on Nunivak and Nelson Islands are designed to stabilize population numbers, while the quota in the eastern Arctic is very conservative to allow continued population expansion. Harvests and estimated populations in 1986-87 were as follows:

GMU/area	Estimated population	Hunting harvest		
		Male	Female	Total
18/Nunivak Island	590	31	34	65
18/Nelson Island	300	16	14	30
22/Seward Peninsula	271+	--	--	--
23/Kotzebue Sound	96	--	--	--
26B, 26C/Eastern Arctic	451	5	--	5

Steven R. Peterson  
Chief of Research

## MUSKOX

### SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 18

GEOGRAPHICAL DESCRIPTION: Yukon-Kuskokwim Delta

PERIOD COVERED: 1 July 1986-30 June 1987

#### Season and Bag Limit

See Hunting Regulations No. 27.

#### Population Status and Trend

##### Nunivak Island:

During a posthunt, precalving census conducted in mid-March 1987, 587 muskoxen were enumerated on Nunivak Island, compared with 487 in 1986 and 547 in 1985. Severe weather and reduced visibility hampered census efforts in 1985 and 1986. The 1987 census was conducted under conditions of good visibility and favorable snow cover, resulting in an accurate count. A high proportion (87%) of the muskoxen observed during the 1987 census were classified according to sex and age groups.

The posthunt, precalving population on Nunivak Island was estimated at 500-550 in 1986. The 1987 count of approximately 590 animals indicates that the Nunivak population slightly exceeds the management guideline of 500-550 animals. Some muskoxen may not have been counted during the 1986 census, and productivity may have been better than expected or both. Elevated harvest levels for the last 3 years apparently have been accompanied by increased productivity; these factors have dampened our management efforts to reduce the size of population.

Prior to the 1987 census, 65 muskoxen were taken in the fall 1986 and spring 1987 hunting seasons. Therefore, the prehunt, precalving population in 1987 numbered at least 652 animals, approximately 100 animals more than postulated for the same time period in 1986.

Examination of the reproductive tracts of 29 cow muskoxen taken during the spring 1987 season indicated a minimum pregnancy rate of 86%, identical to that for 1986 and above that reported for the 2 previous years; i.e. 77% and 74% in 1984 and 1985, respectively. The eleven 3-year-old cows taken

in spring 1987 exhibited a pregnancy rate of 91%. The fourteen 4-year-old or older cows exhibited a pregnancy rate of 93%. Two harvested cows of unknown age were not pregnant. The single 2-year-old cow taken in spring 1987 was reportedly pregnant. These data indicate a highly productive population characterized by early onset of sexual maturity.

#### Nelson Island:

Slow growth has been predicted for the Nelson Island muskox population that numbered approximately 300 animals in early summer 1987. The prehunt, precalving population on Nelson Island was estimated at 287 muskoxen in fall 1986. This population has only increased slightly since 1981. In addition to sustaining substantial annual harvests, this population also provides a nucleus for those muskoxen emigrating to the mainland of Unit 18.

Staff attempted a posthunt, aerial census of Nelson Island on 21 May 1987. Although Nelson Island was thoroughly covered during the 3-hour flight, fog above the cliffs of Cape Vancouver (a muskox concentration area) and patchy melting snow hindered visibility; only 150 muskoxen were counted. I believe the low count resulted from poor sightability and does not reflect a decline in muskox numbers. Most animals observed were on the lower slopes of Cape Vancouver and on the hills northeast of Tununak. As observed in 1986, the largest herd encountered (31 animals) was on Erchaktruk Mountain northeast of Tununak.

#### Mainland Muskoxen:

Muskoxen have been sighted on the mainland of the Yukon-Kuskokwim Delta for over a dozen years. These animals originally dispersed from Nelson Island and are apparently settling in areas of suitable upland habitat.

