REFUGE NARRATIVE REPORT

January - - - - - - - April, 1961

KENAI NATIONAL MOOSE RANGE

Kenai Alaska

Staff:

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

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I. GENERAL

A. Weather Conditions.

Rainfall, snowfall, snow depth and temperatures as recorded at the Kenai FAA Station are presented in TABLE 1. Temperature extremes and means, and precipitation for the period compared with a ten-year-average are as follows:

	Temperatures				Precipitation (in inches)		
	Max.	Min.	Av. Mean	10-yr. Av. Mean	Month	Normal	Snow-fall
January	46	-17	21.5	10.5	1.44	1.23	2.2
February	39	-10	16.1	12.6	1.48	1.08	31.7
March	48	-28	13.0	22.2	.45	.97	5.7
April	56	14	33.9	32.8	1.90	.68	1.7
					5.27	3.96	41.3

This was the fifth relatively mild winter in succession with thirty-six (36) days of below zero temperature recorded for the period. Snowfall was light with a maximum depth of twenty (20) inches on the ground at the Kenai FAA Station March 1. Snow cover practically disappeared during January's unseasonable rain which left a layer of ice on the surface of the ground in exposed areas. February's snow quickly covered the ice permitting unrestricted travel except on steep slopes.

B. Habitat Conditions.

1. Water. Generally, lakes, rivers and streams remained frozen throughout the period. The mid-winter thaw and rain opened the western one-third of Skilak Lake, Kenai River from its terminus to Cook Inlet, and a few of its larger tributaries. The first week in March saw these open waters re-frozen except for a stretch of the Kenai River from Skilak Lake to Sterling, Alaska. Few, small, spring-fed streams remained open throughout the winter.

TABLE 1. - SNOWFALL - SNOW DEPTH (in inches) -MINIMUM and MAXIMUM TEMPERATURES

Day	January				February				March				April			
	Snow-fall	Snow depth	Min. T.	Max. T.	Snow-fall	Snow depth	Min. T.	Max. T.	Snow-fall	Snow depth	Min. T.	Max. T.	Snow-fall	Snow depth	Min. T.	Max. T.
1	1.2	3	21	28	7	7	14	21	4.4	20	- 5	19		2	22	43
2	T	4	17	28	1.0	1	14	22		14	-17	18	T	2	28	47
3		4	27	30	T	1	18	27		12	-15	18		2	27	44
4	.2	4	22	30		T	25	38		12	- 3	20		T	19	45
5	T	4	10	23	1.6	7	29	39		12	8	26	T	T	34	44
6	T	4	14	20	T	2	15	31		9	- 2	26	T	T	34	41
7	T	4	7	22	1.8	2	20	28		9	- 5	27		T	30	40
8		4	- 6	9	6.0	4	24	29		9	-13	28	T	T	27	39
9		4	- 9	13	T	8	2	27		9	-13	25	T	T	31	41
10	.6	4	-17	10		8	-6	20		9	-15	26		T	28	41
11	.2	4	5	23		8	- 4	22	.4	9	-11	22		T	20	38
12		4	19	32		8	-10	19	.4	9	-13	19	T	T	28	39
13		4	17	31	T	8	- 7	15	T	9	-16	11		T	24	39
14	T	4	- 2	24	.3	8	8	19		9	-27	10	.3	T	27	32
15		4	- 5	16	T	8	2	23		9	-27	15	1.2	1	26	33
16		4	- 3	19	T	8	- 5	30		9	-28	15		1	20	37
17		4	4	29		8	-10	23	T	9	-20	26	T	T	14	33
18	T	4	26	39	T	8	- 5	20	T	9	24	36	T	T	25	35
19		3	31	46	.5	8	13	25	T	8	29	37			18	36
20		2	35	46		6	10	30	.5	8	21	30			15	38
21		1	35	40		6	3	25		8	15	33	T		24	38
22	T	1	29	36	T	6	10	20		8	5	28	.2		30	38
23	T	1	34	42		6	- 1	29		8	- 8	32			32	42
24	T	T	36	42		6	- 8	26		8	6	30			34	41
25	T	T	30	42	T	6	- 2	19		8	- 4	35			35	42
26	T	T	24	38	9.0	10	16	25		8	- 3	36			34	40
27		T	15	33	3.0	15	13	22		8	- 3	32			32	50
28		T	10	30	1.5	18	17	31		7	18	40			29	42
29	T	5	27							7	16	38			24	54
30		T	- 2	27					T	6	29	48			35	56
31		T	3	21						4	29	39				

General break-up began on the Kenai March 27 with snow and ice rapidly disappearing from highways, side roads, open muskeg areas and small streams. By period's end, all creeks, streams, rivers, ponds (1/2 to 1 acre in size) and shallow lakes were ice-free with the ice rapidly disappearing from Tustumena and Skilak Lakes.

2. Food and Cover. Food was abundant and cover adequate. The dispersed moose populations throughout the winter indicated the abundance and availability of browse forage. Light snowfall and the mid-winter thaw permitted unrestricted movement of the animals.

II. WILDLIFE

A. Migratory Birds.

1. Waterfowl. Waterfowl were observed throughout the winter in the open portion of the Kenai River. These included mallards, common goldeneye, scaup and mergansers. An estimated five hundred waterfowl were observed along the open area of the Kenai River on March 24. These included large groups of goldeneye and scaup with smaller numbers of pintail, mallards, green-winged teal and mergansers. Mid-April saw the beginning of a rapid build-up of transient birds crossing the Moose Range and utilizing the flats at the mouths of Chickaloon, Kenai and Kasilof Rivers as feeding and nesting sites. Flocks of geese varying in size from 25-250 were observed passing over the Moose Range during the last two weeks ofApril. Included were greater and lesser Canadas, white-fronted geese and snow geese. Large concentrations of mallards, pintail, common goldeneye, green-winged teal and scaup ducks were seen in the open waters of Skilak and Tustumena Lakes, the flats on the Kenai, Kasilof and Chickaloon Rivers. Fewer flights of lesser sandhill crane were sighted than in past years. Flocks were heard calling as they flew over the low overcast which prevailed the last week of April.

2. Trumpeter Swan. The first trumpeter swan returned to Kenai March 24, 1961. On that date, five birds were observed on the Kenai River at the mouth of Skilak Lake. These included one family of two adults with one bird of the year; the other, two adults. It appeared that the family of three may have arrived a few days earlier as the neck feathers had become slightly stained from feeding in the Kenai River. The pair of adults were completely white. Weather prevented an end-of-the-month swan count. The last flight indicated forty-one (41) trumpeters had returned to the area which included one juvenile bird.

B. Upland Game Birds.

1. Spruce Grouse. Few spruce grouse were observed along the roads during the period. Many single birds were seen in timbered areas indicating a highly dispersed population. During January, the weather played games with the spruce grouse. Anticipating spring, the cocks were observed in the Ninilchik area performing their courtship ritual for the hens. A sad disillusionment!!

2. Ptarmigan. No ptarmigan were observed in the lowland wintering areas along the Sterling Highway formerly occupied by large numbers of birds. This was probably the result of the mild winter and light snowfall which kept the ptarmigan at higher elevations.

C. Big-Game Animals.

1. Moose. The moose wintered well with no winter mortality either observed or reported, except for road kills. From the air, the main wintering areas appeared to be cut up with tracks comparable to a large stockyard. Included were large portions of the 1947 Burn and adjoining timbered areas. Few moose arrived in the "excepted area" along the coast formerly one of their main wintering grounds. The mild winter and limited snowfall kept most of the moose widely scattered throughout the interior portions of the Range.

By mid-April, the moose had gone into seclusion with the females probably anticipating the resurgence of their kind. Few animals were observed in open areas. A mild winter with an abundance of available browse forage, indicators of a healthy calf crop this coming spring, may increase the moose population beyond the winter carrying capacity of the range, a critical factor during a severe winter. Increased harvest may be indicated.

TABLE 2 presents known moose mortality for the past year (May 1960 to April 1961) as recorded at this station. During the period, the following mortality occurred within the Moose Range: Highway kills - 19, illegal kills - 2, malnutrition - 1; Spring 1960 - drowning - 3, tangled in wire - 1, unknown - 1.

Following is a summary of a winter moose survey submitted by Assistant Refuge Manager Wade.

A winter aerial moose survey covering the lowland portion of the Moose Range was made February 6, 9, and 10, by Game Management Agents Thayer and Argy as pilots with Refuge Managers Hakala and Wade as observers. This ten per cent (10%) survey covered approximately 790 miles of transect lines, one-quarter (1/4) of a mile wide.

TABLE 2. MOOSE MORTALITY, May 1960 - April 1961

	Adult			Yearling			Calf			Unknown	Totals
	♂	♀	Unk.	♂	♀	Unk.	♂	♀	Unk.		
Highway Kill	1	4		3	3	2	3	3			19
Drowned		2	1								3
Illegal Kill		1							1		2
Malnutrition		1									1
Unknown Cause										1	1
Tangled in Wire	1	-									1
TOTALS:	2	8	1	3	3	2	3	3	1	1	27

Three hundred forty-one moose were recorded for an average of 1.7 moose per square mile. In addition to the above, a twenty per cent (20%) survey of known moose concentration areas totalling 205 miles of lines were also flown. TABLE 3 summarizes the moose survey. In checking a sample of data recorded during this count, it was found that 80% of the moose were seen by the observer-recorder in the rear seat of a Super Cub while the pilot-reporter saw only the remaining 20%. The pilot was required to fly the aircraft at approximately 500 feet above ground level on a prescribed course, in addition to observing and reporting moose to the observer-recorder which kept him pretty busy. The flight transect lines were plotted on maps and the altitude above sea level to be flown was marked in red pencil as a ready reference to the pilot. Cover types along transect lines were recorded by the observer-recorder, i.e., spruce and hardwood forests, burned area, etc. Information on moose usage by cover types is summarized in TABLE 4. The herd's winter concentration areas are shown on MAP I.

2. Dall Sheep.

No report.

3. Mountain Goat.

No report.

4. Brown and Black Bear. A large brown bear track was observed on the north end of the Alaska pipeline right-of-way during mid-March. Black bear sign was seen at the end of the quarter but no sightings made.

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

Mink, marten, fox, lynx, weasel and wolverine trapping seasons were open from January 1 to 31 inclusive; land otter season extended from January 1 through March 31; and the beaver season from February 1 through April 30. Fair catches of beaver and mink were reported with limited otter success as compared with past seasons. Few coyote were observed during the period with little success reported by aircraft permit hunters. Four wolverine were observed March 5, 1961 by John Klingbeil, Alaska Department of Fish and Game pilot, on the south side of Tustumena Lake. A wolf was reported seen March 24, 1961 by Messrs. Fenn and Huber of Anchorage while flying over the glacier flats to the east of Tustumena Lake.

TABLE 3. SUMMARY OF WINTER AERIAL MOOSE SURVEY

Herd Areas	% of Area Covered	Number of Moose Seen	*Estimated No. of Moose
1	20	78	640
2	20	159	1,270
3	20	160	1,280
4	20	61	480
5	20	62	490
6	10	3	40
Other-less than	10	69	1,100
TOTALS:		592	5,300

*Includes percentage as well as pilot-observer efficiency.

TABLE 4. MOOSE USAGE BY COVER TYPES.

	No. Moose Seen	% by Cover Type
1947 Burn	366	61.8
Spruce	43	7.3
Spruce-Hardwood Mixture	121	20.4
Swamp	52	8.8
Other	10	1.7

Wildlife sign observed on a trip into the northeast corner of the Moose Range from Mystery Creek to the Chickaloon River included the following: moose, squirrel, weasel, lynx, wolverine, coyote, snowshoe hare, mink and one possible marten track. Wildlife appeared to be more numerous than in other similar areas on the Moose Range-especially snowshoe hare. Two coyote and one lynx caught in steel traps were dispatched for Trapper Mathison on the return trip.

E. Hawks, Eagles, Owls, Crows, Ravens, and Magpies.

Rough-legged, red-tailed and marsh hawks were noted during the period. The hawks arrived in increasing numbers as soon as break-up commenced. One northern sharp-shinned hawk was observed on the last day of the period.

Bald eagles were observed throughout the winter. Their numbers increased with the advent of break-up-no flight failing to observe less than three birds. An active bald eagle's nest was found April 20, with an adult bird in the nest.

Few owls were observed. Ravens were abundant during the period and magpies more numerous than in past years. On March 3, a flock of 12-14 magpies was seen outside the City of Kenai.

F. Other Birds.

Passerines began arriving the latter part of April. Flocks of redpoles and grosbeaks were seen the weekend of April 22; gulls and shore birds were returning in increasing numbers by the end of the period. The first Wilson snipe was heard the evening of April 23; the first yellowlegs sighted April 24. Twenty-four black geese, believed to be brant, were noted April 20 at the outlet to Skilak Lake. The first robin was observed the morning of May 1.

G. Fish

Ice fishing was popular into mid-March with most pressure confined to the Seven Lake chain on the East Fork of Moose River, Hidden Lake and a new series of lakes opened along the Swan Lake Access Road. The Swanson Lake chain and a few of the larger lakes on the north end of the Moose Range received heavy use by Anchorage fly-in fishermen. Good catches of rainbow, lake-locked salmon, and Dolly Varden trout were reported with fair catches made of lake

trout out of Hidden Lake. On January 26, Clarence Marsh, a trapper operating under permit on the Moose Range, brought in two salmon which were ready to spawn. These were caught January 23 in an interior lake south of Swanson River. The eggs were full-term and the salmon were identified as "Lake-locked" reds or kokanee. The fish were turned over to Fishery Biologist Haley, Alaska Department of Fish and Game.

Eugene Smith of Cohoe submitted his final report on his commercial fishing activities in Tustumena Lake for this winter period. He used fifty (50) yards each of $2\frac{1}{2}$ and $3\frac{1}{2}$ -inch mesh and harvested one (1) whitefish, four (4) Dolly Varden and fifty (50) lake trout. His fishing activities were centered near Nikolai Creek on Tustumena Lake. As can be seen, this was not an economically profitable venture, but another year may bring better results.

I. Disease.

No report.

III. REFUGE DEVELOPMENT AND MAINTENANCE

A. Physical Development.

Three new radio antenna poles were installed at the Refuge Headquarters Site.

C. Collections and Receipts.

No report.

D. Control of Vegetation.

A "Dybar" brush killer experiment was started this April. Thirty-one plots, one-tenth (1/10) acre in size, were set out in six various types of cover. Concentrations varied from ten to eighty pounds per acre. This herbicide is supposed to kill all types of cover including spruce. It is hoped that some of the hardwoods, such as willow and birch, will re-sprout.

IV. RESOURCE MANAGEMENT

C. Fur Harvest.

Sixteen free use trapping permits were in effect during the period. Catch reports on furbearers harvested are incomplete at this time but will be included in the next narrative report. All trapping permits expired on April 30th.

Five free use permits were issued for harvesting coyotes and wolves via aircraft. These permits also expired April 30th.

D. Timber Removal.

Twenty free use non-commercial timber permits were in effect during the period, i.e., house logs and fuel wood.

H. S. Clark, Special Use Permit #36218, paid $22.50 for 15,000 board feet of spruce saw timber.

F. Other Uses.

Two free use commercial fishing permits were active during the period. These permits terminated April 30th. (Section II, Part G- Fish)

One free use permit issued and terminated this period for the access of heavy equipment across Refuge lands near Soldotna.

Mr. H. Campbell paid $50 for Special Use Permit #36220 issued for 1,000 cubic yards ofgravel at $0.05 per yard. This permit terminated during the period.

Secondary Quarters #2 were vacated by Mrs. James Arness on April 29, 1961. These quarters sublet to Mrs. Arness were used as a Kindergarten during Mr. Williams absence on educational leave. A total of $166.50 was received during the period. Mrs. Arness paid her own utilities.

Special Use Permit #20651 originally issued to the Alaska Road Commission for a five-year period for gravel sites in the Soldotna area terminated August 15, 1960. The area has not been restored in accordance with the permit, therefore, cleanup work has been requested prior to relinquishment and acceptance.

Standard Oil Company of California, under the Swanson River Unit Agreement, paid for and removed the following amounts of gravel at $0.05 per cubic yard.

12/21/60 (not previously entered)	20,200 cu. yds.	$1,010.00
1/17/61	45,400 " "	2,270.00
2/13/61	32,450 " "	1,622.50
3/24/61	58,850 " "	2,942.50
	156,900 " "	$7,845.00

V. FIELD INVESTIGATION and APPLIED RESEARCH

A. Progress Report.

Permanent forage plots were measured on May 3rd and 10th. It is interesting to note that the total percentage of use for willow was 77%, Kenai birch 83%, dwarf birch 50%, aspen 2% and cottonwood 0%. Data on these forage plots summarized in TABLE 5.

VI. PUBLIC RELATIONS

A. Recreational Uses.

Ice fishermen and skiing enthusiasts comprised the majority of recreation seekers for the period. Skiing was confined chiefly to the ski area, under permit to the Peninsula Sportsman's Assn., south of the village of Soldotna, Alaska. Estimated use days - 4,000; ice fishing - 2,500.

B. Refuge Visitors.

Date	Name & Title	Organization	Purpose
1/ 3/61	J. Dedrickson, Biologist	ADF&G	Courtesy Call
1/ 9/61	John Nelson, Engineer	Std. Oil	Bridge Specs.
1/10/61	John Merrick, Forest Ranger	BLM	Courtesy Call
"	Bill Klein & Jim Callahan- Land Examiners-BLM		" "
1/11/61	G. Atwell, Mgmt. Biologist	ADF&G	Clam Gulch Mtg.
1/12/61	Dunn & Haley Fish Biologists	"	Coop. Info.
1/17/61-	V. Bookwalter, Retired FWS employee-request to move Cat thru M. R.		
"	Mr. & Mrs. H. Campbell	Henton's	Ferry Permit
1/23/61	Ed Whittemore, Engineer	Std. Oil	Business
"	Elmer Kendall	Alaska Pipeline	"

TABLE 5. FORAGE UTILIZATION 1960-1961 - Permanent Forage Plots

Plot No.	Species	Location	Oct. 1960	May 1961	Forage Used (in inches)	% of Use
1	Willow	Kasilof	352	58	294	84
2	"	"	78	6	72	92
3	"	"	106	30	76	72
4	"	"	432	126	306	71
5	"	" "	962	190	772	80
6	"	"	182	46	136	75
9	"	Kenai	60	22	38	63
8	"	Skilak	1,262	306	956	76
10	"	"	1,020	260	760	75
4	Kenai Birch	Kasilof	1,242	272	970	78
5	" "	"	1,726	204	1,522	88
6	" "	"	1,058	194	864	82
9	" "	Kenai	60	6	54	90
9	Dwarf Birch	Kenai	24	12	12	50
5	Aspen	Skilak	90	14	76	84
7	"	"	1,750	1,650	100	6
8	"	"	496	496	-0-	-0-
10	"	"	1,312	1,304	8	1
11	"	"	3,055	3,055	-0-	-0-
12	"	"	1,262	1,262	-0-	-0-
1	Cottonwood	Kasilof	2	2	-0-	-0-
2	"	"	-0-	-0-	-0-	-0-

Date	Name & Title	Organization	Purpose
1/25/61	Arthur G. Berg, Adm. Asst.	Geological Survey	Business
"	J. W. Brady	U. S. Army	Visitor(w/Berg)
2/ 4/61	Chas. A. Wilson, Asst. Mgr.	HEA	Business
"	Per Osmer, R-O-W Agent	"	"
2/ 7/61	Ed Whittemore, Engineer	Std. Oil	"
2/9-10	Neil Argy, GMA	FWS	Moose Survey
"	John Merrick, Forester	BLM	Visitor
2/13/61	Keith Arnold, Reporter	Cheechako News	"
2/13/61	Per Osmer, R-O-W Agent	HEA	Business
2/17/61	W. Spence & E. Kendall	Delta Engineering	"
2/21-24	Jim Callahan, Land Examiner	BLM	Working in area
2/28/61	R. Smay & I. Miller-Fire protection equip. agents		Business
"	Bob Rausch, Biologist	ADF&G, Fbks.	PU moose jaw bon
3/ 1/61	H. B. Ruehe, Engineer	Std. Oil, S. F.	Business
"	Ed Whittemore, Engineer	" , Anch.	"
"	G. Atwell, Mgmt. Biologist	ADF&G	Guide tests
3/ 6/61	Craig Lyon, Engineer	Std. Oil	Conference
3/21/61	J. T. Crooker, District Supt.	"	"
"	B. Goodwin-McKinley Steel Fence Salesman		Business
"	H. Campbell	Henton's	Ferry Permit
3/28/61	Jim Callahan, Land Examiner	BLM	Working in area
3/29/61	Mr. & Mrs. E. Smith-Bird Observation Reporters		Cooperation
4/6 /61	P. McAndrews, Landman	Std. Oil	Re:cabin status
4/ 6/61	Tom Wardleigh, Pilot(formerly FWS)	FAA	Courtesy Call
4/ 7/61	Theron Smith, A/C Supvr.	FWS	Business
"	Jim Branson GMA in Charge	FWS, Anch.	Enf. Inspection
"	Neil T. Argy, GMA	FWS, "	Business
"	C. V. Chatterton, new District Supt. replacing		
"	J. T. Crooker outgoing Dist. Supt. - Std. Oil		Introduction
4/18/61	A. Salazar, new R-O-W Agent	HEA	Business
"	C. A. Wilson, Asst. Mgr.	"	"
4/21/61	Wm. H. Winzenread, Major, Post Commander, Wildwood		Courtesy C
"	Gene E. Dray, Capt. U. S. Army, Wildwood Station		Courtesy Call
4/24-& 27-	L. E. Whitesel	FWS	Inspection
4/24/61	Eugene Smith, Bird Observer		Courtesy Call
4/25/61	Calvin J. Downey (OSI)	Elmendorf	" "
4/27/61	J. M. Greany, Juneau(formerly FWS)	ADF&G	" "
4/27/61	H. Campbell	Henton's	Ferry Permit
4/28/61	J. Nava & Buck Stewart, TOK	ADF&G	Courtesy Call

Messrs. Waldemar and E. Morsburg of Craig, M. Field and Bill Hopkins of Ketchikan, R. Budbe and R. B. Guire of Sitka, F. Walstad

of Juneau, Virgil Crosby and Don Roberts of Anchorage visited the Kenai Office April 24, 1961. All are ADF&G Agents and were on their way to a State meeting in Homer, Alaska.

