ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

STATE OF ALASKA
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Loren W. Croxton, Director
Don H. Strode, Federal Aid Coordinator

ELK & GOAT, BISON & MUSK OX

by

Jack Alexander
William Griffin
Howard Wood

Volume IX
Annual Project Segment Report
Federal Aid in Wildlife Restoration
Project W-15-R-2 and 3, Work Plan Q

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WORK PLAN SEGMENT REPORT

FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT NO.: W-15-R-2 & 3 TITLE: Big Game Investigations

WORK PLAN: Q TITLE: Bison, Elk, Goat & Muskox Studies

JOBS: 1 (W-15-R-2)
5 (W-15-R-3) TITLE: Elk Studies

PERIOD COVERED: January 1, 1967 to June 30, 1967 (W-15-R-2)
July 1, 1967 to December 31, 1967 (W-15-R-3)

ABSTRACT

Two hundred and forty-two hunters harvested 102 elk on Raspberry and Afognak Island during the 1967 season. The number of hunters increased 33 per cent over 1966, while the number of animals harvested and hunter success decreased 6 and 9 per cent respectively. Sixty-one per cent of the hunting effort occurred during October and November. Likewise 56 per cent of the total kill occurred during this period. Forty-nine per cent of the animals harvested were males as opposed to 39 per cent in 1966. Of 27 jawbones collected, 72 per cent were three years of age or older. Calf crops were lowest on Raspberry (17 per cent) and highest on Malina (30 per cent). Range studies in Muskomee, Malka, and Afognak wintering areas indicated browsing intensity to be light to moderate. Plant trend was 68 per cent progressive and 63 per cent of the plants were fair to good in vigor.

RECOMMENDATIONS

Because of high levels of harvest over the past four years and low annual increment Raspberry Island should be closed to further hunting.

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OBJECTIVES

To determine population levels and trends of elk.

To assess total annual elk mortality, including hunter harvest.

To determine elk range condition and utilization with emphasis on winter-spring use of browse.

TECHNIQUES

1. Elk harvest data including hunting effort, distribution and success were obtained from in-the-field checks and by hunter interviews.

2. Elk jaws were obtained for age classification.

3. Systematic aerial surveys utilizing Piper PA-18 aircraft were conducted on elk summer ranges to obtain herd size, distribution and sex and age composition.

4. Aerial flights were made of Afognak and Raspberry Islands coastlines in February to determine areas of winter utilization by elk. These areas will be checked in April to determine winter mortality.