Two to 3 muskoxen were reported in the vicinity southwest of Chefornek (Cheching Mountain) in January 1987, but this report was not verified. Local residents from 4 different villages (Hooper Bay, Tununak, Scammon Bay, and Newtok) independently reported their observations of muskoxen on or near the Mud Volcanoes and Chakwaktolik 60 miles NW of Bethel. Large ungulate tracks (muskox or moose) were observed from the air by a Hooper Bay resident near the site of old Chakwaktolik and the Mud Volcanoes in March 1987. Residents of Scammon Bay and Tununak also reported seeing muskoxen on the Mud Volcanoes during early winter 1986-87. A Newtok resident gave precise details concerning the location of 4 muskoxen observed near old Chakwaktolik in fall 1985. A U. S. Fish and Wildlife Service (USFWS) field crew had previously found muskox pellets

on one of the Mud Volcanoes in June 1986. These observations lend credence to the belief that a muskox herd is forming in this large area of upland habitat.

A reward was offered in spring 1987 to the 1st person who could lead Game Division biologists to muskoxen on the Mud Volcanoes, but no additional sightings were reported. Several private and charter pilots enroute to other destinations spent time searching for these animals, but a few muskoxen in a large expanse of suitable habitat have proven difficult to locate from the air. Our intention is to radio-collar 1 or more muskoxen on the Mud Volcanoes as soon as possible.

A 3-year-old bull was radio-collared in a small herd of muskoxen southwest of Bethel in March 1984. This herd has not grown substantially since that time, although calves are produced annually. The herd, which is composed of 11 muskoxen, was radiolocated approximately 8 miles northeast of Dall Lake on 1 February 1987. The radio-collared bull was present, while the former dominant bull was absent. These 11 mainland muskoxen were again radiolocated and photographed by USFWS staff near Tuntutuliak on 1 May 1987. Similar to his behavior in May 1986, the adult bull wearing the only radio collar in this herd became solitary by 20 May 1987. The bull had rejoined the herd in fall 1986. We believe the other muskoxen from this herd remained in the vicinity of Dall Lake where they have been residents since 1981.

#### Population Composition

##### Nunivak Island:

No fall aerial surveys were conducted during the reporting period. The posthunt, precalving ground census and composition survey were conducted on 17-19 March 1987 by ADF&G and USFWS staff. This census was one of the most successful in recent years. Excellent visibility and good snowmachine traveling conditions facilitated observations of muskoxen over the entire island. We classified 587 muskoxen in 47 groups ranging in size from 1 to 51 animals. We actually observed 45 groups, and 2 other groups were observed by Mekoryuk residents. One group of 6 muskoxen was reported by local residents on sea ice northeast of Mekoryuk, and 12 muskoxen in another group were observed on western Nunivak Island. The total number of animals observed was higher than expected, and I am confident that this was a complete census.

The 1987 ground census enumerated 164 three-year-old and older cows, representing an increase from the 125 and 140 cows recorded in 1986 and 1985, respectively. If we assume that the mean pregnancy rate of all age classes is at least 80%, I



anticipate that a maximum of 130-140 calves could be added to population during spring 1987. Assuming 28% of the 77 unclassified animals were cows with a similar pregnancy rate, another 17 calves may be added to the population. The maximum 1987 posthunt, postcalving population would approximate 750 animals. This figure is similar to that calculated before heavy harvests were instituted to reduce the population size in 1983.

These extrapolations, however, assume that the harvest sample accurately reflects the proportion of pregnant females in the population and that all fetuses are brought to full term. Neonatal and subsequent calf mortality will undoubtedly reduce the postcalving population size by a significant degree. It is clear, however, that accelerated harvest rates have not kept pace with productivity. Although theoretically plausible, this unexpected result confounds management attempts to hold the population at a desired level. The increasing reproductive rate is probably the result of a decreased mean age structure of the muskox population. Cow hunters will normally attempt to take older females because younger cows are easily confused with young bulls, resulting in the downward skewing of the mean age of females.

### Mortality

#### Nunivak Island:

Five drawing permits for bulls and 5 registration permits for cows were available to hunters during fall 1986. The 5 drawing permittees were notified in mid-July of their eligibility to hunt bull muskox in fall 1986; of these, 4 permittees elected to hunt, and they took muskoxen during the September season. This is a relatively high expression of interest. Usually only 1 bull hunter chooses to hunt during the fall. Boats were used for transportation during the fall hunt. Weather-related difficulties are often encountered during the fall hunt.

The registration permits for cows (5) were available on a first-come, first-serve basis in Mekoryuk on 30 August 1986. Demand was moderate at best; only 3 permits were applied for initially, and 2 permits remained available until mid-September. Eventually 4 permits were filled. One hunter obtained a cow permit but was later unable to go hunting.