C. Refuge Participation.

Assistant Refuge Manager Wade and Refuge Manager Hakala attended an Alaska Department of Fish and Game Advisory Board meeting at Clam Gulch with Mr. Gerry Atwell, ADF&G Management Biologist, January 11, 1961.

Refuge personnel checked out a moose case for GMA Pinkham, Fairbanks, January 26, 1961, and obtained information on meat being held at Sweetgrass, Montana, Customs Station.

Refuge Managers Hakala and Wade attended the Regional Conference February 20 to 24.

Clerk Robinson and Refuge Manager Hakala completed the prescribed ten-hour (10) Standard Red Cross first aid course during February.

Refuge Manager Hakala was a participant in a program presented by GMA Thayer at Anchorage February 28, 1961. A talk covering oil development and associated activities was presented.

Assistant Refuge Manager Wade acted as an observer on a River Basins' game survey in the Rampart-Ft. Yukon area March 19-24, 1961.

Assistant Refuge Manager Wade aided Game Management Agent Thayer in checking out a moose poaching case.

Assistant Refuge Manager Wade attended the 20th annual BLM Fire School in Fairbanks April 2-8, 1961.

D. Hunting.

The spruce grouse and ptarmigan season extended into the period. No reports were received on hunting success. Winter coyote hunting using aircraft under Refuge permit was conducted by a few operators with little success reported to date.

E. Violations.

All violations were handled by the Alaska Department of Fish and Game Protection Officers with an able assist by U. S. Fish and Wildlife Game Management Agent Thayer of Kenai.

VII. OTHER ITEMS

A. Items of Interest.

Mr. Ed Whitesel, BSFW, Juneau, visited the Kenai on an inspection trip April 24 and 27. A check was made of the oil development to familiarize him with the potential oil and fish problems inherent with present and future expansion of this industry on the Moose Range. Sport fish management problems were discussed. An inspection was made of the Jean Lake and Creek siltation problem presented by continual erosion from the Sterling Highway into the system.

Standard Oil Company of California announced completion of nine producing wells and one dry hole during the period, increasing their total oil producing wells on the Moose Range to twenty-seven plus one gas well. By the end of the period, Standard had upped their production to 13,500 barrels of crude per day passing through the Kenai pipeline headed for points south. Wells in the oil field are being drilled with increasing rapidity. Time required to drill to the Hemlock Zone, at approximately 11,000 feet, has decreased from 60 days to 25-30 days maximum. Increased experience, moving drill rigs in large sections without dismantling, and contracting by well or footage has increased number of holes.

Standard Oil Company of California announced abandonment of their Falls Creek Unit Well #1 near Clam Gulch as a dry hole. The hole was plugged back to 8,000 feet where testing indicated natural gas.

A Coastal rig moved into Union Oil Company's Sterling Unit to drill their first "wildcat". This rig drilled Standard's Falls Creek hole.

An application to conduct a seismic survey of Tustumena Lake by the Marine Geophysical Services Corporation of Houston, Texas, was denied. The lake lies in the area closed to oil and gas leasing by the Secretary of the Interior.

The quarter has mainly consisted of oil development and its associated problems. Rumors persisted in circulating around the area of large scale housing development, trailer parks, roads and highways, crude oil line breaks and spills with its allied contamination and pollution taking place on the Range. Humoring individuals, tracking down rumors, field inspections, checks and related correspondence, and meeting with oil officials has been the course of activity. Invariably, the rumors were found to be based on fact. The rapid expansion of the oil industry; annual change in key personnel with one aim "to get the oil" requires constant inspection and direct supervision by this office to keep up with all its ramifications and to protect the public's interest in the area.

Cleanup of line breaks and crude oil spills progressed satisfactorily. Additional cleanup and containment of a line break at Well Site #32-8 was required when the thaw indicated the oil spray had reached Swanson River--over 2,000 feet from the well head. To prevent future spills of this type, installation of Hi-low automatic safety valves, flanged directly to the pressure reducing "Bean" on the X-Mas tree, is being done on all new wells brought in. Modification of existing wells will be accomplished as soon as new equipment arrives. Both Otis and Garrett Hi-low automatic safety valves are being installed.

Standard Oil Company continued seismic exploration activity on the Moose Range throughout the period. In January, 17½ additional miles of line were authorized in the Swan Lake Unit. This work was completed in February with crew and equipment released to Texaco (Texas Co.). During March, Standard Oil was granted authority to construct sixteen additional miles of seismic line in the Swan Lake Unit and adjoining areas. This was their second return to the area this winter. A total of twenty-one miles of line were shot, including five from a previous program. Authority to shoot refraction profile shots along one of the east-west lines was granted. Thirty-two miles of seismic trail were constructed in the Soldotna Creek Unit. Only a portion of these lines was shot with the remainder to be completed early next winter and with a probable request forthcoming for summer work. Crews and equipment were pulled off the Range by the end of March to do a rush job in the southern portion of the Kenai Peninsula. The oil activity in all its phases is going through accelerated growing pains.

Texaco completed construction of seismic trails along Cook Inlet in January. The lines were shot during February and work completed on their program March 9.

Standard applied for and received authorization to gravel and make into an all-weather road the former "winter" road, constructed during January, into the Swan Lake Unit. Additional work remains to be done prior to abandonment of the gravel pit and haul road, filling in gravel prospect pits, installation of additional culverts and roadside cleanup.

A well location for the first "wildcat" in the Swan Lake Unit was inspected and approved March 28, 1961. Target date for "spudding in" is July 1.

Standard Oil Company completed construction of two new single span steel bridges across Swanson River as per their approved year's plan of development. The old structure has been removed and the area will be graded to provide a boat launching site and future campground for public use.

Standard Oil Company extended their approach area to the north end of the Swanson River Strip one thousand feet.

Standard presented a new plan of construction for their oil production facilities. An electrical generating plant, gas processing plant and crude stabilization facility were proposed. After review by the Regional Office, on-the-site inspection and discussion, the plan was approved as presented. Construction of a power plant, re-routing of roads and powerlines, and installation of drainage skimming sumps will proceed immediately. The gas producing plant and crude oil stabilization facilities are deferred until a future date.

A Standard Oil Company engineer was killed in a collision between his vehicle and a large earth-mover in the Swanson River area January 11, 1961. A blind intersection, icy road conditions and excessive speed were all contributing factors.

Alaska Pipeline Company began stringing pipe along the incompleted portion of their line the second week in February.

A special use permit was issued authorizing construction of a second airstrip along Alaska Pipeline Company's Right-of-Way adjoining the eastern boundary of the Moose Range. The strip will be used to facilitate transportation of personnel during completion of pipeline construction. Williams Construction Company completed the airstrip March 16, 1961. Welding of pipe began March 20, 1961. Ditching will not begin until the ground sufficiently thaws to permit excavating. A trial attempt was made but proved to be too costly.

Authorization was granted to the Homer Electric Association for a right-of-way easement on a power transmission line into the Swanson River Unit area and along the Kenai pipeline. The Company had complied with certain specific Moose Range conditions covering cleanup of previously constructed line and had posted the required $10,000 performance bond covering their new application. Construction began in February and ceased in mid-March. Installation of poles from Well Site #41-4 west to Swanson River was completed. Delays attributed to labor troubles and lack of easements to cross patented lands in the "excepted area" stopped the work. HEA anticipates completing the line next winter.

Formal application was received through the Bureau of Land Management on a State right-of-way easement for a road into the "excepted area" east of Soldotna and south of the Kenai River. The road would open up another prime winter moose concentration area. Due to lack of justification for construction of the road, the application was disapproved.

State Highway Department waste disposal areas in the relocation of the Sterling Highway realignment in the Soldotna area were checked out and approved.

The Division of Highways at Soldotna was contacted regarding the recurring Jean Lake and Creek siltation problem. Jean Creek, as a spawning and rearing stream, has been severely damaged.

A request was made to the Alaska Division of Highways at Soldotna as to the number and location of gravel pits they will require along the Sterling Highway and Skilak cutoff roads on Moose Range lands. Those needed will be placed under special use permit and the rest abandoned and rehabilitated.

The Kenai River ferry contract is still under consideration. Completion awaits action by the Solicitor's Office. During the interim, a special use permit was issued to cover the activity.

On March 16, 1961, Wade and Hakala completed the first vehicle crossing of the Moose Range from the Sterling Highway to the Bob Mathison headquarters site at the mouth of the Chickaloon River. An inspection of pipeline activities and airstrip construction was accomplished enroute; also, a survey of wildlife in the area. An interesting discussion was had with Mr. Mathison who has lived in the area these past thirty years.

A D-7 Crossville Clearing Blade, Brush Rake and two Safety Canopies arrived at Kenai Headquarters March 31, after a trip over the Alaska Highway. The equipment will be used in proposed range improvement work.

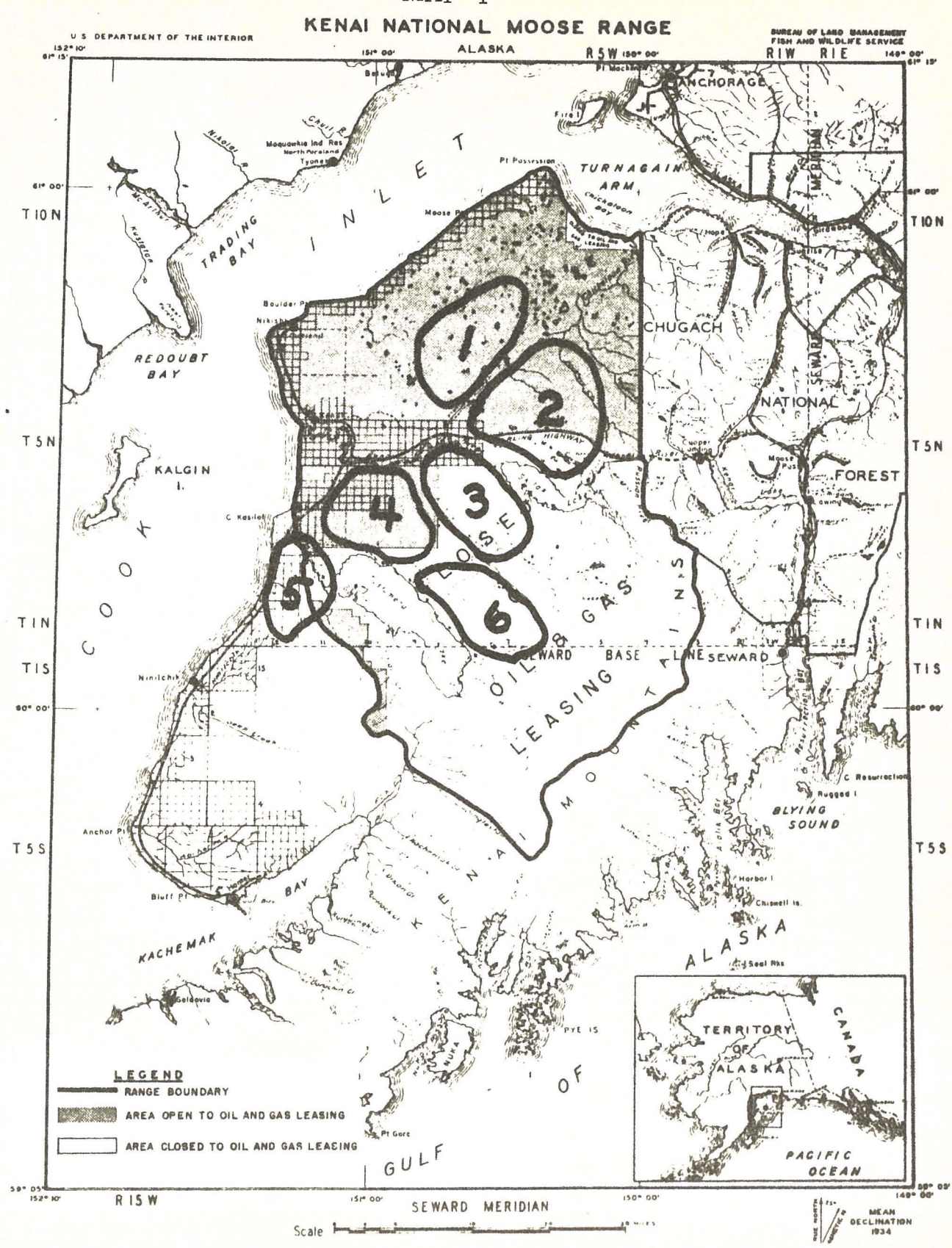
Trapping permits were revised to include use of Snow-Travelers or similar vehicles during trapping operations while the ground is snow-covered.

Submitted by: John B. Hakala
John B. Hakala, Refuge Manager

May 20, 1961

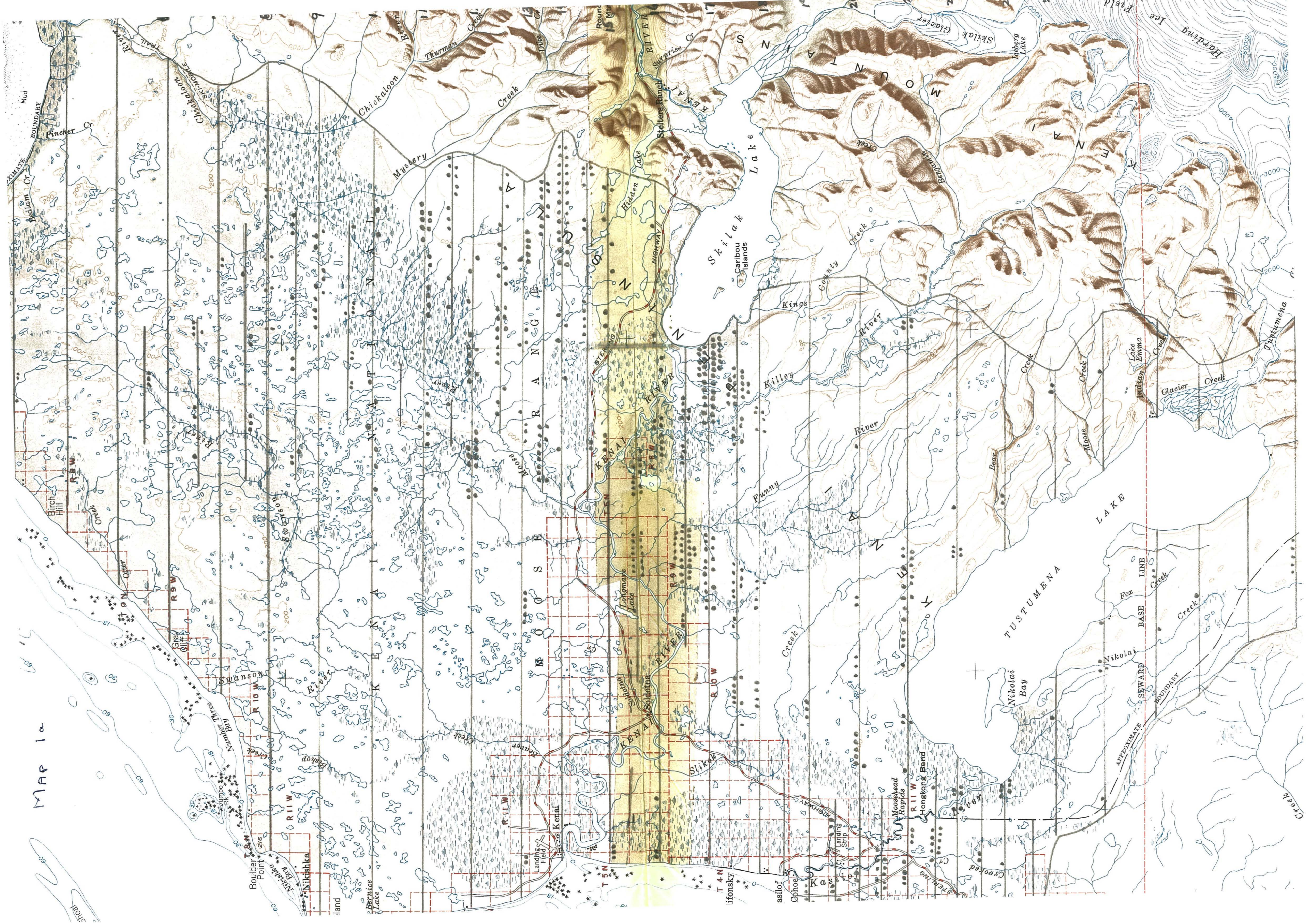
Approved by: David L. Spencer
David L. Spencer, Regional Refuge Supervisor

MAP I



MOOSE HERD WINTER CONCENTRATION AREAS

Washington, D.C., January 28, 1988



Map 1a
KENAI NATIONAL MOOSE RANGE
KENAI MOUNTAINS
Harding Ice Field
Skilak Glacier
Iceberg Lake
Skilak Lake
Caribou Islands
TUSTUMENA LAKE
Kenai River
Killey River
Funny River
Moose River
Swanson River
Chickaloon River
Mystery Creek
Thurman Creek
Surprise Cr
Hidden Lake
Kings County Creek
Benjamin Creek
Bear Creek
Moose Creek
Lake Emma
Indian Creek
Glacier Creek
Tustumena
Nikolai Bay
Nikolai Creek
Fox Creek
SEWARD BASE LINE
APPROXIMATE BOUNDARY
Longmare Lake
Soldotna
Slikok Creek
Beaver Creek
Bishop Creek
Kenai
Landing Field
Landing Strip
Moosehead Rapids
Hongkong Bend
Kasilof
Cohoe
Crooked Cr
Sterling Highway
Boulder Point
Nikishka Bay
Bernice Lake
Grey Cliff
Birch Hill
Otter Creek
Pincher Cr
Bedlam Cr
Mud
R 8 W
R 9 W
R 10 W
R 11 W

3-1750
Form NR.
(Rev. March 1953)

WATERFOWL

REFUGE Kenai Nat'l Moose Range MONTHS OF January TO April 30, , 19 61

(1) Species	(2) Weeks of reporting period 1/7 1	1/14 2	1/21 3	1/28 4	2/4 5	2/11 6	2/18 7	2/25 8	3/4 9	3/11 10
Swans:										
Whistling										
Trumpeter										
Geese:										
Canada										
Cackling										
Brant										
White-fronted										
Snow										
Blue										
Other										
Ducks:										
Mallard	25	25	25	25	25	25	25	25	25	25
Black										
Gadwall										
Baldpate										
Pintail										
Green-winged teal										
Blue-winged teal										
Cinnamon teal										
Shoveler										
Wood										
Redhead										
Ring-necked										
Canvasback										
Scaup	30	30	30	30	30	30	30	30	30	30
Goldeneye	50	50	50	50	50	50	50	50	50	50
Bufflehead										
Ruddy										
Other Harlequin	100	100	100	100	100	100	100	100	100	100
Coot:										

3 -1750a
Cont. NR
(Rev. March 1953)

WATERFOWL
(Continuation Sheet)

REFUGE Kenai Nat'l Moose Range MONTHS OF January TO April 30, , 19 61

(1) Species	(2) Weeks of reporting period: 3/18 (11)	3/25 (12)	4/1 (13)	4/8 (14)	4/15 (15)	4/22 (16)	4/29 (17)	(18)	(3) Estimated waterfowl days use	(4) Production: Broods seen	Estimated total
Swans:											
Whistling			25	25	50	100	50		1,680		
Trumpeter		5	50	75	100	150	200		4,060		
Geese:											
Canada						300	400		4,900		
Cackling											
Brant Black						150			1,050		
White-fronted				100	400	600	1,000		14,700		
Snow				400	1,000	2,000	1,000		30,800		
Blue											
Other Canada Lesser				500	600	800	1,200		21,700		
Ducks:											
Mallard	30	100	400	600	1,000	1,000	1,500		34,160		
Black											
Gadwall				20	50	50	100		1,540		
Baldpate				20	100	100	400		4,340		
Pintail		200	400	600	1,000	2,000	2,500		46,900		
Green-winged teal		50	100	200	400	600	800		15,050		
Blue-winged teal											
Cinnamon teal											
Shoveler											
Wood											
Redhead											
Ring-necked											
Canvasback											
Scaup	30	50	100	100	300	400	500		12,460		
Goldeneye	50	100	400	800	1,200	1,600	2,000		46,550		
Bufflehead											
Ruddy											
Other Harlequin	100	100	100	150	150	150	150		13,300		
Coot:											

(over)

	(5) Total Days Use	(6) Peak Number	(7) Total Production
Swans	5,740	250	-0-
Geese	73,150	3,850	-0-
Ducks	174,300	7,950	-0-
Coots	-0-	-0-	-0-

SUMMARY

Principal feeding areas Lowland lakes & marshes.

Principal nesting areas Lowland marshes

Reported by Robert V. Wade

INSTRUCTIONS (See Secs. 7531 through 7534, Wildlife Refuges Field Manual)

(1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance.

(2) Weeks of Reporting Period: Estimated average refuge populations.

(3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.

(4) Production: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.

(5) Total Days Use: A summary of data recorded under (3).

(6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.

(7) Total Production: A summary of data recorded under (4).

Interio[illegible]uplicating Section, Washington, D. C. 37944
1953

3-1751
Form NR-1.
(Nov. 1945)

MIGRATORY BIRDS
(other than waterfowl)

Refuge Kenai Nat'l Moose Range Months of January ~~to~~ thru April 30,1941

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. Water and Marsh Birds:										
Common loon										
Red-throated loon										
Double-crested cormorant	5	4/25	75	4/30	STILL PRESENT					100
Pelagic cormorant	2	4/25	10	4/30	"	"				20
Yellowlegs	20	4/25	500	4/30	"	"				700
Sandhill crane	20	4/25	1,500	4/30	"	"				2,000
II. Shorebirds, Gulls and Terns:										
Glaucous gull	10	4/4	1,200	4/30	"	"				1,500
Glaucous-winged gull	10	4/4	800	"	"	"				1,000
Herring gull	10	4/4	1,500	"	"	"				2,000
Mew gull	4	4/4	400	"	"	"				500
Bonaparte's gull	2	4/4	400	"	"	"				500
Arctic tern	15	4/4	1,200	"	"	"				1,500
Semipalmated plover	10	4/25	800	"	"	"				1,000
Wilson snipe	20	4/25	1,500	"	"	"				2,000

(over)

(1)	(2)		(3)		(4)		(5)	(6)
III. Doves and Pigeons:								
Mourning dove	None							
White-winged dove	None							
IV. Predaceous Birds:								
Golden eagle	2	4/15	20	4/30	STILL PRESENT			
Duck hawk	None							
Horned owl	Resident		250	"	"	"		
Magpie	"		600	"	"	"		
Raven	"		1,500	"	"	"		
Crow	None							
Bald eagle	Resident		150	"	"	"		
Marsh hawk	"	3/24	300	"	"	"		
Snowy owl	"		50	"	"	"		

Reported by Robert V. Wade

INSTRUCTIONS

(1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiiformes)
II. Shorebirds, Gulls and Terns (Charadriiformes)
III. Doves and Pigeons (Columbiformes)
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)

(2) First Seen: The first refuge record for the species for the season concerned.

