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KENAI NATIONAL MOOSE RANGE

NARRATIVE REPORT

1968



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Washington, D. C. (RF)

Portland, Oregon

Division of Wildlife Refuges

March 25, 1969

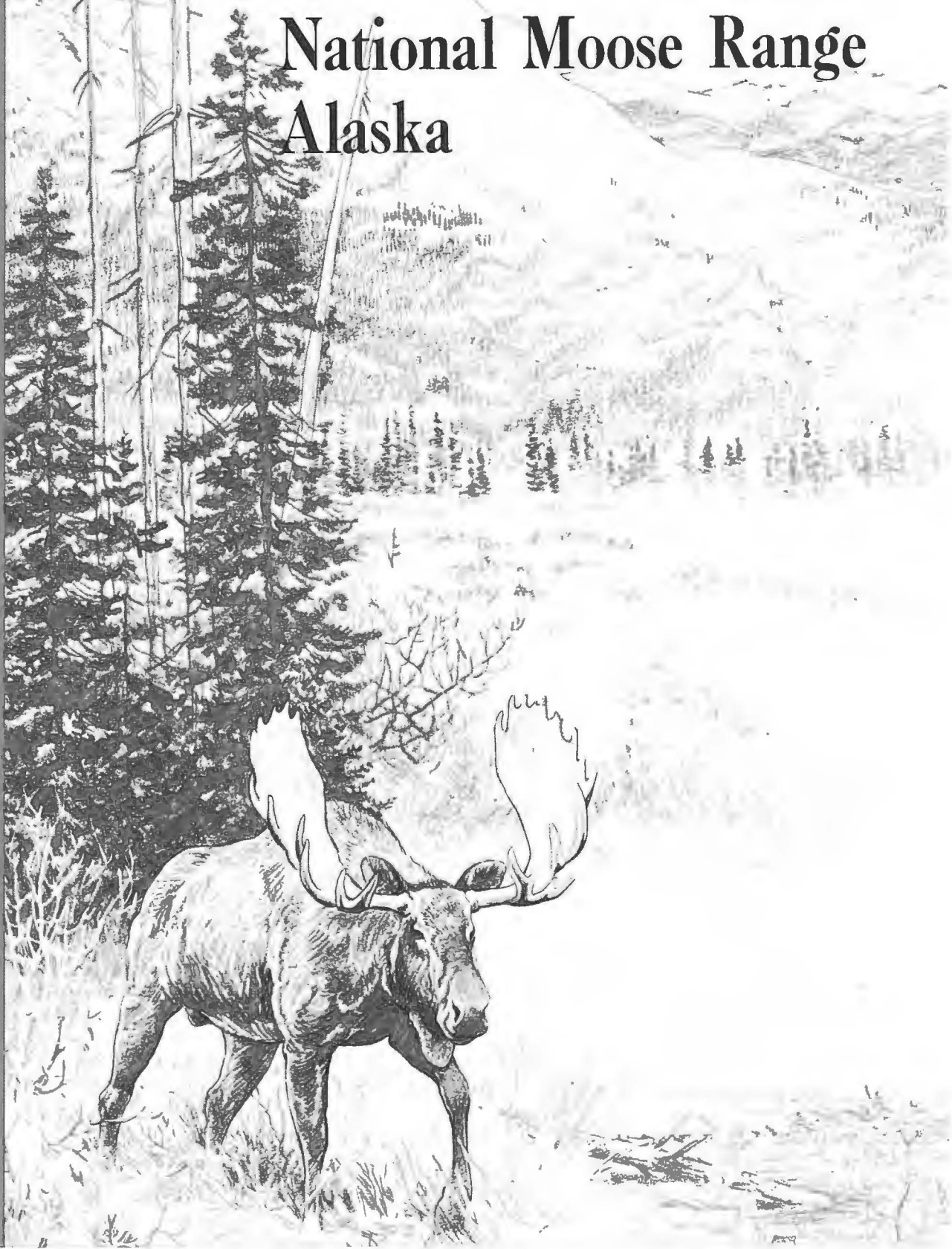
Attached is the Narrative Report for the Kenai National Moose Range.



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# Kenai National Moose Range Alaska



THE KENAI NATIONAL MOOSE RANGE, on the Kenai Peninsula in Alaska, was established in 1941 to ensure perpetuation of the giant Kenai moose, other wildlife, and fish, scenic, and recreational resources. The range extends from the majestic Kenai Mountains to waters of Cook Inlet and contains 2,700 square miles of excellent wildlife habitat.

Historically, the area was significant in the early exploration of Alaska. Cook Inlet bears the name of the famous explorer, Captain Cook, who entered its waters in 1778. Point Possession, on the northeastern corner of the Moose Range, was a landing site for members of the expedition. In 1786, Russians, in search of valuable sea otter, established their first trading post on the Kenai Peninsula where remnants of their extended influence exist today in culture of the people. Discovery of gold in the late 1800's brought hundreds of prospectors and miners into the area. Kenai River and Skilak Lake were important routes of travel to and from the gold fields.

Recently, an oil field of major economic importance was discovered and developed in the northwest section of the Range.

### *Climate*

The climate is subarctic. Temperatures may fall to 30° and 40° below zero in winter and rarely rise above 80° in summer. Cool, cloudy weather predominates during July, August, and September, when most of the 19 inches of annual precipitation falls as rain.

The frosty nights of late September bring out flaming golden colors in willow, birch, and aspen. By late October, lakes freeze and soon the Range becomes covered with a soft blanket of snow which remains until spring breakup in April.

### *Topography*

The Moose Range is divided into two very distinct physiographic sections. Its western two-thirds constitute the Kenai lowlands, composed of low ridges, rolling hills, and muskegs dotted with more than 1,200 lakes. The two largest lakes are Skilak, 24,000 acres in size, and Tustumena, 73,000 acres. Numerous smaller lakes are drained by 160 miles

of major streams and many miles of lesser waterways. These waters have high recreational value for fishing, canoeing, boating, and camping. As spawning ground and nursery area they support one-third of the multimillion-dollar commercial salmon fishery of Cook Inlet.

The Kenai Mountains in the eastern third of the Range rise to elevations of 3,000 to 6,000 feet, with the highest peak 6,612 feet above sea level. The great Harding Ice Field, with numerous glacial tributaries interspersed among these mountains, lends much scenic splendor to the Range. Skilak and Tustumena Glaciers are slowly receding; as they melt, glacial silt flows into lakes and streams, coloring the waters all the way to the sea.

Flowers grow in profusion above timberline during the short alpine summer. Cushion pink, forget-me-not, daisies, and columbine add color to the mountainsides as winter snows recede. On lower elevations, spring brings forth numerous shooting-stars, colorful dwarf dogwood, azaleas, blue lupine, and fireweed, while Alaska cotton waves in the spring breezes along roadside ditches and ponds.

Not quickly forgotten is the aroma of Labrador tea and wild roses. Abundant blueberry and lowbush cranberry are delicacies sought by numerous berry pickers, as well as by various species of wildlife.

The Kenai lowland is covered with a forest of spruce, aspen, willow, and birch. Since settlement by white men, many acres have been burned. The 1947 burn spread over 290,000 acres of timber, and the effects are readily visible years later.

### *Wildlife*

**Moose.** Before the 1890's the Range was primarily caribou country, but widespread fires created conditions favorable to moose, which thrive best on early stages of plant succession. By 1910, caribou had disappeared and Kenai became famous for its large moose herd. Sportsmen from various parts of the world were attracted, and as early as 1916 suggestions were made to designate the area a game range.



**Moose**

The late Andy Simons, a famous Alaskan conservationist and guide, catered to hunting parties in the early 1900's, long before roads were constructed in the area. Andy and his clients traveled across Kenai Lake, and down the Kenai River to Skilak Lake, from his home on the Seward side of the Kenai Peninsula. These parties, often including European royalty, spent weeks traveling through the rich Kenai game lands selecting trophy animals.

Approximately 7,500 moose inhabit the Range today. One management function of the Moose Range is to create and maintain good moose forage for this large animal. When mature, the 1,500-pound moose may require 4 to 5 tons of feed each winter.

Habitat improvement is accomplished by controlled burning and by clearing dense stands of noncommercial spruce forests with mechanical equipment. Habitat improvement in heavily frequented wintering areas encourages growth of new succulent woody plants. Harvest of commercial timber is another means of manipulating habitat to create better moose forage. This last method is proposed for certain designated areas in the future.

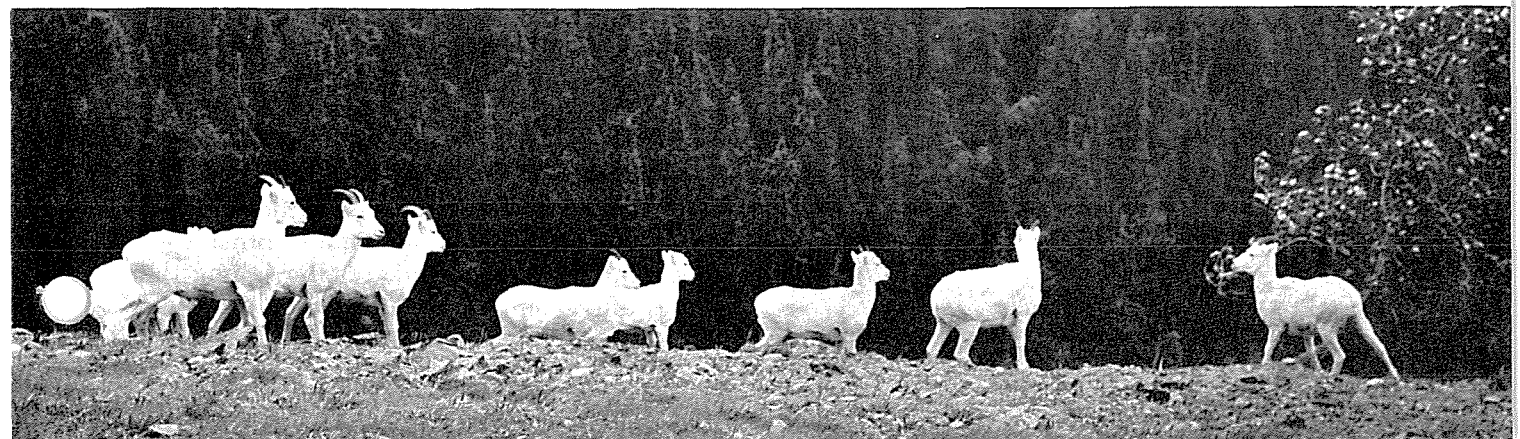
In early winter, when Arctic cold sweeps out of the north and snow deepens, most of the moose migrate to lower elevations to spend

their winters feeding on willow, aspen, and birch twigs. Moose, with their muscular overhanging muzzles, low hindquarters, high shoulders, long necks, large ears, and long legs may appear grotesque, but are well suited to their environment. High shoulders and long necks permit them to reach the higher plant twigs, and their long legs carry them through the deep snows of winter and the marshes in summer. Good swimmers, moose often feed on water plants in ponds and lakes.

Calves are born in early May or June and are long-legged, wobbly creatures that nevertheless soon become adept at following their mother. When spring arrives and snows recede, many moose migrate to mountain foothills for the summer. Others remain in the lowlands and may be seen along roads early in the morning or at dusk. Males begin growing palmate antlers in the spring, and by fall some have an impressive spread of from 5 to 6 feet. Antlers are usually shed in December.

**Dall sheep and mountain goats.** Animals which most typify the mountains of Alaska are the snow-white Dall Sheep and the Rocky Mountain goat. Both are found in the Kenai Mountains. The sure-footed mountain goat inhabits high, rugged, rocky cliffs, trav-

**Dall Sheep**





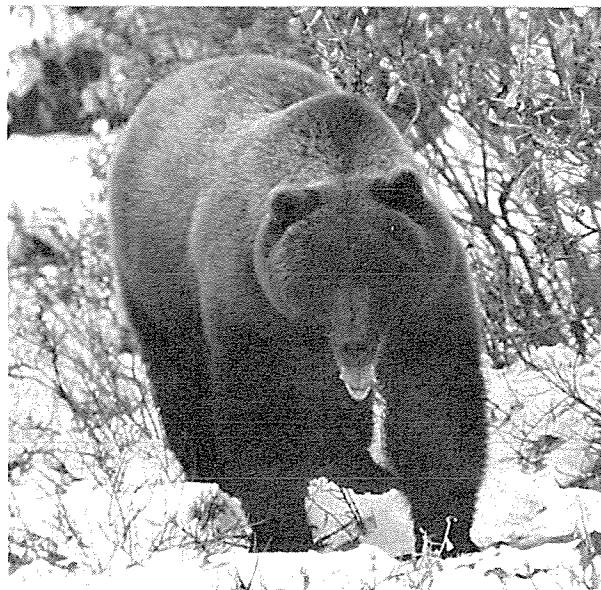
eling with ease in areas where man cannot follow. Both sexes possess backward-curving horns.

Dall sheep are more inclined to inhabit rolling mountain slopes, but may be found on jagged cliffs near the goats. During winter they remain in the mountains, pawing through snow to feed on grasses and sedges. In May and early June, lambs are born and follow their sure-footed mothers over mountainous terrain. Sheep usually run in bands, and later in the summer groups of lambs can be seen playing games of tag and follow-the-leader as they jump over rocks and run around pinacles. Both ewes and rams have horns but those of the female are small. The adult ram carries a magnificent set of fully curved horns.

**Bears.** Brown and black bears inhabit the Moose Range. Brown bears are not numerous and usually seek the solitude of remote areas. The best opportunity for observing this animal is found in the mountain region. Black bears are very common and may be observed anywhere from mountains to lowlands. It is not unusual to see a female ambling along, turning over a rock for some tasty morsel or digging up a few choice roots, while her two or three playful cubs follow behind.

**Other mammals.** Kenai National Moose Range has a variety of smaller animals. Numerous beaver lodges and dams are found in lakes and streams. Beaver fur finds a ready market and is greatly sought by local trappers. During the course of a day, interested wildlife observers may see a small muskrat emerging from a lily-covered pond, ever watchful of the mink, a natural enemy; tree

**Skilak Lake**



**Big Brown Bear**

squirrels scurrying about gathering and hiding their winter cache while chattering in defiance at all intruders; or in the evening, a lynx may appear while the mournful cry of a coyote is heard in the Skilak Lake area. In the mountains, the marmot whistles from rocky crags and an evasive wolverine may be seen loping along.

**Birds.** Birds on the Kenai Moose Range are varied; 168 species have been recorded. Thousands of waterfowl use the lakes, streams, and marshes as resting areas during migration in spring and fall. Waterfowl are best observed in Moose River near the Sterling Highway, at the mouth of Skilak Lake, and on the Chickaloon Flats. Mallards, goldeneyes, teal, and scaup nest along lake shores in the summer. The rare trumpeter swan, once nearly extinct, is an important nester and its trumpet-like call may be heard echoing from one isolated lake to another, a call not soon forgotten.

Bald eagles and several kinds of hawks are present; gull and cormorant rookeries are located on islands in Skilak Lake. Spruce grouse may be observed along gravel roads, and the cackle of ptarmigan is often heard in the high alpine meadows. At dusk, the lonely call of the common loon erupts from many lakes.

Songbirds are numerous. Redpolls, chickadees, and gray jays are winter residents. Spring is heralded by the familiar whistle of the golden-crowned sparrow, swallows darting through the air, and the robin in full song. The golden plover, wandering tattler, northern phalarope, sandpipers, and many other shorebirds may be observed resting along lake shores after completing long migratory flights.



**Fishing by canoe**

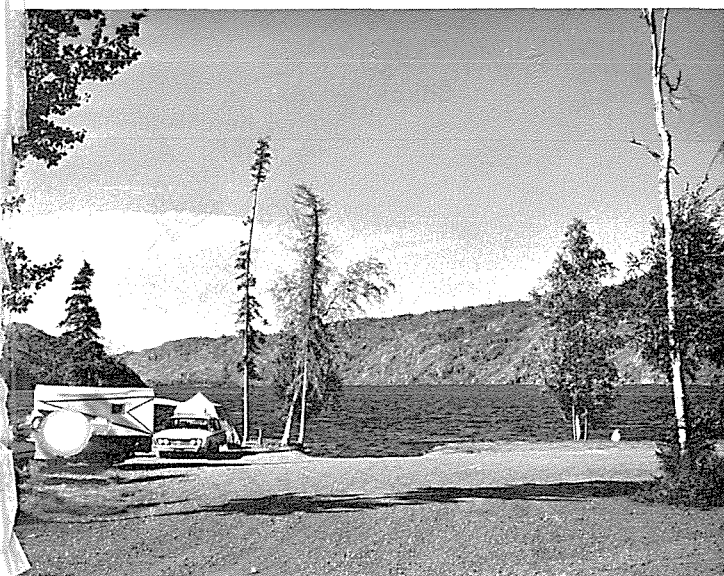
## **Recreation**

**Fishing.** Numerous lakes and streams abound with fish. In season, sport fishermen try their skill on large king, silver, red, and pink salmon, steelheads, and Dolly Varden, rainbow, and lake trout. Good fishing is available close to the highway, but for those who desire more solitude, a fly-in trip to some seldom-visited lake is recommended. Better yet, by canoe you can travel to small lakes and streams and cast a fly on waters seldom fished.

**Camping, hiking, and boating.** To help the visitor to enjoy natural features of the Range, campgrounds, picnic areas, foot trails, horse trails, and a canoe system have been provided. Camping is permitted throughout the Range. An abundance of dead timber is available for campfires.

A number of fine foot trails begin from the Sterling Highway and Skilak Road. These trails meander along lakeshores and through forests, and several climb to higher elevations overlooking scenic terrain. Cross-country travel is invigorating and rewarding.

**Campgrounds provide recreational opportunities**



Mountain areas are a back-packer's delight. One can wander for days enjoying this wilderness atmosphere, photographing various species of wildlife and birds, and camping when the short Arctic night descends.

Boat ramps have been provided at many lakes. Sudden strong winds may rise on Skilak and Tustumena Lakes. Caution is advised for small craft.

A portage system connecting a number of streams and lakes facilitates canoe travel through parts of the interior lake system. Although this system may be traveled upstream from the Moose River Bridge, it is recommended that the canoeist enter from Swan Lake Road where two entrance areas are well marked. From these entrances, he can take a semicircular route through a series of lakes and return to Swan Lake Road, or he can continue by canoe to the headwaters of Moose River and float downstream several miles to the highway bridge. Maps of this area are available at Kenai Moose Range Headquarters and at Skilak Lake Guard Station.

## **General Information**

The Kenai National Moose Range is administered by the Bureau of Sport Fisheries and Wildlife, Department of the Interior, with headquarters in Kenai, Alaska. The Refuge Manager may be addressed at Box 500, Kenai, Alaska 99611. The Moose Range, 112 miles from Anchorage, may be reached by the all-weather Sterling Highway. This road system is maintained throughout the year. The northern border of the Range is only 20 air miles from the City of Anchorage. Air transportation is available at Anchorage, Kenai, and Soldotna. Motels, hotels, stores, and other visitor accommodations are available at nearby towns and resort areas.