Thirty persons successfully drew permits to hunt bull muskoxen on Nunivak Island in spring 1987. A waiting list of 160 alternate permittees is indicative of the continuing popularity of the spring bull hunt. In an effort to fill all unused permits, an additional 31 persons from the alternate

list were contacted. All 27 individuals who eventually hunted were successful.

Seventeen registration permits for the spring cow hunt were available on a first-come, first-serve basis in Mekoryuk. An additional 8 permits were available in Bethel, four in Anchorage, and two in Fairbanks. All 17 cow permits were issued at Mekoryuk; 5 people were placed on a waiting list. Four people on the waiting list later received permits because of cancellations by other hunters. All Mekoryuk permit holders entering the field were successful in bagging a muskox in spring 1987.

As reported in previous years, the demand for the 8 permits issued at Bethel was remarkably high. At 1400 hours the afternoon before the permits were to be available, the line formed outside the ADF&G office, and a sign-up sheet was circulated. The sign-up list contained 8 names by 1730 hours. It was agreed that in order to save their place in line, potential applicants could not leave the immediate area. Thus 8 people spent the night waiting inside the office building. Four late applicants remained on the waiting list. The earliest applicant spent 18 hours waiting for his permit. Eventually, 1 individual on the waiting list received a permit. All 9 Bethel permit holders were successful in taking cow muskoxen on Nunivak Island in 1987.

Two of the 4 available cow registration permits were issued in Anchorage. The 1 hunter entering the field on Nunivak Island was successful; the other permit holder cancelled his hunt. After several weeks, the unutilized permits from Anchorage and Fairbanks were transferred to Mekoryuk.

In spring 1987 the majority of the muskoxen were harvested (1) along a trail leading south of Mekoryuk to Cape Mendenhall, (2) on dunes northeast and northwest of Cape Mendenhall, and (3) around Nash Harbor. The total spring harvest was composed of 27 bulls and 29 cows. Bull hunters displayed a preference for large mature males, while cow hunters were equally divided in their preference for 3- or 4-year-old and older females. More cow hunters (85%) than bull hunters (66%) spent only 1 day hunting. No hunter was in the field longer than 3 days. Most cow hunters (96%) were residents of Unit 18. The majority of bull hunters (63%) were residents of southcentral Alaska, and the remainder were from interior Alaska. Only 1 nonresident participated in the bull hunt.

One 3-year-old cow was found dead on southwestern Nunivak Island during the March 1987 composition survey. Although unfit for human consumption, the animal apparently had died

recently because it had been only partially scavenged by foxes. The carcass was complete with head and hide, and no obvious cause of death was apparent.

In March 1987 two muskoxen from a group of 6-8 animals were reported to have fallen through weakened sea ice northeast of Mekoryuk. Local residents were concerned enough to notify the Department. The remaining muskoxen were unable to forage, because they were trapped against offshore pressure ridges for a week by shifting pack ice driven by strong northeast winds. Considerable discussion ensued among local residents over whether these animals should be salvaged. No action was taken, and eventually the surviving animals were able to return to the island. Most local residents strongly disagree with the Board of Game decision to repeal the regulation permitting the salvage of stranded muskox on sea ice.

One bull muskox found dead in March 1987 near Chakwakamiut was reported as wasted. The head and hide had been removed but the meat was incompletely salvaged. The case subsequently was investigated by the Division of Fish and Wildlife Protection (FWP). Other than harvest, there were no other reported cases of muskox mortality on Nunivak during 1987-88. As reported in previous years, most animals taken by hunters were in excellent condition and had extensive fat deposits.

#### Nelson Island:

Thirty registration permits (15 bulls and 15 cows) were available for Nelson Island muskoxen in spring 1987. In order to avoid having people wait outside all night, the issuing of permits began at 1400 hours on 21 January. An informational meeting was held in Tununak the evening before, and the permit issuance process was discussed at length. The line formed at 0730 hours outside the Community Center, and the permit issuance process began promptly on time and proceeded smoothly. After receiving their permits, the hunters attended a bilingual orientation on the identification of age and sex classes of muskoxen. All 30 permits were issued to local residents of surrounding villages: Tununak, 20; Toksook, 4; and Newtok, 6. Four people remained on the waiting list. All 30 permits were filled. No one was denied access, nor were hunters charged fees for access to private lands where most muskoxen were located. Most muskoxen were taken on ridges northeast of Tununak, and some were taken close to the village. No hunter spent more than 1 day hunting.