5. Elk range studies were conducted in the Afognak Lake area utilizing the closest-plant techniques.

FINDINGS

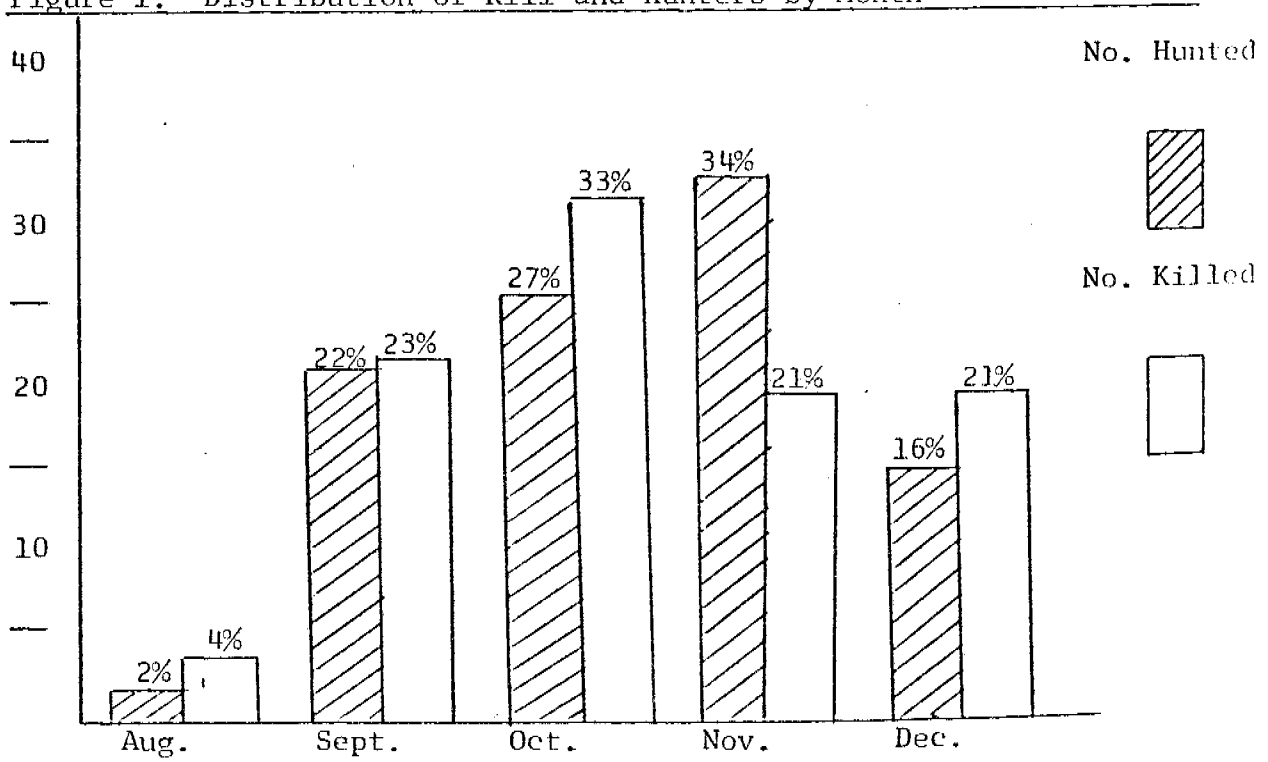
Elk Hunter Harvest

As in past years 1967 offered a 153 day either sex hunting season from August 1 through December 31. Allowing a bag limit of one elk on Raspberry Island and the southern portion of Afognak and two elk in the interior and northern portion of the island. During the season 242 hunters were interviewed, an increase of 33 per cent over the previous year. Hunters harvested one hundred and two elk during the season, a 9 per cent decrease from 1966. Hunter success fell to 42 per cent, a decline from the 51 per cent of 1966. Fifty nine per cent of the total hunters visited Afognak and Malina Lakes and 59 per cent of the harvested animals came from this area. Tonki was second most popular with 23 per cent of the hunters and 21 per cent of the kill. Hunters were interviewed as to the mode of transportation used in the hunting of elk. Air charter (41 per cent) and private boat (50 per cent) were used by 91 per cent of the elk hunters. Eight per cent used private aircraft.

Chronological Distribution of the Elk Harvest

Hunting pressure was evenly distributed, with 22 per cent, 27 per cent, and 34 per cent of the hunting occurring during the months of September, October and November respectively. Sixty-one per cent of the hunting occurred during October and November. Likewise 56 per cent of the elk were harvested during these two months. Weather during the entire season was mild with no snow falling except during the first week of December. Figure 1 shows distribution of kill and hunters by month.

Figure 1. Distribution of Kill and Hunters by Month



Distribution of the Elk Harvest

Raspberry Island which for the past three years produced nearly 50 per cent of the harvested animals yielded only 12 per cent in 1967. Malina and Afognak herds produced 59 per cent of the total harvested elk as compared to 33 per cent the previous year. The Interior and Tonki Cape areas produced 9 per cent and 21 per cent respectively of the 1967 kill. The reduction of elk numbers on Raspberry Island undoubtedly accounts for the shift in hunting pressure to southwestern Afognak.

Composition of the Elk Harvest

Forty-nine per cent of the elk taken in 1967 were males, 51 per cent females. In 1966 only 39 per cent were males. Ninety per cent of the harvested males were yearlings. Malina and Raspberry were the only areas where the female segment of the kill exceeded that of the male. Figure 2 shows the number and per cent of kills from each area. Also, included are number of hunters and per cent successful hunters. Hunter success illustrates obvious deficiencies in our method of collecting harvest information.

Figure 2. Number and per cent of Elk Harvest by Area, also number of Hunters and Hunter Success by Area.

Area	Kill	%	Number Hunters	% Success	% Females Harvested
Malina	29	28	66	44	69
Raspberry Island	12	12	13	92	58
Afognak	31	31	79	39	42
Interior	9	9	27	33	33
Tonki	21	21	57	37	43
TOTAL	102		242	*42	*51

* Overall hunter success and per cent females harvest.

Age Composition

Twenty-seven jaws were collected, 27 per cent of the total harvest. Eighteen (67 per cent) of these were three years of age or older, indicating a high percentage of mature animals in the Afognak Island elk herds. Age breakdown of the twenty seven jaws collected is as follows:

Yearlings - - - - 24% Two year olds - - - - 4%

Three year olds - 24% Over three year olds - 48%

There exists a conspicuous absence of the two year old class.