## Regulations

Range regulations are designed to protect natural, scenic, and wildlife values in the National interest and for public enjoyment of the primitive scene.

**Hunting and fishing:** Permitted in accordance with State and Federal Regulations. Copies of regulations are available at Moose Range Headquarters.

**Aircraft:** South of the Kenai River, planes may land *only* on lakes and three designated airstrips. Landing of planes in mountain meadows and glaciers in this area is prohibited. No restrictions for landing aircraft are in effect north of the Kenai River.

**Boats:** Boating is permitted in all waters of the Range.

**Camping:** Permitted throughout the Range. Restricted to 2 consecutive weeks at public campgrounds; a 60-day limit is in effect elsewhere.

**Use of motorized vehicles:** Prohibited off established roads.

**Cutting of trees:** Restricted to dead and down timber.

**Garbage:** Must be placed in garbage cans, buried, or removed from the Range.

**Fires:** Permits are not necessary to build campfires, but fires must be attended at all times.



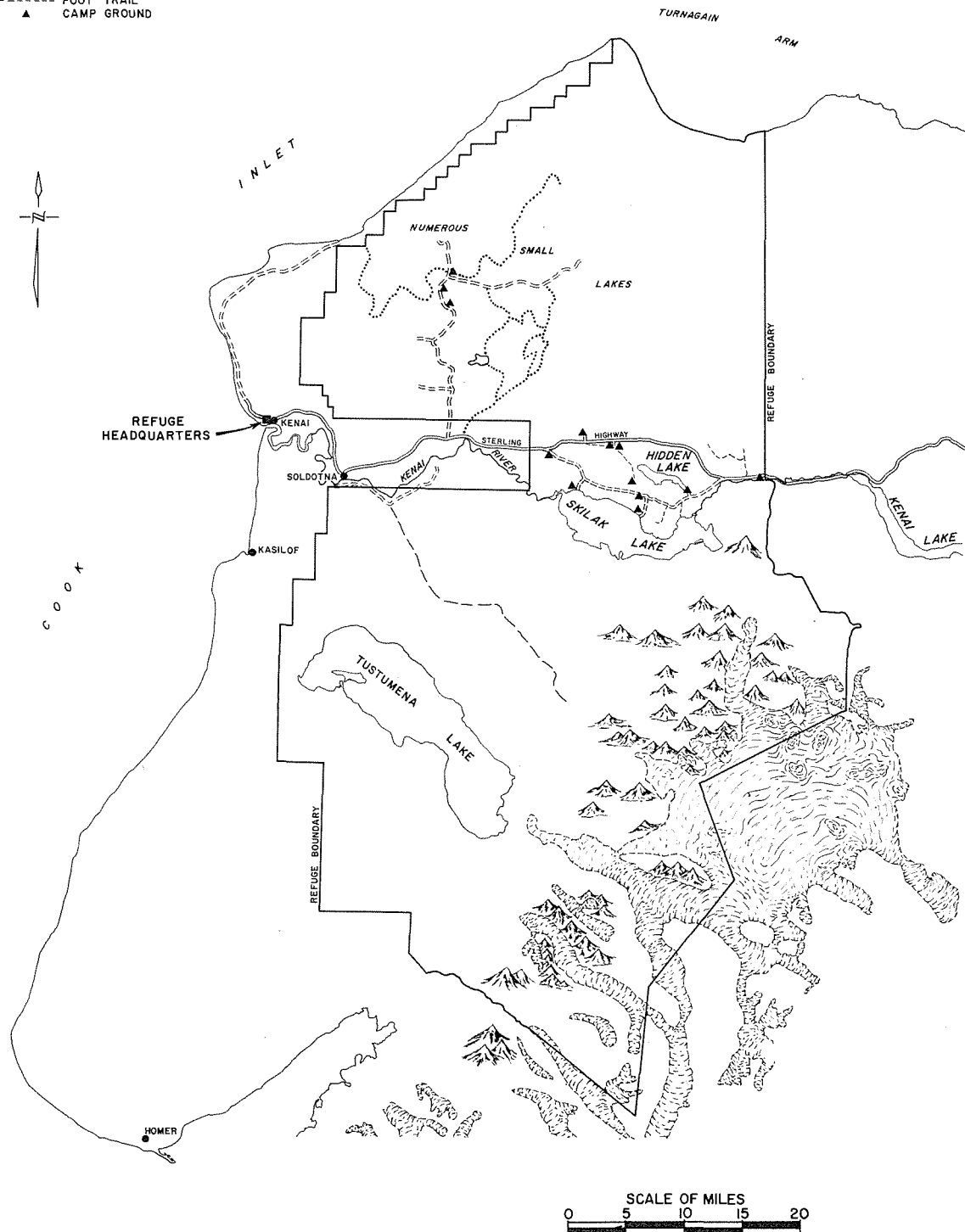
## LOCATION MAP

SCALE 0 50 100 200 300 400 MILES

# KENAI NATIONAL MOOSE RANGE

## LEGEND

- ..... CANOE ROUTE
- HORSE TRAIL
- - - FOOT TRAIL
- ▲ CAMP GROUND



## *Other National Wildlife Refuges in Alaska*

Besides the Kenai National Moose Range, there are 16 other National Wildlife areas in Alaska. As one travels the perimeter of the State from northeast to southeast, they are—

ARCTIC NATIONAL WILDLIFE RANGE, the largest unit in the National Wildlife Refuge System, consists of 8,900,000 acres in the extreme northeast corner of the State. It provides for a variety of wildlife, especially Barren Ground caribou and polar and grizzly bears, and was established in 1960.

CHAMISSO NATIONAL WILDLIFE REFUGE consists of islands in Kotzebue Sound, 641 acres in all. It protects large nesting colonies of Arctic seabirds and was established in 1909.

BERING SEA NATIONAL WILDLIFE REFUGE comprises St. Matthew and Hall Islands in the Bering Sea. It contains tremendously large seabird rookeries. There are 41,113 acres in the refuge, which was established in 1909.

CLARENCE RHODE NATIONAL WILDLIFE RANGE is an important waterfowl nesting area between the deltas of the Yukon and Kuskokwim Rivers. Established in 1960, it contains 1,870,015 acres.

HAZEN BAY NATIONAL WILDLIFE REFUGE, established in 1937, consists of two islands offshore from the Clarence Rhode Range. Its 6,800 acres form a concentrated breeding area for black brant and cackling geese.

NUNIVAK NATIONAL WILDLIFE REFUGE includes all of 1,109,400-acre Nunivak Island off the west coast of Alaska. It is the only home of the muskox in the United States, contains vast seabird rookeries, and was established in 1929.

IZEMBEK NATIONAL WILDLIFE RANGE lies on the north side of the western end of the Alaska Peninsula. It is a vital feeding area for waterfowl, especially black brant. It contains 415,016 acres and was established in 1960.

ALEUTIAN ISLANDS NATIONAL WILDLIFE REFUGE contains most of the islands in the Aleutian Chain, 2,720,430 acres in all. It was established in 1913 and protects a large variety of wildlife, including sea otter.

BOGOSLOF NATIONAL WILDLIFE REFUGE, established in 1909, consists of seabird nesting islets of 390 acres, and lies in the South Bering Sea.

SIMEONOF NATIONAL WILDLIFE REFUGE is an island and associated shoal-waters of 10,442 acres south of the Alaska Peninsula. Its principal purpose is sea otter protection. It was established in 1958.

SEMIDI NATIONAL WILDLIFE REFUGE is a group of islands 100 miles southwest of Kodiak Island, where large seabird colonies nest. It contains 8,422 acres and was established in 1932.

KODIAK NATIONAL WILDLIFE REFUGE consists of the southwestern two-thirds of Kodiak Island. It protects especially the Kodiak brown bear and salmon. It contains 1,815,000 acres and was set aside in 1941.

TUXEDNI NATIONAL WILDLIFE REFUGE lies in Cook Inlet. It protects vast numbers of nesting seabirds. It contains 6,439 acres and was set aside in 1909.

ST. LAZARIA NATIONAL WILDLIFE REFUGE is an island of 65 acres protecting seabird colonies. It is situated near Sitka and was established in 1909.

HAZY ISLANDS NATIONAL WILDLIFE REFUGE lies off the southeast Alaskan coast south of Sitka. The islands protect seabird colonies, contain 42 acres, and became a refuge in 1912.

FORRESTER ISLAND NATIONAL WILDLIFE REFUGE consists of islands and sea rocks where large colonies of seabirds nest. The refuge contains 2,832 acres and was established in 1912. It lies near the southeastern tip of Alaska.

The Department of the Interior, created in 1849, is our Nation's Department of Natural Resources, concerned with management, conservation, and development of water, wildlife, fish, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As America's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States, now and in the future.



## UNITED STATES DEPARTMENT OF THE INTERIOR

### FISH AND WILDLIFE SERVICE

#### BUREAU OF SPORT FISHERIES AND WILDLIFE

WASHINGTON • ISSUED 1966 • RL-14-R



REFUGE NARRATIVE REPORT

1 9 6 8

KENAI NATIONAL MOOSE RANGE

&

TUXEDNI NATIONAL WILDLIFE REFUGE\*

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(transferred June 3, 1968)

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(transferred in June 4, 1968)

Robert A. Richey, Assistant Refuge Manager

Robert K. Seemel, Assistant Refuge Manager

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(transferred June 2, 1968)

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(transferred in July 14, 1968)

Cherie E. Stroud, Administrative Clerk

Rex E. Williams, Maintenance Foreman I  
(transferred June 16, 1968)

John Kodysz, Maintencenceman

U. S. DEPARTMENT of the INTERIOR  
Bureau of Sport Fisheries and Wildlife  
U. S. Fish and Wildlife Service  
Kenai, Alaska 99611

\* no report

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# KENAI NATIONAL MOOSE RANGE

## NARRATIVE REPORT

January - December 1968

### I. GENERAL

#### A. Weather Conditions

The weather during the months of May, June, July, and August was exceptionally warm and dry with temperatures in the high 60's and 70's much of the time. Only 3.22 inches of rain fell during these four months, making it one of the driest since 1936. Usual precipitation is from 8 to 10 inches during the four month period. The fire hazard was extreme during this period and the refuge staff spent considerable time on fire patrols and fire fighting. (See Fires under Section III, sub-section F.)

A summary of this years' weather data as recorded by the Kenai FAA Station follows:

	TEMPERATURES				PRECIPITATION *	
	EXTREMES		10-Yr	This Month	10-Yr.	Snowfall
	Max.Min.	Av.	Av.		Av.	
		Mean	Mean		Mean	
January	37 -24	7.8	19.8	1.03	1.23	8.5
February	47 -33	22.6	24.3	1.29	1.08	12.0
March	45 -11	27.0	22.8	.78	.97	12.7
April	56 1	34.0	31.0	.48	.68	4.7
May	77 30	46.9	42.9	.92	.66	T
June	79 34	52.7	49.9	1.00	1.47	0
July	76 42	58.7	53.3	.27	2.45	0
August	83 34	56.2	53.2	1.03	2.63	0
September	68 20	46.6	46.5	1.05	3.60	T
October	51 11	34.4	35.0	1.34	2.80	.9
November	41 -08	23.9	22.4	1.33	1.45	5.9
December	36 -27	.3	9.5	.50	1.01	7.7
TOTALS				11.02		52.4

\* in inches



## B. Habitat Conditions

1. Water. Water levels in the lakes appeared to remain normal in spite of the lack of precipitation. The ice was out of many lakes by May 10, and by May 17, nearly all lakes were ice-free. Freeze-up began in October and by the first part of November a few of the lakes had enough ice to land wheeled aircraft.
2. Food and Cover. The abundance, condition, and availability of food and cover has remained very good. Due to the mild winter last year the moose were fairly well dispersed and many moved back to the high country early. Consequently there was no apparent over-utilization of the range in any area. The berry crop was somewhat below normal due to the lack of precipitation.

## II. WILDLIFE

### A. Migratory Birds

1. Waterfowl. A sub-normal spring waterfowl migration was observed this year. Appearance of a few ducks in the open water area outlet of Skilak Lake was seen during the first week of April. The first Canada geese on the Moose Range were observed April 14, and by April 23, several hundred ducks and geese arrived. These date records nearly duplicate those of the past year when geese arrived April 15, and were observed in numbers on April 21.

Waterfowl numbers appeared below normal this spring and the favored waterfowl resting area at Chickaloon Flats received far less use than last year.

Throughout the summer numerous lakes were dotted with white-winged scoter, common goldeneye, Barrow's goldeneye and green-winged teal.

From mid-September to mid-October ducks and geese passed through the refuge on their migration south. Duck numbers were considerably lower than in previous years. Groups of birds departed almost as quickly as they arrived.

The first hard freeze occurred on October 10, and shortly thereafter most of the smaller lakes and open swamp-muskeg areas were frozen. A gathering of more than 500 geese were observed October 15 at Chickaloon Flats but late in the month most ducks and geese had departed.

An observation on November 8, by local residents recorded more than 2000 ducks, mostly mallards with some widgeon and green-winged teal on Skilak Lake south of Caribou Island.

Hunting pressure was considered very light.

## 2. Trumpeter Swans

Spring Breeding Population. Although no known trumpeter swans remained on the Kenai this winter, two adults and six cygnets of the previous year were observed March 12 on the West Fork of the Moose River. A closer check revealed one neck-banded adult to be the female marked at Mink Creek Lake the previous year.

Trumpeter swans are usually the earliest species of waterfowl to arrive in the spring. The Mink Creek Lake pair have been the first swans to nest on the Kenai Peninsula for several years and were the first pair to arrive this year.

The Moose River near the Sterling Highway Bridge was again a favorite gathering place for swans. They arrive from other ice-free river areas to the east just as soon as this portion of the Moose River is open. Feeding, grooming and generally resting, the swan pairs usually leave the river once a day travelling to their old nesting sites anxious for "their" lake to be ice-free. These pairs are frequently observed standing on the ice of these selected lakes during the day, returning to Moose River for the night. The birds gathered along the Moose River departed by May 3, two weeks earlier than last year, to their selected nest sites or other ice-free water areas nearer their chosen nesting territory.

On June 6, swan nesting surveys were initiated for the entire refuge. A total count of nesting pairs, location of the nest site, size of clutch and total swan numbers was recorded. At the completion of this survey twenty-seven (27) nesting pair had been located. The largest clutch observed contained seven (7) eggs. Most of the non-nesters were either in pairs or single at this time. During later flights two additional nests were located.

Nesting. A total of 30 active nest sites were located during the summer (Table 1). This is an increase of two sites from last years' total figure and slightly below average for the twelve year period (Table 2). Eight nesting sites utilized last year were not active this season.

Again this season several pairs occupied territories for some time but failed to nest at these locations. These territories,

TABLE 1.

## TRUMPETER SWAN NEST LOCATION, PRODUCTION AND SURVIVAL

KENAI PENINSULA - 1968

Nest #	Location	Clutch Size	HATCHING SUCCESS		SURVIVAL - SEPTEMBER	
			Date Checked	Cygnets	Date	Cygnets
1	Elephant Lake	4	6/19	1	9/12	0
2	Cow Lake	5	6/19	1	9/12	0
3	Silver Lake	4	6/27,28 abandoned	-	-	-
4	Fish Lake ( $\frac{1}{2}$ mi. W)	1	6/27,28 abandoned	-	-	-
5	Upper Moose River	unknown	6/13,25	6	unable to locate	-
6	Brood Lake	4	6/12	2	9/12	2
7	Moose Lake (1 mi. N.)	5	6/19	0	unable to locate	-
8	Moose Pasture (N. Scenic Lake)	4	6/19	1	9/12	1
9	Two Island Lake ( $1\frac{1}{2}$ mi. NE)	6	6/19	5	9/12	5
10	Dipper Lake	5	7/18	4	9/12	3
11	Diamond Lake	5	7/18	4	9/13	4
12	Kuguyuk Lake	5	6/19	4	9/13	2
13	Moose Point (2 mi. SW)	7	Unable to locate	-	9/13	1
14	Hook Lake (1 mi. W)	5	6/19	2	9/13	0
15	Curlew Lake (1 mi. NE)	6	unknown	-	9/13	3
16	Scaup Lake (2 mi. W)	4	unknown	-	unable to locate	-
17	Gray Cliff	5	unknown	-	9/13	4
18	Snipe Lake	5	unknown	-	9/12	4
19	East Forelands	6	7/13	5	9/13	4
20	Beck Lake	unknown	8/20	3	9/13	3
21	Quill Lake	6	7/11	2	9/13	0
22	Wild Lake	4	unknown	-	9/13	2
23	Coal Creek Lake (2 mi. S.)	unknown	abandoned	-	-	-
24	Pollard's Lake	7	6/15	6	9/11	4
25	Clam Gulch	3	7/19	3	9/11	2
26	Fox River	6	7/13	5	9/11	5
27	Bay Lake ( $1\frac{1}{2}$ mi. SE)	unknown	unknown	-	9/11	1
28	Tony's Lake	unknown	unknown	-	9/13	5
29	Caribou Lake	6	8/9	5	9/11	4
30	Killey River	unknown	unknown	-	9/11	2

TABLE 2.

TRUMPETER SWAN PAIRS NESTING  
ON THE KENAI PENINSULA 1957-1968

<u>Year</u>	<u>Number of Nests</u>
1957	20
1958	21
1959	20
1960	27
1961	30
1962	25
1963	22
1964	25
1965	39
1966	36
1967	28
1968	30

near nesting sites utilized often in past years, were located at Mink Creek, Swan Creek, Nest Lake, Coal Creek Lake (1½ mi. S), and Mackey's Lake.

The Fox River pair, which until this year occupied a nest site near the rivers' west bank, moved one-quarter mile east of the river, constructed a nest in the muskeg and raised five cygnets.

New nest sites were constructed at Quill Lake, at a small lake 1½ miles northeast of Wild Lake and on the Upper Killey River. The nesting pair at Caribou Lake, three (3) miles south of the Moose Range boundary, was recorded this year. This nesting site has apparently been utilized by swans for several years.

The disturbance by fishermen is likely responsible for the lack of a nesting pair at Nest Lake this year. Past seasons exploits by a group of avid fishing enthusiasts working on the Moose Pen fence construction project nearby resulted in disturbance while the swan family was yet young. The Nest Lake pair remained in the immediate area several weeks but refused to nest.

Construction of a right-of-way on State lands and parallel to the refuge west boundary has traversed several swan nesting territories. Continued disturbance along this route may displace these nesting sites to new locations.

Nesting Period and Incubation. The Mink Creek pair were again the earliest on their nest site. This pair was seen May 7, at the nest but later observations indicated they did, in fact, not nest.

Lack of sufficient surveillance flights this year prevented accurate and complete information on incubation periods.