One hunter who had been issued a bull permit shot a cow by mistake and turned himself in during the check-out procedure. The muskox head and hide were forfeited and were eventually

donated to Bethel High School for purposes of education and display. The meat was distributed to charity.

Hunters on snowmachines from Tununak herded a group of muskoxen near the village airport in February 1987 and took 3 muskoxen from this group; although the muskox were of the correct sex and the permit holders were present, two of the muskoxen were not shot by the permit holders. Other residents of the village complained to the city office that the animals should not be herded and that it was dangerous to hunt so close to the village. Several air taxi pilots from Bethel that had observed the muskoxen, and hunters from the airport filed complaints with ADF&G in Bethel. An investigation by ADF&G and FWP followed; the responsible hunters were interviewed, and the case was turned over to the District Attorney who declined to prosecute. When informed that herding of muskoxen by snowmachine is prohibited and only permit holders should dispatch the animals, the Tununak IRA Council and the United Villages of Nelson Island notified the public of the law and urged compliance. There were no further incidents.

Following a consultation between Game Division and United Villages, a crippled bull muskox (broken leg) was salvaged in late February northeast of Tununak by a local resident. The meat was distributed to charity.

For several months, another solitary lame bull was observed by local residents on a low hill 3 miles north of Cheforak. Permission was granted to salvage this animal, which was found to have been previously wounded many times in the front and rear legs with a .22-caliber weapon. The wounds were festering; the meat was discolored and odiferous and considered not fit for human consumption. This is the 3rd known case in which Nelson Island muskoxen have been wounded by .22-caliber rimfire weapons and abandoned. A yearling bull found dead east of Tununak in March 1985 was necropsied by Game Division and found to have been shot with a .22-caliber weapon. A muskox taken under permit in the 1986 hunting season had been previously wounded by a .22-caliber bullet, but the wound had apparently healed.

A resident of Tununak reported that an adult muskox was found dead in a stream northeast of Tununak in July 1987. The animal had apparently fallen through the ice during the 1987 spring break-up. This is the 2nd such mortality reported in the last 2 years. There were no other reported cases of muskox mortality on Nelson Island during the 1986-87 reporting period.

### Mainland Muskoxen:

Poaching of mainland muskoxen has been reported during previous years and has continued during 1986, in spite of efforts to reduce it. Two muskoxen were reportedly taken along the Johnson River near Bethel in fall 1986. A muskox head was offered for sale to a teacher in the village of Tuntutuliak in November 1986. Muskoxen were reported to be within "snowmachine distance" of the village of Atmauthluak on the Johnson River southwest of Bethel in December 1986. A muskox hide was offered for sale to a fur buyer visiting the village at the time. It is uncertain whether these incidents involved the same muskox, but it appears that illegal harvest levels may be sufficient to stabilize mainland muskox herds at very low numbers.

### Management Summary and Recommendations

#### Nunivak Island:

The Nunivak posthunt, precalving population, estimated at the time of the complete 1987 census to number 590 animals, was slightly above the management guideline of 500-550 animals. Elevated harvest levels during the last 3 years have been accompanied by increasing productivity, dampening efforts to reduce the population. Pregnancy rates have apparently risen, an artifact of a younger age structure in the population created by heavy harvests. A minimum of 164 reproductive-age cows were counted during the March 1987 census. Examination of cow muskoxen taken during the winter hunting season prior to the census indicated pregnancy rates of 86-93%. The single 2-year-old cow harvested was reportedly pregnant. These data indicate a highly productive population characterized by early onset of sexual maturity.

The continued marked potential for expansion in the size of the population has furthered concerns about the deteriorating range quality on Nunivak Island, a National Wildlife Refuge, and led to USFWS suggestions for additional reductions in the size of muskoxen and reindeer populations. According to the Soil Conservation Service (SCS), the range on Nunivak is now critically overgrazed. I believe that significant additional harvests of cows need to be undertaken to reduce the reproductive rate of Nunivak muskoxen.