Herd Composition and Productivity Counts

Lowest calf-crop percentages are to be found in the Raspberry Island herd (17 per cent), and the highest in the Malina and Afognak Lake herds (33 per cent). Productivity among the Afognak Island elk herd is below what would normally be expected. Batchelor (1961) reported an average calf:cow ratio in the entire island to be 26:100 while Eide (1965) reported 34:100. 1967 averages fell back to the 1961 level of 26 calves per 100 cows. Bull-cow ratios are low in all areas. This probably is due to the tendency of the bulls to remain segregated from the cow-calf segment of the population during this period and thus are missed in the annual census. Figure 3 shows results of 1967 elk composition counts.

Figure 3. Results of 1967 Elk Composition Counts

Total	Area	Branched	%	Calves	%	Females	%	Calves/ 100 Cows	Male: Female
41	Raspberry	0		6	14	35	86	17	
101	Raspberry Strait and Afognak	10	10	20	20	61	68	33	16:100
164	Malina	14	8	35	21	115	70	33	14:100
175	Interior	17	10	31	18	127	72	24	13:100
241	Tonki	14	6	43	18	184	76	23	7:100
722		55	7.6	135	19	522	72	26	

Range Studies

Elk winter range studies were conducted in spring of 1967 on Muskomee, Malka Valleys and Afognak Lake areas. Each of these areas are willow communities considered primarily in importance for wintering elk. Transect summary for all areas indicated plant trend to be 68 per cent progressive. Sixty-seven per cent of the plants fell in the fair to excellent vigor class, with no severe or heavy browsing occurring. Good plant vigor and light browsing is attributed to the mild weather conditions which prevailed during winter of 1967. Elk were unrestricted in movements and remained dispersed over secondary winter ranges at higher altitudes. Lack of personnel prevented the evaluation of winter utilization of elderberry.

Literature Cited

Batchelor, Ronald F., 1961 Annual Segment Report, Federal Aid in Wildlife Restoration, Project W-6-R-3, Work Plan D.

Eide, Sterling, 1966 Annual Segment Report, Federal Aid in Wildlife Restoration, Project W-15-R-2, Work Plan Q.

PREPARED BY:

Jack Alexander
Job Leader

SUBMITTED BY:

Robert A. Rausch
Project Leader

WORK PLAN SEGMENT REPORT

FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT NO.: W-15-R-2 & 3

WORK PLAN: Q

JOBS: 2 (W-15-R-2 & 3)

TITLE: Alaska Wildlife Investigations
Big Game Investigations

TITLE: Bison, Elk, Goat, and Muskox Studies

TITLE: Bison Studies

PERIOD COVERED: January 1, 1967 to June 30, 1967 (W-15-R-2)
July 1, 1967 to December 31, 1967 (W-15-R-3)

ABSTRACT

The total number of bison counted in the Big Delta herd was 162. Calf production was 31 or 19 percent.

Sixty-two bison were counted in the Healy Lake herd. Calf production counts were inadequate for determining calves produced.

Counts of the Copper River herd revealed 51 bison. Calf production was 14 or 27 percent.

The Farewell herd had a total of 17 bison, one of which was a newly born calf. This is the first observed calf born to this transplanted herd.

The Upper Chitina herd was counted by a reliable bush pilot and 12 bison were sighted, two of which were calves.

Five bison in the Big Delta herd were known to have died during the year.

RECOMMENDATIONS

An annual permit hunt should be continued in both the Big Delta and Copper River herds, if current investigations indicate that no harmful effects will result.

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FEDERAL AID IN WILDLIFE RESTORATION

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OBJECTIVES

To determine population structure and production, and to implement management of the bison herds in Alaska.

TECHNIQUES

Aerial surveys with a PA-18 aircraft were made of four herds. Mr. Jack Wilson a commercial pilot from Gulkana made an observation on the fifth herd located on the upper Chitina. (Figure 1)

The herds were surveyed as follows:

1. Big Delta herd, March 24, April 3, June 8, Oct. 4.
2. Healy Lake herd, April 3, June 9.
3. Copper River herd, June 24, August 9.
4. Farewell herd, June 26.
5. Upper Chitina herd, early August.

Because environmental conditions affect the distribution of bison as well as the ability of the aerial observer to classify them it is often necessary to make replicate surveys in order to obtain results that provide useful indices to populations well-being that are comparable from year to year.

FINDINGS

Delta Herd

The Big Delta herd was surveyed four times (Table 1). A

Figure 1.