The first cygnets of the year were observed June 12 at the Brood Lake site. The incubating adult rose slightly from the nest during a low pass with the aircraft, revealing two newly hatched cygnets and two yet unhatched eggs. An aerial survey of the Upper Moose River swan nest site the following day revealed six cygnets in company with their parents. The Pollard's Lake clutch hatched June 15, four days earlier than last year. Mr. and Mrs. Fletcher, who live in a home overlooking the lake, reported a 34-day incubation period. By the end of the third week in June most swan eggs on the Kenai had hatched.



Clutch Size. The clutch size of 23 nests was recorded prior to hatching. The largest clutch this year contained 7 eggs and the smallest 3 eggs for a mean of 5.1 eggs per nest (Table 3).

Hatching Success. Nest sites at Mink Lake, Fish Lake, Silver Salmon Lake, and Coal Creek Lake were abandoned prior to hatching. These nests and their eggs may have been destroyed by predators. We do know by aerial surveys of nest sites and late cygnet counts, at least 139 swan eggs were laid during the season. Of the 82 eggs recorded in 16 nests, 50 eggs produced cygnets for a hatching success of 61 percent. This figure is slightly less than the 63 percent success figure of last year and considerably less than the 79 percent figure of 1967. The tardy survey of nesting sites following hatching may be partly responsible for this low percentage.

At least 8 nests were abandoned which contained one to three unhatched eggs following the hatching success of one or more cygnets. Uncovered nests revealed eggs not actively incubated on June 28 and July 18. The nest at Quill Lake contained three cold eggs as late as September 13. Poor survival of the first clutch may have induced renesting at this site.

Survival and Mortality. A total swan count for the Kenai Peninsula was conducted September 11-13. A pilot and one observer in a PA-18 aircraft flew a count time of 11.3 hours. Fifty-three swan observations were recorded during the counting period. A total of 181 swans were observed, including 21 broods with 65 cygnets.

Sixty-one cygnets from the thirty recorded nesting sites survived and reached flight status. Cygnets in broods number 1, 2, 15 and 21 apparently did not survive. We were unable to locate broods number 5 and 16 but they may have survived. Of the 81 cygnets observed during this season, 65 were again observed during the September count.

No adult mortalities were recorded or reported during the past year. (See VI, Public Relations, E. Violations.)

Banding and Marking. No banding or marking was accomplished this year. Four adults and nine cygnets were banded in 1967 with Monel #9 BSF&W bands. All the adults and five cygnets received red-plastic neck bands. Banded adults were observed on several occasions near the banding nest site areas used in 1967. However, we were unable to approach the birds sufficiently close to read the individual letters on the neck bands therefore determining, if in fact, these were the same birds. The distance between banding areas and annual utilization of these sites would suggest the same pair had indeed returned to their favorite nest site.

TABLE 3.

CLUTCH SIZE OF 23 TRUMPETER  
SWAN NESTS ON THE KENAI PENINSULA - 1968

<u>CLUTCH SIZE</u>	<u>FREQUENCY</u>
7	2
6	6
5	8
4	6
3	1
2	0
1	0

Range 3-7

Mean 5.1 eggs per nest

Wintering Population. This year wintering swans were not observed at the Skilak Lake outlet. We have no record to indicate wintering swans on the refuge this season. Two adults and one cygnet were observed in company on November 7 at Upper Russian Lake.

Reports of single cygnets in mid-October and early November at Pollard's Lake, Tony's Lake, and Watson Lake were volunteered by the public. Small areas of open water were available to these birds-of-the-year at these lakes. During the last days of December, a cygnet was retrieved near the North Kenai Road. This bird was released January 3, 1969 at the Kenai River in open water below Skilak Lake. In all cases, these young birds were subject to human contact and associated activities, refusing to depart southward in company with the family group.

West Side Cook Inlet Surveys. The sample area on the west side of Cook Inlet was flown this year by the Management and Enforcement staff from Anchorage. This survey was flown during late August in conjunction with a total survey of the west side and Susitna Flats areas.

### 3. Other Migratory Birds

Eleven sandhill crane were observed during July and August northeast of the Kenai Airport. Ten additional birds were seen near Slikok Lake on August 20. On September 11, seventy to eighty birds were observed resting east of Bottinentnin Lake before their continued migration southward.

## B. Upland Game Birds

1. Spruce Grouse. Larry Ellison of the Alaska Department of Fish and Game completed his studies of the movements and behavior of Alaskan spruce grouse during the breeding season. These studies were conducted on the Moose Range in the Finger Lake four-square-mile study area. Observations suggested a density of approximately ten males per square mile in 1965 and 1966, and seven males per square mile in 1967. During the latter two years, the spring population was composed of about 30 percent territorial adults and 70 percent juveniles, with one-half or fewer of the juveniles territorial.

A female spruce grouse with six chicks was observed July 8 on Sports Lake Road. On August 13, in the same general area, two adults and four juveniles were observed picking up gravel.

A considerable number of grouse were harvested during the fall hunting season. Many hunters were observed travelling the Swanson River, Swan Lake and Skilak Lake Roads. Hunting success was generally fair to good during early morning hunts.



The spruce grouse population compared favorably with numbers last year and indicated little change.

2. Ptarmigan. Ptarmigan populations again appeared reduced in some areas while the isolated mountain populations remained noticeably unchanged.

All three species of ptarmigan: willow, rock, and white-tailed, were observed between May 31 and June 2 by a group of hikers (Alaska Conservation Society Directors) during their travels from Lake Emma across the mountain to the north fork of Indian Creek. Rock ptarmigan were observed on their breeding territories above timberline.

Ptarmigan were observed picking at gravel on Skilak Lake Road November 9. A group of six ptarmigan were also seen November 13 near Mile 5, Mystery Creek Road.

Hunting pressure was again very light this year. Extended period of cold weather contributed to the lack of hunting enthusiasm although few hunters will expend the necessary effort to reach mountain elevations containing large ptarmigan populations.

#### C. Big Game

##### MOOSE

1. Productivity. Two aerial surveys were conducted this year to obtain productivity information of moose. The annual calving inventory was flown in late June and a composition count was conducted during December.

June Calving Inventories. Calving inventories were flown in the Moose and Chickaloon River flats between June 25-29 as in past years. The five surveys were flown by Robert Richey in a PA-18 aircraft between the hours of 5:00 and 9:00 a.m. (Alaska Daylight Saving Time).

The calf-cow ratio for this survey was 45:100, slightly above the nine year average and considerably below the 63:100 for the previous year's count in this area (Table 4). Calves represented 18.2 percent of the population surveyed, a noticeable drop from last years 22 percent. However, last year calf production was the highest reported during this nine year recording period. The first moose calf this season was observed on May 17.

Table 5 indicates yearlings represented nearly 30 percent of the total population this year, an increase of one percent of the 1967 figure. Prevailing mild winter conditions

TABLE 4

MOOSE CALF PRODUCTIVITY IN THE  
MOOSE RIVER - CHICKALOON RIVER AREAS  
AS DETERMINED FROM AERIAL SURVEYS  
DURING THE LAST TWO WEEKS IN JUNE 1960-68

Year	No. Calves/100 cows	Percent Calves
1960	58	18
1961	41	14
1962	28	16
1963	45	17
1964	44	18
1965	38	19
1966	29	14
1967	63	22
1968	45	18
Nine Year Average	43	17



TABLE 5

COMPOSITION OF THE MOOSE POPULATION IN THE MOOSE  
RIVER AND CHICKALOON AREAS IN LATE JUNE 1968

Date	Single Cows	♀ 1C	♀ 2C	Total Calves	% Calves of Total	Total Cows	Total Bulls	Total Yrlg.	% Yrlg. of Total	Total Moose	R A T I O Calves:Cows:Bulls		
6/25	38	18	2	22	16.4	58	19	35	26.1	134	38	:100	:33
6/26	71	23	4	31	13.5	98	30	70	30.6	229	32	:100	:31
6/27	77	43	11	65	22.5	131	24	69	23.9	289	50	:100	:18
6/28	25	29	3	35	20.5	57	19	60	35.1	171	61	:100	:33
6/29	31	15	5	25	17.9	51	16	47	33.6	140*	49	:100	:31
TOTALS	242	128	25	178	18.2	395	108	281	29.9	962	45	:100	:27

\* Includes one injured calf alone.

Total Count Time 18.6 hours

Average moose counted per hour: 51.7

greatly eliminated the calf loss experienced during severe winter conditions late last season.

There were numerous observations to indicate twinning was again common to the survey area. For every 100 cows with calf, sixteen had produced twins. During the summer additional sightings of twins indicated a healthy production year.

Productivity from October Composition Counts. Composition counts of three major hunting areas to determine the bull to cow ratio during the rut and some additional productivity knowledge were not flown this year.

2. Population Inventory. The Square Mile Quadrat method of censusing the moose population was not used this year. Instead, a survey of the population was conducted using the Total Unit Census method, a censusing technique utilized on the Kenai since 1950 and last flown in 1964. This method provided information on the population trend, the fall composition and the distribution of the population during the censusing period.

Poor snow cover postponed this annual census until early December. Following substantial snowfall on December 2 and 3, the census began the next day.

The survey was flown between December 4-14 using one Supercub and a Cessna 180. Counting conditions were good during this period with clear days and temperatures from 20 below to 10 above zero. Additional aircraft and Bureau pilots were not available during this period seriously restricting the total effort. Refuge personnel flew with pilot Bob Richey with aircraft assistance from River Basins pilot Chuck Evans and the M. and E. pilot Ray Tremblay both from the Anchorage Office. with Game Management Agent Don Coombs as observer.

The Moose Range was divided into 25 censusing units based on existing recognizable geographic features. The large and highly concentrated moose units north of the Kenai River were flown first. Several days of survey were conducted before deteriorating weather and other commitments prevailed. Unfortunately, only 60 percent of the total Range census was completed. Those completed units included 9B, 12A, 12B, 15B, 18A, 18B, 19C, 19D, 19E, and 19F.

A total of 2661 moose were recorded during this inventory including 137 unclassified animals (See Table 6). The calf population totaled 25 percent of the total moose recorded, however, during this early winter count some bulls had already dropped their antlers so an accurate calf-cow ratio could not be obtained.

TABLE 6

## COMPOSITION OF THE MOOSE POPULATION NORTH\*\* OF KENAI RIVER IN EARLY DECEMBER 1968

BY THE TOTAL UNIT CENSUS METHOD  
(Includes 80 percent of Game Management Unit 15A)

Date	Unit	♀ w/o	♀ w/1	♀ w/2	Lone calves	Total calves	% Calves of total	Total ♀	Total ♂	Total Yrgl ♂	% Yrlg. of Tlt.	Unc.	Total Moose	R A T I O Calves: ♀ : ♂
12/10,11	9B	49	56	2	2	62	32.6	107	21	7	3.7	0	190	58:100:20
12/9,10	12A	242	131	6	1	144	24.4	379	66	31	5.3	0	589	38:100:17
12/11	12B	152	152	4	7	167	32.1	308	46	17	3.3	0	521	54:100:15
12/14	15B*	129	52	2	1	57	20.1	183	43	21	7.4	0	283	31:100:24
12/4,5,6	18A	258	155	14	3	186	27.8	427	55	28	4.2	0	668	44:100:13
12/5	18B	79	37	4	0	45	18.1	120	34	19	7.7	49	248	38:100:28
12/6	19C	7	4	0	0	4	18.2	11	2	0	0.0	5	22	36:100:18
12/5	19D	9	1	0	0	1	5.6	10	0	0	0.0	7	18	10:100: -
12/5	19E	2	0	0	0	0	0	2	0	0	0.0	5	7	- :100: -
12/4,5	19F	18	10	0	0	10	8.7	28	6	2	1.7	71	115	36:100:21
TOTALS		945	598	32	14	676	25.4	1575	273	125	4.7	137	2661	43:100:17

\* Mountains NE of Hidden Lake and area North and East of Hidden Creek not surveyed.

\*\* Unit 15B is located adjacent to and bordering the Kenai River and Skilak Lake outlet south.

Total flight time: 39 hours

Total count time: 29 hours

Average Moose Counted per hour: 92



We presently are unable to accurately determine the percentage of the moose counted to the actual number present. However, the previous four years census using the Quadrat Sampling Method indicates we observe and record slightly more than 50 percent of the total moose in the count area.

Discussion. The data recorded in Table 6 represents only a 60 percent survey of the total moose habitat on this refuge. If the fifty percent figure of moose recorded to actual numbers present is a valid assumption, there is strong reason to believe as many moose are presently residing on the refuge as the previous four years population estimates indicate. The partial 1968 moose composition survey did not provide an indication of population stability when compared to past composition surveys, but rather that of a growing population trend. In fact, to extrapolate known information into those less and scattered populated areas not surveyed would indicate a greater total moose population than those of earlier estimates.

The faster Cessna flew a series of parallel courses in Units 19, all of which contain vast spruce forests. The increased airspeed, limited aircraft visibility, gross habitat cover and the resulting moose observations would indicate the 50 percent figure of moose observed to actual numbers present was indeed high.

Fall hunting pressure and harvest in the census area nearly paralleled last season's efforts. A recorded total of 265 bulls were harvested in 1967 and this year records indicate 16 fewer animals taken, of small consequence to the total population estimate.

### 3. Population Composition

Spring. A spring population composition was obtained during the calf survey in late June. Of the 962 moose tabulated in the Moose-Chickaloon River Flats there were 108 bulls, 395 cows, 178 calves and 281 yearlings. A percentage breakdown of these tabulations indicate, for this area of the Moose Range, 11 percent bulls, 41 percent cows, 18 percent calves and 30 percent yearlings.

Comparing these results with those of 1967 we note a 3 percent decrease in the bulls observed and a 9 percent increase of cows. Calf production lowered 4 percent and yearlings remained the same.

Fall. Our discussion earlier in this section indicated the Total Unit Censusing observations and recordings during early December could not, with reliability, be utilized to determine the composition of the population because some bulls had indeed dropped their antlers by this date.

During the third week of November despite poor snow conditions the Alaska Department of Fish and Game conducted composition counts south of Tustumena Lake. The total moose recorded for this entire area numbered 1883 animals. Air count time totaled 31.1 hours, which included Unit I.

The Caribou Hills area, Unit I, is almost entirely within the Moose Range. A total of 506 moose were recorded for this unit, less than half the total number moose (1042) counted the year before. This year's composition breakdown was 141 (28 percent) bulls; 293 (58 percent) cows; and 72 (14 percent) calves for a ratio of 24.6 calves per 100 cows. These percentage figures are within 3-5 percent of the 1967 census tabulations for this area.

4. Movements. Light snowfall for the second year delayed migrational movements from the mountain foothills to the lowland areas.

Large moving concentrations of moose were observed December 14 at the southwest edge of Skilak Lake. Groups of four to fifteen animals appeared as they departed the spruce forest traveling northwesterly across a portion of the 1947 Burn. Nearly 300 moose were observed moving through this area this day.

Some downward movement of moose along Mystery Creek Road was recorded in mid-November shortly before the hunting season ended. Large concentrations of moose were observed on September 18 during the rut just three to four miles east of Mystery Creek Road on the benchland south of Mystery Creek.

Nearly 200 moose were observed just north of the Robinson Loop Road December 10 and 11. Three days later these moose had moved out of this area and north of Sunken Island Lake Road. Large concentrations of moose were also recorded in the sparsely timbered area just north of Site 19.

Small groups of animals were observed feeding in the Slikok Range Rehabilitation area as early as the first week in November. Large concentrations of animals in this area were not observed as in past years.

Numerous moose were seen October 18 near treeline in the Caribou Hills. One group of 18 animals contained 4 very large bulls and many additional groups were observed throughout the spruce forest near Trophy Lake.

5. Tagging Program. An experimental moose tagging and collaring project in cooperation with the Alaska Department of Fish and Game was initiated in the Upper Mystery Creek drainage. This is an attempt to delineate one of the several sub-populations on the Moose Range and to record their movements.



An initial survey on September 18 located numerous moose in the planned tagging area. On October 21 the programmed neck-collaring and ear-tagging operation began in the headwaters drainage of Mystery Creek. This operation was conducted utilizing two crews working from one helicopter. A Bureau aircraft piloted by Assistant Refuge Manager Richey flew cover.

When a moose has been shot with a tranquilizing dart, the cover pilot keeps track of the animal until it goes down, then notifies the helicopter crew which has been waiting in the copter on the ground and the crew then moves in to the downed animal. Once the crew reaches the moose the copter takes off, picks up the other crew and moves in on another animal which the cover pilot has previously located. The ground crew measure the animal, extract an outside incisor tooth for aging, take a blood sample, affix a numbered metal tag on each ear and place a four inch wide fluorescent plastic collar around its neck; orange collars on cows and yellow on bulls. Only adult animals are tagged.

This entire operation may appear simple and efficient but the moose frequently do not cooperate. During the first day's operation twelve moose were shot but only six were handled. Some animals failed to become immobilized, rising to their feet on approach of the crew, who often had to make hasty retreats.

A number of times darts failed to penetrate the hide or simply glanced off. Tranquilizer dosages had to be increased since these animals, in prime condition, apparently have greater body weight.

The initial plan was to tag 40 cows and 10 bulls but the operation came to a sudden close with the crash of the helicopter November 4, at the head of Mystery Creek. A total of 26 moose had been tagged, including 11 bulls by that date.

Numerous sightings of marked moose from the Mystery Creek tagging area have been recorded since the close of this year's tagging effort. Several observations have come from the Sportsman's Lodge area on the Sterling Highway. Other sightings have been made along the highway near mile 65 and 67. One tagged animal was seen northwest of Hidden Lake and several tagged moose were observed between mile 6-8 near Mystery Creek Road. On December 12 one tagged female had traveled at least 23 miles from its tagging point to an area near the moose pen complex where it was observed.

6. Hunting Kill. Hunting regulations this year permitted the harvest of one bull and in two areas the taking of an antlerless moose by permit only. For the first time Unit 15A, that

area north of the Kenai River, was closed to aircraft hunting during the beginning 12 days of the season. This regulation was generally well excepted, especially by those ground hunters using canoes and boats on the rivers and lakes and those preferring to hike into their selected hunting areas. Harassment by aircraft during a ground hunt has been a source of undesirable competition for many years.

Following the opening of this Unit to aircraft hunting a remarkably few aircraft were observed in the area. Perhaps these usual early Moose Range aircraft hunters visited other management units open to hunting and were successful. Perhaps many hunters may have taken this opportunity to hunt waterfowl for that opening week coincided with the Unit 15A opening to aircraft use. The season was also shortened 10 days in this Unit, ending September 20.

Antlerless moose permits were issued for Units 15B and 15C, those areas south of the Kenai River. One hundred permits were issued for the Upper Skilak Bench area and 150 permits for the Upper Deep Creek area (See Figures 1 and 2 ). Hunter success was very poor in both areas. Only six antlerless moose were harvested in Unit 15B and twenty in Unit 15C. Access to these remote antlerless areas was perhaps difficult and the animals were not abundant during the early season. Unfortunately the regulations stated, "Persons holding unfilled permits on September 30 may be allowed to take antlerless moose at a later date in areas described by Commissioner's announcement only if conditions warrant." Many permit holders gambled on the opening of the late season to harvest their antlerless moose, a time that moose are usually moving and more accessible to the hunter. Unfortunately for many hunters, that second antlerless moose season was not approved by the Commissioner.