An alternative to additional heavy harvests is to transplant muskoxen to other suitable ranges. Transplants on a small scale could be undertaken annually while current harvest levels are maintained. I believe that at least 25 yearling muskoxen could be transplanted annually to mainland Alaska without reducing current harvest levels. Transplants have



long been identified as one prioritied use of Nunivak Island muskoxen. Suggested transplant areas in Unit 18 include Kuka and Mogak Creek in the Kilbuck Mountains and the Cape Newenham area.

Nelson Island:

The postcalving muskox population on Nelson Island was estimated to number approximately 300 muskoxen by late May 1987, a slight increase from 1986; however, the 1987 census was not completed because of fog and poor sightability. The Nelson Island population remains stable to slightly increasing, and it provides for substantial harvests as well as a source for emigration to the mainland. No changes in seasons and bag limits are recommended.

Mainland Muskoxen:

Muskoxen have been sighted on the mainland of the Yukon-Kuskokwim Delta for over the dozen years that emigrating individuals from Nelson Island have dispersed. A small herd has been radiolocated repeatedly during the last year in the vicinity of Dall Lake southwest of Bethel. There were additional reports during the reporting period of muskoxen inhabiting the Mud Volcanoes, a large expanse of upland habitat 60 miles northwest of Bethel.

The season on mainland muskoxen should remain closed for the foreseeable future to allow continued dispersal and population growth. Continuing illegal harvest appears to be sufficient to retard population growth in the small herd southwest of Bethel. Combined education and enforcement efforts are recommended to reduce this illegal harvest.

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## MUSKOX

### SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 22

GEOGRAPHICAL DESCRIPTION: Seward Peninsula

PERIOD COVERED: 1 July 1986-30 June 1987

#### Season and Bag Limit

See Hunting Regulations No. 26.

#### Population Status and Trend

The historic demography of muskoxen on the Seward Peninsula is largely undocumented, although frequent discoveries of skeletal material indicate that the species was once widely distributed throughout the area. Muskoxen were extirpated from Alaska by the end of the 19th century, probably as a result of overharvest by humans. Aboriginal muskox populations may have been eliminated from the Seward Peninsula relatively early because a large, stable human population occupied the area. Beechey (1831) was unable to locate living muskoxen along the coast of the Seward Peninsula during his voyage in 1825-28, but he collected evidence indicating that the species may have recently been present prior to his arrival. No subsequent explorers reported the occurrence of live muskoxen on the Seward Peninsula.

In 1970, as part of a long-range program to reintroduce muskoxen to suitable ranges in Alaska, 36 muskoxen from Nunivak Island were released 30 miles northwest of Nome. An additional 35 animals were transplanted from Nunivak Island to the western Seward Peninsula in 1981. Muskoxen adapted quickly to the Seward Peninsula, and the population has become one of the most important in Alaska.

The Seward Peninsula population was last censused in 1985; 271 animals were observed. Methods and theoretical considerations for censusing muskox populations were discussed previously (Smith 1986). To summarize, it is practical to conduct a complete census of this discrete population by an aerial photocensus of groups located with the aid of radiotelemetry; however, this method requires that a sufficient proportion of the population be radio-collared. In addition, the distribution of radio-collared animals should be such that all major groups include at least 1 collared animal. In 1985, 6% of the

population was radio-collared, and the census was essentially a total count of the population. Declining Department budgets and, more importantly, competing regional priorities for staff time precluded maintaining an adequate pool of radio-collared animals since 1985. Although 8 bull muskoxen were collared in April 1987, these animals were collared too late in the season to become distributed in the population, and field observations indicated that the number of radio-collared animals was still not adequate for a complete census. I concluded that a partial count would provide little useful information in light of the excellent results obtained in 1985.

#### Population Composition

A sample of 119 muskoxen, including 14% calves, was counted on 30 June 1986. Calf production was significantly lower than that for 1985 (22%). Severe winter weather in 1985-86 and freezing rain and high winds during calving in May 1986 may have reduced calf production and survival. Calf production and survival were not measured in spring 1987. Snow conditions were moderately severe in 1986-87 with deeper than normal accumulations of snow, but the snow was not as hard packed as in 1985-86. Rainfall in November 1986 produced icing on exposed vegetation and a layer of ice on the snow surface.