(3) Peak Numbers: The greatest number of the species present in a limited interval of time.

(4) Last Seen: The last refuge record for the species during the season concerned.

(5) Production: Estimated number of young produced based on observations and actual counts.

(6) Total: Estimated total number of the species using the refuge during the period concerned.

3-1752
Form [illegible]
(April [illegible]946)

UPLAND GAME BIRDS

Refuge Kenai Nat'l Moose Range Months of January thru April 30, , 19 61

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'v'd.	Estimated Total	Percentage	Hunting	For Re-stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Spruce Grouse	Spruce forest 900,000 acres	75			1:1				12,000	No accurate estimate
Ptarmigan	Alpine meadows, Hardwood Forest 300,000 acres	50			1:1				6,000	No accurate estimate

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.*

(1) SPECIES: Use correct common name.

(2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.

(4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.

(5) REMOVALS: Indicate total number in each category removed during the report period.

(6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.

(7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

* Only columns applicable to the period covered should be used.

3-1754
Form NR-4
(June 1945)

SMALL MAMM

Refuge Kenai Nat'l Moose Range Year ending April 30, 1961

(1) Species	(2) Density		(3) Removals					(4) Disposition of Furs						(5)
								Share Trapping						
Common Name	Cover Types & Total Acreage of Habitat	Acres Per Animal	Hunting	Fur Harvest	Predator Control *	For Re-stocking	For Re-search	Permit Number	Trappers Share	Refuge share	Total Refuge Furs Shipped	Furs Donated	Furs Destroyed	Total Population
Beaver	Marsh-Brush 750,000	500		14										1,500
Mink	Marsh "	750												1,000
Land Otter	" "	1,500												500
Muskrat	" "	1,500												500
Coyote	Timber-1,500,000	10,000		2										150
Marten	" "	---												Trace
Weasel	" "	1,500												1,000
Wolverine	" "	10,000												150
Wolf	" "	---												Trace
Fox	" "	150,000												10
Snowshoe Hare	" "	375												4,000
Lynx	" "	3,000												500

* List removals by Predator Animal Hunter

REMARKS:

Reported by

INSTRUCTIONS

Form NR-4 - SMALL MAMMALS (Include data on all species of importance in the management program; i. e., muskrats, beaver, coon, mink, coyote. Data on small rodents may be omitted except for estimated total population of each species considered in control operations.)

(1) SPECIES: Use correct common name. Example: Striped skunk, spotted skunk, short-tailed weasel, gray squirrel, fox squirrel, white-tailed jackrabbit, etc. (Accepted common names in current use are found in the "Field Book of North American Mammals" by H. E. Anthony and the "Manual of the Vertebrate Animals of the Northeastern United States" by David Starr Jordan.)

(2) DENSITY: Applies particularly to those species considered in removal programs. Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottom land hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) REMOVALS: Indicate the total number under each category removed since April 30 of the previous year, including any taken on the refuge by Service Predatory Animal Hunter. Also show any removals not falling under headingslisted.

(4) DISPOSITION OF FUR: On share-trapped furs list the permit number, trapper's share, and refuge share. Indicate the number of pelts shipped to market, including furs taken by Service personnel. Total number of pelts of each species destroyed because of unprimeness or damaged condition, and furs donated to institutions or other agencies should be shown in the column provided.

(5) TOTAL POPULATION: Estimated total population of each species reported on as of April 30.

REMARKS: Indicate inventory method(s) used, size of sample area(s), introductions, and any other pertinent information not specifically requested.

32715

REFUGE NARRATIVE REPORT

May------August, 1961

KENAI NATIONAL MOOSE RANGE
Kenai Alaska

STAFF:

John B. Hakala, Refuge Manager

Robert V. Wade, Asst. Refuge Manager

Rex E. Williams, Mechanic (General)

S. E. Robinson, Clerk-Typist

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

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KENAI NATIONAL MOOSE RANGE

NARRATIVE REPORT

May----------August, 1961

I. GENERAL

A. Weather Conditions.

Rainfall, maximum and minimum temperatures as recorded at the Kenai FAA Station are presented in TABLE 1. Temperature extremes and means compared with a ten-year average, and precipitation for the period follows:

1961

	Precipitation		Means		Temperature	
	This Month	Normal	This Month	Normal	Max.	Min.
May	.26	.66	44.4	42.9	65	25
June	.89	1.47	50.6	49.5	74	30
July	2.85	2.45	54.6	53.3	73	38
August	2.30	2.63	52.3	53.2	73	31
Total:	6.30	7.21				

A cold spring with some precipitation extended into June followed by a mild summer with four days' temperatures 70° F or above recorded for the period. Sixty-two days out of 123 had rain. The last frost occurred June 4 and the first this fall August 26.

B. Habitat Conditions.

1. Water. Water levels remained normal throughout in the period. Intermittent showers reduced the fire hazard to a minimum.

2. Food and Cover. Food was abundant. Excellent growing conditions, weather-wise, produced a bumper crop of browse forage plants, herbaceous vegetation and berries.

II. WILDLIFE

A. Migratory Birds.

1. Waterfowl. The small resident Refuge waterfowl population nested successfully. Broods of five to nine ducklings were observed during

TABLE I - RAINFALL (in inches) - Maximum and Minimum Temperatures

Day	MAY			JUNE			JULY			AUGUST		
	Rain-fall	Max. T.	Min. T.	Rain-fall	Max. T.	Min. T.	Rain-fall	Max. T.	Min. T.	Rain-fall	Max. T.	Min. T.
1		55	29	.02	59	30	.42	54	48		73	49
2		54	27	T	57	34		55	47	.16	61	54
3		56	25		59	31		59	45	.38	56	51
4		56	27	T	61	30	T	58	45	.11	56	49
5		52	26	.09	59	44	.10	60	47	T	59	44
6		65	25		63	41	T	63	44		58	38
7		47	34	T	59	44	T	68	46	T	58	38
8		63	28		57	40	.02	61	44	.09	59	47
9		47	29	.02	57	34	.18	70	50	.63	55	47
10	T	45	35	T	57	45	.06	66	48	T	60	45
11		54	32	T	57	40	T	58	49	.14	57	39
12		54	26	.11	52	45	.11	58	46		64	42
13		57	25		65	40		68	41		59	38
14		55	40		64	42		73	38		60	44
15	.04	52	41		56	47	T	60	48	T	63	50
16	.03	56	37		57	48	.29	58	44		65	49
17	T	58	37		69	34	.34	59	49	T	65	52
18	.01	52	37		63	42	.46	63	49	.36	63	51
19	.06	55	31		74	43	.21	63	52	.02	59	50
20		57	31	.17	51	46	T	58	49	T	59	47
21		60	30	.09	55	46	.03	56	51	.04	62	51
22		64	34	T	56	46		60	51	.23	61	48
23		52	31	.39	51	43		58	51	T	56	38
24		54	38	T	62	39		59	52		60	35
25		55	39		58	44		66	50		60	36
26	T	55	35		68	39		62	48		63	31
27	.01	65	34		70	41	.51	62	52	.11	56	38
28		63	38		57	48	.11	62	51	.03	64	46
29		64	40		56	50		61	44		64	43
30	T	56	40		59	49	.05	64	50		65	40
31	.11	56	37					65	52		61	33

July. They included scaup, goldeneye, harlequin, mallards, pintail and green-winged teal. Aerial surveys covering 445 miles of transect lines each flown once in June and August tallied 2.62 and 2.74 birds per square mile, respectively. This indicates a total of resident waterfowl population of approximately 5,000 to 5,500 birds and includes all species.

On May 1, the annual spring waterfowl survey was flown following the same aerial route (see May-August 1960 Report) as in past years. Results as follows:

Trumpeter swan	- 238	Scaup	- 182
Greater Canada	- 75	Green-winged teal	- 82
Lesser Canada	- 275	Baldpate	- 16
White-fronted geese	- 325	Gadwall	- 11
Pintail	- 1,207	Lesser sandhill crane	- 9
Mallards	- 368	Cormorants	- 11

Geese began flocking the middle of August. Family groups were occasionally seen flying over the area indicating the possibility of a few nesters on the Moose Range. At period's end, few lesser Canada and white-fronted geese had moved into Chickaloon Flats as compared with past years. An aerial check of the area August 31, tallied 666 waterfowl of which 55 were lesser Canadas, 405 pintails, 150 mallards, 50 green-winged teal, 4 lesser sandhill crane and 2 swan. A ground observer saw an additional 150 white-fronted geese and 30 lesser sandhill crane.

2. Other Water Birds.

a. Trumpeter Swan. Investigations consisted of aerial surveys to establish distribution and size of 1961 nesting populations. Sixteen flights were made during the nesting and brooding period, covering the lake area from Tustumena Lake north to Point Possession. Re-checks of family groups were made during August.

Twenty nest sites either in the process of construction, containing eggs and/or cygnets were located. Twenty of the twenty-two nests known to contain eggs produced cygnets. Clutches ranged from one to eight; cygnets from one to six. A total of 150 swan were counted during the flightless period in July. This included 65 cygnets--no juvenile birds were observed. A re-check of nest sites at the end of August indicated a loss of four cygnets.

Record of nests:

MAP I shows the location of observed nests. A record of observations on individual nests follows:

#1. (Site occupied 1957-1961) - Pair, nest and 6-7 eggs noted May 12. Site produced 3 cygnets as noted 6/28, 7/26 and 8/23.

#2. (Site occupied in 1958 & 1959) - Pair, nest and 8 eggs observed May 12. One plus cygnets seen 6/28. Five cygnets observed 7/26 & 8/23.

#3. (Site occupied 1957-1961) - Pair, nest with pen on nest observed 5/12. Seven eggs noted 5/18. On 6/29, 3-4 cygnets seen--maybe more. Five cygnets observed 7/27 & 8/26.

#4. (Site occupied 1957-1961) - Pair, nest and 6 eggs observed 5/18. Four cygnets seen 6/29. Five cygnets observed 7/28 and 8/23.

#5. (Site occupied 1957 and 1960) - Two adults, nest and 7 eggs seen 5/18. Three cygnets observed 6/29, 7/26 & 8/22.

#6. (Site occupied 1959) - Pair and nest with 3 eggs observed 5/18. Completely abandoned 6/28, 7/27 and 8/23.

#7. (Site occupied 1959) - Pair, nest and 6 eggs observed 5/23. Completely abandoned 6/29, 7/26 and 8/26.

#8. (Site occupied 1960) - Pair, nest and 5 eggs observed 5/12 and 5/18. Three cygnets seen 6/28. Two cygnets observed 7/27. Two cygnets 8/23.

#9. (Site occupied 1957, 1959 & 1960) - Pair, nest, 2 cygnets and 3 eggs seen 6/29. Completely abandoned 7/28 & 8/26.

#10. (Site occupied 1957-1961 - did not produce any cygnets 1960) - Pair, nest and 7 eggs seen 5/18. Four to five cygnets and one egg observed 6/28. Six cygnets seen 7/27 and 8/23.

#11. (Site occupied 1957-1959) - Pair, nest with one egg seen 5/12. Six eggs observed 5/18. Two plus cygnets seen 6/29. Four cygnets observed 7/26. Five cygnets found 8/26.

#12. (Site occupied 1957, 1958 and 1960) - Two adults, nest and 4 eggs seen 5/18. Three to four cygnets observed 6/29. Three cygnets at site 7/27. Two cygnets seen 8/23.

#13. (Site occupied 1957, 1959 and 1960) - Pair and nest seen 5/18. Site appeared abandoned 6/29 and 7/28. Two adults and three cygnets seen 8/26.

#14. (Site occupied 1959 and 1960) - Pair with pen on nest sighted 5/25. Three cygnets seen 6/29. Five cygnets observed 7/28 and 8/26.

#15. (New site same lake as #34 in 1960) - Pair, nest and five eggs seen 5/12. Five cygnets observed 6/29, 7/28 and 8/26.

#16. (New site) - Pair, nest and 3-4 cygnets observed 6/29. Completely abondoned 7/28 and 8/26.

#17. (Site occupied 1957-1961) - Pair, nest and 5-6 eggs observed 5/12 and 5/25. Completely abandoned 6/29. One cygnet and two adults located at new location 7/28 and 8/26.

#18. (Site occupied 1957. Birds moved to new location on same lake in 1960) - Pair, nest with eggs covered observed 5/18. Two cygnets seen 6/28 and 7/26. One cygnet observed 8/22.

#19. (Site occupied 1958-1960) - Pair, nest and 5-6 eggs observed 5/12 and 5/18. Two cygnets seen 6/28. Five cygnets observed 7/27 and 8/23.

#20. (New nest site) - Pair, nest with pen on nest seen 5/12. Two cygnets found 6/29. Three cygnets observed 7/28 and 8/23.

#21. (Site occupied 1959 and 1960) - Pair, nest and 2 eggs noted 5/15. Pair with nest destroyed observed 5/21. Apparently birds tend to re-nest--two eggs seen 5/25. Completely abandoned 5/29, 6/28, 7/27 and 8/26.

#22. (New site) - Pair with nest observed 5/15. Completely abandoned 5/23.

#23. (Site occupied 1960) - Pair, nest with 3 eggs observed 5/25. Completely abandoned 6/29, 7/27 and 8/26.

#24. (Site occupied 1960) - Pair, nest with 6 eggs observed 5/25. Three cygnets seen 6/29. Four cygnets 7/26 and 8/26.

#25. (Site occupied 1958 and 1960) - Pair with nest observed 5/12. Completely abandoned 6/28.

#26. (Site occupied 1960) - Pair with nest and one cygnet seen 6/29. Two cygnets observed 7/28. One cygnet seen 8/26.

#27. (New site) - Pair, nest and 3 eggs observed 6/2. Completely abandoned 6/28, 7/26 and 8/26.

#28. (New site) - Pair and nest observed 5/23. Nothing 6/28 and 8/26.

#29. (Site occupied 1960) - Pair, nest and 5 eggs seen 5/18. Three cygnets observed 6/28. Five cygnets seen 7/26. Completely abandoned 8/23 and 8/26.

#30. (Site occupied 1958 and 1960) - Pair, nest and two eggs seen 5/28. Nothing found 6/29. One cygnet observed 7/28 and 8/26.

B. Upland Game Birds.

1. Spruce Grouse. A cold spring appears to have affected the yearly crop of spruce grouse. Broods of 4-6 birds were common compared to the 8-12 observed last year.

2. Ptarmigan. A ground survey on foot in the Indian Creek area in mid-June indicated a high ptarmigan breeding population. This was later substantiated by a ground survey of the Benjamin Basin area in mid-August. Twenty-five ptarmigan broods were observed, 17 willow and 8 white-tailed. Willow ptarmigan brood size ranged from 5 to 12 with an average of 9.35. White-tailed ptarmigan brood size ranged from 2 to 6 with an average of 4.13. In every case, one adult bird was seen with the white-tailed broods, and two adults with each willow brood. No brood counts were made on rock ptarmigan which had been observed earlier in the Indian Creek area. The willow ptarmigan appeared to occupy the lower brush levels, while the white-tailed were found in the rocky, barren areas. Brush line seemed to be the integration area between the two niches.

C. Big-Game Animals.

1. Moose. The moose population continued to do well. Moose calf survey flights were initiated May 15 and continued through July 10. Twelve aerial surveys were made within the limits of the Moose Rive drainage and portions of Chickaloon and Mystery Creek areas to determine 1961 herd reproduction and composition. One area (MAP II) was repeatedly covered and a minimum count of fifty cows per flight attempted but not always maintained. The greatest number of moose observed on any one flight was 230, the least 49--an abortive mission.

A total of 2,102 moose were observed during the period. Data obtained is presented in TABLE 2. The census consisted of the following: 843 cows, 266 calves, 356 bulls, and 637 yearlings. The yearling count may be subject to some error through incorrect identification of yearling females and adults. The yearling class was composed of 254 males and 383 females indicating good survival of calves over the past winter. Cow:calf ratio for the total female population was 100:22. Adult cow:calf ratio averaged 100:34, a decided drop from previous years.

Herd composition percentages are as follows: 16.9% bulls, 40.1% cows, 12.7% calves and 30.3% yearlings. Of the total 843 cows observed, 210 or 24.9% produced calves. One hundred fifty-four or 73.3% of the cows observed had single calves; fifty-six or 26.6% had twins.

The Alaska Department of Fish and Game conducted a moose calf tagging program via helicopter in the Range May 29, 30 and June 3. A total of 75 calves were ear-tagged and color-banded. Calf surveys subsequent to the tagging program point to considerable movement of cows with calves out of the main calving area. Each calf seen was checked for the colored ear band. Two banded calves were observed indicating the cows had either moved with their calves out of the area or had abandoned them. No evidence of dead or abandoned calves was found.

Results of moose calf surveys conducted in the Moose River drainage the last four years have indicated two peaks in calf production. In past years, this was largely attributed to movement of animals in and out of

the open muskeg areas, and existing weather conditions at time of the surveys. Checking for banded calves following initiation of the tagging program has suggested otherwise. Two peaks in production are indicated which may correspond to the estrous cycle in moose. The first calves for the year were observed May 15. By month's end, calf production had reached 55:100 cows. A gradual tapering-off occurred in the number of calves seen with cows the first two weeks in June. A low point of 32 calves per 100 cows was observed June 12. In place of cows with calves, an increase in single cows became apparent. Groups of cows up to nine in number were observed feeding and resting together. The morning of June 16, a new calf drop was in progress. (Newborn calves are readily identified from the air and the cows reaction to the new arrival is decidedly different upon the approach of the aircraft.) By month's end, a new peak of 50 calves per 100 cows was observed for this area. Calving on the Moose Range extends into July with new arrivals noted in past years on July 5.

2. Dall Sheep. A sheep count was made on foot in the Killey River-Indian Creek and Tustumena Glacier area June 16 to 22. Four hundred and nine sheep were tallied. Composition was as follows: 99 ewes, 52 lambs, 47 yearlings, 136 rams and 54 undetermined. A lamb:ewe ratio of 53:100 is indicated. Of the rams recorded, 18 were full-curl, 32 - 3/4-curl, 32 - 1/2-curl, 14 - 1/4-curl and 40 undetermined.

A total count of the Refuge sheep population was flown August 1, 6, 7 and 14. The extended period between surveys was due to inclement weather conditions which persisted over the Kenai Mountains. Total flying time expended was seventeen hours and fifty-seven minutes.

A total of 817 sheep were counted on the Range. These included 147 lambs, 176 rams and 494 ewes and/or yearlings. In comparison, 763 sheep were tallied in the same area in 1960.

Distribution of sheep at time of survey is presented in MAP III.

3. Mountain Goat. The annual August aerial survey of the Refuge goat herd (MAP IV) totalled 185 goats, of which 29 were identified as Billys and 36 as kids. The 1960 count totalled 134 animals, 25 of which were identified as kids.

4. Bears.

a. Brown Bear. Twenty-seven brown bear sightings were made this period. A sow with three yearlings was seen in the Moose River drainage May 19 feeding on a downed moose. During the spring, numerous reports on brown bear observed in the vicinity of the oil field came in regularly. The last observation reported by a Standard Oil employee May 28 was of a brownie chasing a black bear who, in turn, was after a cow with a calf. Seven bears have been reported seen in the vicinity of the City of Kenai. One bear was shot at and wounded by a homesteader

TABLE II - 1961 MOOSE CALF SURVEY - Moose River Drainage

Date	Total Cows	*Cows with Calves 1/c	*Cows with Calves 2/c	Total Calves	Yearlings Male	Yearlings Female	Yearlings Bulls	Total Moose	Ratio Calves:100 Cows
5/15	84	3	0	3	16	21	19	143	4:100
5/19	92	6	3	12	22	25	25	176	13:100
5/23	80	10	5	20	12	20	40	172	25:100
5/26	102	13	5	23	25	46	34	230	23:100
5/29**	20	1	5	11	7	8	3	49	55:100
6/2	83	17	12	41	28	35	35	222	49:100
6/5	48	13	5	23	17	25	18	131	48:100
6/12	77	17	4	25	22	21	19	164	32:100
6/16	86	24	5	34	26	45	33	224	39:100
6/19	48	11	1	13	26	40	42	169	27:100
6/26	73	23	7	37	20	45	40	215	50:100
7/11	50	16	4	24	33	52	48	207	48:100
Totals:	843	154	56	266	254	383	356	2,102	Av. 34:100

*Number included in total cows.
**Abortive Flight.

in the Beaver Creek area. Patrols and air searches have been made for the wounded animal since brownies are particularly vicious after such an occurrence and take out their "ire" on man. The brown bear population appears to be on the upgrade on the Moose Range.

b. Black Bear. Fewer black bear observations were made during the Moose calving period compared with past years. Only one sow with two cubs was seen. During the four-month period, 130 individual sightings of black bear were made indicating the bear population is holding its own. Lack of blackies in the moose calving area may be attributable to the influx of brown bear during the period. Brownies and blackies do not appear to be compatible.

Thirty-one black bears were observed during the sheep survey: Composition as follows:

	Groups	No. of bears
Single bear	16	16
Sow w/one cub	2	4
Sow w/two cubs	1	3
Sow w/three cubs	2	8
	21	31

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

Fur animals common to the Moose Range such as beaver, land otter, mink and muskrat are moderate in numbers. No significant population changes have occurred recently. Predation and competitive pressures by fur animals on birds is of minor occurrence. A few beaver dams, obstructing streams in the Bedlam Lake, were dynamited the first part of this period to enable salmon and steelheads to reach their spawning areas. Old beaver houses continue to provide some of the trumpeter swans with nest sites or materials for nesting. Several wolverines were seen above timberline in the Indian Creek country on the "ground" sheep survey. Rabbits continue on the upswing of their cycle but are not expected to peak for a couple of years. Porcupine road kills along the Sterling Highway and Oil Access Road have noticeably increased this past summer.

Brown bear are probably the greatest predators on the adult moose with a noticeable increase observed over last year. Abandoned dogs in the Naptowne area are reported to have taken two moose calves this period. Reports come in throughout the year concerning dogs running down moose. Predation by other animals and birds has not been conspicuous and is considered of minor importance.

Marmots are common above timberline in the Tustumena-Skilak Lakes area. Both vole and lemming tunnels were noted in the mountainous area up to the 4,000 foot elevation.