The late moose season opened November 1, terminating November 20. Hunter success increased as the animals began to move down from timberline concentrating along the Mystery Creek access road and in the Caribou Hills, making them available to road hunters and snow vehicle users just outside the Moose Range boundary.

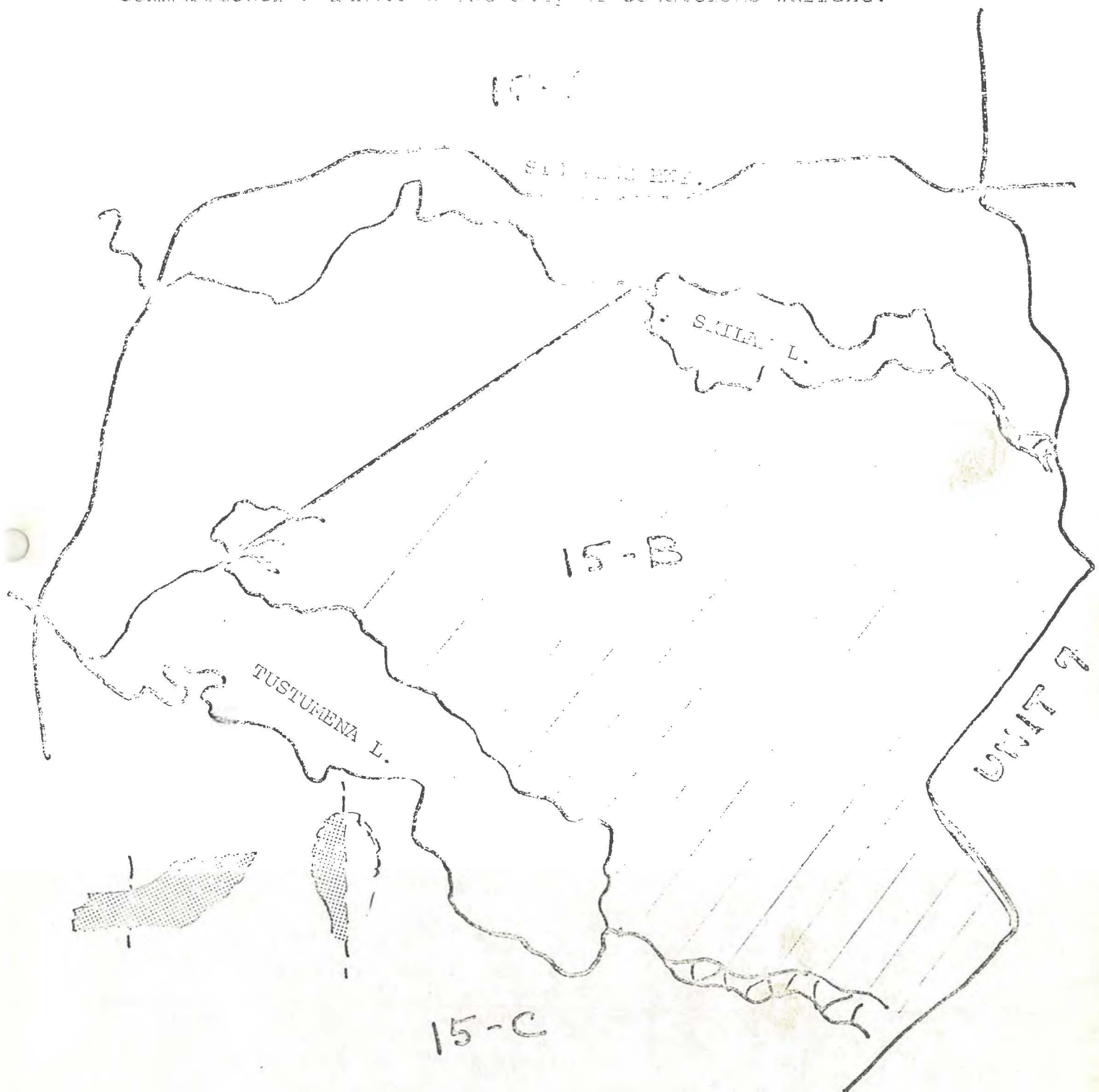
Hunting regulations require each moose hunter to obtain a harvest ticket prior to moose hunting. The hunter is required to return the ticket following a successful hunt with information including the location, area, sex, date and method of transport. Unsuccessful hunters must return the unused tickets. The data on Table 7 was obtained from these records.

Hunter success this season was lower than last and success last season was the lowest recorded for many years. Again, mild temperatures and lack of deep snow failed to drive mountain populations into the lowlands thereby providing available moose for hunters.

Fig. #1 SHADED AREA INDICATES PORTION OF 15-B OPEN FOR ANTLERLESS MOOSE HUNTING

100 Permits will be issued - Antlerless season Aug. 20 thru Sept 30, 1960

Person holding unfilled permit as September 30 may be allowed to take antlerless moose of a 15-B type in areas designated by Commissioner's announcement only, if conditions warrant.



#### INSTRUCTIONS

Within 15 days from date of kill, the forward portion of the lower jaw (see above diagram) and permit must be delivered to the Department of Fish and Game in person or by mail in a plastic bag and envelope furnished for this purpose.

150 Permits will be issued

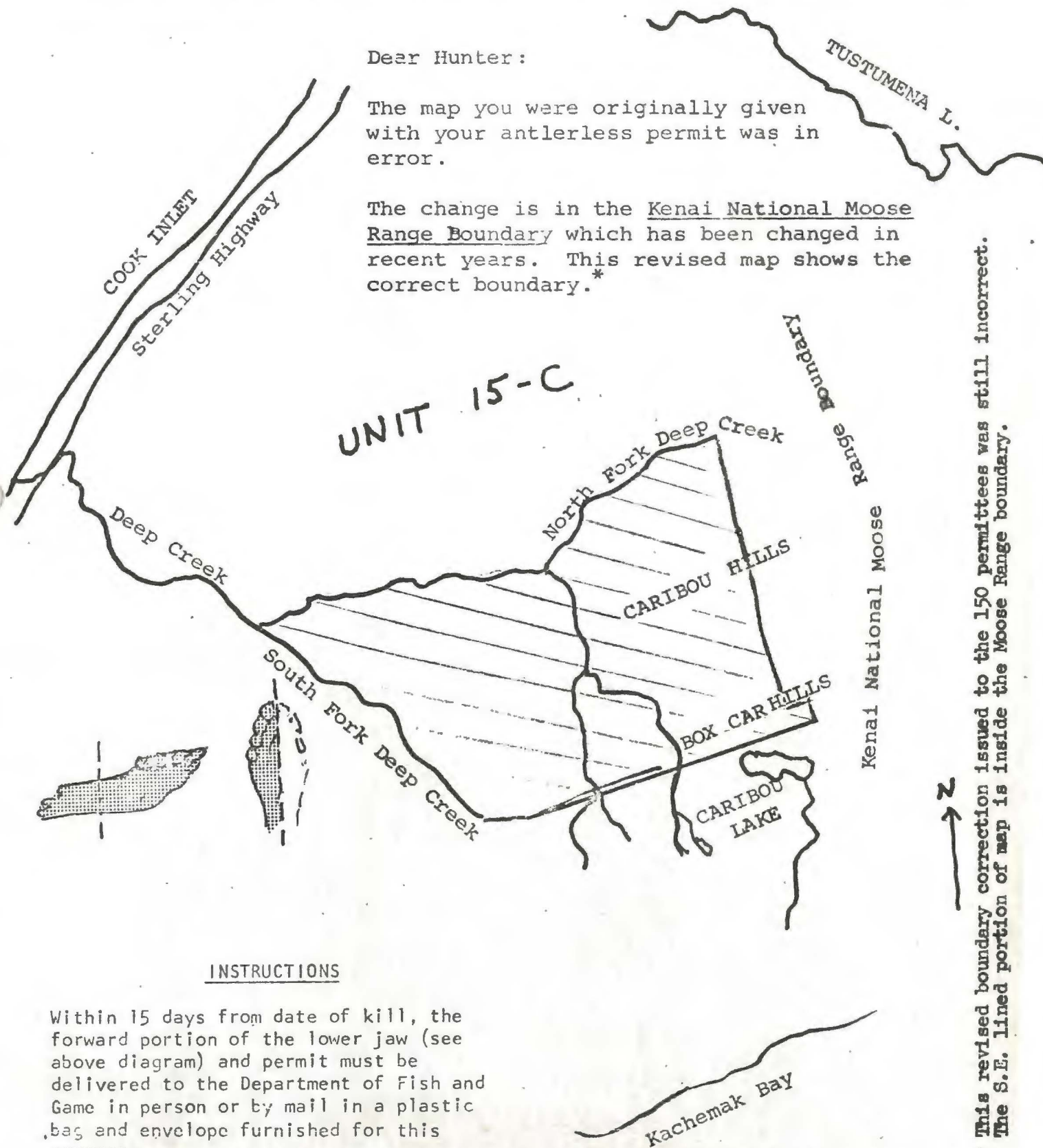
FIGURE # 2

Persons holding unfilled permits on September 30 may be allowed to take antlerless moose at a later date in areas designated by Commissioner's announcement only if conditions warrent.

Dear Hunter:

The map you were originally given with your antlerless permit was in error.

The change is in the Kenai National Moose Range Boundary which has been changed in recent years. This revised map shows the correct boundary.\*



#### INSTRUCTIONS

Within 15 days from date of kill, the forward portion of the lower jaw (see above diagram) and permit must be delivered to the Department of Fish and Game in person or by mail in a plastic bag and envelope furnished for this purpose.

\* This revised boundary correction issued to the 150 permittees was still incorrect. The S.E. lined portion of map is inside the Moose Range boundary.



TABLE 7

## DISTRIBUTION OF THE MOOSE HARVEST

IN UNIT 15 - 1968

	<u>♂</u>	<u>♀</u>	<u>UNK.</u>	<u>TLT.</u>
<u>UNIT 15(A)</u>				
North of the Kenai River	228 (265)*	1	5	234
<u>Unit 15(B)</u>				
Between the Kenai River and Kasilof River	93 ( 75)*	6	1	100
<u>Unit 15(C)</u>				
That area from Kasilof River south	361 ( 60)**	20	3	384
Unknown	68	0		69
TOTALS	750 (400)	27	10	787

\* ( ) indicates 1967 harvest

\*\* ( ) includes harvest on Moose Range only.



Poor hunting success was also attributed to the lack of bulls in the lowland population. Yearling bulls account for the majority of the kill and these are not readily available.

For the second year hunter success was greater south of the Kasilof River in Unit 15C, than in the two units north of the river. Fifty-three percent of the total harvest in Unit 15 was recorded in Unit 15C which includes the Caribou Hills but otherwise concerns areas outside the Moose Range.

Apparently success varied in some areas for Troy Hodges, owner of the Soldotna Air Service, remarked he had transported 11 bull moose from the Lower Funny River area in three days.

Other. On June 27, a cow moose accompanied by a yearling calf was struck by a car at mile 100 on the Kenai Spur Road. The cow had a broken leg and was consequently shot. Upon butchering the animal it was found to contain a female fetus. This date is the latest official record of an adult cow moose still bearing a fetus and may be an indication of a lack of sexually mature bulls in the Kenai lowland area.

Road kills again took their toll of both moose and vehicle. Officially recorded vehicle road kills on or bordering the Moose Range follow:

January	3
February	1
March	1
April	1
May	2
June	1
July	2
August	2
September	0
October	3
November	5
December	21

A total of 42 road kills were reported but several additional animals were struck by vehicles and not located. Other kills were unofficially retrieved before State or Federal personnel arrived at the scene for pickup.

## DALL SHEEP

### 1. Population Surveys

Aerial. Our aerial Dall sheep surveys this year were conducted by the Alaska Department of Fish and Game. The purpose of these surveys was to map distribution, enumerate the total population and determine lamb production (See Figure 3).

No serious attempt was made to classify rams, ewes or yearlings. It was felt that rams could best be classified during the rutting season and that yearlings should be classified in early spring. It is very difficult to separate from an aircraft, young rams and yearlings from ewes during the summer unless a disproportionate amount of time is spent examining each group. Therefore, an attempt to determine all age and sex classes during one survey in the summer as has been done in the past, was not conducted because of the possible associated confusing and misleading results.

The Surprise Mountain population was surveyed on June 19 by observer Paul LeRoux and pilot Lyman Nichols flying a PA-18 aircraft. A good total count and lamb production record was obtained but yearlings were difficult to identify due to their size and the confusion associated by many lambs and large groups.

Surprise Mountain sheep population records from 1952 indicate this 1968 population the largest ever recorded. This 275 sheep population increased 53 animals (23.9 percent) since the 1967 count and 20 animals from the 1966 tabulations (Table 8).

Lamb production displayed a marked increase from the 31 tabulated in 1967 surveys. The 68 lambs observed this season constitutes 25 percent of the Surprise Mountain population. This is an increase of 119 percent in lamb production over the preceeding year.

There are known movements of small bands of sheep between Surprise Mountain and Cooper Mountain to the east. Past aerial surveys have tabulated total populations and later ground surveys have indicated an increase or perhaps decrease of twenty or so animals. The following sheep population in July 1964, 1965 and 1966 is 255, 222, and 275 respectively. These observations may indicate a temporary but relatively stable population.

Sheep surveys for the remainder of the refuge were conducted July 16 and 17. Mr. Nichols was again piloting a PA-18 aircraft accompanied by observer T. Smith. The weather was clear and counting conditions good. An additional 991 sheep were observed, including 180 lambs for a grand total of 1266 animals (Table 9).



Figure 3. Area Distribution of Sheep and Goats During the June-July 1968 Aerial Surveys

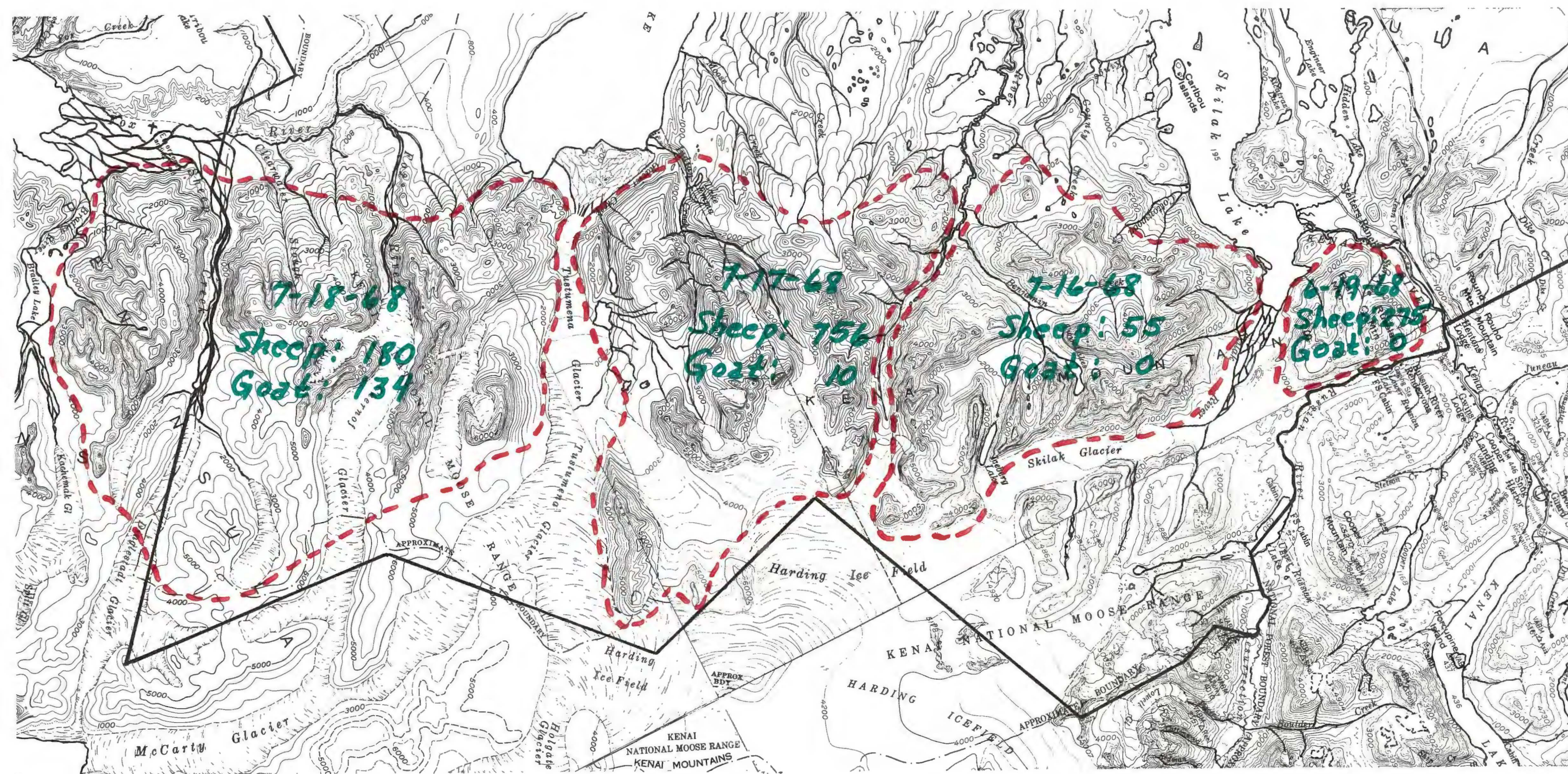




TABLE 8

SHEEP POPULATION SURPRISE MOUNTAIN  
July 1964-68  
KENAI NATIONAL MOOSE RANGE

SURPRISE MOUNTAIN (Ground Surveys)				TOTAL MT. AREAS Incl. Surprise Mt. (Aerial Surveys)		
Year	Lambs	% of Total	Tlt No On Mt.	Lambs	% of Total	Total Sheep
1964	19	13	147	123	12	1030
1965	44	25	179	175	19	914
1966	66	26	255	196	19	1046
1967	31	14	222	108	15	714
1968*	68	25	275	257	20	1266

\*Includes that area from Dinglestadt Glacier to Bradley Lake outside the Moose Range. All aerial surveys.

TABLE 9

## SHEEP AERIAL COUNT SUMMARY - 1968

## KENAI NATIONAL MOOSE RANGE

Area	Date	Rams	Lambs	% of Lambs Tlt Count	Uncl.*	Total
Surprise Mountain	6/19	33	68	24.8	174	275
Skilak River to Killey River	7/16	12	9	16.4	34	55
Killey River to Tustumena Glacier	7/16,17	141	158	20.8	457	756
Tustumena Glacier To Bradley Lake**	7/17	56	22	12.2	102	180
<b>TOTALS</b>		<b>242</b>	<b>257</b>	<b>18.6</b>	<b>767</b>	<b>1266</b>

\* Includes all sheep other than lambs and positive ram observations.