#### Mortality

No mortalities were observed, except for an adult bull that died following anesthetization during spring 1987. Natural mortality rates among radio-collared muskoxen and the small number of observed mortalities suggest that mortality rates among Seward Peninsula muskoxen remain low.

#### Management Summary and Recommendations

The Seward Peninsula muskox population appears to be increasing, although observations of reduced calf survival may indicate that the rate of increase declined during 1985-86. Observations of radio-collared individuals and sighting reports by the public show a significant expansion of range, particularly in the areas used as winter range. Two muskoxen were observed 12 miles west of Kaltag in fall 1987, more than 200 miles east of the release site. A single cow was observed on Monument Mountain in February 1987 standing in 30 inches of powder snow in an open spruce forest. It is becoming increasingly evident that muskoxen are much more adaptable than previously thought and suitable habitat is much more widely available. I anticipate that muskoxen in Alaska will continue to expand their range at least through this century.

Natural range extension could be supplemented effectively by transplants.

A census of the Seward Peninsula population is overdue. Fifteen radio collars were purchased during the reporting period for use on Seward Peninsula muskoxen. If these collars can be placed on muskoxen during fall 1987, a pool of instrumented animals large enough for a photocensus will be available, and conducting the census will be the top priority for muskox survey-inventory activities during the following spring. Recent composition data is also extremely limited and should be obtained by ground surveys in spring 1988.

A research report (Smith 1987) summarizing work carried out on the Seward Peninsula since 1983 was completed in spring 1987. One of objectives of this research was to develop a less costly technique for capturing muskoxen that would minimize the stress experienced by the animals. Using fixed-wing aircraft for transportation and a herding dog to hold the muskoxen in a defense formation for darting, 10 animals were captured in spring 1987 at an average cost of \$108 per animal. Using standard helicopter darting methodology, the cost in 1984 to capture 11 animals was \$410 per animal. The low cost of capturing muskoxen using these methods and the long useful life of modern radio-collars make radiotelemetry an indispensable and cost-effective tool for conducting survey-inventory activities.

National Park Service funds were used to (1) capture and instrument with radio collars 10 muskoxen in spring 1987, (2) purchase 15 additional radio collars in spring 1987, and (3) conduct several radio-tracking flights.

#### Acknowledgements

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## MUSKOX

### SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 23

GEOGRAPHICAL DESCRIPTION: Kotzebue Sound

PERIOD COVERED: 1 July 1986-30 June 1987

#### Season and Bag Limit

See Hunting Regulations No. 27.

#### Population Status and Trend

The muskox population in Unit 23, established by transplants of 36 animals in 1970 and 34 animals in 1977, appeared to be stable in size during this reporting period. Ninety-three animals were counted in September 1986, a figure comparable to the 96 animals counted in July 1985; however, these figures are only minimum numbers because the surveys did not cover all available muskox habitat. Some long-time residents of Unit 23 believe that the number of muskoxen has decreased in recent years; however, we have no documentation to support this viewpoint. At the same time, the apparent lack of growth of this population compared with other transplanted muskox populations in Alaska is of major concern.

As a result of a cooperative project between ADF&G and the National Park Service (NPS), the number of radio-collared muskoxen increased from 2 to 7 animals in September 1986. These animals will enable us to obtain better information concerning the status and trend of this population.

#### Population Composition

Composition data have been limited to a determination of the proportion of calves in a presumably large sample of the population. Calves 3-4 months old composed 14% (10) of 70 muskoxen counted in September 1986. In July 1987, 21% (15) of 73 muskoxen were calves 1-2 months old. These and past years' data suggest that productivity should be adequate for growth of the population.

#### Mortality

Known mortalities of muskoxen include 4 animals illegally killed by hunters. One kill was found on the lower Wulik

River and the other three were in the Cape Thompson and lower Kukpuk River areas. Additionally, 1 muskoxen that had been radio-collared in September 1986 either died or shed its collar prior to April 1986. Hunting mortality may be a significant factor impacting the growth in this population.