E. Hawks, Eagles, Owls, Crows, Ravens, and Magpies.

Marsh, rough-legged and red-tailed hawks were noted during the period. Bald eagle numbers do not appear as large as in past years. Golden

eagles are common throughout the Moose Range, especially in the mountainous area.

Great horned owls are common in the lowlands, while a few snowy owls were probably residents during the summer period in the mountainous areas.

Ravens continue to be one of our best feathered scavengers in the area. No unusual predation by the above birds was noted this past period.

F. Other Birds.

The following birds were observed to be nesters in the mountainous area southeast of Skilak Lake this summer.

Harlequin	Northern shrike
Barrow's goldeneye	Wilson's warbler
Green-winged teal	Orange-crowned warbler
Golden eagle	Gray-crowned rosy finch
Willow ptarmigan	Slate-colored junco
White-tailed ptarmigan	Common redpoll
Dipper	Golden-crowned sparrow
Wandering tattler	White-crowned sparrow
Spotted sandpiper	Savannah sparrow
Horned lark	Fox sparrow (dusky)
Hermit thrush	Snow bunting
Water pipit	Raven

Transient birds noted were white-fronted geese, tree swallow and a golden plover--a rare occurrence for this area.

G. Fish.

Fishing pressure has been heavy and about a fifteen (15) percent increase over last year is noted. King, silver and red salmon were harvested in large numbers this past period on their annual run to spawning areas. Rainbow and Dolly Varden trout were caught in many of the lakes and streams of the Moose Range. Lake trout catches were moderate, but fishermen "in the know" did extremely well.

Habitat conditions for fish were good this period. An exception is the stream running from Jean Lake to the Kenai River, which could hardly support fish life in the heavy silt-laden waters due to erosion of the nearby Sterling Highway. The new access road into Funny River may cause this excellent fishing stream to be over-fished in the next few years.

The State of Alaska had fisheries' men stationed in the Skilak Lake area most of the period. This is a continuation of their studies started last year. Water depths, test netting for fish species and numbers are part of the information gathered. As in the past, it is expected that the data obtained will be submitted to this office in the fall period.

I. Disease.

No report.

III. REFUGE DEVELOPMENT AND MAINTENANCE

A. Physical Development.

Kenny Carver of Soldotna was low bidder on the Skilak Guard Station well. He completed drilling to 254 feet and production of the well is 17 gallons of water per minute.

Two hundred and twenty-one (221) standard National Wildlife Refuge signs were posted along main roads in the Moose Range. About 50 additional informational signs were also posted during the period.

New galvanized pipe was placed in the headquarters well and a cement underground enclosure constructed.

Existing recreational campgrounds were cleaned up, new garbage pits dug and old pits covered.

Three-inch planking was bolted to the bed of the lowboy.

A loading ramp was constructed at the headquarters site.

New screening was installed on the meat house.

The office short wave radio was relocated and new antennas strung.

Maintenance of vehicles, boats and lawns took up considerable time during the period.

B. Plantings.

No report.

C. Collections and Receipts.

No report.

D. Control of Vegetation.

See V, Field Investigations or Applied Research.

E. Planned Burning.

No report.

F. Fires.

Following is a summary of fires occurring on the Moose Range during the period. Both the number of fires and acreages are greatly reduced from the previous year. A total of 8.8 acres was burned in eight fires.

Date	Fire No. BSFW	Fire No. BLM	Location	Cause	Acres Burned	Suppression Costs BSFW	Suppression Costs BLM	Suppression Costs Other
5/31	61-1	25	*E.A.	Misc.	.5	-	37	109
6/7	61-2	33	**H.L.	Campfire	.1	16	31	-
6/7	61-3	34	*E.A.	Debris burning	2.0	-	63	70
6/7	61-4	35	*E.A.	Misc.	2.0	-	34	132
6/14	61-5	40	*E.A.	Misc.	.1	36	43	59
6/19	61-6	-	*E.A.	Debris burning	1.0	51	-	-
6/19	61-7	44	**H.L.	Campfire	3.0	10	76	-
6/19	61-8	46	**H.L.	Campfire	.1	-	4	-

*E.A. - Excepted Area
**H.L. - Hidden Lake

John Meissner and Dave Schroer, Bureau of Land Management fire guards, were on duty at the Skilak Guard Station throughout the period.

IV. RESOURCE MANAGEMENT

C. Fur Harvest.

Of the sixteen free use trapping permits issued last winter, thirteen catch reports were returned. A summary of last winter's reported fur harvest follows:

Beaver	145
Land Otter	16
Muskrat	2
Mink	42
Coyote	15
Weasel	1
Wolverine	1
Lynx	13

D. Timber Removal.

Seven free use permits were issued during the period for fuel wood and/or house logs.

F. Other Uses.

Permits issued during the period were:

Three commercial recreational fishing camps.

Five free use commercial recreational hunting camps.

Paul Nestor's gravel permit #32865, previously paid for was extended to May 15, 1962.

Special Use Permit #36225 issued this period to Herbert C. Campbell for $100 for operating a commercial ferry near the Russian River.

Standard Oil Company of California, under the Swanson River Unit Agreement, paid for and removed the following amounts of gravel at $0.05 per cubic yard.

5/15/61	99,650 cu. yds.	$4,982.50
5/17/61	60,460 " "	3,023.00
6/22/61	76,100 " "	3,805.50
8/22/61	74,186 " "	3,709.30
	310,396 cu. yds.	15,520.30

V. FIELD INVESTIGATION and APPLIED RESEARCH

A. Progress Report.

1. Mechanical Moose Browse Rehabilitation. Considerable time and money has been spent the past period on this project. Two D-7 tractors with various types of blades, rakes and drags have been operating on two types of moose browse habitat. One was in the "1947 Burn" and the other in the Slikok Burn of 1926. The purpose of this project is to evaluate the costs of various means of mechanical rehabilitation. The idea being to find a way to economically maintain large acreages of land suitable to moose. This involves setting-back spruce and providing a good supply of willow, birch and aspen brush. In most cases, hardwood brush naturally increases as competition from spruce decreases.

The following table summarizes operation costs and man-days this past summer.

Oil Road 1947 Burn Plot No.	Acres	Attachment Used	Cost Per Plot	Cost Per Acre	Time (in min.) per acre
1	40	Rake	307.20	7.68	48
2	20	"	110.02	5.50	37
3	40	Angle blade	226.30	5.66	39
Slikok Burn					
1	7.2	Cl. blade	31.98	4.44	28
2	9.0	Cl. blade & rake	92.10	10.23	80
3	13.0	" " " "	94.56	7.16	54
4	5.1	Cl. blade	28.11	5.51	38
5	6.2	" "	32.57	5.25	46
6	50	Cl. blade & cable	179.40	3.59	32
7	15	Cl. blade	86.67	5.78	44
8	80	Cable	164.89	2.06	22
9	41	"	108.65	2.65	28

Costs include employees time while working on the plots, travel time not included etc. Fuel and maintenance costs of the equipment were determined

for the period on an average cost per hour. Since no major repairs or breakdowns occurred, the average equipment costs are low. Cost of equipment or depreciation was not included.

To help evaluate the results of various equipment, several vegetation line transects were established both before and after the operations. The following table gives general results from various operations.

Plot	Type of Operation	% Reduction of Woody Plants	% of Bare Ground Exposed
Oil Rd #1	Rake	97	78
" " #2	Angle blade	70	58
Skilak #1	Crossville blade	86	23
" #3	" "	80	20

The Crossville rake operation in the "1947 Burn" exposed about 75% mineral soil. Type of seeds in this soil will be of prime importance. Will it be fireweed, grass, spruce, seeds from nearby standing aspen or sproutings of willow and birch roots? Time will tell! The rake does a good job in knocking down the fire-killed spruce snags.

The Crossville blade floats on top of the ground, therefore, only about 20% of the mineral soil is exposed. This blade seems to do the best job, as the spruce are cut off and many willow and birch seedlings remain as moose browse. A regular angle blade seems to do a job about half-way between the Crossville rake and blade.

The use of a single attachment such as a Crossville blade, rake or angle blade once over an area will tend to raise the cost slightly over five (5) dollars per acre.

On plot #2 in the Slikok Burn, the Crossville blade worked the area first and was followed by the rake which pushed the debris into berm piles. The ground thus worked is clean enough for farming. Therefore, if the need ever arises for a farming operation, the cost of clearing would be slightly over ten (10) dollars per acre. Left as is, this area may be seeded by the many nearby aspen trees.

A weighted cable dragged by two D-7 tractors was used on Slikok plots 8 and 9. So far, this has proved to be the cheapest method found, at a cost of slightly over two (2) dollars per acre. One of the drawbacks to this operation, however, is that the spruce trees are only knocked down and not uprooted. If the downed spruce do not die, the ecological succession may not be set back enough to obtain the desired results.

2. Hand Pulling of Spruce Seedlings 1960. Between August 8th thru the 31st, 1960, a forty-acre plot area in the "1947 Burn" near Jean Lake was hand picked of spruce seedlings. The seedlings varied from a few inches in height to about four (4) feet. The average cost per acre was $17.52. This cost does not include travel time nor cost of transportation to and from the plot. It took an average of four hours and 45 minutes or 285

minutes to pull the seedlings from one (1) acre. There are many seedlings still on the plot, as some were missed on the first picking. This plot would have to be picked for several years to keep down competition from spruce.

3. Chemical "Dybar" Vegetation Plots. A few "Dybar" plots established this spring were checked during the summer. No apparent change is noticeable so far. A complete check of these plots will be made this fall.

4. Succession Plots. Vegetation succession plots were laid out in 1950. They were checked in 1955 and again in 1961. The following is a summary of changes on these plots located within the "1947 Burn."

Plot Nos.

1. Grass remains to dominate this plot. Fireweed (Epilobium angustifolium) numbers increased slightly, as have bunchberry (Cornus canadensis). Willow (Salix spp.) numbers increased 6, 9 and 22 in 1950, 1955 to 1961, respectively. Heavy browsing by moose on the willow was noted in 1955 and 1961. Spruce seedling invasion of the plot was zero in 1950 increased to 34 in 1961. The moss percentage dropped from about 25% to 1% in the past eleven years. Jacob's-ladder has increased.

2. Moose browse ranged from moderate to heavy, to very light in 1950, 1955 and 1961, respectively. The present light browsing is due mainly to the height growth of the aspen. In 1950, the average height was approximately two (2) feet, while now it is mostly over eight (8) feet tall. These aspen will probably grow out-of-reach of the moose in a few more years. Herbs, mosses and grasses have changed little in the past eleven years. Spruce numbers increased from one to four in eleven years. Rose, (Rosa acicularis) increased from two to seven plants in the above period. Lupine has also showed a steady increase in numbers. Alder showed up for the first time. Of the total aspen mortality, 40% is from over-browse while 60% is from suppression. Mortality is confined to aspen under four feet.

3. Utilization by moose ranged from none to heavy, back to very light in the three successive check years. Aspen heights averaged about 2 feet in 1950, to about 5 feet, presently.

Willow plants decreased three to one in eleven years. Spruce still has not invaded this plot. Lupine numbers have increased from less than 100 plants to over 500 in the past eleven years. Jacob's-ladder (Polemonium) present in 1950 was not found in either 1955 or 1961.

4. Moose utilization has ranged from light to heavy, to light, in the three respective check years.

Aspen heights averaged about 2 feet, with the tallest 6 feet, in 1950. In 1961, the average height was about 10 feet while the tallest was 20 feet.

Willow numbers varied from 1 to 5, to 4 in the respective check years.

Ten Lupine (Lupinus nootkatensis) were noted for the first time in this plot. Birch (Betula kenica) increased from 1 to 3, to 6 in 1950, 1955 and 1961, respectively.

Lowbush cranberry (Vaccinium vitis-idea) increased from 270 plants in 1950 to about 3,000 in 1961.

Five umbrella-shaped mushrooms up to 4 inches in diameter have invaded this plot.

There were three spruce in 1950, while now there are 26.

5. In 1950, there was over 70% mineral soil, presently there is less than 5%.

Although no moose utilization was noted in 1950 or 1955, with only slight use in 1961, the plot shows heavy use in past years. This is indicated by the hardwood species remaining under 4 feet in height. On plots 2, 3 & 4 the hardwoods are well over head-high.

Fireweed has decreased, while bunchberry and lupine have greatly increased.

6. In 1950, there were 4 species of plants, in 1955 - 5, and in 1961 there are 16. The increase or encroachment of various species is the big change in this plot. New species on this plot are: moss, raspberry, fescue grass, alder, mushroom, horsetail, bedstraw, lamb's tongue and blue flea-bane.

No mineral soil was exposed in the past but this year a small percentage was visible.

In the eleven-year period, willow increased from zero to 15 while fireweed decreased from over 2,500 to less than 800 plants.

Birch seedlings, 2-4 inches high, were numerous in 1950. Their numbers have been reduced over 50%, however, the average height is now 3-4 feet and would be higher if not browsed.

Utilization by moose increased over past years; browse on both grasses and hardwoods was noted.

7. More mineral soil is exposed now than in 1950.

Utilization by moose, at present, shows an increase.

Moss recorded as under 10% in 1950, is now over 60% in 1961.

Lowbush cranberry increased from about 150 plants in 1950 to over 2,400 in 1961.

Fireweed increased as did Spiraeas and aspen.

8. The percentage of mineral soil exposed has greatly reduced.

The numerous birch seedlings noted in 1950 are continiously being thinned out as the dominate plants shade out the weaker ones. Moose utilization also has a small part in the reduction of birch.

Bunchberries increased, while fireweed decreased.

Lowbush cranberry increased from about 160 plants in 1950 to about 2,000 in 1961.

Willow increased and alder clumps up to 9 feet high are now present where none were evident in 1950.

9. The alder sprouts of 1950 have turned into thick alder clumps up to 18 feet high.

A good number of white spruce seedling are presently being shaded and crowded.

Birch are slowly increasing.

VI. PUBLIC RELATIONS

A. Recreational Uses.

Fishing, hunting, camping, sight-seeing and bird watching activities continued to increase over past years. Berry picking has increased to the point that there is much competition to get into the accessible areas early. Blueberries, lowbush cranberries, bunchberries, currants, crowberries and red raspberries are some of the more common berries gathered on the Moose Range.

Weekly cleanup of eight campgrounds and the emptying of trash barrels was carried on during the summer months.

B. Refuge Visitors.

Visitors during the period were:

Messrs. M. H. Soyster, Regional Oil and Gas Supervisor, and W. J. Lenton, Petroleum Engineer, U.S. Geological Survey, visited the Kenai May 4. Mr. Soyster was instrumental in obtaining concurrence from Standard Oil Company in moving SCU Well Location #23-9 approximately one thousand feet back from the Swanson River, as originally recommended by this office.

Mr. George Ducret, Service Engineer from the Portland Office, was in Kenai from May 10 to 16. He conducted an engineering survey of the proposed new headquarters site southeast of the town of Soldotna.

July brought an influx of V.I.P.s including Mr. Thomas L. Kimball, Executive Director, National Wildlife Federation Washington D.C. visited the Kenai from the 5th through the 7th. On July 10, Dr. H. J. Van Oordt, Professor of Endocrinology, University of Utrecht, Netherlands was conducted on an aerial and vehicular tour of the Moose Range. July 10th also saw the arrival of Mr. Winston E. Banko, Chief, Section of Wildlife Management, BSFW, Washington, D.C. to spend a week on the Moose Range and become acquainted with the area, its problems and objectives. Assistant Secretary of Interior Carver and party, while on a Bureau of Land Management inspection trip, stopped in the Kenai Office to discuss Moose Range problems. Two German photographers, Mr. Eugene Schutmacher and Mr. Helmut Barth, representing the International Union for Conservation of Nature and National Reserves, arrived July 12 to take 35mm. movies of the trumpeter swan. Arrangements were worked out for them to visit McNeil River to photograph Alaska brown bear. On July 25, John Schwartz, Robert Porterfield and Sig Olsen (formerly with the Service), all with the U.S. Forest Service, were conducted on a field trip through the Moose Range including a check of the oil activity.

Regional Director Nelson, BSFW, Juneau, visited the Kenai on an inspection trip July 31. Mrs. Hilda Ginn, Klamath Falls, Oregon, mother of Gerald Watson (deceased) and Mr. & Mrs. Allen Petersen, parents of Jim Petersen (deceased) former employees of the Service who drowned in Skilak Lake September 1955, visited Kenai Headquarters and the Skilak Lake area August 7. Visitors in August included Mr. Ed Whitesel of our Juneau Office in company with a Dingle-Johnson party; H. Wakefield, Unit Conservationist, SCS, Homer, Alaska, and E. Lewis, Manager Plant Material Center, SCS, Waikiki, Hawaii, discussing soil erosion, range rehabilitation and revegetation of former well sites and roads; Marcel Bahizi, National Parks, Congo, with his interpreter M. Wood, and Mr. Wolfgang Koehler from the German Embassy who accompanied Mr. B. Bruce of the U.S. Forest Service.

The following is a list of other visitors during the period.

Date	Name & Title	Organization	Purpose
5/1	C. J. Noger, Appraiser	B.L.M.	Courtesy call
5/1	Joe Dremen	Std. Oil Co.	Conference
5/1	W. P. Howland Jr.-Safety Eng.	Std. - S.F.	Conference
5/3	Tim Callahan	B.L.M.	Business
5/4	W. J. Linton- Petr. Eng.	USGS	Business
5/4	Elmer R. Norberg	ADF&G	Moose Calf tagging proj.
5/4	Bob L. Burkholder	BSFW	Business
5/9	Craig Lyons	Std. Oil Co.	Conference
5/15	B. L. Goodrich	Soldotna Chamber Commerce	Business
5/19	George Gustafson	Land & Minerals Officer-B.L.M.	Courtesy call
5/19	John Merrick, Forester-Homer	B.L.M.	Business
5/23	Elmer Norberg	ADF&G-Anchorage	Moose tagging proj.
5/23	Jack C. Didrichson	ADF&G	" " "
5/23	David K. Mathiesen	Safeway Airways	" " "
5/23	Kenneth Moon	Hill-I-Copter, Inc.	" " "
5/23	Neil Argy	U.S. GMA-Anchorage	Business
5/23	Chuck Wilson	ADF&G Protection of Seward	"
5/24	Craig Lyon	Std. Oil	Conference
5/26	Ted Foss	Foss Company - Ck. dictating Equip.	Business

Date	Name & Title	Organization	Purpose
5/26	Fred Pearson	Pilot	Business
6/1	W. J. Linton - Petr. Eng.	USGS	"
6/1	Jack McGuire	Kenai Pipeline	"
6/2	Hayden & Connelly, Sr.	Connelly Electric	"
6/2	Keith Hutchison - Juneau	Alaska Forest Research Center	"
6/6	Karl M. Hegg - Juneau	Northern For. Exp. Sta	"
6/7	Wilbur A. Farr- Research Forester	-Northern-For Exp. Station	"
6/7	James T. Bones- "	" " " "	"
6/7	Vernon J. LaBan- "	" " " "	"
6/7	Robert B. Mattson- "	" " " "	"
6/8	Carl F. Nickel- Prot. Aide	ADF&G	Courtesy call
6/8	Robert Smith	U.S. Corps. of Eng.	Business
6/14	A.G. Hilton - Div. Eng.	Union Oil Co.	"
6/19	Ash & Brennan	Gold Dreders	"
6/20	Don & Madge Holliday	St. Marie, Mich.	Courtesy call
6/21	Craig Lyon	Std. Oil	Conference
6/21	Bob Seltzor	Std. Oil	"
6/22	George Gustafsm	Lands & Minerals Officer-B.L.M.	Visit
6/22	Clifton Brownell-Land Examiner	B.L.M.	"
6/22	Rae & Sera Baxter	ADF&G	"
6/23	Russ Ferbrache-Utilization officer	GSA	Business
7/5	T.B. Smith- Const. Eng.	Kenai Pipe Line Co.	"
7/6	Francis J. Hall	Dept. Health & Welfare	"
7/7	Stan Kubik - Skilak	ADF&G Fisheries	"
7/7	Denny Christian - Skilak	" "	"
7/8	Ronnie Hakale	Denner, Cub Scouts, Milbrae, Calif	Visit
7/8	D. Robert Hakale	USNPS, San Francisco, Calif.	"
7/9	Jean Hakala	Milbrae, Calif.	"
7/9	Mr. & Mrs. T. M. Saari	Superior, Wis.	Tourists
7/12	Walter Hire - Civil Eng.	Delta Eng. - Anchorage	Business
7/12	Bill Gredigan	Survey Crew- "	"
7/12	Carlton Crittenden	" " "	"
7/12	Jimmy Easterling	" " "	"
7/14	R. A. James	Alaska R. R.	"
7/20	Donald Thurston	U.S. F.W.S.- Anchorage	"
7/20	Dave Graebner	U.S. F.W.S.- Anchorage	"
7/20	Dale P. Tubbs-Courthouse, Warppra, Wis. - Tech. Alumni Forestry 55		Visit
7/20	M. H. Soyster - Reg. Oil & Gas Suprv. - U.S.G.S. - Anchorage		Business
7/20	Bill Dunlop	Marie Geological Company	Business
7/25	Raymond Anderson - Pilot	AAI	"
7/25	J.J. Dremer	Std. of Calif.	Conference
7/27	D.N. Barrow - Houston, Tex.	Delta Eng. Corp.	Courtesy call
7/27	Walter Spence	" " "	" "
7/27	Ken Sheppard	Alaska Pipeline Company, Anc.	" "
8/1	Chester B. Sorensen - Forester	B.L.M.	Business
8/1	Clifton E. Brownell	B.L.M.	"
8/1	Wm. H. Klein	"	"
8/7	R. M. Hawkins	Alaska Pipeline Company, Anc.	"
8/7	W. Walter Spence	" " " "	"
8/8	Thomas E. DeVaney-Fishery Biol.	BSFW, Fed. Aid. Wash. D.C.	Visit
8/8	Sid Logan - " "	ADF&G- Seward, Alaska	"
8/8	Richard Haley	" " "	"
8/8	Lou Bandinola	" Juneau, Alaska	"

Date	Name & Title	Organization	Purpose
8/11	Bob G. Lebby-Conservationist	Merced, Calif.	Visit
8/15	Neil Argy - GNA	FWS - Anchorage	Business
8/15	Hank Hansen	" Juneau	"
8/15	Joyce Dechant	" Anchorage	Visit
8/15	Jim Scott - Fire Control	B.L.M.	"
8/15	Mr. Davis (Red)	Wm's Construction Co.	Business
8/15	Mr. Richardson	" " "	"
8/15	Walter Rust - Fire control	B.L.M.	"
8/15	G. Newmann	Pilot	Visit
8/16	Dr. Lee R. Dyer	Dentist - Wildwood St.	"
8/18	Dennis M. Rehder	Minnesota	"
8/29	Clifton E. Brownell	B.L.M. Land Ex.	"
8/31	Dr. Lee R. Dyer	Dentist - Wildwood St.	Business
8/31	Lt. James T. Cannon - Finance Officer - Wildood St.		"

C. Refuge Participation.

Refuge personnel assisted GMA Thayer in setting out scaring devices to rid a local homesteader's grain field of ravaging lesser sandhill cranes.