\*\* Includes that area from Dinglestadt Glacier to Bradley Lake outside the Moose Range.



This total does, however, include approximately 60 sheep observed between Dinglestadt Glacier and Bradley Lake, an area immediately outside the refuge. Removing these animals from the total population, this balance is the largest number of sheep ever recorded on the refuge. Lamb production apparently good throughout the range, included 257 animals or 20 percent of the total population, the highest production figures recorded during the past nineteen years. The mild winter contributed to a good survival and in early May, sheep were feeding on the lower exposed slopes where they could utilize new green shoots.

Ground Counts. Ground counts were not conducted this year.

2. Hunting Kill. The sheep hunting season began August 10 and closed September 20. Each hunter was again permitted one ram with  $3/4$  curl horns or larger. As with moose hunters, each hunter is required to obtain a sheep harvest tag prior to his hunting effort. Following this effort, whether successful or not, the harvest ticket must be returned to the issuing agency with pertinent information about that hunt. From this record we obtain the number sheep taken that season on the Moose Range.

YEAR	SHEEP HARVEST
1957	45
1958	27
1959	22
1960	18
1961	31
1962	31
1963	38
1964	26
1965	36
1966	48
1967	47
1968*	27+

\*Unfortunately, the computer at the University of Alaska has been inoperative and delayed this seasonal information. Final figures therefore are not available at this time.

Through personal contact, known harvest this year was at least 27 animals. Several sub-legal sheep and ewes were also killed. Two sub-legal rams were harvested in the Twin Lakes area and one on Surprise Mountain. A ewe was also killed near Tustumena Glacier and left to rot. Undoubtedly other illegal animals are shot and left and others are harvested and taken without contact with wildlife personnel for this sheep country includes a vast area with numerous access routes including trails, lakes, roads and unrestricted cross-country travel.

Distribution of the known 1968 sheep harvest occurred in the following areas:

Tustumena Glacier to Sheep Creek	2
Green Lake to North Fork Indian Creek	8
North Fork Indian Creek to Killey River	4
Killey River to Skilak Glacier	5
Surprise Mountain	8
Unknown	+

Although hunting pressure was higher in these areas than last year, a smaller take was recorded. Numerous groups of hunters throughout the Green Lake area for instance, discourage others from spending time and effort in what they had hoped would be a quiet wilderness hunting experience with perhaps minimal human contact.

Trophy Value. Horn measurements were obtained from several sheep and are on file.

#### MOUNTAIN GOAT

The annual goat survey was not conducted by refuge personnel this year. However, during the Alaska Department of Fish and Game sheep survey mentioned earlier, several goat were sighted and recorded. In that mountain area between Killey River and Tustumena Glacier 10 goats were observed. That survey area between Tustumena Glacier and Bradley Lake to the south, 134 goats were recorded. No goats were sighted on Surprise Mountain this year or in the mountains south to Killey River. We should explain the primary purpose of this sheep survey was to determine total sheep population, distribution and lamb production. Flight time was not utilized to survey goat habitat and therefore those goats recorded were incidental to the sheep count. There is every reason to believe numerous goats were not observed during this sheep survey.

It is interesting to note that as we advance from excellent sheep habitat at Surprise Mountain and that area immediately northeast, and move in a southwesterly direction through the Kenai Mountains, the sheep population continues a downward trend and goat population increases markedly. Weather and terrain conditions parallel this population species trend, the accessible drier areas to the north and the more inaccessible and wet areas to the south.

Goat hunting pressure was light this year as in the past. Most goat were taken incidental to a sheep hunt. Hunters were permitted two goats of either sex during the August 10 to December 31 season.

Records indicate 3 goats were harvested near Twin Lakes one week following the opening of the season. One goat was recorded taken near Green Lake. Perhaps less than six goats were taken throughout the refuge. Twin Lakes and Green Lake are those areas most hunted for goat although some interest and effort by other parties on Goat Mountain east of Twin Lakes has been recorded.

Other. On July 26, Mr. Caulkins of Homer Electric Association observed goats feeding below timberline in the Sadie Cove Mountain area. This summer season was extremely dry forcing the animals to lower elevations where they were found feeding on fern fronds. The bunch grasses, only a few inches high, were going to seed indicating little winter feed would be available.

#### BEAR

1. Brown Bear. The brown bear population remains low on the Kenai although at least a dozen sightings were recorded during the past year, four of which involved family groups.

On June 16 a bear was recorded near the southeast corner of Skilak Lake above Irish Channel.

The following day, June 17, a brown bear was sighted by several fishermen near the Russian River Campground. Then on June 23, three yearlings were observed in the area. Fishermen later reported a brownie in the immediate area had been chasing fishermen, stealing fish and generally becoming a "problem". Not long afterward one fisherman decided to shoot a yearling he had observed mid-stream in the Russian River a mile or so below Lower Russian Lake. The bear was killed and Alaska Department of Fish and Game conducted an investigation.

During the early morning of June 26, a sow with two yearlings was sighted near the canoe system two miles northwest of Swan Lake. Three days later a sow and two cubs were observed feeding on a cow moose killed three miles north of Scenic Lake. An accompanying calf may also have been killed.

While canoeing down the Moose River July 3, two brown bear were sighted observing the canoeists from tall grass on the bank of the East Fork of the Moose River. One animal was a yearling. It is possible the sow and two yearlings sighted June 16 and traveling southward, had indeed reached the confluence of the East Fork of the Moose River. A concentration of spawning salmon were located immediately upstream



the East Fork and would have been of great interest to this bear family.

One adult bear was observed August 2, traveling upstream in the Funny River four miles north of the Upper Funny River Airstrip and sow with two cubs was sighted September 2, near the Skilak Lake Guard Station.

On September 11, a large mature bear with dark coat was observed feeding on an adult cow moose just three miles northwest of Timberline Lake. On the last day of this month one of the largest Brown bears ever taken on the Kenai Peninsula was killed about three miles from the Lower Funny River Strip. The bear hide squared out at 9 feet 3 inches, had a 29 point skull and was shot by Troy Hodges of Soldotna Air Service, using a .338 magnum. This may have been the large "Brownie" observed near that area earlier in the month.

2. Black Bear. The black bear is very common to this area and numerous sightings were recorded during the year. The following observations tabulated included 19 singles; 3 (♀ 2Y), 1 (♀ 3Y), 1 (♀ 1C), 5 (♀ 2C), 3 (♀ 3C), 2 cubs and 1 yearling. An adult black was observed on October 21 crossing snowfields near the mountain headwaters of Mystery Creek.

#### CARIBOU

Winter groups of caribou were again observed roaming the marshy flat area northeast of the Kenai Airfield and the Moose River Flats east of Swan Lake.

A group of eleven caribou were sighted January 3, approximately three miles northeast of Kenai. This gathering included 2 bulls, 8 cows and 1 calf. During the year nine additional sightings of this group were recorded. On July 22 four calves were observed with the adults. These particular animals have resided in this area the past two years.

Early in November during the moose hunting season, two hunters observed two female caribou in the burn area near Funny River Road.

#### D. Fur Animals, Predators, Rodents and Other Mammals

1. Coyote. The coyote population appears stable and without change. Coyotes are frequently observed both summer and winter and are common throughout the Range.



2. Beaver. The beaver inventory conducted in October 1967 revealed a total of twenty-six active lodges and four active bank houses. Twenty-nine inactive houses were also observed.

The beaver population is widely scattered throughout the refuge; activity near these populated areas was often observed by the staff.

3. Mink, Otter, Weasel, Lynx. There are no apparent changes in populations. Lynx population is very low, tracks and animals are now rarely observed. Three otter were observed near Tustumena Lake. Following freeze-up in late November numerous otter trails were observed throughout the lowland lake system. Several hundred otters reside on the refuge.
4. Snowshoe Hare. The hare population remains low. A few sightings were made along Mystery Creek and Skilak Lake Roads. Seldom is more than one hare observed at a time. Tracks indicate a minimal population on the refuge.
5. Wolves. Wolf observations were few but historically important. An adult grey was observed in the Caribou Hills August 31, by Bob Richey, BSF&W and Jim Nutgrass, Alaska Department of Fish and Game. The wolf ran through grasses and over tundra at a good rate attempting to somehow out-distance the supercub aircraft. A moose cow with calf were directly below the wolf when first observed on the slope east of the plateau and SW of VA Bench March #2334.

Alaska Department of Fish and Game Biologist Demetri Bader reported observing a pack of ten wolves about 10:45 a.m. on November 21, two miles east of Timberline Lake. The pack included five black and five grey animals, only two of which were thought adults. This is the first authoritative observation of a wolf pack in recent years.

6. Wolverine. One wolverine was observed near the origin of Skilak Glacier at the Harding Ice Field. On August 13, two wolverine were sighted as they ran along the east bank across Upper Funny River Strip. Estimates place the refuge wolverine population at 150 animals.
7. Marmots. No report.

E. Hawks, Eagles, Owls, Ravens and Magpies

1. Hawks. Hawks were observed occasionally throughout the summer. A Harlan's hawk was observed calling from its perch in a cottonwood across the Swanson River at Swanson River Campground. A second Harlan's was heard near the Swanson River several miles downstream from the campground. No hawk nests were located.

2. Eagles. Several active bald eagle nests were located this year. A nest on the Kenai River near the Denison residence was again occupied, as was a nest between Kelly and Petersen Lakes. These nests were located in mid-March by the adult activity near the sites. One additional active nest was observed May 29 at Goose Lake. Both young in this nest reached flying stage.

Adults on all three nesting sites were observed incubating during May. The refuge undoubtedly supports many additional eagle nesting sites.

Groups of eagles are often observed at the Skilak Lake outlet and during late summer large groups of these birds were observed feeding on dead and dying salmon carried down the Kenai River into the lake.

3. Owls. The great horned owl breeds and raises its young throughout the refuge. This owl is commonly observed in its spruce forest habitat by the alert hiker.

A hawk owl, uncommon to this area, was observed October 3, at Mile 10 on the Funny River Road by Bob Richey.

4. Ravens. The common raven is indigenous to this region. Nest locations are not well known although a nest site was located near Big Mink Lake. Incubating adults were observed several times at this site.

5. Magpies. No report.

- F. Other Birds. Spring arrived suddenly in mid-May but the accompanying multitude of song birds was not apparent until the following week although Lapland longspurs were observed as early as March 28, ruby-crowned kinglets April 20, and robins two days later. The osprey family again occupied their nest near Weed Lake and successfully reared two young. One adult was observed at the nest site in late May. An adult incubating two eggs was recorded June 10.

A small island on Shadura Lake was inspected June 8, and revealed presence of several nesting species. More than sixteen glaucous winged gull nests were observed. All but one contained three eggs. The exception was a nest with six eggs. Two common golden-eye nests were located containing nine and five eggs respectively. A common loon nest with two eggs was also present on the island. It is not unusual to find several species of incubating birds on many of the small islands located among the numerous lakes in the lowland area.

The rare long-billed dowitcher was observed and filmed on July 1 in the muskeg near Engineer Lake by Mr. and Mrs. Peter Kagan of Cinema Wildlife Productions, Peapack, New Jersey.

Three parasitic jaeger were observed in July flying northward from Kenai Packers Cannery near Kenai.

- G. Fish. Sport fishing gains in popularity each year. By far the most popular is the red salmon run at Russian River. According to Alaska Department of Fish and Game personnel, over 17,000 man-days of fishing took place between June 15 and August 15 in about one mile of river.

Fishing for silver (coho) and King salmon was considered average, while pink salmon fishing was outstanding. Pinks had the largest run for several years. The pink salmon, unfortunately is not held in high esteem by fishermen.

Lakes within the canoe system continued to provide good fishing. Other lakes with power boat access provided many hours of fishing, but success was probably lower than the "wilderness" lakes.

Assistant Manager Kurtz has started classifying the 1200+ lakes on the Moose Range. Plans are to publish a pamphlet which shows the name of the lake, size in acres, depth (if known), location, type of access and fish species present (if known). This pamphlet will be similar format to the "Refuge Bird List".

Alaska Department of Fish and Game personnel are continuing to sample lakes in the Moose Range. Lakes in the Sunken Island Lake area were sampled this summer. All the data will be presented in the lake classification pamphlet.

- H. Reptiles. Reptiles and amphibians are few and far between in this part of the country. In fact, none have ever been reported for the Moose Range.
- I. Disease. No report.

### III. REFUGE DEVELOPMENT

- A. Physical Development. Work projects accomplished during calendar year 1968 are as follows:

#### REAL PROPERTY

1. Replaced cracked and broken sidewalks at office and at Quarters # 1 and 3.
2. Painted exterior of refuge buildings
3. Painted interior of refuge office.



4. Constructed covered walkway into office.
5. Installed metal skirting around office building.
6. Bailed and rehabilitated Skilak Guard Station waterwell and installed new submersible pump.
7. Replaced basement entrance Quarters #1.
8. Refinished the Refuge Manager's wooden desk top.
9. Cleaned up and organized boathouse, "bone yard" and vehicular storage building.
10. Installed guard rails on shop stairway.
11. Readied Quarters #2 for disposal.
12. Roadway and parking area maintenance (re-graveled).

#### RECREATION

1. Constructed double-pit toilets at Dolly Varden and Tustumena Campgrounds.
2. Drilled water wells at Dolly Varden, Tustumena, and Russian River Campgrounds. Redrilled Russian River #1 well.
3. Constructed well splash pad and installed pump at Dolly Varden and Tustumena Campgrounds.
4. Constructed various recreational signs.
5. Graveled campground roads and parking lots where needed.
6. Trail and canoe portage clearing and maintenance. (Approximately 110 man-days expended and over \$4,000 is required annually).
7. Installed wooden routed Moose Range boundary signs on Tustumena and Beaver Lake Roads.

#### OTHER

1. Jean Lake Roadside rehabilitation continued with approximately 50 percent of the final roadside embankment completed. Five acres were sloped, graded, and seeded.
2. Restoration of well pad sites and other oil activity damage continued:

Texaco - rehabilitated two well pads and one pot hole (8 acres)



covered one airstrip with 4" topsoil, seed and fertilizer (15 acres).

Marathon - rehabilitated 3 well pads and surrounding area (13 acres).  
rehabilitated 1 gravel pit (2 acres).

Standard - reseeded and fertilized area adjacent to strip (10 acres).

3. Seismic lines restored by seeding, fertilizing and tree planting:

Sunray DX	5 acres
Phillips	3 acres
Texaco	15 acres
Standard	25 acres

4. Three miles of Swanson River Road and 13 miles of Swan Lake Road graded by Standard Oil. Eroded areas were repaired and culverts at Sucker Lake outlet replaced.

One hundred acres of spruce were mechanically treated to convert cover to willow.

Routine maintenance included vehicle and equipment repairs; sign table, and log work painting and repairs; campground maintenance and cleanup (total cost for 1968 was nearly \$13,000 for contract and force account garbage pickup); and Jean Lake highway slope repairs (2 acres).

B. Plantings

1. Aquatics and Marsh Plants. None attempted.

2. Trees and Shrubs. None attempted by refuge (see section on oil operations).

3. Upland Herbaceous Plants. Five acres of newly sloped highway cutbanks and two acres of repairs were seeded to Alsike Clover and Meadow Fescue on the Jean Creek Soil and Moisture Project. An additional eight acres where the cover was sparse was reseeded with clover.

This has been a very frustrating project but it appears that our efforts are paying off in the reduction of silt in Jean Creek. We hope that the stream can be rehabilitated in the near future and the million dollar red salmon fishery restored.

Revegetation accomplished by the oil companies is reported in that section.

4. Cultivated Crops. Nothing to report.

C. Collections and Receipts

1. Seed or Other Propagules. No seed collections were made. The grass seed used on the Soil and Moisture highway cut-bank stabilization project was purchased.
2. Specimens. Ten moose were collected by the Alaska Department of Fish and Game in January as part of our cooperative moose research project. Pertinent measurements and samples were taken. All of the meat was distributed to needy families.

D. Control of Vegetation

Browse Rehabilitation Work. During the past winter, 100 acres were treated to improve moose winter range. "D-8" Cats with fleco-roller-choppers were used. The total acreage treated in this manner is 6600 acres. This work has been carried out over the past six years in the Slikok Lake area. The willow has responded unbelievably well to this treatment. Dense stands of willow three to four feet high are already providing excellent browse. In January two-hundred moose were observed in the area.

Permanent study plots were established in the area during the past summer in order to evaluate and follow the changes in the vegetation.

- E. Planned Burning. Planned burning was not attempted this year as the fire hazard remained too high.
- F. Fires. We feel fortunate to have again had Brian Weatherford, Fire Control Technician, Bureau of Land Management, man the Skilak Guard Station. His efforts held the acreage burned to a minimum. BLM records indicate that the lack of precipitation created the highest fire danger recorded since 1936.

From July 25 to August 10, the refuge was closed to camping except in campgrounds, by public announcement through local news media by the refuge manager.

A total of 19 fires occurred during the season. This is a substantial increase compared with the total of 12 fires for the previous five years. In the data which follows cooking fires are fires at camp sites and warming fires are used in the field during inclement weather:

Date	Cause	Acres	Name	Number
* 6/17	Signal fire	1.0	Hidden Lake Island	W68
6/24	Cooking fire	0.1	Jean Lake	W71

Date	Cause	Acres	Name	Number
* 6/24	Burning plane wreckage	0.1	Bratlief-Frank	68-2
7/4	Fireworks	0.0	Dump	W-76
* 7/21	Cooking	0.0	Fuller	W-90
8/1	Cooking	0.1	Hidden Creek	1F6
8/10	Warming	0.1	Torpedo	1F8
* 8/12	Smoking	2.0	Glacier Creek	2F
* 8/13	Smoking	1.0	Twin Lakes	2F4
8/15	Cooking	0.1	River	2F8
8/16	Cooking	1.0	Shore	4FD
* 8/19	Cooking	16.0	Green	4F6
8/27	Cooking	0.1	Boundary	5F2
9/13	Warming	0.1	Skilak	6F6
9/14	Cooking	0.5	Woods Lake	6F7
* 9/18	Cooking	0.1	Gavia Lake	68-3
* 9/20	Warming	0.1	Jean	5F8
9/24	Cooking	0.5	Caribou Island	7F4
TOTAL		22.9		

\* Moose Range participated in control.

#### IV. RESOURCE MANAGEMENT

- A. Grazing. Grazing has not been permitted.
- B. Haying. Haying has not been permitted.
- C. Fur Harvest. During the winter of 1967-68, trappers were allowed to trap without permits on the entire Moose Range. It is estimated that 100 furbearers were taken.

With the drop in fur prices and the recent economic boom in the Cook Inlet area, trapping has become a recreational pursuit. The economic aspect has been eliminated due to high paying winter jobs and low fur prices.

Since there has been little demand for furbearers and trapping permits, a recreational trapping program appeared to be the most equitable method of providing trapping opportunity to those who desire to pursue this sport.

The Fur Management Plan was rewritten this year to provide for the maximum number of people. The plan is set up so each interested trapper is required to obtain a free-use permit and report take at end of season. No areas are assigned and trapping is in accordance with State regulations.