#### Management Summary and Recommendation

The apparent lack of growth in the muskox population in Unit 23 is of concern at this time. The most likely factors inhibiting growth are illegal hunting, dispersal, and predation by grizzlies and/or wolves. Other factors unknown to us may be significant as well. The relative importance of each of these factors is unknown at this time. Management efforts during the next reporting period will include (1) increased routine monitoring of radio-collared and associated animals, (2) increased effort to inform the public about the detrimental effects of illegal hunting and the need for enforcement of the hunting ban, and (3) continued efforts to work cooperatively with NPS to obtain critically needed biological information regarding population size and productivity.

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## MUSKOX

### SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS: 26B and 26C

GEOGRAPHICAL DESCRIPTION: Central and eastern Arctic Slope

PERIOD COVERED: 1 July 1986-30 June 1987

#### Season and Bag Limit

See Hunting Regulations No. 27.

#### Population Status and Trend

The postcalving muskoxen population within and adjacent to the Arctic National Wildlife Refuge was estimated at 257 in 1982, 311 in 1983, 384 in 1984, and 476 in 1985. The highest count during this reporting period was 451. Muskoxen appear to be dispersing long distances and are, therefore, difficult to locate. The population is probably still increasing; however, the rate of increase has slowed, at least temporarily, because of low yearling recruitment during the last 2 years.

During the past year, slower growth of the muskoxen population correlated with harsh winter conditions and an extremely late spring green-up. Caribou productivity and survival were also lower in the eastern Arctic Slope area. There is no evidence that reduced recruitment in either species is due to range deterioration. Assuming the muskoxen population continues to increase, there will be over 1,000 muskoxen in the eastern Arctic within 4-5 years.

#### Population Composition

Composition data from a sample of 360 muskoxen were collected by U.S. Fish and Wildlife Service biologists in July 1986. Yearlings made up 17% of the sample, indicating that the population should continue to grow but not as rapidly as during the early 1980's.

#### Mortality

Hunters killed 5 bull muskoxen in March 1987 in the Sadlerochit and Katakturak River areas. Two permits went to nonlocal hunters (1 from Fairbanks and 1 from Michigan), and 3 permits went to Kaktovik residents.

## Management Summary and Recommendations

Wild muskoxen were eliminated from Alaska during the late 1800's. In 1969 and 1970 muskoxen were reintroduced to northeastern Alaska to reestablish populations on historic ranges and provide for a high-quality recreational hunt. Muskoxen are now well established within and adjacent to the Arctic National Wildlife Refuge, and they are slowly dispersing to surrounding regions.

Regulating hunting to allow continued dispersal and protecting suitable habitat during petroleum exploration and development are currently the primary management concerns for muskoxen in Subunits 26B and 26C. Range expansion is occurring, but at a relatively slow rate. Muskoxen, especially adult males, have been sighted annually for nearly 10 years along the Dalton Highway, but resident groups have only recently established themselves west of the Canning River. The current harvest of 5 bulls is not affecting dispersal, and as the herd increases, even more bulls may be taken.

Under current regulations, 5 registration permits are available for taking bull muskoxen in Subunit 26C during March. Permits must be obtained in person in Kaktovik. The existing system of issuing a limited number of permits on a first-come, first-served basis has not worked well. There have been tensions between Kaktovik residents and outsiders waiting for permits. Other Alaskan resident hunters have complained it is an unfair burden on them to travel to Kaktovik for the chance of being issued a permit. The Board of Game has ruled on at least 2 occasions that muskoxen are not a subsistence species in Subunit 26C; therefore, it is recommended that the muskoxen hunt in Subunit 26C be administered through a lottery-permit drawing to increase efficiency and assure fairness to all interested hunters.

Seventeen of the 22 muskoxen harvested since hunting of this population began in 1982 have come from the Sadlerochit River area. Other bands of muskoxen in the Okerokovik, Katakturuk, and Tamayariak River areas have received little or no hunting pressure. If harvest quotas are increased in the future, the harvest of muskoxen should be shifted to other areas away from the Sadlerochit bands or spread over time by establishing a fall hunting season to avoid concentrated harvest of the Sadlerochit group.

To ensure that dispersal into new areas results in viable new populations, increased education and enforcement efforts will be necessary, particularly for Nuiqsut residents.

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