Refuge personnel and equipment aided in a three day search for a drowned man in a lake near Soldotna. The body was recovered.

Moose Range personnel and equipment participated in another search for three men lost in a boat in Skilak Lake. The missing men reached shore safely after waiting out high winds in a temporary camp.

News articles were written and sent to local newspapers concerning new blue goose signs posted on the Refuge, and wildlife activities on the Moose Range.

D. Hunting.

Sheep, goat and black bear season opened August 10th, followed by moose and upland game bird seasons on August 20th. Hunting pressure (road and aircraft) has been heavy with the kill light. Known harvest during the period is 37 moose, 13 sheep and 8 goat. Two of the goats were taken near the new Funny River access road.

E. Violations.

No known game violations occurred during the period. GMA Thayer stationed at Kenai does considerable patrolling of the Refuge area.

F. Safety.

Three safety meetings were held during the period. Some of the subjects discussed were water and boat safety, artificial respiration, handling of axes and other hand tools, vehicle driving, and safety with heavy equipment such as the D-7 tractors in use on the Moose Range. Prior to the

departure of the temporary summer employees, a review of our safety program was held. Several suggestions discussed by the group will make for safer operations in the future. Hunting and gun safety were also discussed. No accidents occured during the period.

The oil house was vented at both the floor level and ceiling and the vents screened. Repairs to hand tools and maintenance of orderly conditions in the shop were carried on as in the past. Safety posters have been given prominent display. All fire extinguishers were weighed and checked this period. Additional fire extinguishers were located where needed.

The Kenai Moose Range has enjoyed three hundred and ninty-five (395) accident-free calender days as of the end of this period.

Future safety plans include a continuance of safety meetings, maintaining safe working conditions and improving conditions as time and money permits.

During the report period, this office obtained safety leather welding pants, jacket and gloves, three new dry chemical fire extinguishers and two liquid chemical refills for extinguishers.

VII. OTHER ITEMS

A. Items of Interest.

Mr. Carl Divinyi, a student in Wildlife Management at the University of Alaska, was hired as Wildlife Aid, IASS-5 this summer. Carl worked on a waterfowl study most of the period. He returned to the University this fall.

Mr. Rex Williams and family returned to Kenai from home and educational leave May 24. Rex attended the Nashville Auto-Diesel College, Nashville, Tennessee, where he was awarded a set of tools at graduation time for the highest average (95.5) for the year.

Iesley A. Holt, E.O.D. on June 5th as a (temporary) dozer operator. Mr. Holt has had many years of experience working with heavy equipment.

Lynn Crandell was hired as a (temporary) typist during the summer months. Miss Crandell was a recent graduate of Kenai High School and left this fall to attend college in California.

Eugene Morin and J. Von B. Phillips, local school teachers, worked with us as laborers (temporary) during the summer months--their second summer on the Range.

Darrell Watt hired as a Wildlife Aid for the Arctic Wildlife Range was on temporary assignment to the Moose Range for approximately six weeks this period.

Standard Oil of California completed the following thirteen (13) oil wells on the Moose Range during the period: 21-27, 43-4, 43-5, 23-4, 23-33, 21-15, 41-9, 41-8, 23-9, 21-9, 43-28, 14-3 and 34-15. One gas well (243-4) was also completed in August. Production from the field at the end of August was 22,048 barrels per day. A total of forty (40) oil wells were in pro-

duction on the Moose Range by the end of this period. There are two (2) gas wells capable of production when a market becomes available. Five drill rigs continue operation in the Soldotna and Swanson River Units. A sixth rig is currently drilling the first "wildcat" in the Swan Lake Unit.

Construction is proceeding on Standard's housing development of eight units in the Soldotna Creek Unit. Cleanup of Standard's Swan Lake and Soldotna Creek Units and Texaco's Cook Inlet seismic trails was completed and approved this period. An inquiry was received from Standard August 30 regarding the drilling of a new "wildcat" well in the Soldotna Creek Unit, 3½ miles south of their present field. Approximately two miles of road will be required.

Home Electric Association worked periodically this summer on cleanup of the Moose Range portion of their Cooper Lake transmission line. They completed a power transmission line into the Swanson River oil field along the Kenai Pipeline right-of-way.

Alaska Natural Gas Pipeline Company completed ditching, burying and testing of their pipe across the Moose Range. Cleanup work of the right-of-way was started during the period.

Western Geophysical conducted seismic operations in the Soldotna Creek Unit the latter part of June. This summer's seismic operation was approved only near the oil production area. Lines that would disturb swan nesting or silting of salmon streams were deleted from the planned operation.

Standard Oil Company completed a gas well in their Falls Creek Unit, with a stabilized flow rate of 1,950,000 cubic feet of gas per day. This well is located in the Clam Gulch area and is approximately five miles from the western boundary of the Moose Range. Union-Ohio completed their gas well in the "excepted area" of the Moose Range, about 2½ miles north of Soldotna in the Sterling Unit.

Submitted by: John B. Hakala
John B. Hakala, Refuge Manager

September 20, 1961

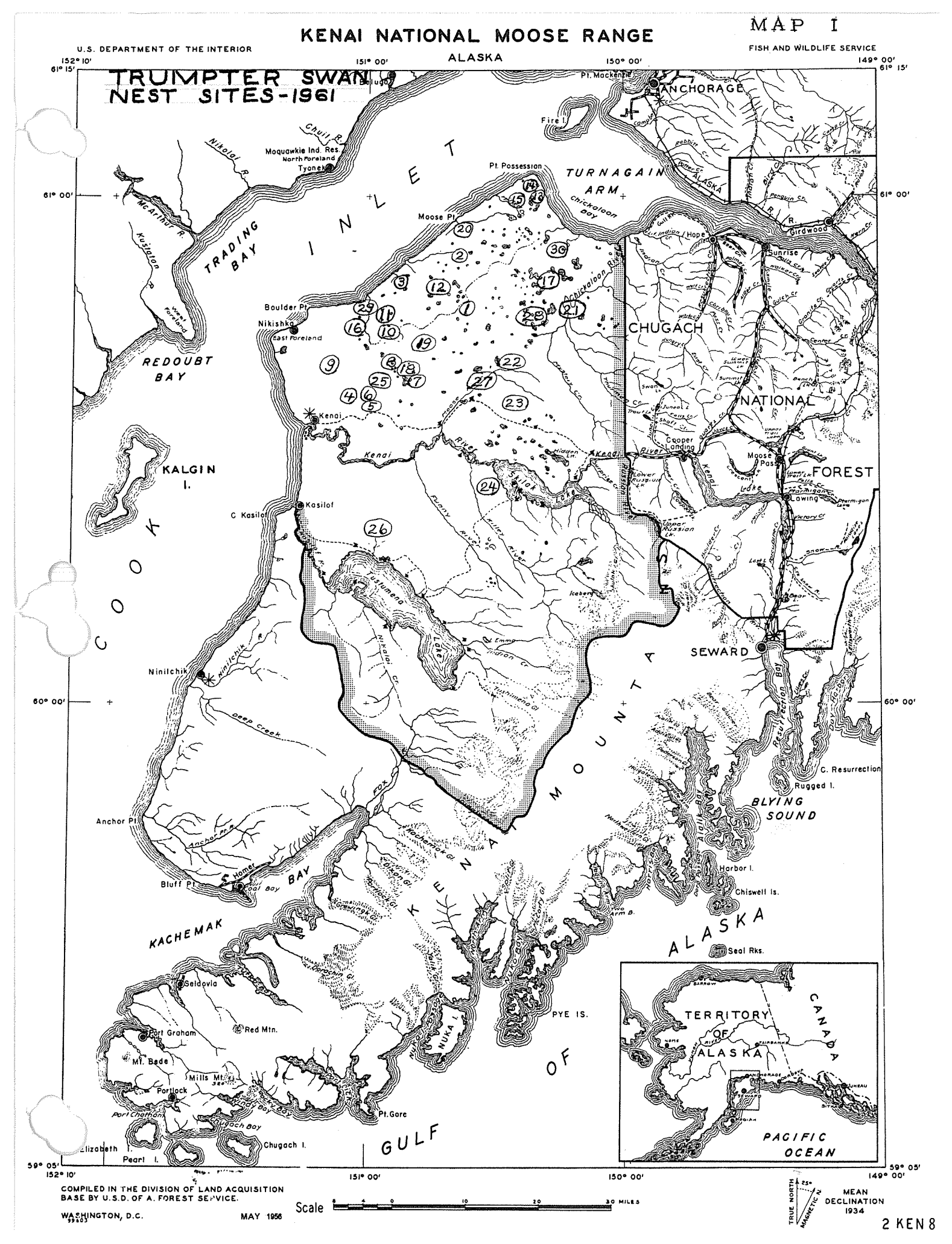
Approved by: David L. Spencer
Refuge Supervisor

MAP I

KENAI NATIONAL MOOSE RANGE

ALASKA

U.S. DEPARTMENT OF THE INTERIOR — FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF LAND ACQUISITION
BASE BY U.S.D. OF A. FOREST SERVICE.

WASHINGTON, D.C. 99803 — MAY 1956

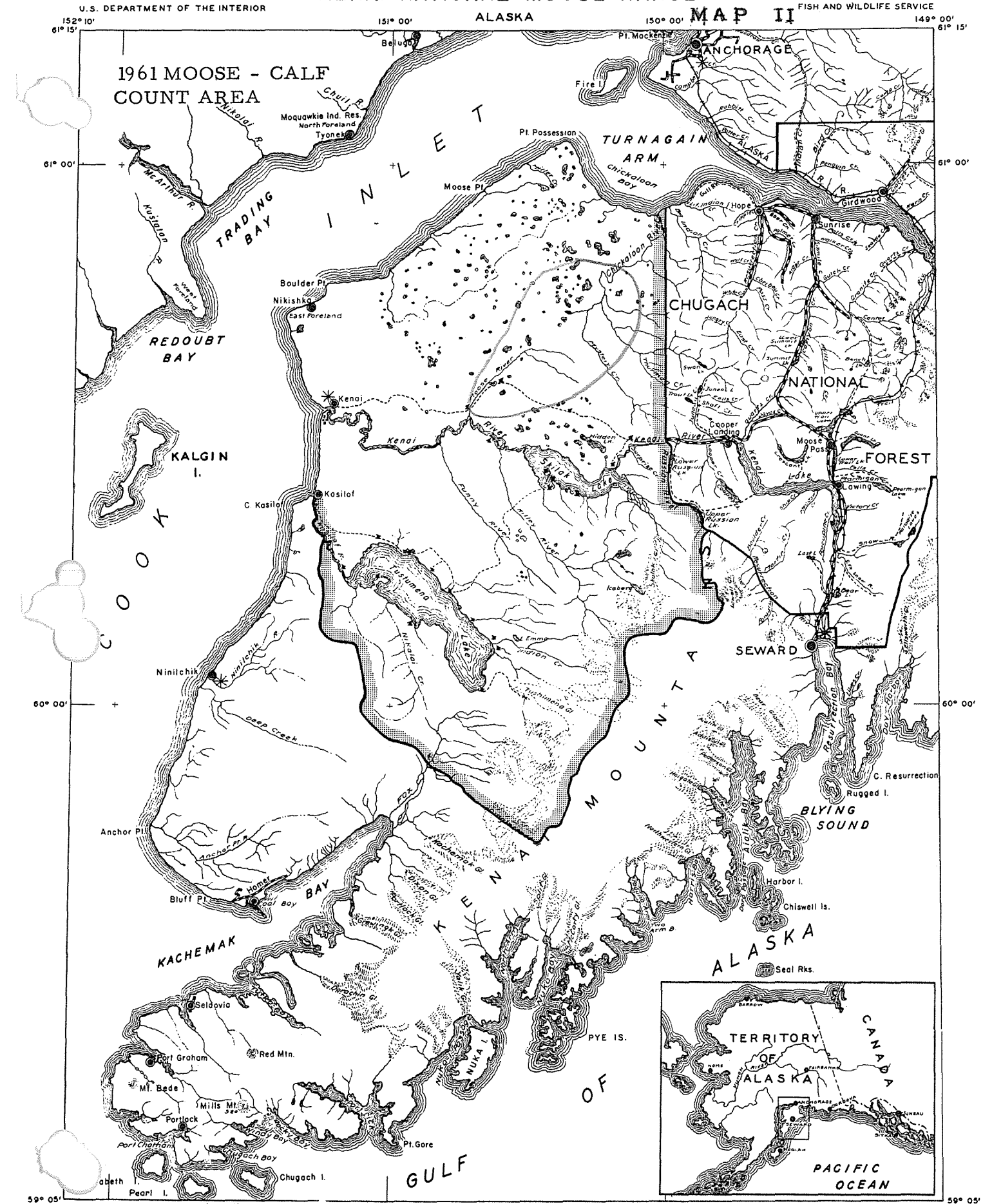
Scale 0 5 0 10 20 30 MILES

MEAN DECLINATION 1934

2 KEN 8

KENAI NATIONAL MOOSE RANGE

U.S. DEPARTMENT OF THE INTERIOR — ALASKA — MAP II — FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF LAND ACQUISITION
BASE BY U.S.D. OF A. FOREST SERVICE.

WASHINGTON, D.C. 99803 — MAY 1956

Scale 0 4 0 10 20 30 MILES

TRUE NORTH — 25° — MAGNETIC N — MEAN DECLINATION 1934

2 KEN 8

KENAI NATIONAL MOOSE RANGE MAP III

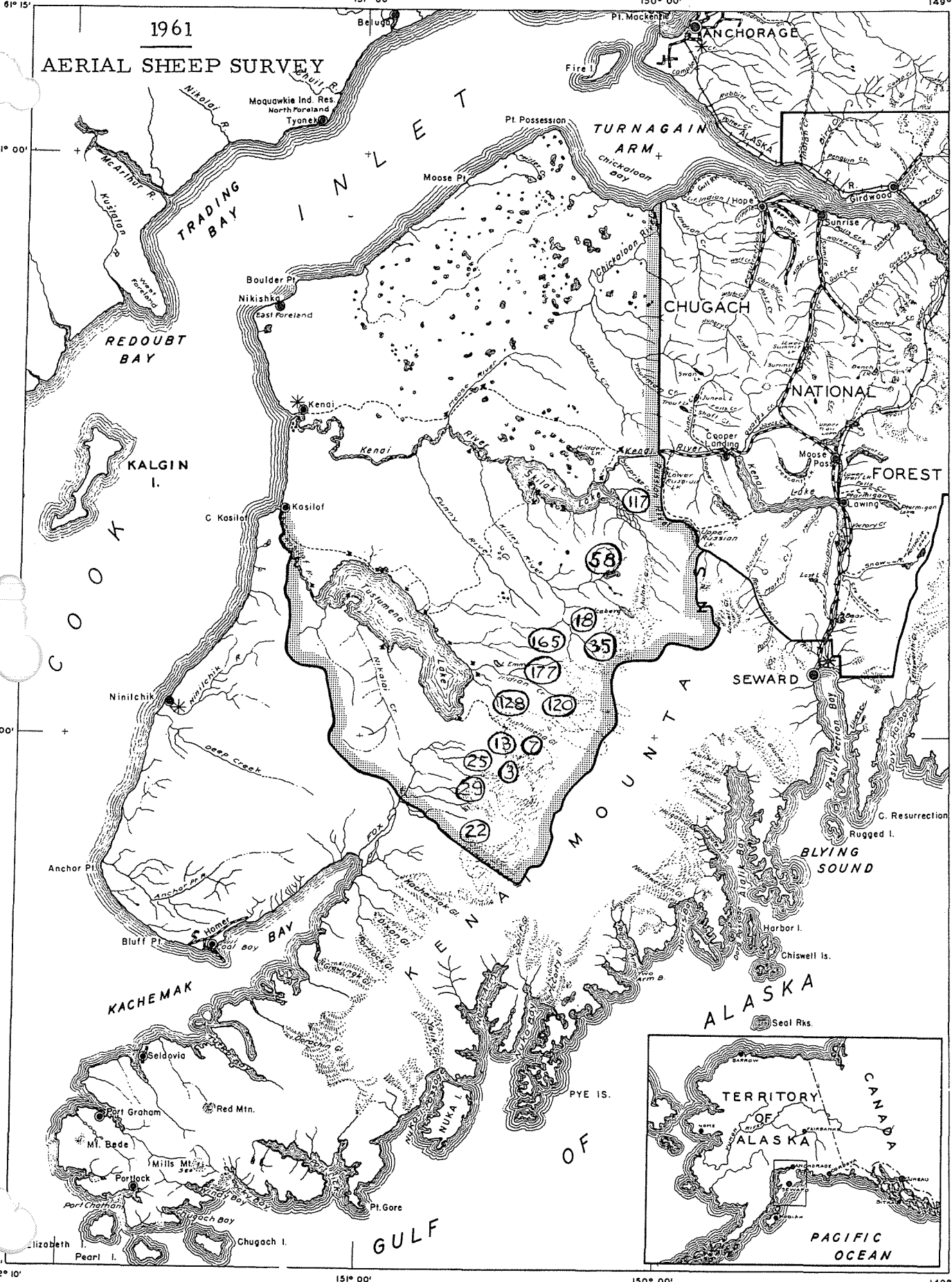
ALASKA

U.S. DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

1961

AERIAL SHEEP SURVEY



COMPILED IN THE DIVISION OF LAND ACQUISITION
BASE BY U.S.D. OF A. FOREST SERVICE.

WASHINGTON, D.C. 99603

MAY 1956

Scale 0 4 0 10 20 30 MILES

MEAN DECLINATION 1934

TRUE NORTH 23° MAGNETIC N

2 KEN 8

U.S. DEPARTMENT OF THE INTERIOR

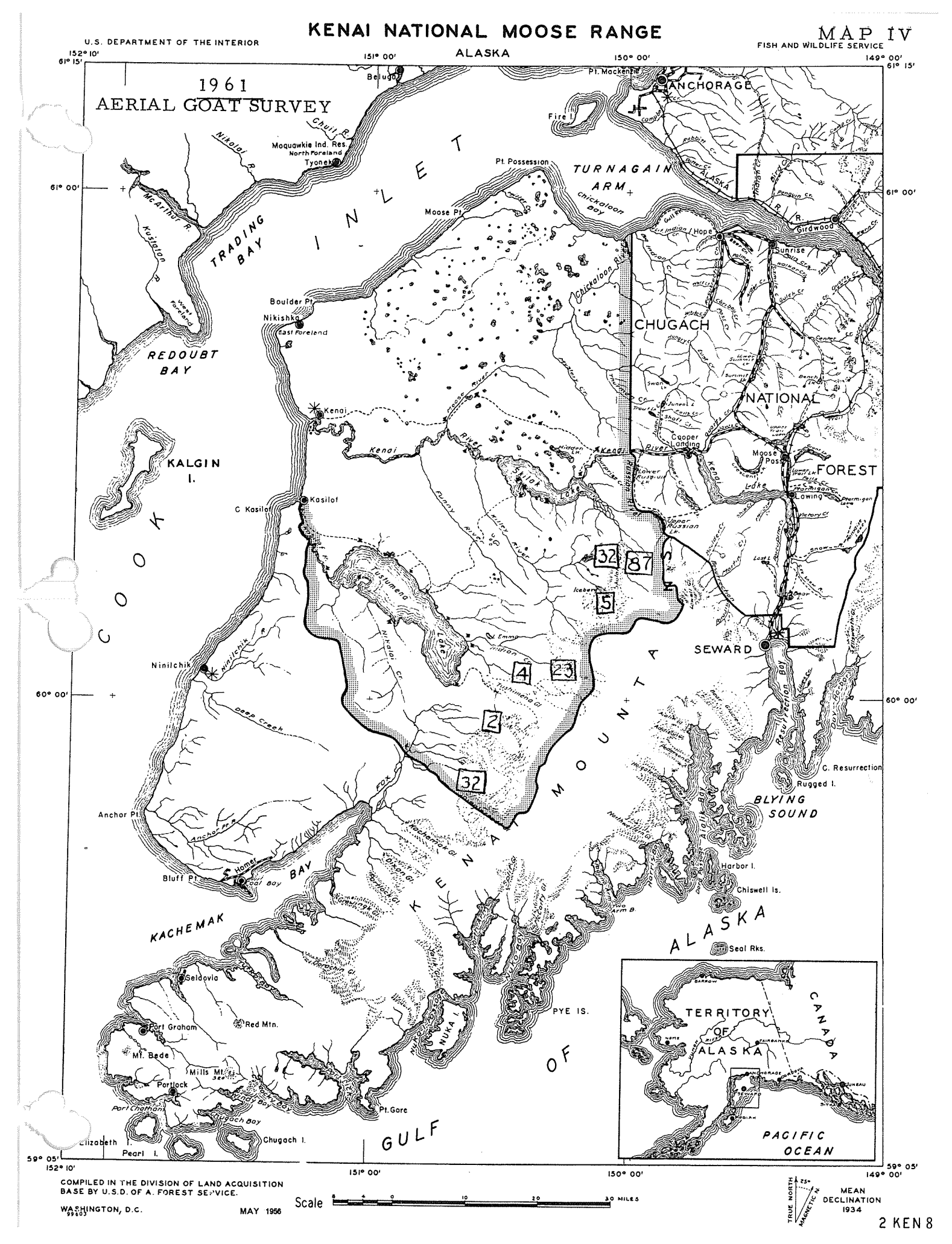
KENAI NATIONAL MOOSE RANGE

ALASKA

MAP IV

FISH AND WILDLIFE SERVICE

1961 AERIAL GOAT SURVEY



COMPILED IN THE DIVISION OF LAND ACQUISITION
BASE BY U.S.D. OF A. FOREST SERVICE.

WASHINGTON, D.C. 99603

MAY 1956

Scale 8 4 0 10 20 30 MILES

TRUE NORTH 25° MAGNETIC N

MEAN DECLINATION 1934

2 KEN 8

Range Forage Project
1961

Figure 1. Loading D-7 with Crossville land clearing blade on BSFW lowboy.