So far during the 1968-69 trapping season, seventeen permits have been issued. The report of take will be reported in next years Narrative Report.



- D. Timber Removal. Commercial timber harvest has been restricted due to wilderness study. Only one special use permit was issued for forest products this year. The permittee was authorized to harvest Christmas trees along the Mystery Creek Road in the 1947 Burn; at 5¢ per tree the total return was \$50.

Forty-one (41) free-use permits were issued to local residents for the purpose of cutting house logs, cesspool logs, fuelwood, and fence posts; these were restricted to areas previously cut.

Forest products removed are as follows:

Christmas trees	1,000
Dead & Down spruce	70 cords
Spruce house and	
Cesspool logs	34,000 BF

- E. Commercial Fishing. No commercial fishing permits were issued on the Moose Range during the past year.

A recent court decision (which is being appealed) ruled that the State of Alaska owns Tustumena Lake even though it is entirely within the Moose Range boundary. The ruling apparently opens the way for oil and gas exploration under the lake. Of immediate concern is the value of Tustumena Lake and associated streams as a salmon spawning and rearing grounds.

We have data indicating that 40 percent of the Cook Inlet salmon pack can be attributed to Moose Range streams. Some very interesting data was compiled in defense of Tustumena Lake and the Kasilof River. Following is a brief summary of the value of the Kasilof-Tustumena drainage as a spawning area to the salmon industry in 1968.

Value of Total Cook Inlet Catch

RED	\$3,323,847
KING	50,680
COHO	1,438,411
CHUM	3,756,500
PINK	3,798,800
TOTAL	<u>12,368,238</u>

Value of Kasilof River Drainage to Total  
Cook Inlet Catch

RED	930,677
KING	25,340
COHO	71,920
CHUM	262,955
PINK	141,952
TOTAL	<u>1,442,844</u>



Percent of Cook Inlet Catch  
Attributed to Kasilof Drainage

RED	28%
KING	50%
COHO	5%
CHUM	7%
PINK	4%
TOTAL	<u>11.7%</u>

Value of Total Alaska Salmon Catch

RED	\$ 11,000,000
KING	3,000,000
COHO	4,500,000
CHUM	7,500,000
PINK	<u>11,500,000</u>
TOTAL	\$ 37,500,000

Percentage of Total Alaska Catch  
Attributed to Kasilof Drainage

RED	8.4%
KING	T
COHO	T
CHUM	T
PINK	<u>T</u>
TOTAL	3.8%

Other values of Tustumena Lake include:

1. The largest lake trout population on the Kenai Peninsula.
2. Recreational Silver Salmon (sport) fishery in creeks feeding the lake.
3. Spawning area for large numbers of salmon.
4. Dolly Varden trout (sport) fishery tremendous in all streams emptying into lake.
5. Potential winter (sport) fishery for whitefish.
6. Steelhead run into system (value unknown).
7. Reds, silvers and Kings use the lake for up to three years before going to sea.
8. King salmon is an endangered species in this area. Kasilof drainage is one of the most important spawning areas south of the Forelands.

- F. Other Uses. Marathon Oil Company in accordance with their plan of operation dated April 10, 1968 to drill the Beaver Creek Unit #3 well, paid for and removed 9,750 yards of sand and gravel in the construction of a road and well pad site. Received by check was \$487.50 at .05 cents per yard.

The commercial tent camp sites of Messrs. Marshall Farmer and Lloyd Hall were active again this year. Mr. Farmer utilized two tents at Clam Lake and one at Scenic Lake. Lloyd Hall again operated two camp sites each at Gene, Mull and Sportfish (Hinchey) Lakes. Permits issued in 1967 for tent camps at King and Scenic Lakes remained valid. A total of \$90 was received in payment for tent sites from Messrs. Farmer and Hall.

A special use permit number KN 9-68 was issued to Mr. Kenneth Olsen on November 18, 1968 for operation of a small passenger ferry on the Kenai River near the Sportsman's Lodge for calendar year 1969. A fee of \$100 or 3 percent of the net receipts was required.

G. Oil Operation.

Production. During December 1967, there were 36 wells producing an average of 37,000 B/D oil, 5,700 B/D water and 53,650 M/D gas from the Hemlock Zone in the Swanson River oil field. Of the 36 producing wells, 4 were on gas lift and 32 were flowing. During the same month, gas injection rates averaged 130,200,000 cu. ft. per day into 9 injection wells at surface injection pressures ranging from 4800-5000 psi.

For the year 1968 the Swanson River oil field recovered 13,619,458 barrels of oil and 25,434,323 MCF of gas. The cumulative production of this field on December 31, is now 88,570,878 barrels of oil and 57,809,959 MCF of gas.

The maximum number of wells in operation occurred in February. During that month 42 wells were operating and 7 were shut down for maintenance.

A portable rig was moved over five locations to pull tubing and clear areas of sand accumulation. Multiple packers were installed along tubing sections for production control. Well site SCU 23-4 was converted from a producer to an injector.

Installation of another 3400 HP compressor was begun in late 1967 to increase the compressor plant capacity to 6000 psi injection service. The installation of this compressor was completed in early 1968. The current capacity of the new plant is 150 million cubic feet of gas per day. The conversion of existing engines in the old plant during 1968-69 will raise the 6000 psi capacity 25 million to 35 million cubic feet of gas per day.

Vapor recovery facilities placed in operation in early 1967 are now, according to Standard Oil, conserving some 600-800,000 cubic feet per day of rich vapors. These vapors are piped to the compressor plant and provide the source for propane for the propane recovery facilities completed late this year.

During mid-summer Standard Oil was working on a vapor recovery system for their 13,000 barrel surge tank (tank #22) which would recover approximately 200-300,000 cubic feet per day of rich vapors. Upon completion, these facilities will recover vapors and provide an additional source of propane.

As mentioned earlier, an average of 5,700 barrels of water per day are produced in this oil field. The 5-6,000 barrels of waste salt water is presently injected into shallow barren salt water sands in Section 33. Standard Oil is now completing engineering work to determine if this waste salt water should be injected into the Hemlock Zone, thus using a waste by-product to aid in maximizing field oil recovery.

A past fire at Soldotna Creek well site #14-9 was discovered July 29. The burn area covered one acre. A later inspection of the Soldotna Creek-Swanson River oil field August 15, located two large oil spills and two fires which had not been reported. Standard Oil Company officials were contacted and apprised of existing regulations.

#### Exploration

Drilling. Two wells were drilled on the Moose Range during the period. Marathon Oil Company commenced drilling operations spudding in on July 26 at the Beaver Creek Unit well #3. This gas well at 6300 feet and the associated gas testing was completed four weeks later.

Texaco also began drilling at their Swanson Lakes well #1 early in the year. This well proved a dry hole and was abandoned Friday, March 22, 1968. Restoration of this drill site began following the removal of drilling equipment that same month.

During drilling operations at the Swanson Lakes Well #1, an adjacent pot hole to the drilling pad was contaminated as was the surrounding vegetative cover. Consequently, during an August inspection of Texaco's cleanup progress the refuge staff observed this pot hole in a very contaminated condition. Considerable damage to surrounding timber and vegetation had resulted from the oil and caustic soda pumped into the pot hole.

Other cleanup discrepancies were noted at the nearby Point Possession well Unit #1 and airstrip. Texaco's cleanup program



of these areas was therefore disapproved. A complete cleanup was insisted upon including restoration of access roads, airstrip, and drill pads. The airstrip will remain in place as an emergency landing site for aircraft traveling between Kenai and Anchorage but the surface will be revegetated to remove a permanent scar from the landscape. To date this program has not been approved.

Seismographic. Five oil companies continued seismic exploration work during early 1968. More than 300 miles of seismic trail were involved in the associated programs requiring a continuous vigil by the refuge staff. The companies involved included Sunray DX, Phillips, Texaco, Standard, and Continental. All but one used explosives in their operations; Continental conducted a Vibroseis (T.M.) program.

Warm and thawing weather conditions provided a poor winter for seismic operations. During the winter, seismic operations were shut down several times because thaw and rain conditions removed protecting snow and ice cover from the routes of travel.

The Standard Oil seismic crew bulldozed numerous severe cuts on several lines and were warned that any additional negligence of this nature would result in the immediate cancellation of their program.

During May, Assistant Refuge Manager Thayer checked the last winter's seismic efforts and prepared recommendations for rehabilitating these trails before his reassignment to the District Supervisory Management and Enforcement position at Fairbanks. Seismic trail restoration and cleanup continued during June, July and August.

Summer inspection of the Standard Oil lines following seismic cleanup operations was disapproved. Meetings were held with representatives of the company at the Kenai office and in the field. As a result of these contacts, a new cleanup program involving small "cat" equipment was initiated to repair the damage resulting from what was considered to be the worst winter seismic program ever conducted on Moose Range lands.

Final checks were made of winter 1967-68 seismic trail cleanup and land restoration disapproved during September for Standard Oil, Texaco, Continental, Phillips and Sunray DX. Numerous seismic areas required additional cleanup and restoration, especially on Standard Oil's lines. The cleanup of all lines was finally approved by October 18.

Seismic programs for the 1968-69 season were submitted by Gulf Oil Company June 20 following earlier discussions. This work was programmed in the fragile Caribou Hills area. Shell Oil representatives also inquired on August 14 about their proposed winter program.



Standard, Continental, and Marathon Oil Companies also submitted seismic programs during late summer and early fall.

Each company requesting a permit for seismic activity on the refuge was informed of the 1964 Wilderness Act which required the evaluation of refuge lands and the associated restrictions which would limit their operations to existing trails, not permit the use of dozer equipment for construction of new seismic trails nor allow the felling of trees.

Standard Oil Company submitted, as did Gulf Oil, a revised program from that originally presented in October. Authorization was granted for those proposed lines coinciding with existing trails to permit land surveyors access to flag these routes, via snow machine, along extensions into trailless areas. Final authorization was withheld until all extensions were visually inspected on the ground and individually approved or disapproved.

Considerable time was expended in meeting and in-field inspections with oil company representatives. Standard and Gulf Oil Companies initiated their season's geophysical survey programs on the refuge during December. Marathon Oil and Continental Oil because of internal problems both withdrew earlier requests to conduct geophysical programs this season.

A meeting was held October 18 with Western Geophysical and Atlantic-Richfield representatives concerning the restoration of seismic trails constructed by Western for Richfield (Atlantic Refining Co.) during August and September 1962. Gross erosion has resulted from dozer cuts and subsequential vegetative removal. Assistant Refuge Manager Richey accompanied the party via helicopter to the Caribou Hills to inspect "on-the-ground" and photograph the repair work required. Plans were tentatively firmed for moving materials this winter for partial repair of the damaged area next summer. Since determining approximate costs for repair work (minimum \$100,000) Atlantic-Richfield Company apparently is beginning to "drag its feet" as no further activity has taken place by the close of the year.

## V. FIELD INVESTIGATIONS

### A. Progress Report on Studies

1. Moose Pen. (Wildlife Management Study Outline #3) This is a cooperative study with the Alaska Department of Fish and Game. The Bureau has primary responsibility for the range portion of the study while the Alaska Department of Fish and Game has primary responsibility for the study of the animals.

Permanent successional study plots were established in the pens during the summer of 1967. Permanent browse study plots

were established in the fall of 1967 and read again in the spring of 1968

When the gates to the pens were closed in January 1968 just prior to stocking there were 11 moose in Pen #1 and 24 in Pen #2. The pens are each one square mile in size.

Ten moose in each pen were tranquilized with succinylcholine chloride contained in a dart syringe shot from a cap-chur-gun using a helicopter as a shooting platform.

Several attempts were made to drive the excess moose out of Pen #2 with the helicopter and on foot but this did not work. After tagging was completed the remaining ten cows were collected. Weights, measurements and various samples were taken. All the meat was distributed to needy families in Kenai, Soldotna, Homer, and Cooper Landing.

The remaining untagged animals in Pen #2 were calves. They were left to try and shed some light on the ability of orphaned calves to survive the winter. Observations indicate they did.

At least five calves were born in Pen #1 and at least two were born in Pen #2.

On June 24, two Alaska Department of Fish and Game biologists were killed when the Supercub they were flying crashed and burned in Pen #1. The pilot, Art Bratlie, was in charge of the construction and operations of the pens. The observer in the aircraft was Dr. John Frank, a doctor of veterinary medicine, in charge of moose physiology studies. This was a very tragic loss in many respects.

This loss combined with internal problems in the Alaska Department of Fish and Game has caused the project to deteriorate rapidly and greatly.

The Moose Range does not have the funds to take on this additional responsibility or to even carry out the range portion of the study as intensively as the initial investment and opportunity justify.

2. Moose Populations Study (Wildlife Management Study Outline #4)  
During the summer moose are well dispersed from the shores of Cook Inlet and the lowlands to the alpine areas to the Kenai Mountains. As winter snows deepen in the mountains these animals move down and concentrate in the lowlands. There are some years, when the snow does not get too deep, many moose will remain in the higher areas.

Due to hunter accessibility the moose in the lowlands receive the brunt of the hunting pressure and the resultant harvest.

A study in cooperation with the Alaska Department of Fish and Game was initiated this fall to try to provide answers to the following objectives:

1. Are the "lowland" and "highland" groups of moose essentially distinct populations from the standpoint of reproduction and productivity, or are they of the same breeding population, with different population characteristics attributable to differential behavior of the various sex and age categories?
2. Is the moose population or population segment characterized as the "lowland" group being depressed by hunting pressure?
3. To what extent do the traditional seasonal ranges of the two hypothetical groups overlap?
4. What is the relationship between moose in the population segment living on the far west of the Kenai lowlands and those nearer the mountains; what sort of population interactions occur between them?
5. If the "lowland" group is essentially a distinct population, and if it is being depressed by environmental factors, including hunting, to what extent can pressure be relieved by altering hunting seasons to take advantage of the populations of moose which move to the lowland in winter; i.e. what sort of "dilution factor" can be obtained?

The major prerequisite to answering these questions is to demonstrate the relationships between the "lowland" and the "highland" groups of moose.

The initial phase of the study is to mark adult moose in alpine areas with color-coded plastic coated canvas neckbands four inches wide. The first area selected was the Upper Mystery Creek drainage. Cows were marked with red-orange and bulls marked with yellow.

The State chartered a Bell 4GA helicopter and furnished two, two-men crews for the first week of tagging effort. The Moose Range provided a fixed-wing aircraft and pilot to spot moose, keep track of drugged animals, and as a safety factor for the helicopter operation.

The moose are drugged with succinylcholine chloride from a dart syringe shot from a Cap-chur gun. The man doing the shooting must compensate for the speed and direction of the moose as well as the speed and direction of the helicopter



he is using as a shooting platform. The moose's flank is the target area.

After a moose is shot the helicopter moves off and lands. The drugged moose is watched from the fixed-wing aircraft (\$20/hr. vs \$140/hr. for the helicopter) until the moose goes down (about 20 minutes). The helicopter takes the two-man crew over and lets them off at the nearest landing area to the moose. The helicopter immediately takes off and picks up the other two-man crew and they in turn locate and shoot a moose, etc.

Two men working on foot tagged two moose in two days. This was considerably cheaper than using the helicopter but was considered to be too slow.

The second week of tagging with a helicopter ended in disaster. After drugging the first moose the helicopter sat down near the edge of a rock bluff and let Royce Perkins (Biologist, ADF&G) and John Kurtz (Asst. Refuge Manager) out to put a collar on the animal. As the helicopter took off to pick up the second crew (Al Johnson, Biologist ADF&G, and Bob Seemel, Asst. Refuge Manager) the tail dipped and the rotor clipped vegetation on a snow covered hummock. This apparently broke the tail rotor and the force of the main rotor under full power hurled the craft off the bluff and down the mountain side scattering the wreckage. Kurtz and Perkins got to the pilot, Harold Davidson, within seconds and removed him from the wreckage. He apparently was killed instantly as a result of three or four severe head lacerations. A crash helmet might have saved his life.

Assistant Refuge Manager Bob Richey, who was flying cover in a fixed-wing aircraft, called FAA. Another helicopter was sent out to take Kurtz and Perkins off the mountain and to bring the pilot's body to the coroner.

This ended the tagging portion of this particular project until we can re-evaluate the techniques.

The primary responsibility of the Bureau in this project is to follow the seasonal movements of the collared animals. A number of observations have been made of which the most note worthy is the sighting of an orange collared cow near the Swan Lake Road northwest of the moose pens in December. The straight line distance from where it was tagged is over 23 miles.

Seventeen cows and eleven bulls were tagged for a total of 26 animals. One tagged bull was shot during the November season near the junction of the Sterling Highway and the Mystery Creek Road.

3. Slikok Area Browse Plots. Permanent plots were established in the Slikok Lake Browse rehabilitation area during the summer. In this area over 6000 acres of white spruce, which became established after a fire in 1926, have been broken down with "cats" pulling Fleco-roller-choppers. The response of the willows has been tremendous. This area and areas where the results have not been as fruitful should be studied more intensely so that the range rehabilitation program can be expanded efficiently.
4. Dall Sheep Studies. Sheep winter range between Killey River and Indian Creek was examined during the fall. Due to the increasing sheep population there is a pressing need to establish vegetation transects on these winter ranges.

The lambing study on Surprise Mountain is in the process of being written up as a Master's thesis by Marsh Pitzman under the supervision of the Cooperative Unit, University of Alaska.

With the increasing pressures on the resources the need for full time biologists both in wildlife and in fisheries is critical.

Past history indicates that under the present conditions a crash in the Dall sheep population is imminent. This may also be true of the moose population. Over five million dollars worth (over 40%) of the Cook Inlet salmon catch was spawned in streams on the Moose Range. These resources deserve more attention.

## VI. PUBLIC RELATIONS

- A. Recreational Use. The Kenai Peninsula is advertised as the "Playground of Alaska". Nearly all the recreational facilities are provided by the U. S. Forest Service and the Bureau of Sport Fisheries and Wildlife. We have a close working relationship with the USFS in planning and coordinating of development activities. We are presently studying the possibilities of cooperative agreements that will benefit both agencies in areas such as construction, patrol, garbage pickup, firewood and other miscellaneous maintenance.

We presently have fourteen campgrounds with a "designed capacity" of 150 camping units. During the peak weekend in the summer of 1968, we had in excess of 300 camping units using the Moose Range campgrounds. (On July 5, 151 camping units were crowded into the Kenai-Russian River Campground, which is designed for 40 units.)