Figure 2. Ready to move afield.

Figure 3. Crossville blade in action.

Figure 4. Blade cuts tree stump at ground level.

Figure 5. Experimental area completed.
Note aspen left standing for seed trees.

Figure 6. Close-up of same area.
Spruce trees have been removed.

Figure 7. The cause of it all!

Figure 8. Crossville land clearing plow.

Figure 9. D-7 tractor in action using Crossville rake.

Figure 10. Forage experimental plot #7 after treatment with Crossville plow.

Figure 11. Forage experimental plot #2 after treatment with Crossville plow and rake.

Figure 12. Two hundred twenty-two refuge signs posted during period.

Figure 13. Three public use signs posted at strategic points.

3-1750
Form [illegible]-1
(Rev. March 1953)

WATERFOWL

REFUGE Kenai National Moose Range MONTHS OF May TO August 31, 1961

(1) Species	(2) Weeks of reporting period: 5/6 (1)	5/13 (2)	5/20 (3)	5/27 (4)	6/3 (5)	6/10 (6)	6/17 (7)	6/24 (8)	7/1 (9)	7/8 (10)
Swans:										
Whistling	50	50	20	10	10	10	10	10	10	10
Trumpeter	200	200	220	220	238	220	190	150	150	150
Geese:										
Canada	75	50								
Cackling										
Brant Black	25	10	5	5	5	5	5	5	5	5
White-fronted	350	150								
Snow										
Blue										
Other Lesser Canada	300	150	10	10	10	10	10	10	10	10
Ducks:										
Mallard	1,000	800	400	400	400	400	400	400	400	400
Black										
Gadwall	20	20								
Baldpate	40	10								
Pintail	1,500	1,000	200	100	400	400	400	400	400	400
Green-winged teal	500	100	50	50	50	50	50	50	50	50
Blue-winged teal										
Cinnamon teal										
Shoveler										
Wood										
Redhead										
Ring-necked										
Canvasback										
Scaup	1,000	1,000	1,000	1,200	1,400	1,500	1,500	1,500	1,500	1,500
Goldeneye	1,000	500	500	700	1,000	1,000	1,000	1,000	1,000	1,000
Bufflehead										
Ruddy										
Other Harlequin	150	70	100	150	150	150	150	150	150	150
White-winged scoter	100	100	100	100	150	150	200	300	300	300
Coot:										
Int. Dup. Sec.,										

3 -1750a
Cont.
(Rev. March 1953)

WATERFOWL
(Continuation Sheet)

REFUGE Kenai National Moose Range MONTHS OF May TO September 2, 19 61

(1) Species	(2) Weeks of reporting period: 7/15 11	7/22 12	7/29 13	8/5 14	8/12 15	8/19 16	8/26 17	9/2 18	(3) Estimated waterfowl days use	(4) Production: Broods seen	Estimated total
Swans:											
Whistling	10	10	10	10	10	10	15	20	1,990		
Trumpeter	150	150	150	150	150	150	160	175	22,210		61
Geese:											
Canada						50	200	400	5,420		
Cackling											
Brant	10	10	10	10	10	10	20	20	1,220		10
White-fronted					50	100	200	325	8,220		
Snow											
Blue											
Other Lesser Canada	10	20	20	20	20	20	20	50	4,970		8
Ducks:											
Mallard	400	400	400	400	400	400	800	1,500	67,900		100
Black											
Gadwall								20	420		
Baldpate								20	490		
Pintail	400	400	400	400	400	600	1,000	2,000	75,600		100
Green-winged teal	50	50	50	50	50	400	600	800	21,350		20
Blue-winged teal											
Cinnamon teal											
Shoveler											
Wood											
Redhead											
Ring-necked											
Canvasback											
Scaup	1,500	1,500	1,500	1,500	1,500	2,000	2,500	3,000	196,700		150
Goldeneye	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,200	118,300		200
Bufflehead											
Ruddy											
Other Harlequin	150	150	150	150	300	300	300	300	22,190		20
White-winged scoter	300	300	300	300	300	300	800	1,000	37,800		
Coot:											

(over)

	(5) Total Days Use	(6) Peak Number	(7) Total Production
Swans	24,200	250	61
Geese	19,830	79	
Ducks	540,750	9,840	
Coots	None	None	

SUMMARY

Principal feeding areas Chickaloon Flats and Kenai River during migrations.

Principal nesting areas Many small lakes

Reported by R. V. Wade

INSTRUCTIONS (See Secs. 7531 through 7534, Wildlife Refuges Field Manual)

(1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance.

(2) Weeks of Reporting Period: Estimated average refuge populations.

(3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.

(4) Production: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.

(5) Total Days Use: A summary of data recorded under (3).

(6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.

(7) Total Production: A summary of data recorded under (4).

Interior Duplicating Section, Washington, D. C. 37944
1953

3-1750b
Form NR-1B
(Rev. Nov. 1957)

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

WATERFOWL UTILIZATION OF REFUGE HABITAT

Refuge Kenai National Moose Range For 12-month period ending August 31, 1961

Reported by R. V. Wade Title Asst. Refuge Manager

(1) Area or Unit Designation	(2) Habitat Type	Acreage		(3) Use-days	(4) Breeding Population	(5) Production
Kenai Moose Range	Crops	-	Ducks	1,013,600	5,000	500
	Upland	1,650,008	Geese	122,740	4	18
	Marsh	9,000	Swans	43,184	60	61
	Water	145,472	Coots	None	-	-
	Total	1,804,480	Total	1,179,524	5,064	579
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			

(over)

INSTRUCTIONS

All tabulated information should be based on the best available techniques for obtaining these data. Estimates having no foundation in fact must be omitted. Refuge grand totals for all categories should be provided in the spaces below the last unit tabulation. Additional forms should be used if the number of units reported upon exceeds the capacity of one page. This report embraces the preceding 12-month period, NOT the fiscal or calendar year, and is submitted annually with the May-August Narrative Report.

(1) **Area or Unit:** A geographical unit which, because of size, terrain characteristics, habitat type and current or anticipated management practices, may be considered an entity apart from other areas in the refuge census pattern. The combined estimated acreages of all units should equal the total refuge area. A detailed map and accompanying verbal description of the habitat types of each unit should be forwarded with the initial report for each refuge, and thereafter need only be submitted to report changes in unit boundaries or their descriptions.

(2) **Habitat:** Crops include all cultivated croplands such as cereals and green forage, planted food patches and agricultural row crops; upland is all uncultivated terrain lying above the plant communities requiring seasonal submergence or a completely saturated soil condition a part of each year, and includes lands whose temporary flooding facilitates use of non-aquatic type foods; marsh extends from the upland community to, but not including, the water type and consists of the relatively stable marginal or shallow-growing emergent vegetation type, including wet meadow and deep marsh; and in the water category are all other water areas inundated most or all of the growing season and extending from the deeper edge of the marsh zone to strictly open-water, embracing such habitat as shallow playa lakes, deep lakes and reservoirs, true shrub and tree swamps, open flowing water and maritime bays, sounds and estuaries. Acreage estimates for all four types should be computed and kept as accurate as possible through reference to available maps supplemented by periodic field observations. The sum of these estimates should equal the area of the entire unit.

(3) **Use-days:** Use-days is computed by multiplying weekly waterfowl population figures by seven, and should agree with information reported on Form NR-1.

(4) **Breeding Population:** An estimate of the total breeding population of each category of birds for each area or unit.

(5) **Production:** Estimated total number of young raised to flight age.

Interior Duplicating Section, Washington, D. C. 27580

3-1751
Form NR-1A
(Nov. 1945)

MIGRATORY BIRDS
(other than waterfowl)

Refuge Kenai National Moose Range Months of May to September 2, 1961

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. Water and Marsh Birds:										
Common loon	2	5/10	1,800	8/30	Still	Present	-	1,000	1,200	2,000
Red-throated loon	2	5/10	600	8/30	"	"			100	800
Double-crested cormorant	Were	Present	75	8/30	"	"	6	75	100	100
Pelagic cormorant	"	"	10	8/30	"	"			5	20
Yellowlegs	"	"	1,000	7/15	2	8/5		1,000	2,500	1,500
Sandhill crane	"	"	1,000	8/25	75 Still	Present	4	75	150	1,500
II. Shorebirds, Gulls and Terns:										
Glaucous gull	Were	Present	8,000	8/15	Still	Present			1,000	9,000
Glaucous-winged gull	"	"	5,500	8/15	"	"			800	6,000
Herring gull	"	"	10,000	8/15	"	"			1,000	12,000
Mew gull	"	"	1,000	8/15	"	"			200	1,500
Bonaparte's gull	"	"	1,000	8/15	"	"			200	1,500
Arctic tern	"	"	2,500	7/15	10	8/5			500	3,000
Semipalmated plover	"	"	1,000	8/30	Still	Present			200	1,500
Common snike	"	"	2,500	8/30	"	"			500	3,000
Aleutian tern	"	"	800	7/15	5	8/5			100	1,000

(over)

(1)	(2)		(3)		(4)		(5)		(6)
III. Doves and Pigeons:									
Mourning dove	None								
White-winged dove	None								
IV. Predaceous Birds:									
Golden eagle	Were	Present	30	8/30	Still	Present		10	40
Duck hawk	None								
Horned owl	Resident		250	8/30	"	"		20	270
Magpie	"		900	8/30	"	"		200	1,000
Raven	"		3,000	8/30	"	"		900	4,000
Crow	None								
Bald eagle	Were	Present	225	8/30	"	"		75	300
Marsh hawk	"	"	600	8/30	"	"		200	700
Snowy owl	"	"	10	8/30	"	"		5	20
Rough-legged hawk	"	"	300	8/30	"	"		50	350

Reported by R. V. Wade

INSTRUCTIONS

(1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiiformes)
II. Shorebirds, Gulls and Terns (Charadriiformes)
III. Doves and Pigeons (Columbiformes)
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)

(2) First Seen: The first refuge record for the species for the season concerned.

(3) Peak Numbers: The greatest number of the species present in a limited interval of time.

(4) Last Seen: The last refuge record for the species during the season concerned.

(5) Production: Estimated number of young produced based on observations and actual counts.

(6) Total: Estimated total number of the species using the refuge during the period concerned

3-1752
Form 9-2
(April 1946)

UPLAND GAME BIRD

Refuge Kenai National Moose Range Months of May to August 31, 19 61

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'v'd.	Estimated Total	Percentage	Hunting	For Re-stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Spruce grouse	Spruce forest 900,000 acres	100			1:1	400			9,000	No accurate estimate
Ptarmigan	Alpine Meadows, Hardwood forest 300,000 acres	38			1:1	100			8,000	No accurate estimate

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.*

(1) SPECIES: Use correct common name.

(2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.

(4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.

(5) REMOVALS: Indicate total number in each category removed during the report period.

(6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.

(7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

* Only columns applicable to the period covered should be used.

REFUGE NARRATIVE REPORT

September - - December, 1961

KENAI NATIONAL MOOSE RANGE

Kenai Alaska

STAFF:

John B. Hakala, Refuge Manager

Robert V. Wade, Asst. Refuge Manager

Rex E. Williams, Maintenance-Mechanic

Lesley A. Holt, Dozer Operator-Maintenanceman

S.E. Robinson, Clerk-Typist

S.A. Tachick, Typist (Temporary)

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

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KENAI NATIONAL MOOSE RANGE

NARRATIVE REPORT

September - December, 1961

A. Weather Conditions.

Daily weather data as recorded at the Kenai FAA Station are presented in TABLE 1. The weather summary for the period is as follows:

	Temperatures				Precipitation (in inches)		
	Extremes		Average Mean	10-Yr. Average Mean	Rain		
	Max.	Min.			Month	Normal	Snowfall
September	63	25	47.8	46.5	7.03	3.60	-
October	51	-8	29.7	35.0	3.46	2.08	39.5
November	42	-20	15.7	22.4	1.80	1.45	20.4
December	37	-40	3.4	9.5	2.00	1.03	5.6
				Totals:	14.29	8.16	65.5

The last three (3) months of the period were colder than normal. December 26 through 28 saw the thermometer hit forty (40) below, three (3) days in a row. Rains in early December formed an ice crust on the surface of the snow, making travel difficult for the moose. There were thirty two (32) days below zero weather this period, as compared to nine (9) days last year.

The total precipitation for the year was 25.86 inches as compared with the 10-year average of 19.23.

B. Habitat Conditions.

1. Water. Water levels remained satisfactory. Most of the smaller lakes and ponds were frozen over by the end of October. Skilak and Tustumena Lakes were ice covered by mid-December.

2. Food and Cover. Food and cover were abundant, but throughout the month of December a large portion of the food became unavailable. This was due to deep snows (2 to 4 feet) in the timber which became crusted over with ice.

TABLE 1. PRECIPITATION, SNOW FALL, SNOW DEPTH, MINIMUM AND MAXIMUM TEMPERATURES.

Day	September			October					November					December				
	Pr.	Min. T.	Max. T.	Pr.	S.F.	Snow depth	Min. T.	Max. T.	Pr.	S.F.	Snow depth	Min. T.	Max. T.	Pr.	S.F.	Snow depth	Min. T.	Max. T.
1	.02	34	62	.11	-	-	41	50	T	T	6	-3	19	1.26	3.0	12	15	21
2	.36	47	61	.53	-	-	41	51	T	T	6	17	25	-	-	12	14	23
3	-	46	62	-	-	-	29	48	T	T	4	10	29	T	T	11	10	19
4	-	35	58	-	-	-	29	49	.04	.7	4	24	32	T	T	11	-7	11
5	.02	47	57	T	-	-	27	48	.05	2.0	7	22	30	.02	.3	11	-9	8
6	.81	45	54	-	-	-	21	46	T	T	7	26	38	T	T	11	-14	8
7	.34	42	59	.64	T	T	32	40	.11	T	5	25	40	.06	1.2	11	-1	15
8	-	36	61	.02	-	-	33	45	-	-	5	5	34	.15	.3	13	14	28
9	.66	40	55	-	-	-	28	39	-	-	5	1	23	.05	.2	10	27	32
10	1.35	48	59	-	-	-	13	34	T	T	5	3	20	.12	-	10	30	34
11	.74	51	63	-	-	-	12	29	T	T	5	12	19	.01	-	10	31	35
12	.22	40	57	.01	.1	T	25	34	.16	2.7	5	19	32	.17	-	10	31	35
13	-	39	57	.16	3.7	2	30	34	.08	0.9	8	-1	26	T	T	10	22	37
14	.04	32	53	.11	.9	4	28	34	.62	1.0	8	-1	38	T	T	10	13	29
15	.44	42	50	T	-	4	12	38	T	-	7	30	42	-	-	10	-7	13
16	-	35	56	.24	2.6	7	21	41	.15	.9	7	24	36	-	-	9	-18	3
17	.05	30	52	-	-	3	20	43	.05	.8	7	-	30	-	-	9	-24	7
18	.44	43	54	-	-	3	17	48	-	-	8	-6	16	-	-	9	-11	7
19	T	43	55	-	-	3	27	34	.11	2.0	8	15	24	-	-	9	-20	8
20	-	42	54	.42	-	1	30	43	.03	.6	11	20	30	-	-	9	-23	-7
21	T	44	54	.76	T	T	30	39	.04	.5	11	-2	25	-	-	9	-23	-3
22	.79	45	50	-	-	T	25	43	-	-	11	-13	15	-	-	9	-23	-3
23	.03	46	55	T	T	T	18	35	-	-	10	-20	8	-	-	9	-31	-12
24	T	40	52	T	T	T	23	34	.33	7.9	15	6	20	-	-	9	-32	-12
25	-	31	54	-	-	T	14	30	-	-	19	1	20	-	-	9	-34	-14
26	-	25	53	-	-	T	11	32	-	-	9	-14	9	-	-	9	-40	-14
27	T	38	51	.12	1.4	T	9	27	-	-	9	-11	12	-	-	9	-40	-23
28	.42	42	48	.33	4.0	3	26	32	T	T	9	-6	21	-	-	9	-40	-20
29	.15	42	49	.01	.8	6	9	28	T	T	9	3	23	.05	T	9	-39	-4
30	.15	41	51	T	T	7	-4	23	.03	.4	9	1	22	.06	T	11	-4	22
31				-	-	6	-8	23						.05	.6	11	21	34

II. WILDLIFE

A. Migratory Birds.

1. Waterfowl. The southern migration of waterfowl through the area appeared normal this fall. A cold snap with snow in mid-October did not allow the birds to linger as long as they have the past few years. Lesser Canada, black brant and white-fronted geese moved through in good numbers during September. There were several thousand lesser Canada geese congregating in Kachemak Bay just south of the refuge through October. Chickaloon Flats and Kenai River continue to be heavily used by the migratory waterfowl. The wintering waterfowl at the end of the period consisted of small numbers of mallards, scaup and goldeneye along the Kenai River and about one-hundred each of harlequin and white-winged scoter along the coast.

2. Trumpeter Swan. An aerial survey on October 16 and 17 revealed 40 adult trumpeters and 21 cygnets. At this time about 80% of the lakes were ice covered so many of the swans had left with the first snows on October 7 and 12. It was noted during the survey that most of the trumpeters selected nesting sites on lakes that were late in freezing up, probably due to the presence of springs or running water.

B. Upland Game Birds.

1. Spruce Grouse. Spruce grouse numbers, though still abundant, appear to be less than in the past few years. The flock size was also smaller this fall, with an average of five as compared to 10 - 12 last fall. There is a great harvest of these birds along the road systems, especially the Oil Access Road, while birds in more remote areas receive little or no hunting pressure.

2. Ptarmigan. For the first time in several years ptarmigan are down in the lowlands in large numbers. An increase in the population is indicated. Deep snow and ice in the mountainous area appears to have forced the birds westward towards the inlet. Flocks of twenty (20) to forty (40) birds are common.

C. Big-Game Animals.

1. Moose. The annual fall moose herd composition count was conducted November 15 to 18 and 22. A total of 55.8 hours was flown utilizing Service-owned aircraft N-724, N-751 and N-795. Those participating included Bob Burkholder, Acting Regional Supervisor, Predator and Rodent Control; Jack Didrickson, Game Management Biologist, Alaska Department of Fish and Game; Refuge Supervisor Spencer, GMA Thayer and Refuge Managers Wade and Hakala, Kenai.

Two thousand three hundred fourteen (2,314) moose were tallied on the Moose Range, with an additional 405 moose noted in adjoining areas. Comparable areas in 1960 had 3,422 and 622 animals, respectively, which indicates a considerable decrease in numbers at the time of survey. A combination of heavy snow and an extended hunting season may have kept the animals in cover and out of units surveyed. A total count of animals will be scheduled for January 1962, to find out whether this is true.

The majority of moose were recorded by individual groups (1 group to a line) in the following classifications: Yearling bulls (animals with spikes, forks or very small palms), medium bulls (small palms possessing antler spread of less than 48"), large bulls, single cows cows with one calf, cows with two calves and undetermined moose. Records were kept by units (MAP I).

TABLE 2 presents a summary of the count by units. Herd composition for the total population was as follows: 26.8% bulls, 54.3% cows and 17.9% calves. Overall BULL:COW:CALF ratio equalled 49:100:33.

One thousand four hundred seventy-seven (1,477) cows were tallied during the survey (TABLE 2). Three hundred ninety-seven (397) cows, or 26.9% were observed with one calf, 43 or 2.9% had twin calves, and 1,037 or 70.2% had no calves. Few bulls had lost their antlers, thereby having little effect on the total count.

Bull composition data by units for 1961 is presented in TABLE 2. Of the 729 bulls observed, 149 or 20.5% were yearlings, 208 or 28.5% were medium size, and 372 or 51.0% large. TABLE 3 presents bull composition data for the years these three classifications have been used.

The survival information available on bulls from six to eighteen months is based on recorded yearlings, as compared with one-half the previous year's calf crop (6-month-old calves, assuming a 50:50 sex ratio). The ratio of calves and yearling bulls to cows has been used since cows are the most constant population segment of the herd. The survival data for the years 1952 to 1961 is presented in TABLE 4.

TABLE 5 presents a three-year comparison of total counts and composition ratios by units. TABLE 6 is an eight-year comparison of the total herd composition.

Summary:

A total of 55.8 hours flight time was flown, classifying 2,719 moose. Two thousand three hundred fourteen (2,314) moose were classified within the boundary of the Kenai National Moose Range. An additional 405 moose were checked in the Caribou Hills, which adjoin the Moose Range.

Herd composition for the total population is as follows: 26.8% bulls, 54.3% cows and 17.9% calves. Bull:Cow:Calf ratio equalled 49:100:33.

Two moose tagged by Refuge personnel while using the Cap-Chur gun in February 1960 were recovered this fall. Both were adult bulls. Dr. Izaak of Soldotna shot a bull with tag #4 near the lower Funny River airstrip in September. This bull was tagged 13 miles away at Soldotna. Another bull (tag #5) was recovered by Mrs. E. Crandall of Kenai near the Kenai F.A.A. station on December 8th, during the antlerless moose season. This animal was tagged two miles east of the point where it was shot, along the Kenai Spur Road.

TABLE 2. SUMMARY OF MOOSE POPULATION COMPOSITION COUNTS - KENAI NATIONAL MOOSE RANGE - CARIBOU HILLS - NOVEMBER 1961

Unit	Yearling Male	Medium Male	Large Male	Total Males	Single Cows	Cows W/1	Cows W/2	Total Cows	Total Calves	Undet. Moose	Total Moose
1	10	6	6	22	28	20		48	20		90
2	6	1		7	22	10	3	35	16		58
3	1			1	15	9		24	9		34
4		3		3	9	6		15	6		24
5	8	45	41	94	131	18	1	150	20		264
6				-				-			-
7	3	3	2	8	22	10	1	33	12	4	57
8	2	2	2	6	21	14	3	38	20		64
9					7	5	1	13	8		21
10	22	28	28	78	115	50	4	169	58	3	308
11		1		1	17	7	2	26	11	1	39
12	18	21	36	75	201	120	21	342	162	11	590
13	Not Surveyed										
14	Not Surveyed										
15	17	18	28	63	76	24	1	101	26		190
16			8	8	3			3		1	12
17	6	9	6	21	35	24	1	60	27		108
18	39	21	42	102	221	57	5	283	69	1	455
Refuge Totals:	132	158	199	489	923	374	43	1340	464	21	2314
20N	12	41	161	214	82	15		97	16	4	331
20S	5	9	12	26	32	8		40	8		74
Sub - Totals:	17	50	173	240	114	23		137	24	4	405
T O T A L S:	149	208	372	729	1037	397	43	1477	488	25	2719

TABLE 3. BULL COMPOSITION - 1951 - 1961

Year	Yearling		Medium		Large		Total Bulls
	No.	%	No.	%	No.	%	
1951	39	7	61	11	441	82	541
1952	50	15	60	18	225	67	335
1956	131	12	299	27	657	60	1,087
1957	140	18	196	25	439	56	775
1958	170	22	320	40	306	37	796
1959	269	21	428	34	566	45	1,263
1960	203	22	398	42	340	36	941
1961	149	21	208	29	372	51	729

TABLE 4. SURVIVAL OF MOOSE CALVES FROM SIX TO EIGHTEEN MONTHS FOR THE YEARS 1952 - 1961

Year	Bull Calves: 100 Cows	Yearling Bulls: 100 Cows	Indicated Percent Survival*
1952	11.5	7.5	65
1953	10.5	7.4	71
1954	13.0	11.6	89
1955	13.5	7.3	54
1956	9.6	6.0	63
1957	11.9	7.9	66
1958	17.5	9.4	54
1959	21.5	10.9	51
1960	19.6	9.5	48
1961	16.3	10.1	62

*Annual loss includes the yearly hunter take of yearling bulls--an unknown quantity--therefore, percentage figures do not portray a true picture of yearling female survival.

TABLE 5. RATIOS AND TOTAL COUNTS BY UNITS 1959 - 1961

Units	1959 Total	1960 Total	1961 Total	1959 Bull:Cow:Calf	1960 Bull:Cow:Calf	1961 Bull:Cow:Calf
1	45	112	90	50:100:65	23:100:52	46:100:41
2	58	95	58	23:100:20	13:100:45	20:100:46
3	122	40	34	11:100:77	0:100:67	4:100:38
4	128	143	24	19:100:43	13:100:34	20:100:40
5	145	669	264	58:100:25	52:100:33	63:100:13
6	*	2	-	*	0:100:100	-
7	63	124	57	50:100:25	34:100:59	24:100:36
8	11	51	64	0:100:57	29:100:36	16:100:53
9	32	16	21	53:100:85	11:100:67	0:100:62
10	442	424	308	50:100:36	47:100:61	46:100:34
11	18	19	39	13:100:100	0:100:111	4:100:42
12	1,040	972	590	31:100:40	32:100:61	22:100:47
15	299	248	190	42:100:56	30:100:28	62:100:26
16	-	-	12	-	-	267:100:0
17	475	11	108	108:100:47	0:100:57	35:100:45
18	676	538	455	44:100:39	65:100:54	36:100:24
19	*	18	-	*	100:100:25	-
Moose Range Average	3,387	3,442	2,314	43:100:43	39:100:49	36:100:35
20N/1	538	504	331	93:100:16	86:100:23	221:100:4
20S/1	241	42	74	50:100:28	25:100:50	65:100:20
Anchor River/1	16	36	-	0:100:60	42:100:46	-
Juneau Flats	387	*	-	57:100:40	*	-
T O T A L S:	4,736	4,064	2,719	51:100:39	44:100:46	49:100:33

*Not Covered.
/1 Comprises the Caribou Hills adjacent to the Refuge.

TABLE 6. MOOSE COMPOSITION COUNTS - KENAI - 1954-1961

	1954	1955	1956	1957	1958	1959	1960	1961
Yearling Males	114	134	131	140	170	269	203	149
Medium "	*	*	299	196	320	428	398	208
Large "	705	788	657	439	306	566	340	372
Total Males:	819	922	1,087	775	796	1,263	941	729
Lone Females	736	1,516	1,701	1,218	1,129	1,607	1,275	1,037
Females w/1 calf	224	286	422	478	578	770	738	397
Females w/2 calves	15	33	48	68	98	101	120	43
Females w/3 calves					1			
Total Females:	975	1,835	2,172	1,764	1,801	2,478	2,133	1,477
Total Calves:	254	352	518	616	774	972	984	488
Total Moose Checked:	2,048	3,109	3,776	3,155	3,371	4,736	4,064	2,719
Bull:Cow Ratio	84:100	50:100	50:100	43:100	44:100	51:100	44:100	49:100
Calf:Cow Ratio	27:100	19:100	24:100	35:100	42:100	39:100	46:100	33:100
%Cows	47.6	59	57.5	55.9	53.4	52.3	52.5	54.3
%Calves	12.4	11.3	13.7	19.5	22.9	20.5	24.2	17.9
%Bulls	40	29.6	28.8	24.5	23.6	26.7	23.2	26.8
%Females w/1 calf	24	15.5	19.4	27.1	31.8	31.1	34.6	26.9
%Females w/2 calves	1.5	1.8	2.1	3.0	5.4	4.1	4.1	2.9
Ratio Single:Twins	15:1	9:1	9:1	7:1	6:1	8:1	8:1	9:1

*Included with Large Males

2. Dall Sheep. No report.

3. Mountain Goat. No report.

D. Fur Animals, Predation, Rodents, and other Mammals.

On the morning of November 1, 1961, Hakala and Wade made an aerial survey for furbearing animals in Super Cub N-724. The following observations were made:

Location:	Observation:
Kenai to Beaver Lake	5 moose
Beaver Lake to Hungary Lake	2 moose
Hungary Lake to West Swanson River Lake	2 ducks, 10 moose, 2 otter trails, old beaver house.
West Swanson River Lake to Bedlam Lake	6 otter trails, 4 moose, 1 lynx trail, 3 beaver houses, 1 beaver dam, 1 coyote trail, 3 live coyotes.
Bedlam Lake to Many Planes Lake	2 beaver houses, 1 old beaver house, 1 beaver dam, 2 mink trails.
Many Planes Lake to Swan Lake	4 beaver houses, 4 otter trails.
Swan Lake to Bottinintin Lake	2 beaver houses, 1 mink trail, 10 moose.
Bottinintin Lake to Cabin Lake 269	1 beaver house, 1 beaver dam, 1 moose, 15 ducks.
Cabin Lake 269 to Slikok Lake	2 beaver houses, 3 coyote trails, 23 moose, 1 bear trail.
Slikok Lake to Kenai	1 beaver house, 1 rabbit trail, 1 coyote trail.
Side trip, Slikok Lake to Lower Funny River Airstrip	1 otter trail, coyote feeding on dead moose, 140 moose.

The following is a summation of the aerial survey. The survey covered an estimate of populations in the lowlands of the Moose Range and may serve as a trend figure. It has short-comings as an actual population estimate, especially on some species.

		Observations		
		Actual	Per Sq. Mile	Per Million Acres
Otter trails	2,6,4	12	.48	750
Lynx trails	1	1	.04	62
Beaver houses	3,2,4,2,1,2,1	15	.60	937
Coyote trails	1,3,1	5	.20	312
Mink trails	2,1	3	.12	187
Bear trails	1	1	.04	62
Rabbit trails	1	1	.04	62
Moose	5,2,10,4,10,1,23	37	1.48	2,312
Ducks	2,15	17	.68	1,062
Beaver Dam	1,1,1	3	.12	187

Jerry Hout, with the Wildlife Cooperative Unit of the University of Alaska, was on the Moose Range over the New Year Holidays. He is studying the beaver-salmon problem and will be doing more research work here this coming summer.

It appears that all furbearers are locally on the increase. This includes beaver, mink, muskrat and land otter.

Coyote signs have increased over last year. A few lynx signs have been noted, but not as many as in past years.

Snowshoe hare have increased greatly this year, especially in the spruce forests along the coast. The lack of cover in the 1947 Burn area continues to keep populations low in this vast area.

E. Hawks, Eagles, Owls, Crows, Ravens, and Magpies.

Marsh and rough-legged hawks were present in moderate numbers during the period, as were golden and bald eagles. Snowy owls confined most of their activities to the mountainous area, while the great horned owl were near the hare and voles in the lowlands. Ravens in goodly numbers continue their scavenger work throughout the Range. Magpies are as common as ever. No unusual predation by the above birds was noted.

F. Other Birds.

A mourning dove was seen on October 24 near the headquarters area by Regional Refuge Supervisor Spencer. According to news reports there were also a few mourning doves sighted in the Anchorage area. This dove is rare to this locality.

G. Fish.

Salmon continued their fall spawning runs until freeze up. Rainbow and Dolly Varden fishing was good until mid-October when many of the lakes froze. Ice fishing on the warmer days this winter provided good catches of rainbows in Upper Alcatroz Lake and small sized lake trout in Hidden Lake.

I. Disease.

Actinomycosis, "lumpy jaw" was noted on two jaws returned by hunters during the antlerless moose season. A report from the State should be forthcoming in the next few months on other findings collected in December.

III. REFUGE DEVELOPMENT AND MAINTENANCE

A. Physical Development.

Maintenance of furnaces, water and sewer lines occupied considerable time during the colder months.

Major repairs were completed on the lowboy-tractor and D-4 tractor this period. A snow plow blade was adapted to the Reo 6x6 for snow removal.

A physical property inventory was completed November 13.

B. Plantings.

1. Aquatic and Marsh Plants. Fifty (50) pounds of wild rice (Zizania aquatica var. angustifolia) was received from Rice Lake National Wildlife Refuge on September 27th. Twenty-nine (29) locations were seeded, water samples were taken and analyzed, water depths measured and associated plant species were recorded. Results, negative or positive, will be forthcoming the next few growing seasons.

2. Trees and Shrubs. In conjunction with Soil and Moisture work on the Moose Range, various experimental plantings, i.e., willow cuttings, birch seedings, etc; were made during the period. One interesting item noted at this early stage is that birch seed with plenty of moisture will not germinate in complete darkness.

C. Collections and Receipts.

1. Seed or other Propagules. Fifty (50) pounds of iced wild rice were received from Rice Lake National Wildlife Refuge on September 27th via air freight. The ice had completely melted upon arrival. The seed was planted during the next few days. During the short time prior to planting the seed was stored in cold, running water.

Ten (10) pounds of birch seed was collected during the period under a soil and moisture program. Thirty (30) pounds of seed collected the past two (2) years is being held for future plantings on the Range.

2. Specimens. A black bear found by a Kenai trapper was turned over to the State for study. The young bear was killed by unknown causes.

A sea otter found dead near Port Graham was turned in to the Alaska Department of Fish and Game, Homer, Alaska, who, in turn, forwarded it to Kenai. To prevent damage to the pelt, the animal was skinned, fleshed and stretched and the skeleton retained. It is now planned to return this pelt to the State for disposition.

D. Control of Vegetation.

See Sec. V Field Investigation progress report for "Dybar" chemical vegetation control and mechanical moose browse rehabilitation.

F. Fires.

No forest fires this period. See May - August narrative for annual summary.

On December 30 there was a fire on site SRU 22-23 in the oil field which destroyed a maintenance shed, two pieces of trucking equipment and two house trailers which belonged to Oil Field Services Incorporated (a contractor for Standard Oil Company). An exploding space heater was the cause of the fire. One employee was slightly burned. The contractor estimates the loss at $30,000.00.

IV. RESOURCE MANAGEMENT

C. Fur Harvest.

To date twelve (12) free use trapping permits have been issued for this seasons activities.

D. Timber Removal.

During the calendar year twenty seven (27) free use permits were issued for non-commercial uses. The total came to 289 cords of dead and down fuelwood and 97,000 board feet of green spruce for house logs and other personal uses.

Two (2) special use permits were issued during the year for commercial cutting of timber, for a total of 19,300 board feet. During the current period SUP #36,233 was issued to Glenn Bradley for 860 lineal feet of poles and $4.30 was received.

E. Commercial Fishing.

Three (3) free use commercial fishing permits have been issued for this winter's season, including both Skilak and Tustumena Lakes.

F. Other Uses.

Standard Oil Company of California, under the Swanson River Unit agreement, paid for and removed the following amounts of gravel at $0.05 per cubic yard:

Date	Cubic Yards	Amount
9/11/61	57,957	$2,897.85
10/10/61	44,930	2,246.50
11/17/61	14,875	743.75
12/15/61	7,420	371.00
Totals:	125,182	$6,259.10

A surplus property sale on December 1, netted the government $299.75.

V. FIELD INVESTIGATION AND APPLIED RESEARCH

A. Progress Report.

Permanent forage utilization plots were measured between October 5 to 10. In the past it required one man to measure the forage and another to record. With the use of a portable tape recorder this fall one man completed the task.

Forage production continued its downward trend on these plots. Total growth this year was 12,917 inches as compared to last years 16,531 inches. In comparison the growth on these plots in 1955 was 31,295 inches. Though there is a definite growth reduction on these plots through mortality, this is no indication that moose browse on the Moose Range is reduced. The truth being that browse production is probably as high or higher than it ever has been.

These plots do indicate the history of individual plants, their growth, mortality and use.

Not included in the above figures are two (2) new plots established this October in the dwarf birch (Betula nana) type. The growth measurements of the new plots (13 and 14) appear in TABLE 7 along with the data of former plots.

"Dybar" chemical vegetation control plots were set on April 12, 13 and 19, 1961 by Hakala and Wade. Du Pont "Dybar" fenuron weed and brush Killer in pellet form as used. This is a substitute urea herbicide technically known as 3-phenyl - 1, 1-dimethylurea. Results hoped for are a complete die back of all vegetation, with a resprouting of the hardwood species such as: willow, birch and aspen.

In all, thirty-one (31) plots, one tenth (1/10) acre in size, were set out in six (6) types of cover. They are as follows:

Plot No's	
1-6	Within 1947 Burn, spruce reproduction and grass, with light scattering of birch and willow brush.
7-12	In 1947 Burn, spruce, willow and birch near good hardwood seed source.
13-18	Black spruce and birch.
19-24	Mature spruce and birch.
25-30	In 1947 Burn - heavy spruce reproduction with willow and birch.
31	Alder brush.

TABLE 7. PERMANENT FORAGE PLOTS - ANNUAL GROWTH (MEASURED OCTOBER 5-10, 1961)

Plot No.	Species	Location	No. of Leaders	Total Length (in inches) Annual Growth
1	Willow	Kasilof	70	278
2	"	"	15	32
3	"	"	22	78
4	"	"	48	298
5	"	"	180	958
6	"	"	13	62
9	"	Kenai	17	46
8	"	Skilak	134	1,182
10	"	"	120	731
13	"	Sterling RD.	25	152
14	"	" "	4	12
4	Kenai Birch	Kasilof	197	1,470
5	" "	"	178	1,728
6	" "	"	127	1,040
9	" "	Kenai	14	78
9	Dwarf Birch	Kenai	35	140
13	" "	Sterling RD.	65	176
14	" "	" "	202	634
5	Aspen	Kasilof	15	98
7	"	Skilak	210	1,200
8	"	"	114	574
10	"	"	168	860
11	"	"	331	1,252
12	"	"	211	812
14	"	Sterling RD.	27	170
1	Cottonwood	Kasilof	0	0
2	"	"	0	0

TABLE 8 shows the dozage of "Dybar" applied and the results observed during an inspection by Wade on October 10 and 11. It is planned to check these plots in future growing seasons.

Early indications are that we may get satisfactory results at a rate of forty (40) pounds of "Dybar" per acre. This is also what the manufactures recommend.

Soil and Moisture. A soil and moisture project was initiated the 1st of September with the hiring of Steven Smith as Wildlife Aid, IASS-5, under project 6117. Work has consisted of examination of problem areas; collecting soil samples; library research; checking physical properties of the areas; establishing two experimental areas (one of two acres another three) for controlled tests on seedings, plantings and fertilizers; running germination tests--year-old birch seed had 72% viability--and disking two portions of former well site locations to determine what results scarifying the soil will have on natural reseeding.

A temporary laborer was hired to aid Smith in this work during parts of October. Birch seed (10#) was collected despite a poor seed production year. Experimental plantings consisted of the following: Willow - vegetative cuttings, root cuttings and whole plants; birch - seedlings and planting of seed in thirty (30) plots. Soil samples were collected and sent to the Soil Conservation Service at Palmer, Alaska, for analysis. A considerable amount of time was spent on the Jean Lake area erosion problem and various means used on experimental plots to counteract the almost daily flow of liquid mud which occurs each thawing day. The rock fill hauled and dumped along the shoulders of the highway for the second year in a row is beginning to produce results. Means have to be found to control the mud flow in cuts and on the flats.

Progress reports were completed, plans developed for an experimental seeding program to begin in the spring and an evaluation of work accomplished this fall prior to freeze-up. Discussions were held with Soil Conservation Service personnel at Palmer and Homer, Alaska, and recommendations obtained based on results of soil samples collected and analyzed. Mr. Steven Smith terminated November 22 but hopes to be back with us April 1 to continue the project.

Mechanical Moose Browse Rehabilitation. Inclement weather and mechanical troubles with the D-7 tractors and lowboy slowed this project during the period.

Plot #10 in the Slikok Burn consisting of 14.0 acres was completed in September using a straight dozer blade on the D-7.

Plot #11 in the Slikok Burn was started but not completed. Only two circles of this large plot (over 100 acres) with the Crossville clearing blade were made.

TABLE 8. "DYBAR" MOOSE BROWSE REHABILITATION EXPERIMENT

Plot No.	"Dybar" Applied Equivalent pounds per acre	Results - October 1961 Percentage of Spruce Affected	
		Browned	Killed
1	60	60	40
2	40	50	20
3	50	60	40
4	30	10	1
5	70	70	50
6	80	90	75
7	30	20	5
8	40	5	5
9	50	30	5
10	60	80	20
11	70	80	40
12	80	80	60
13	30	60	10
14	40	80	30
15	50	80	70
16	60	60	40
17	70	95	80
18	80	95	80
19	30	40	0
20	40	5	0
21	50	50	0
22	60	0	0
23	70	70	5
24	80	70	0
25	10	10	5
26	30	50	40
27	20	10	5
28	40	30	10
29	50	60	40
30	60	70	50
31	30	10	0

On the Jean Lake Pipeline Access Road Plot #1 in the 1947 Burn, 35 acres of a 40 acre plot were completed using the Crossville blade. About 50% of the spruce reproduction (under four feet high) is too flexible to be knocked back.

During 1961 approximately 375.5 acres have been experimentally rehabilitated by using various attachments on D-7 tractors.

VI. PUBLIC RELATIONS

A. Recreational Uses.

Recreational use continued to increase this period. Skin diving and training dog sled teams are uses made by the public in addition to hunting, fishing and camping. Skiing on the Soldotna Hill and cross country skiing were popular this winter. Ice skating on the more accessible lakes prior to the heavy snow was another type of use this period.

B. Refuge Visitors.

Date	Name & Title	Organization	Purpose
9/14	John Merrick - Fire Control	B.L.M.	Courtesy Call
10/2	Eugene & Mary Smith	Audabon Soc.	" "
10/5	R.M. Hawkin - Supt.	Alaska Pipeline	Business
10/5	Walter Spence - Engineer	Delta Engineer Co.	"
10/5	Joe Dremer - Field Supt.	Standard Oil Co.	"
10/9	Don Buelow - Div. Mgr.	Phillips Petroleum Co.	"
10/9	Pete Gathings - Resident Supv.	United Geophysical	"
10/10	L.H. Saarela - Reg. Mining Supt.	U.S.G.S.	"
10/10	Art Buswell-Dean Statewide Svr.	U. of Alaska (extension)	Courtesy Call
10/17	John Klingbeil Jr.-Prot. Officer	ADF&G	Law Enforcement
11/14-17	Bob Burkholder-Supt. Pred. Control	BSFW	Moose Survey
11/14-17	Jack Dedrickson - Biologist	ADF&G	" "
11/27	Don Buelow - Div. Mgr.	Phillips Petroleum Co.	Business
11/27	Pete Gathings - Resident Supv.	United Geophysical	"
12/4	Ches. York - Eng.	Alaska Highway Division	"
12/7	Al Erickson - Biologist	ADF&G	Antlerless Season
12/7	R.W. Behoe	USFS	Courtesy Call
12/7	E.E. Brownell	B.L.M.	" "
12/12	Joe Dremer - Field Supt.	Standard Oil Co.	Business
12/13	Chas. Wilson - Protection Officer	ADF&G	Law Enforcement
12/14	Sal DeLeonardis	State Div. of Lands	Business
12/14	J.A. Lietzke-Ass't Vice Pres.	City National Bank	"
12/18	Mr. Chatterton - Dist. Supt.	Standard Oil Co.	"
12/18	Joe Dremer - Field Supt.	" " "	"
12/19	Jim Reardon - Dist. Fish Biologist	ADF&G	Courtesy Call
12/21	Ed Martin	ADF&G	" "
12/27-31	Fred Schultz-Wild. Coop. Unit	U. of Alaska	Beaver Study
12/27-1/5	Jerry Hout - " " "	" " "	" "

C. Refuge Participation.

Refuge Managers Hakala and Wade in company with GMA Thayer and Maintenance Mechanic Williams attended the September 11 meeting of the Cheechako Rod and Gun Club at Wildwood Station. Two waterfowl movies and a waterfowl exhibit were presented. Talks were made by Thayer and Hakala on waterfowl regulations, and the Kenai National Moose Range--its history, status and regulations.

On September 27, while engaged in the wild rice seeding project, Refuge Managers Hakala and Wade, flying in Service-owned Super Cub N-722, were requested by the local FAA to search for an aircraft reported "in-the-trees" on the edge of a small lake on the Moose Range. This had been reported by a commercial airline pilot. A search was made; the aircraft located and, upon landing, personnel were found uninjured. The plane made a forced landing due to carburetor icing while on a moose hunt. Arrangements were made with the military to have the personnel evacuated.

Refuge Manager Hakala, at an open city counsel meeting in December at Kenai, spoke on Moose Range operations: specifically in regards to use of land by moose, fish and oil.

Several news articles on moose were released to local newspapers this fall.

D. Hunting.

1. Dall Sheep. Season - August 10 - 31. The hunting season was ten (10) days longer than last year. The known sheep kill was 31 as compared to 22 a year ago. The August aerial survey revealed 817 sheep which included 176 adult rams. The hunter harvest was about 15% this season and 11% last year.

2. Mountain Goat. Season - August 10 through November 30. This hunting season also started ten (10) days earlier than last year. The known goat kill was 20 as compared to 11 last year. The aerial count in August revealed 137 goats using the Range.

3. Moose. There was an early and late bull season, August 20 through September 30 and November 1 through November 30. The bull seasons lasted 72 days this year as compared to 41 days last year. There was also an antlerless season of five days from December 6 through 10 on the peninsula which included the Moose Range.

Air traffic increased with the hunting pressure and resulted in four (4) private aircraft accidents on the Moose Range during the hunting season. No lives were lost.