Of the fourteen campgrounds, only five have potable water; only three have firegrates; only three have adequate parking lots; and

TABLE 10

	RECREATIONAL VISITS				
	<u>1 9 6 4</u>	<u>1 9 6 5</u>	<u>1 9 6 6</u>	<u>1 9 6 7</u>	<u>1 9 6 8</u>
HUNTING					
Big Game	20,000	30,000	46,000	46,900	45,740
Small Game	3,000	3,000	3,200	4,000	5,800
Waterfowl	800	800	700	700	800
Other	-	340	560	20	40
FISHING	40,000	42,750	46,000	75,200	79,600
CAMPING		29,550	56,500	101,400	108,500
PICNICING		1,000	3,000	1,000	5,200
WATER SPORTS					
Boating		1,000	4,820	5,550	7,150
Canoeing		710	1,100	3,800	4,700
Swimming		100	1,500	1,600	2,800
Water Skiing		50	60	50	450
WINTER SPORTS	38,300				
Skiing		3,500	5,150	5,500	6,550
Skating		200	200	300	160
Snowmobiles		200	500	750	1,500
OTHER					
Berry Picking		400	400	1,500	8,400
Hiking		200	200	400	1,000
Photography				1,500	1,550
Horseback Riding					320
Other Misc.		28,700	37,740	55,820	42,900
TOTAL	102,100	142,500	207,630	305,970	323,160



TABLE 11

		VISITOR USE DAYS				
		<u>1 9 6 4</u>	<u>1 9 6 5</u>	<u>1 9 6 6</u>	<u>1 9 6 7</u>	<u>1 9 6 8</u>
HUNTING						
Big Game			42,500	65,167	58,625	59,578
Waterfowl			1,000	1,067	1,333	1,933
Other			400	350	350	358
FISHING			106,875	115,000	127,100	85,734
CAMPING			124,300	236,983	322,500	396,055
PICNICING			250	750	250	433
WATER SPORTS						
Boating			583	2,410	4,425	10,350
Canoeing			3,905	6,233	7,600	15,600
Swimming			50	250	267	467
Water Skiing			25	30	25	121
WINTER SPORTS						
Skiing			1,167	1,717	1,833	3,287
Skating			67	67	100	53
Snowmobiles			100	250	375	973
OTHER						
Berry Picking			167	167	500	3,500
Hiking			800	800	400	1,608
Photography					500	387
Horseback Riding						397
Other Misc.			5,417	6,880	7,000	7,286
TOTAL	(Est.) 200,000		287,889	438,496	533,193	588,133

# RECREATIONAL VISITORS KENAI NATIONAL MOOSE RANGE 1948-1968

50

NUMBERS

600,000

500,000

400,000

300,000

200,000

100,000

- 1962-63 APW CONSTRUCTION (5 NEW CAMPGROUNDS ADDED)  
START OF LARGE VISITOR USE INCREASE
- 1964 EARTHQUAKE REDUCED VISITOR USE
- 1967 LARGE INCREASE IN NUMBER OF VISITORS  
(CENTENIAL YEAR CELEBRATION) - COOL, WET  
SUMMER REDUCED LENGTH OF STAY
- 1968 SMALL INCREASE IN NUMBER OF VISITORS -  
MILD, DRY SUMMER INCREASED LENGTH  
OF STAY

(ESTIMATED)

VISITORS

VISITOR USE DAYS

(ACTUAL)

48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68

YEARS

Figure 4

only five have adequate toilet facilities. All but five of the campgrounds are little more than a wide place at the end of a road, with tables, outhouse and garbage cans.

Development funds received in FY 1968 and 1969 will provide for adequate facilities and upgrading of six campgrounds, and water wells at three additional. By 1972 we hope to have our existing facilities upgraded to acceptable standards, then start construction of additional facilities.

The recreational development is directed toward providing a wilderness type experience. We feel that campgrounds should have only the minimum necessary facilities. These include, one outhouse and one hand pump well per each 10 camp units; and one garbage can, picnic table and fire grate for each camp unit. No electricity, running water, flush toilets or sewer hookups are provided.

Emphasis is placed on hiking trails rather than roads, canoeing rather than power boating, and cross-country skiing rather than snowmobiling. Primitive or pioneering methods of hunting are encouraged by restricting the use of aircraft, snowmachines and other off-road vehicles. By restricting off-road use by motorized vehicles and providing access only by hiking trails and canoe trails, we hope to be able to provide "quality" and "trophy" hunting.

Nearly all types of outdoor recreation are becoming more popular. The activities with the highest rate of increase are boating, canoeing and other water sports, cross-country skiing, snowmobiling and ice fishing.

#### B. Refuge Visitors.

Official visitors from the USDI and the BUREAU are listed below in date order:

1/29	David B. Marshall	Portland, Oregon
4/29	John Van den Akker	Portland, Oregon
4/29	Lee Jacoby	Portland, Oregon
6/26-7	Regional Director Findlay	Portland, Oregon
6/26-7	Assistant Director Tunison	Washington, D.C.
7/26	James Heckman	Portland, Oregon
8/27	David B. Marshall	Portland, Oregon
8/29	Robert F. Scott, Chief, Refuges	Washington, D.C.
9/3	Urban C. Nelson (retired Reg.Dir.)	Juneau, Alaska
9/20	James Shaw	Portland, Oregon
9/20	Jerry Hout	Bethel, Alaska
10/1	Cal Lensink	Bethel, Alaska
10/1	Don Coombs	Anchorage, Alaska
11/26	Earl Fleming (former employee)	Tacoma, Washington
12/9	Ray Tremblay, M & E	Anchorage, Alaska
12/9	Chuck Evans, RBS	Anchorage, Alaska



## Visitors from Other Federal Agencies

### U. S. Forest Service

8/13	John C. Crupper	Anchorage, Alaska
8/13	Burnett H. Payne	Arlington, Va.
8/13	W. Howard Johnson	Juneau, Alaska
8/13	George F. Roskie	Juneau, Alaska
9/12	John Galea	Seward, Alaska

### U. S. Geological Survey

6/26	William Winnicke	Anchorage, Alaska
9/11	Stanley H. Jones	Anchorage, Alaska
9/11	Gary S. Anderson	Anchorage, Alaska
10/2	Gary S. Anderson	Anchorage, Alaska
11/20	Stanley Jones	Anchorage, Alaska
11/20	Gary S. Anderson	Anchorage, Alaska

### General Services Administration

7/31	Ned Shelton	Anchorage, Alaska
7/31	Joe Shrzypek	Anchorage, Alaska

### Federal Aviation Agency

11/5	A. A. Rise	Anchorage, Alaska
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### Federal Water Pollution Control Administration

7/9	Bryan M. Johnson, Program Director	Portland, Oregon
7/9	Warren T. McFall	College, Alaska
7/9	Ray Morris	Anchorage, Alaska
9/6	Max N. Edward	Washington, D.C.
9/6	W. A. Mitchell	Fairbanks, Alaska
9/6	Ray Morris	Anchorage, Alaska

### Management and Enforcement

6/25	E. V. Cofer	Bekersfield, California
6/25	R. Leeman	Merced, California

### Public Land Law Review Commission

7/19	Dr. Duncan A. Harkin	Univ. of Wisconsin
7/19	Douglas A. Yauggen	Univ. of Wisconsin
7/22	Don Seastone	Washington, D. C.

### National Safety Board

11/5	Frank Malone	Anchorage, Alaska
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Other Agencies:

Alaska Department of Fish and Game

2/20	Loren Croxton	Anchorage, Alaska
2/20	Ben Hilliker	Anchorage, Alaska
4/3	Joseph R. Blum	Anchorage, Alaska
4/3	Ron Somerville	Anchorage, Alaska
4/3	J. A. Erickson	Anchorage, Alaska
5/13	John Frank	Anchorage, Alaska
7/16	Sam Harbo	College, Alaska
8/5	Don Strode	Juneau, Alaska
8/8	Fred Waldstad	Anchorage, Alaska
8/23	Jerry D. McGowan	Fairbanks, Alaska
8/23	Teny B. Medjo	Fairbanks, Alaska
9/9	Joe Janutka	Fairbanks, Alaska
10/21	Loyal J. Johnson	Cordova, Alaska
11/8	Jim Rearden	Homer, Alaska
11/8	Kenneth R. Middleton	Anchorage, Alaska

Alaska State Housing Authority

12/10	Charles R. Roohar	Anchorage, Alaska
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Canadian Wildlife Service

8/26	John S. Tener	
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National Wildlife Federation

11/3	William L. Reavley	Washington, D. C.
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Homer Electric Association

8/1	Jack Lunden, Resident Engineer	Homer, Alaska
8/22	Larry C. Farnen, Gen. Mgr.	Homer, Alaska
8/22	Sam Mathews, Engineer	Homer, Alaska
10/25	Jack Lunden	Homer, Alaska
10/25	Dale C. Richey, Snelson, Inc.	<b>Kenai</b> , Alaska
10/25	James Rehms, Snelson Inc.	Kenai, Alaska

Oil And Geophysical Company Representatives

Alaskan Geophysical

12/2	Joe A. Reindell	Anchorage, Alaska
12/17	Harold L. McQuitty	Anchorage, Alaska

Atlantic Richfield Company

4/19	Jack H. Carlsile	Anchorage, Alaska
4/19	Bert R. Brown	Anchorage, Alaska
10/18	Ralph Kraus	Anchorage, Alaska

Continental Oil Company

1/3	Norman L. Smith	Ponca City, Oklahoma
11/6	Norman L. Smith	Ponca City, Oklahoma
11/6	Roy C. Morgan	Anchorage, Alaska

Gulf Oil Company

11/26	Arnold Spoor	Bakersfield, California
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Marathon Oil Company

7/1	Morris Lowman	Anchorage, Alaska
7/1	A. I. "Buddy" Socha	Kenai, Alaska
8/8	John R. Barber	Anchorage, Alaska
11/13	Ralph D. Mathis	Anchorage, Alaska
11/13	John R. Barber	Anchorage, Alaska
11/13	Morris Lowman	Anchorage, Alaska
12/4	Morris Lowman	Anchorage, Alaska
12/4	James F. Huff	Los Angeles, California

Shell Oil Company

8/14	W. S. Freitas	Los Angeles, California
8/14	Tom Hanrahan	Los Angeles, California
9/3	Jerry Sager	Anchorage, Alaska

Standard Oil Company

9/10	John H. Silcox	Anchorage, Alaska
9/10	J. Foster	Anchorage, Alaska
9/30	J. Foster	Anchorage, Alaska
9/30	L. G. Root	Anchorage, Alaska
9/30	T. Nichols	Anchorage, Alaska
11/19	Bob Ortalda	Anchorage, Alaska
11/19	Jim Foster	Anchorage, Alaska
12/3	Norm Giedt	Anchorage, Alaska
12/3	J. Foster	Anchorage, Alaska
12/17	Don Eck	Anchorage, Alaska
12/17	T. Nichols	Anchorage, Alaska
12/17	J. Foster	Anchorage, Alaska

Texaco

9/5	J. S. Barbert	Anchorage, Alaska
9/5	Claude H. Brown	Anchorage, Alaska

Western Geophysical

4/19	Vic Mittasch	Anchorage, Alaska
10/18	Vic Mittasch	Anchorage, Alaska



11/26	Vic Mittasch	Anchorage, Alaska
12/4	C. Quinn Williams	Anchorage, Alaska
12/17	W. E. Tackett	Anchorage, Alaska
12/17	D. B. Stocks	Palmer, Alaska

#### Other Visitors

4/26	Steve Smith (former employee)	Anchorage, Alaska
5/22	Gary C. Milke (willow study) U of A	College, Alaska
6/25	Dr. Harold Steinhoff (Research on Moose Range - Economics - 1 year study)	Ft. Collins, Colorado Colorado State Univ.)
6/27	Dr. and Mrs. Wendell Chapman	Los Angeles, California
7/9-16	Charles C. Johnson, Photographer Wetlands Book	New York, New York
7/9	G. F. Ralmbach (timber)	Wasilla, Alaska
7/29	Sue and Peter Kagan, Cinema Wildlife Prod.,	Peapack, N.J.
8/5	Des Bartlett (Moose Meeting)	Nairobi, Kenya
8/5	R. J. Mackie (Moose Meeting)	St. Paul, Minnesota
8/5	J. W. Ahliu (Moose Meeting)	Stockholm Sweden
8/5	Darrell A. Kitchen (Moose Meeting)	St. John's, Newfoundland
8/5	Ralph Ritcey (Moose Meeting)	Kamloops, B.C.
8/5	Eugene Mercer (Moose Meeting)	St. John's, Newfoundland
11/6	Lorraine Ireland	North Kenai, Alaska

- C. Refuge Participation. Refuge Manager Troyer attended the Alaska Department of Fish and Game's Annual Meeting on January 9, 10, and 11.

Assistant Refuge Manager Thayer attended the Environmental Influences meeting sponsored by the Natural Resources Office of the Federal Field Committee in Anchorage on January 12.

Assistant Refuge Manager Seemel gave a slide talk to the Kenai Garden Club on January 9.

Refuge Manager Troyer was elected to another term on the Board of Directors of the Kenai Chapter of the Alaska Conservation Society.

Robert Seemel attended the Alaska Interagency Moose Committee Meeting on February 14-15. Will Troyer was elected Chairman of the organization for the coming year. The committee will host the North American Moose Committee meeting in August.

Assistant Manager Richey gave a slide lecture to the Protestant Women's group at Wildwood Station on February 14.

Refuge Manager Troyer attended the Kenai Game Advisory Board meeting on February 20 and discussed hunting proposals.

Assistant Refuge Manager Richey gave a slide talk on the Kenai NMR to the Rod and Gun Club at Wildwood AFS on February 28 and a SAFETY

talk on hunting and fishing and boating to the Boy Scouts at Wild-wood March 7. During Wildlife Week he wrote several news releases and showed movies to three schools in the area.

Assistant Manager Thayer gave a conservation talk to the Kenai Peninsula Tourism Committee on March 16.

A news release depicting our program in the moose pens was released to local papers and published.

Assistant Manager Seemel gave a talk to the Lions Club on the Moose Pen.

The Fairbanks-Newsminer, one of the largest daily papers in Alaska, carried a story on the Kenai Moose Range in its annual issue.

Friends Magazine (Chevrolet) has a picture article on the Moose Range in its May issue. The story was gleaned last summer when one of their writers and photographer was in the area to observe our activities.

Refuge Manager Troyer gave a talk "Wilderness and the Wilderness Act" to the local Republican Club on April 21.

Refuge Manager Troyer also gave a slide-talk to the Soldotna Chamber of Commerce on April 23. The lecture depicted our problems and accomplishments. At the same meeting Refuge Manager Troyer was pleasantly surprised when the Chamber group awarded him a community service placard and pronounced April 23, Will Troyer Day.

Acting Refuge Manager Troyer met with members of the Alaska Inter-agency Moose Committee on May 22, to plan the North American Moose Meeting in August.

Assistant Manager Richey gave a slide talk to the Kenai High School Biology class on May 7.

An Alaskan Conservation Society Wilderness trip to the sheep country in the Indian Creek area was led by Acting Refuge Manager Troyer May 30, to June 2. Eight persons participated.

Assistant Manager Seemel made reservations for the North American Moose Meeting to be held at Soldotna August 6, and 7.

Assistant Manager Richey accompanied the Sierra Club on a trip through the Swan Lake Canoe System June 30, to July 4. Thirty-six club members took part in the outing. The canoe trip was followed by a hiking-horse pack trip into the Indian River drainage above Tustumena Lake July 5-12. George Pollard's "pack train", Kasilof, was hired to haul supplies and equipment.



Mr. Charles C. Johnson, Photographer, New York, N.Y., arrived at Kenai on July 8 to take marsh and water pictures to illustrate a book on wetlands. A canoe was furnished for his use and plans made to fly him into interior areas, but the weather did not cooperate. The sun finally broke through on Saturday, July 13, when Associate Supervisor Spencer flew him over the Range for a series of aerial shots. Mr. Johnson departed Kenai on July 14.

Alaska Department of Fish and Game Research Biologist Pausch and Bishop arrived at Kenai July 10 and spent the day discussing and developing plans for a moose tagging program to be initiated this fall; reviewing research proposed for the Moose Pen Project; and finalizing plans for the North American Moose Meeting taking place August 6 and 7 at Soldotna, Alaska.

Sam Harbo, Statistician, Alaska Department of Fish and Game (University of Alaska) was at Kenai July 16 and 17 reviewing moose pen vegetation data and discussing the moose tagging program and population studies. Assistant Manager Seemel accompanied him to the Moose Pen for an "on-the-ground" look at the project.

On July 19, Dr. D. A. Harkin and Dr. Douglas A. Yauggen, University of Wisconsin, representing the Public Land Law Review Commission, Alaska Study, spent the day at Kenai discussing land and water resources management problems. Dr. Harkin accompanied Associate Supervisor Spencer and Refuge Manager Hakala on a two-hour-flight over the west side of Cook Inlet and the Kenai National Moose Range to obtain a comparable view of seismic activities taking place on the two areas.

Refuge Manager Hakala attended and gave a short talk at the ribbon cutting ceremony dedicating the Tustumena Road August 4, 1968.

The Fifth North American Moose Committee meeting was held in Soldotna, Alaska, August 6 and 7. More than 50 people attended. We were pleased to have representatives from Norway and Sweden as well as representatives from twenty different universities and conservation agencies throughout Canada and the United States. Field trips were taken to the Moose Pens and to the Slikok Lake Browse Rehabilitation area.

Moose Range personnel assisted the U. S. Forest Service in picking up and transporting 20 yellow cedar logs to Anchorage for the Federal Field Committee. The logs are to be used in a totem carving workshop by the Office of Equal Opportunity and were delivered to Nikishka docks by the Hawaiian Standard.



U. S. Forest Service officials John C. Crupper, Anchorage; Burnett N. Payne, Arlington, Va.; W. Howard Johnson, Juneau; and George Roskie, Juneau; visited Kenai on August 13.

Assistant Managers Seemel and Kurtz presented a movie "Arctic Game Range" to the Kenai Chamber of Commerce on 9/4/68. Thirty-five people attended.

Assistant Manager Kurtz presented the same movie to the Kiwanians at a breakfast meeting on 9/10. Eighteen people attended.

Refuge Manager Hakala attended a meeting of the Kenai Advisory Committee on 9/17. Fish and wildlife regulations are formulated at these meetings for presentation to the Board of Fish and Game for future consideration.

Assistant Refuge Manager Kurtz presented a slide talk to Technical Action Panel meeting at Soldotna, Alaska on October 8. Six people on the committee were in attendance.

Assistant Manager Kurtz and Assistant Manager Seemel attended the Soldotna Chamber of Commerce meeting on October 15, 1968. Dr. Harold Steinhoff presented the program on Recreation Economics. Thirty-five people were in attendance.

Assistant Manager Richey and Refuge Manager Hakala attended a meeting of the Kenai Chapter, Alaska Conservation Society on October 19. Assistant Manager Richey showed the movie "Ecology of a Pond". Eighteen people were in attendance.

Assistant Manager Richey presented a slide show "Alaska Refuges" to the North Kenai Elementary School PTA on October 21. One-hundred twelve people attended.

Assistant Manager Kurtz presented the movie "Arctic Game Range" to the North Kenai 5th Grade on November 21. Forty-four pupils attended.

D. Hunting

<u>Species</u>	<u>BIG GAME Season</u>	<u>Limit</u>
Moose (bulls) Unit 15A	August 20-Sept. 20	1
	November 1-20	1
Moose (bulls) Unit 15B,C	August 20-Sept. 30	1
	November 1-20	1
Moose (antlerless) Unit 15B,C	August 20-Sept. 30 Antlerless moose taken by permit only	1

(continued)  
 Moose (antlerless)  
     Unit 15B  
     Unit 15C

100 permits issued  
 150 permits issued

Caribou	No open season	
Mt. Goat	August 10-December 31	2
Mt. Sheep	August 10-September 20	1 3/4 curl ram
Brown Bear	September 1-30	1
Black Bear	August 10-June 30	3

#### UPLAND GAME

Grouse	August 10-April 30	15/da, 30 poss.
Ptarmigan	August 10-April 30	20/da, 40 poss.

#### WATERFOWL

Game ducks & brant	September 1-December 14	Federal
Geese, other	September 1-December 15	Federal

Beginning in late March black bear provide the earliest big game public hunting. Numerous hunters glassed the treeless slopes for those first bear of the season. Following this early spring surge of hunting pressure an equivalent effort for "blackies" is not again forthcoming until the moose-sheep hunting season. At that time several bear are usually taken during late August and September.

At least three known brown bear were harvested during the September hunt. Two animals were taken from the Lower Funny River Strip and one from the Caribou Hills area.

Sheep and goat hunters frequented the Green Lake, Twin Lakes, Surprise Mountain and Upper Funny River Strip areas. The greatest hunting pressure was again at Green Lake, an area which also tallied the most successful hunters. Several aircraft were observed taking hunters into Twin Lakes and camps were sighted near Iceberg Lake shoreline. Several sheep hunters were observed using Lake Emma as a base camp.

The road and hiking trail accessibility to Surprise Mountain drew numerous hunters into this area during the first week of the open hunting season. At least seven legal sheep were taken, two illegal and one black bear. A second bear was wounded. Most hunting pressure on this mountain is present during the opening weekend. This year, several parties of 2 to 6 hunters were observed camped in Surprise Valley. Additional hunters arrived via the east route from Lower Russian Lake.

Two enforcement men were stationed at Green Lake, Upper Funny River strip, Twin Lakes and at Surprise Mountain during the first two weeks of the big game season. The men at Surprise Mountain



checked 22 hunters personally although additional hunters were present. These enforcement men related this incident to us:

Saturday evening, August 10, "we went about  $\frac{1}{2}$  mile south of cabin (Surprise Valley Cabin) to retrieve tent which Bob Richey had dropped at the six-man hunting camp there. My partner, Al Havens, reached the camp and I was about 100 yards away when a flock of about 15 sheep came down the natural trail on the N.E. slope of Bear Mountain. He signaled me to stop, so I sat down and watched as the sheep descended straight toward the hunters. Al told them he believed one was a legal  $\frac{3}{4}$  curl ram. Suddenly, as the sheep bunched up at least 200 yards away, 3 of the 6 hunters began shooting. Then I moved over to the scene. They were still shooting when I got there. They missed the only legal ram, hitting a half curl and a lamb. I watched them throw additional wild shots that didn't hit anything. The ram, hit through the pelvis, died on the spot, but the lamb, even though a hind leg was hit hard and dangling, scaled the steep slope out of sight on 3 legs. One of the hunters went after the lamb but couldn't find it. We took care of the ram and cited the guilty hunters."

Mild weather again limited available moose during the early August September season. Numerous hunters were observed traveling the road systems in search of a harvest but their success was quite limited compared to hours expended. Continued mild weather again delayed the descent of moose from highland areas during the November hunt resulting in an overall low harvest for the season.

The use of aircraft as an aid in hunting was highly beneficial for those privileged few, although, the lowland lake country was closed to aircraft hunting for the first twelve days of the early season.

A permit controlled antlerless moose season was authorized in Game Management Units 15 B and 15 C. One-hundred permits and 150 permits were issued to these Units respectively.

- E. Violations. Vehicle use off established roads is not permitted although there are usually several violations of this nature yearly. During the big game hunting season snow machines are not permitted, nor are they authorized as an aid in big game hunting. In spite of these restrictions there continue to be a few individuals who disregard these regulations.

Lack of snow in the lowlands usually eliminates snow machine trespass problems, however, there is in the Caribou Hills intensive boundary hunting by mechanized equipment. This year snow conditions were excellent for 4-wheel drive, tractors, swamp buggies, snow machines and even a specially tired VW. Numerous vehicles were observed during the hunting season in this area inside the Moose Range boundary. The twelve miles of boundary line posted in the Caribou Hills this summer was apparently not sufficient. Some



hunters trespassing with off-road equipment above this posted section were successful in harvesting bulls and antlerless animals contrary to regulations. This particular area is difficult to patrol unless suitable tracked equipment with radios and aircraft including helicopters are utilized during the season.

Following the close of the moose season November 20, at least 11 moose were poached on refuge lands. Six animals were taken on Mystery Creek Road, three of these with a 4-wheel drive vehicle using a winch. Other poached moose were recorded along Swanson River, Swan Lake and Marathon Oil Roads.

Poor hunter success during the hunting season, lack of adequate game law enforcement officers and the massive influx of human population in this local area all help account for the active poaching.

Two brothers were apprehended with three trumpeter swan in their possession shot September 29 at Evvook Lake near Sunken Island Lake road. The case was tried October 4 in Magistrates Court, Kenai, Alaska, both defendants plead guilty but sentencing was deferred until October 11. At that time fines of \$500 each were imposed, with \$200 suspended and license revoked for taking a trumpeter swan by one defendant and \$250 suspended for attempting to take swan by the other.

F. Safety. The following accidents occurred during the year:

Government personnel

1. Head, Rodney - while picking up a log, the log fell out of its rotten bark and caused a protruding branch to lacerate his leg. (No lost time)
2. Johnson, Michael - Picked up a log which apparently was too heavy, causing a back strain (5 days-lost-time).
3. Mallett, Jimmie - Injured knee while attempting to open spring loaded door with arms full of equipment. Door slammed on knee. (5 days-lost-time)

Government equipment

1. Temporary employee backed government vehicle into rear of private vehicle while backing out of a parking space. (No damage to government vehicle, \$115 damage to private vehicle.)

Private Aircraft

A total of 13 known aircraft accidents occurred on the Moose Range. These resulted in five fatalities. Several additional accidents

took place on the refuge that were not reported to this office or FAA.

On June 24, State biologists Arthur Bratlie and Dr. John Frank were killed when their plane, piloted by Bratlie, crashed and burned in the Moose Pen while on a wildlife survey. The cause of the crash is unknown.

Two hunters crashed in Gene Lake on September 14. Both occupants were killed.

On November 4, State biologist Perkins and Assistant Manager Kurtz departed from Sportsman's Lodge in a leased helicopter enroute to the moose tagging operation area. A moose was shot from the helicopter with a tranquilizer gun. The pilot landed on the opposite side of the canyon to wait for the drug to take effect. The pilot flew to the vicinity of the downed moose and landed on a rock outcrop. Perkins and Kurtz got out and started running toward the downed moose. They then heard power being applied for takeoff, then a "Ping", and a muffled crash behind and below them. They ran toward the crash which was about 100 feet below the landing site and pulled the pilot from the wreckage. The pilot was apparently killed immediately from head injuries.

Kurtz and Perkins were picked up by another helicopter about an hour after the crash.

The crash was apparently caused by the tail rotor hitting some small willows and snow, breaking the rotor, causing the aircraft to wheel to the left and down the side of the mountain.

#### Other

A 8' pram overturned 20 feet from shore in Lower Ohmer Lake spilling a 71-year-old man and his 6-year-old grandson into the water. Both persons drowned. Neither person was wearing a life preserver, although one preserver was in the boat.

Summary of accidents for 1968 follows:

Fatalities	7
Aircraft Accidents	13 (known)
Boating Accidents	1 (known)
Injuries (gov't employees)	3
Lost Time Accidents	2 (10 days total)

Needless to say, the SAFETY record for this station is not enviable.

SAFETY bulletins are posted as required and are read by all employees. Proper procedures in handling equipment and tools is emphasized, particularly with temporary employees.

Monthly SAFETY meetings are scheduled to discuss timely SAFETY topics.

Our SAFETY program review reported the following:

1. A SAFETY committee was appointed to update station SAFETY and conduct monthly SAFETY programs.
2. Temporaries will be required to have hard-toe shoes as a condition of employment.
3. Temporaries will be required to spend one full day with a permanent staff member on SAFETY and vehicle operation prior to issuance of drivers ID card, and attend monthly SAFETY meetings.
4. SAFETY will be stressed at the weekly work meetings, attended by all staff members.

During the past year, the following SAFETY projects were completed:

1. The station SAFETY and fire plan was revised.
2. All boats and canoes were checked for floatation and labeled.
3. Walkways to the office and two residences were repaired.
4. Hand railing installed in shop stairway.
5. All furnaces and heating systems checked, cleaned and repaired.
6. Fuel pump tank vents were raised to 12' above the ground.
7. Wire screens are being installed on rear windows of all trucks.
8. The service building, storage building, boat house and boneyard were cleaned and reorganized.
9. All trails and portages were maintained to remove trip-fall hazards.
10. Purchased approved life preservers for boat and aircraft use.

## VII. OTHER ITEMS

### A.. Items of Interest

Associate Regional Refuge Supervisor Spencer's office was officially moved to Anchorage October 16 with pickup of files and office



equipment by the movers. The Kenai Refuge staff spent October 17 and 18 "cleaning and rearranging" office space.

Mrs. S. E. (Betty) Robinson received notice of her disability retirement September 20 to be effective 8:00 a.m. September 23. Mrs. Robinson worked at Kenai for 14 years as refuge clerk-typist on Associate Regional Supervisor Spencer's staff.

B. Credits

Credit should be given to the following persons for their work on the following sections:

Robert A. Richey - II. Wildlife, Section A, B, C, D, E, F, and I.

IV. Resource Management, Section F and G.

VI. Public Relations, Section D & E.

Robert K. Seemel - I. General, Section B.

III. Refuge Development, Section B, C, D, E. & F.

IV. Resource Management, Section A, B, & D.

V. Field Investigations

John E. Kurtz - II. Wildlife, Section G & H.

III. Physical Development, Section A.

IV. Resource Management, Section C & E.

VI. Public Relations, Section A & F.

Cherie E. Stroud - I. General, Section A.

VI. Public Relations, Section B & C

C. Photographs. A selection of photographs depicting Moose Range activities are included in the appendix.

Submitted by:

John B. Hakala  
John B. Hakala  
Refuge Manager

Date:

3/10/69

Approved by:

David L. Spencer  
David L. Spencer  
Associate Supervisor, Wildlife Refuges

Date:

3/17/69

March 10, 1969

JBH:ces

US FISH & WILDLIFE SERVICE--ALASKA



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Retirement banquet August 10, for Mrs. S.E.(Betty) Robinson. Associate Supervisor, Alaska Wildlife Refuges - master of ceremonies. Left to Right, Assistant Manager John E. Kurtz, David Spencer, Mrs. Robinson and husband Glenn and Mrs. Robert Seemel.

Retirement banquet. Mrs. Robinson receiving gifts from former associates. Left to Right, Refuge Manager Hakala, Mae Hakala, Glenn Robinson and Betty.





# **PUBLIC USE**

## **KENAI NATIONAL MOOSE RANGE**

THIS AREA OPEN TO PUBLIC USE ACCORDING TO THE FOLLOWING:

### **AUTHORIZED USE**

WITHOUT PERMIT INCLUDES HUNTING - FISHING -  
CAMPING - BOATING - HIKING - PHOTOGRAPHY - BERRY  
PICKING AND OTHER RECREATIONAL ACTIVITIES

### **UNAUTHORIZED USE**

INCLUDES OPERATION OF VEHICLES OFF ESTABLISHED  
ROADS - CONSTRUCTION OF AIRSTRIPS - ERECTION  
OF PERMANENT STRUCTURES - PROSPECTING -  
MINING & COMMERCIAL ENTERPRISES

### **PERMITS**

ARE REQUIRED FOR TRAPPING - TIMBER CUTTING  
- TEMPORARY GUIDE CAMPS AND OTHER  
ECONOMIC USES - A VALID STATE LICENSE IS  
REQUIRED FOR HUNTING & FISHING

### **FOR INFORMATION**

ON OTHER USES CONTACT REFUGE MANAGER -  
KENAI NATIONAL MOOSE RANGE - BUREAU OF  
SPORT FISHERIES & WILDLIFE

*BOX 500 - KENAI, ALASKA  
PHONE KENAI - 283-7563*

Public use informational signs along access roads into the Moose Range.

Campgrounds are constructed by backfilling roadways without disturbing vegetation or topsoil.







Backfill is leveled with dozer. The dozer operates only on road surface, and does not disturb the vegetation or topsoil adjacent to the new road.

We presently have 6 water wells at 5 of the 14 campgrounds. Water wells average \$2,000 to \$2,500 each.







The two canoe systems are becoming more popular each year. During 1968, about 3800 people used the canoe systems.

There are presently 72.3 miles of hiking trails ranging from one mile in length to 20.2 miles. A total of 392 miles of hiking trails are planned.







Groups such as the Sierra Club enjoy canoeing, camping, hiking and fresh trout from the canoe system lakes.





Modern day hunting camps have nearly all the conveniences of home, as exemplified by their camp near the Funny River Strip.

Vern Berns (Assistant Manager - Kodiak) can be proud of this fine Dall sheep.







This is when the work starts. It is a long way back!

Snowmobiling is one of the fastest growing sports in this area. Present regulations restrict snowmobile use as an aid in big game hunting. Plans are underway to construct snowmobile trails and to zone snowmobile use.







We encourage this type of winter refuge use. Cross-country skiing is very popular with many of the "old-timers".

The only timber cutting presently permitted is for personal use such as house logs and firewood due to wilderness study.





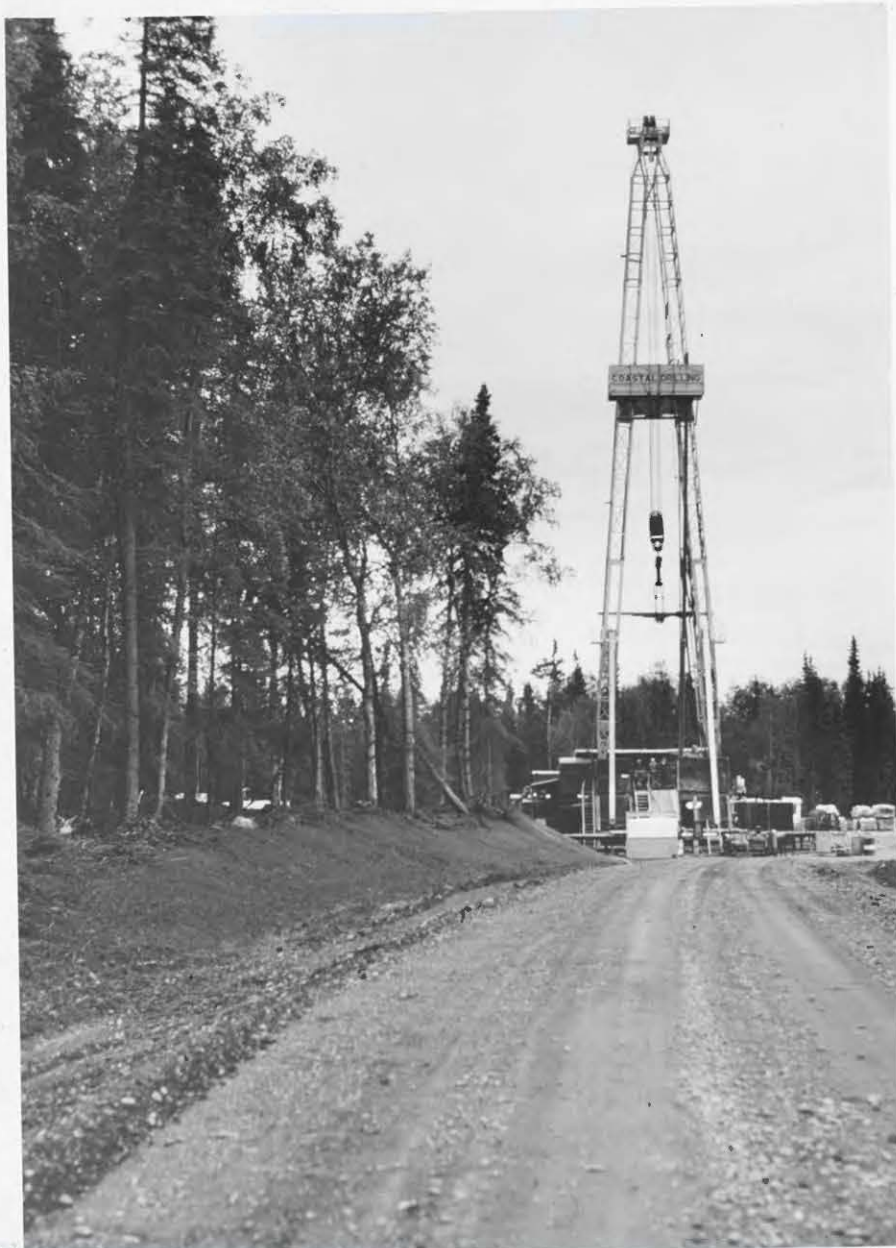


The last of the cutbanks to be sloped. The scraper is spreading a layer of gravel over the entire slope for better stabilization.

Repairing areas where the silt has slipped on the Jean Lake highway cutbank stabilization project.







There are currently 49 producing oil or gas wells on the Moose Range. Several additional well sites are capped awaiting production demands.





Although seismic operations are permitted with restrictions, occasionally unauthorized lake approaches and sub-surface soil disturbance occurs.

Occasionally seismic operation instructions are not well understood by operators in the field. The scarring of ground, removal of top soil, disturbance of sub-surface soils, cuts and fills are not authorized.







The remaining portion of a wooden bridge at a stream crossing portage along the Swan Lake Canoe Route following the unauthorized construction of an oil seismic trail through this recreational area.

The moose pen fences must be checked frequently. The only problems to date have been moose on the outside breaking in.







A tranquilized cow is marked with a bright plastic collar and ear tags. The pens were stocked with 10 moose each in January.

Nearly 200 trumpeter swan resided on the refuge this year. Thirty nesting pairs were observed with an average clutch of 4.6 eggs per nest.







The 150 mile canoe system provides many excellent photographic possibilities. Mother golden-eye and a portion of her brood pass in review.

The numerous lowland lakes support a large waterfowl production area. This red-necked grebe tending her nest was located on Swan Lake, largest lake along the Swan Lake Canoe Route.







On January 28, 1949 an Alaska Airlines DC-3 struck Ptarmigan Head Mountain in the Caribou Hills on a clear cold winter evening. Captain Land, the pilot, and one of six passengers survived although some frozen limbs were later amputated. The aircraft, returning to Anchorage via Homer from an unsuccessful supply trip to fog-covered Bethel, carried several hundred pounds of meat, oysters and eggs. Captain Land was unfamiliar with this route and correct elevations on then current maps were questionable. The aircraft is presently being removed.