The State's antlerless permit hunt was held on the Kenai peninsula December 6 to 10. Refuge personnel participated throughout the hunt on patrol duty and aiding in collecting biological specimens from the harvested animals. Results are as follows:

Area	Description	Permits Issued	Permits Validated	Successful Hunters	Unsuccessful Hunters*
A	Homer to Kasilof River	150	131	120	7
B	Kasilof R. to Round Mt.	150	130	120	2
C	Cooper Landing to Hope	50	42	30	7

* Includes only hunters who attempted to bag a moose. Some persons validated but did not hunt.

At the State's Game Checking Station near Cooper Landing, 1,037 hunters checked through 208 moose during the early season. This indicates a 20% success by visiting hunters, mostly from Anchorage and Seward. In a hunters survey last winter, conducted by the State, it was estimated that 86% of the local hunters were successful in bagging a moose.

Hunters flown in by guides are almost 100% successful and many of the guides guarantee a moose or the hunt does not cost a cent.

Five (5) guides had commercial hunting camp permits this past period. Incomplete reports from these guides flying hunters in for moose indicated a harvest of 62 moose, 10 black bear, 3 goat and 2 sheep.

Of the 60 measured moose antler spreads reported to this office, the average for the season was 35.2 inches. This breaks down as follows: 20 antlers under 30 inches (33%), 28 from 30 to 48 inches (47%), and 12 antler spreads greater than 48 inches (20%). The largest moose antler spread reported taken on the Range this fall was 60½ inches.

TABLE 9. KENAI PENINSULA MOOSE KILL - 1961

	Known Kill	Estimated
Moose Range	397	800
Adjacent Lands	169	400
Total:	566	1,200

TABLE 10. PERCENTAGE OF KNOWN MOOSE KILL HARVESTED ON THE MOOSE RANGE 1954-1961

Year	Moose Range	Kenai Peninsula Total	Percentage of Kill on Moose Range
1954	188	427	44
1955	158	323	49
1956	251	361	70
1957	197	308	64
1958	281	387	73
1959	221	348	64
1960	286	334	86
1961	397	566	70
Totals:	1,979	3,054	520
Average:	247	381	65

4. Birds. The following is a summary of fifty-six (56) bag checks made on the Moose Range by Game Management Agent Thayer during September.

Species	Number Taken
Pintail	75
Mallard	110
Shoveler	11
Wideon	9
Gadwell	8
Green-winged teal	6
Blue-winged teal	1
Total ducks checked:	210
White-fronted geese	5
Brant	1
Snipe	4
Sandhill crane	1

These bag checks were made at Chickaloon Flats and Kenai River, the two most popular waterfowl hunting areas on the Moose Range. The kill averaged out to 3.75 ducks per hunter. Only one sandhill crane was reported taken on the Moose Range.

E. Violations.

Rex Williams, refuge mechanic, assisted Game Agent Thayer on the following cases. One whistling swan was mistakenly shot for a goose and the hunter was fined $25.00 by the deputy magistrate in Seward. Two ducks over the limit of five were taken by a hunter who was fined $200.00 ($150.00 suspended) by the deputy magistrate in Kenai.

A few other violators were apprehended by State Protection Officers and/or Game Agent Thayer.

F. Safety.

The Kenai Moose Range has enjoyed four hundred and seventeen (417) accident free calendar days as of the end of this period.

A safety program was held at the Kenai Office October 13. Fire prevention was stressed; recommendations and suggestions were solicited from employees--many of which will be acted upon.

During the report period six (6) water pressure type fire extinguishers were placed in the buildings at headquarters. This is in addition to the carbon dioxide extinguisher previously present.

VII. OTHER ITEMS

A. Items of Interest.

Assistant Refuge Manager Wade wrote most of this report. Mrs. Sue A. Tachick (temporary-typist) typed the report.

Lesley A. Holt (dozer operator-maintenanceman) was changed from temporary to permanent status in December.

Standard Oil of California completed the following five (5) producing oil wells on the Moose Range this period: SCU 41-5, SCU 34-5, SRU 43-15, SCU 34-9 and SRU 21-4. One gas well, SRU 212-27 was also completed. The "wildcat" well in the Swan Lake Unit was completed and abandoned as a dry hole. SRU 41-8 also proved to be a dry hole and was abandoned. To date there is a total forty-five (45) producing oil wells and three (3) gas wells on the Moose Range. The number of active rigs, usually six (6), was reduced to three (3) by the end of the period. Standard's drilling in the Swanson River Oil Field is drawing to a close. After current holes are completed, an additional four (4) gas wells will be drilled on the field periphery to serve as a source of gas to be reinjected into the oil field to insure maximum recovery of crude. Oil production from the field is about 27,000 barrels per day.

Standard's personnel started moving into their five (5) dwellings on the Moose Range oil fields in mid-December.

Intensified geophysical operations in the open portions of the Moose Range during the winter season appears a reality. Four companies have presented programs and been issued special use permits to cover their respective operations. A gravity meter survey is being conducted by Precision Exploration from Nikishka Beach east to the mountains; British American has a United Geophysical party constructing trail prior to shooting in the Mystery Creek area; Phillips Petroleum has a United

crew ready to move into the Slikok area southeast of Soldotna; and Standard Oil Company has a program prepared for a Western Geophysical crew in the Soldotna Creek Unit, once the crew is released by Richfield Oil Company in the Susitna area.

Alaska Natural Gas Pipeline Company completed, under contract, two (2) bridges along their right of-way. The bridges are located at the East Fork of Moose River and No Name Creek.

Off the Moose Range, but near by, Standard Oil Company has abandoned its lower Kenai Peninsula "wildcat", the Anchor River #1 as a dry hole. Three (3) rigs are currently drilling across the inlet from the Moose Range in the Tyonek area, but no reports have been heard.

During its first year of operation, (November 12, 1960 to November 6, 1961), 5,232,574 barrels of crude oil moved through the Nikiski Marine Terminal to deepwater tankers that carry it to the west coast. All the oil was produced in the Swanson River Field.

The following information was received from the U.S. Geological Survey. Production in fiscal 1961 in the Kenai Moose Range oil fields amounted to about 2,619,824 barrels of petroleum, 7,585,000 cubic feet of natural gas with a total estimated value of $6,560,020.00, and returned royalties valued at about $647,554.00.

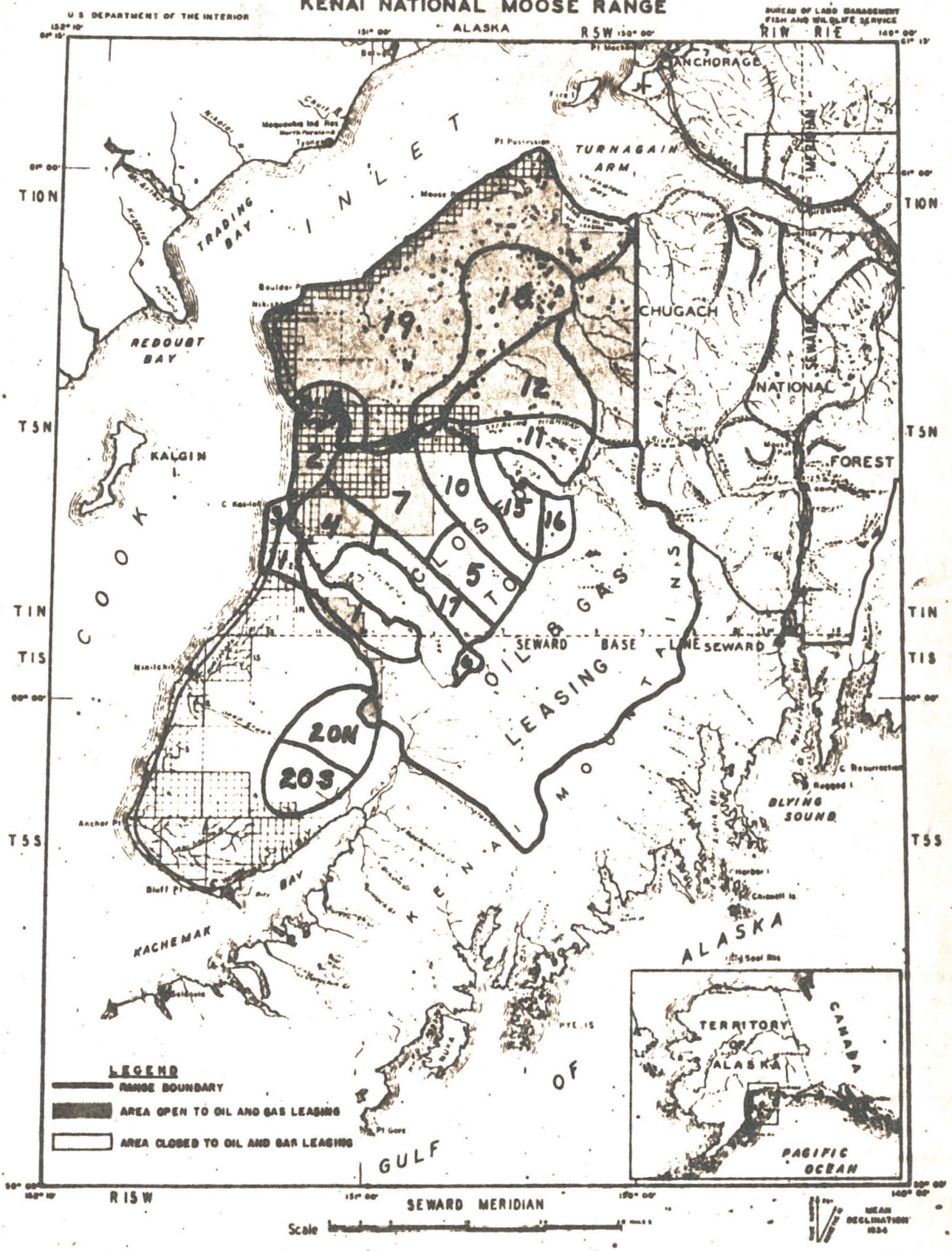
Twenty (20) moose, mostly road kills, were collected by Game Management Agent Thayer and refuge personnel during the period. The meat recovered was distributed to the needy through the local welfare agency and ministers.

Submitted by: John B. Hakala
John B. Hakala, Refuge Manager

January 15, 1962

Approved: A. L. Spence

MOOSE
FALL INVENTORY UNITS
KENAI NATIONAL MOOSE RANGE



Washington, D.C., January 20, 1960

3-1750
Form N[illegible]
(Rev. [illegible]rch 1953)

WATERFOWL

REFUGE Kenai National Moose Range MONTHS OF September TO December, 1961

(1) Species	(2) Weeks of reporting period: Sept. 10 1	Sept. 17 2	Sept. 24 3	Oct. 1 4	Oct. 8 5	Oct. 15 6	Oct. 22 7	Oct. 29 8	Nov. 5 9	Nov. 12 10
Swans:										
Whistling	50	100	150	300	100					
Trumpeter	175	200	175	150	100	61				
Geese:										
Canada Lesser	400	500	400	100	50	50				
Cackling										
Brant Black	20	20	25	10						
White-fronted	450	400	200	100	50					
Snow										
Blue										
Other										
Ducks:										
Mallard	2,000	2,000	1,500	500	100	100	50	50	25	25
Black										
Gadwall										
Baldpate	200	300	200	100	20					
Pintail	2,000	2,500	2,000	1,000	50					
Green-winged teal	1,000	1,200	600	50						
Blue-winged teal										
Cinnamon teal										
Shoveler										
Wood										
Redhead										
Ring-necked										
Canvasback										
Scaup	3,000	3,000	4,000	5,000	4,000	2,000	100	100	100	100
Goldeneye	1,200	1,200	1,400	1,750	1,500	1,500	1,000	1,000	500	400
Bufflehead										
Ruddy										
Other Harlequin	300	400	300	200	100	100	100	100	100	100
White-winged scoter	1,000	1,000	1,200	1,500	1,000	100	100	100	100	100
Coot:										

Int. Dup. Sec.,

3 -1750a
Cont. NR
(Rev. March 1953)

WATERFOWL
(Continuation Sheet)

REFUGE Kenai National Moose Range MONTHS OF September TO December, 1961

(1) Species	(2) Weeks of reporting period: Nov. 19 (11)	Nov. 26 (12)	Dec. 3 (13)	Dec. 10 (14)	Dec. 17 (15)	Dec. 24 (16)	Dec. 31 (17)	(18)	(3) Estimated waterfowl days use	(4) Production: Broods seen	Estimated total
Swans:											
Whistling									4,900		
Trumpeter									6,000		
Geese:											
Canada Lesser									10,500		
Cackling											
Brant Black									500		
White-fronted									8,400		
Snow											
Blue											
Other											
Ducks:											
Mallard	25	25	25	10	10	10	10		45,250		
Black											
Gadwall											
Baldpate									5,700		
Pintail									52,850		
Green-winged teal									19,950		
Blue-winged teal											
Cinnamon teal											
Shoveler											
Wood											
Redhead											
Ring-necked											
Canvasback											
Scaup	50	50	25	25	25	25	25		151,370		
Goldeneye	400	200	75	75	75	75	75		86,970		
Bufflehead											
Ruddy											
Other Harlequin	100	100	100	100	100	100	100		17,500		
White-winged scoter	100	100	100	100	100	100	100		48,300		
Coot:											

(over)

	(5) Total Days Use	(6) Peak Number	(7) Total Production
Swans	10,900	450	-
Geese	19,400	920	-
Ducks	427,890	11,600	-
Coots	-	-	-

SUMMARY

Principal feeding areas: Chickaloon Flats and Kenai River

Principal nesting areas: Small Lakes

Reported by: Robert V. Wade

INSTRUCTIONS (See Secs. 7531 through 7534, Wildlife Refuges Field Manual)

(1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance.

(2) Weeks of Reporting Period: Estimated average refuge populations.

(3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.

(4) Production: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.

(5) Total Days Use: A summary of data recorded under (3).

(6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.

(7) Total Production: A summary of data recorded under (4).

Interior Duplicating Section, Washington, D. C. 37944
1953

3-1751
Form NR-
(Nov. 1945)

MIGRATORY BIRDS
(other than waterfowl)

Refuge Kenai National Moose Range Months of September to December 31, ~~19~~ 61

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. Water and Marsh Birds:										
Commom loon	Were	present	1,000	10/5	4	10/12				1,200
Red-throated loon	"	"	20	10/5	2	10/6				40
Double-crested cormorant	"	"	300	9/3	3	9/6				400
Pelagic cormorant	"	"	10	9/3	1	9/6				20
Sandhill crane	"	"	1,500	9/3	5	10/6				4,000
II. Shorebirds, Gulls and Terns:										
Glaucous gull	Were	present	1,200	10/6	15	10/12				2,000
Glaucous-winged gull	"	"	1,000	10/6	10	10/12				2,000
Herring gull	"	"	2,000	10/6	200	10/12				4,000
Mew gull	"	"	400	10/6	2	10/12				1,000
Boneparte's gull	"	"	400	10/6	1	10/12				1,000
Semipalmated plover	"	"	800	9/3	400	9/6				1,500
Common snipe	"	"	2,500	9/15	6	10/7				4,000

(over)

(1)	(2)		(3)		(4)		(5)	(6)
III. Doves and Pigeons:								
Mourning dove	1	10/24	1	10/24	1	10/24		1
White-winged dove	None							
IV. Predaceous Birds:								
Golden eagle	Were	present	25	10/6	1	10/30		40
Duck hawk	None							
Horned owl	Resident		450	10/20	-	-		600
Magpie	"		800	10/20	-	-		1,200
Raven	"		1,500	10/6	-	-		2,000
Crow	None							
Bald eagle	Were	present	200	10/10	Still	present		250
Marsh hawk	"	"	300	9/3		10/10		500
Snowy owl	"	"	50	12/10	Still	present		70
Rough-legged hawk	"	"	200	9/3	1	10/10		300

Reported by Robert V. Wade

INSTRUCTIONS

(1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiiformes)
II. Shorebirds, Gulls and Terns (Charadriiformes)
III. Doves and Pigeons (Columbiformes)
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)

(2) First Seen: The first refuge record for the species for the season concerned.

(3) Peak Numbers: The greatest number of the species present in a limited interval of time.

(4) Last Seen: The last refuge record for the species during the season concerned.

(5) Production: Estimated number of young produced based on observations and actual counts.

(6) Total: Estimated total number of the species using the refuge during the period concerned.

3-1752
Form ER-2
(Apr[illegible] 1946)

UPLAND GAME BIRDS

1613

Refuge Kenai National Moose Range Months of September to December, 19[illegible]61

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'v'd.	Estimated Total	Percentage	Hunting	For Re-stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Spruce Grouse	Spruce Forest Types 900,000 acres	112			1:1	1,000			8,000	
Ptarmigan	Alpine meadows older sites, dwarf birch & willow to lowlands in winter 1,800,000	180				500			10,000	

Form NR-2 - UPLAND GAME BIRDS.*

(1) SPECIES: Use correct common name.

(2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.

(4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.

(5) REMOVALS: Indicate total number in each category removed during the report period.

(6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.

(7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

* Only columns applicable to the period covered should be used.

3-1753
Form R-3
(June 1945)

BIG GAME

Refuge Kenai National Moose Range Calendar Year 1961

(1) Species	(2) Density	(3) Young Produced	(4) Removals				(5) Losses			(6) Introductions		(7) Estimated Total Refuge Population		(8) Sex Ratio
Common Name	Cover types, total Acreage of Habitat	Number	Hunting	For Re-stocking	Sold	For Research	Predation	Disease	Winter Loss	Number	Source	At period of Greatest use	As of Dec. 31	
Moose	Mixed Spruce, Birch, Aspen and Willow forest interspread with lakes, marsh and bogs- lowlands to above timberline. 1,400,000 acres	1,600	300						180			6,600	5,500	
Black Bear	Same as above	-	15									650	450	
Brown Bear	" " "	-	0									75	60	
Dall Sheep	Alpine meadows down to edge of timberline 2-4,000 elevation 200,000 acres	147	31									900	800	
Mountain Goat	Same as above plus glacier edge.	36	20									150	130	

Remarks:

Reported by Robert V. Wade

INSTRUCTIONS

Form NR-3 - BIG GAME

(1) SPECIES: Use correct common name; i.e., Mule deer, black-tailed deer, white-tailed deer. It is unnecessary to indicate sub-species such as northern or Louisiana white-tailed deer.

(2) DENSITY: Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge: once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated total number of young produced on refuge.

(4) REMOVALS: Indicate total number in each category removed during the year.

(5) LOSSES: On the basis of known records or reliable estimates indicate total losses in each category during the year.

(6) INTRODUCTIONS: Indicate the number and refuge or agency from which stock was secured.

(7) TOTAL REFUGE POPULATION: Give the estimated population of <u>each species</u> on the refuge at period of its greatest abundance and also as of Dec. 31.

(8) SEX RATIO: Indicate the percentage of males and females of each species as determined from field observations or through removals.

DISEASE

Refuge Kenai National Moose Range Year 19X 61

Botulism

Period of outbreak _____

Period of heaviest losses _____

Losses:

	Actual Count	Estimated
(a) Waterfowl		
(b) Shorebirds		
(c) Other		

Number Hospitalized	No. Recovered	% Recovered
(a) Waterfowl		
(b) Shorebirds		
(c) Other		

Areas affected (location and approximate acreage) _____

Water conditions (average depth of water in sickness areas, reflooding of exposed flats, etc.

Condition of vegetation and invertebrate life _____

Remarks None known

Lead Poisoning or other Disease

Kind of disease Actinomycosis - "Lumpy Jaw"

Species affected Moose

Number Affected Species	Actual Count	Estimated
1	2	100

Number Recovered _____

Number lost none known

Source of infection animal to animal from pus

Water conditions good

Food conditions good

Remarks This disease was noted on two jaws returned by hunter during the antlerless moose season. A more complete report will be submitted at a later date when biological samples have been further studied by the State.

3-1756
Form [illegible]
(Rev. August 1957)

PUBLIC USE

Refuge Kenai National Moose Range Calendar Year 1961

Total Use Visitor-Days	Hunting Use	Fishing Use	Miscellaneous Use
125,000	18,000	25,500	81,500

Where practical, by means of occasional spot checks, or other methods, show by percent and visitor-days the breakdown of the above figures and other related information:

Hunting (on refuge lands):	Percent	Visitor-Days	Acres
Waterfowl	5	900	75,000
Upland Game	15	2,700	1,200,000
Big Game	80	14,400	1,800,000

Supervised by refuge 90% by State 10% No. of blinds 0

Miscellaneous:	Percent	Visitor-Days
Recreation *	10.4	8,500
Official	.6	465
Economic Use	89	72,535
Other		

Hunting (off refuge lands): Estimated man-days of hunting on lands adjacent to the refuge 6,000 (These figures should not be included in hunting-use totals above).

Fishing:

Acres of ponds or lakes 150,000 and miles of streams 105 open to fishing.

Comments:

Approximately 72,000 days of miscellaneous use were concerned with oil activities.

*(including picnicking, swimming, boating, camping, viewing wildlife, and photographing)

INT.-DUP. SEC., WASH., D.C. 22919

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF SPORT FISHERIES AND WILDLIFE
Juneau, Alaska

Refuge Kenai National Moose Range Calendar Year 1961

Facilities

Picnic areas: areas 6 tables 15 fireplaces 15 toilets 6
drinking water none shelters none

Swimming: designated areas none bathhouses none

Boating: launching sites 6 rental facilities none
service facilities none
are motors allowed yes maximum horsepower unlimited

Camping: permitted yes or not permitted
tent camps yes total capacity unlimited
group camps yes total capacity "
hunter camps yes total capacity "
trailer camps yes
lodges none capacity -
cabins none motels none total units -

Tours: season none frequency
self-guided nature trails none is trail leaflet available? no
self-guided auto tour route none is tour leaflet available? no

Access points: estimate number in public use 125,000 days
two on State Highway

General - Brief statement of two to five lines on recreational opportunities available on refuge (suitable for inclusion in refuge leaflets or briefing reports). Statement on back of page.

INSTRUCTIONS

Supply numbers wherever appropriate. These may be estimated if necessary.

Where operation and maintenance is supervised by this Bureau, but the responsibility of a concessioner, group, or agency, indicate by a single *. Where supervision of such activities is by another Federal Bureau indicate by two **.

Minimum camping facilities are provided at seven sites. Use of these improved sites is permitted for a period of two weeks. In unimproved areas within the Kenai National Moose Range temporary tent camps are allowed for private use for a period of 60 days.