General location of bison herds in Alaska

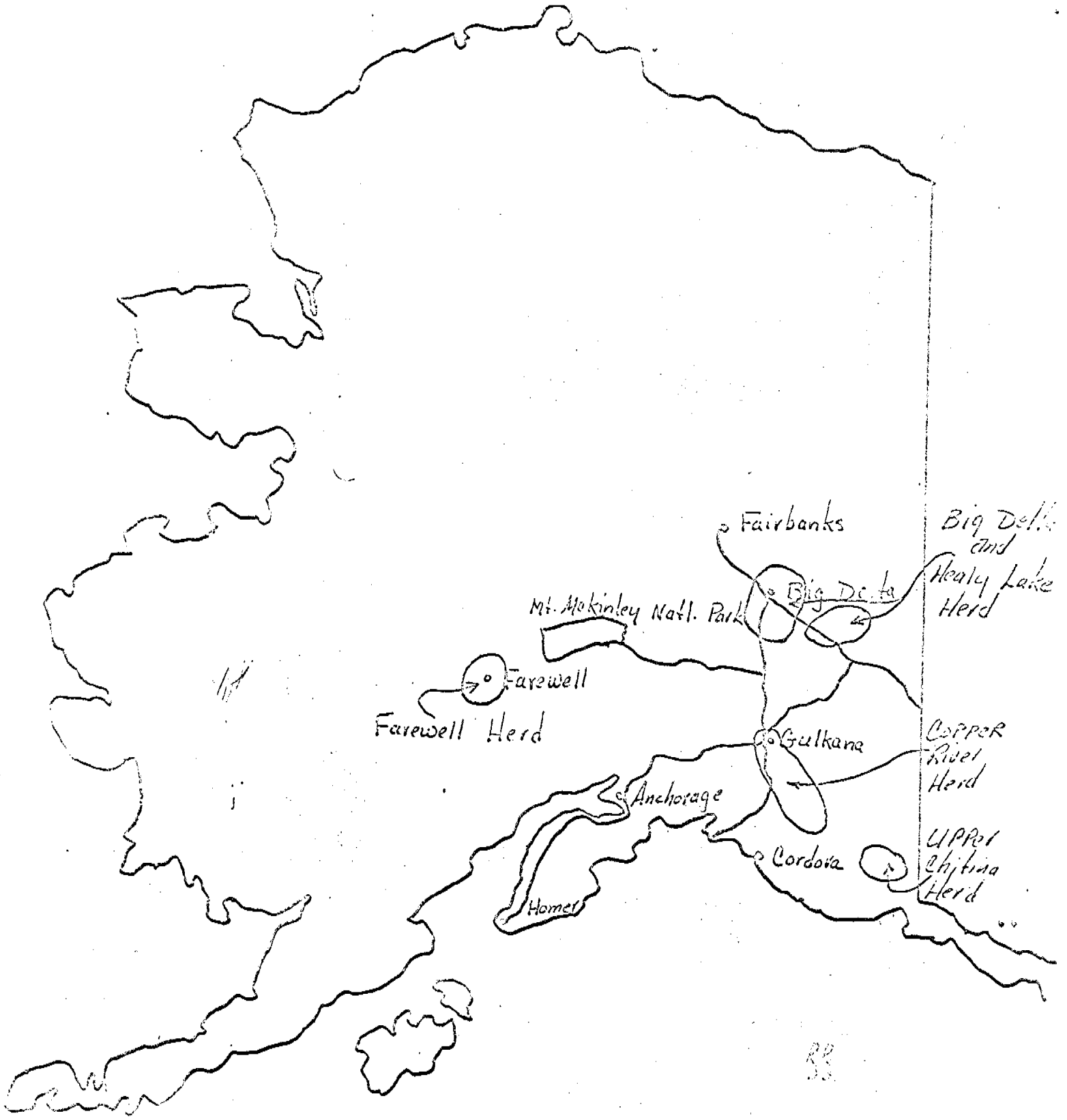


Table 1. 1967 Calf Production Counts

Area & Herd	Method of Count	Date	Bison Observed	Yearlings or Older	Calves	Percent Calves in the Total Number Observed
Big Delta Herd	PA-18 Aircraft	March 24	56	56*	-	-
Big Delta Herd	"	April 3	66	66*	-	-
Big Delta Herd	"	June 9	122	100	22	18
Big Delta Herd	"	Oct. 4	162	131	31	19
Healy Lake Herd	"	April 3	62	62*	-	-
Healy Lake Herd	"	June 9	12	10	2	17
Copper River Herd	"	Aug. 9	51	37	14	27
Farewell Herd	"	June 26	17	16	1	6
Upper Chitna Herd	?	Early Aug.	12	10	2	17

* Includes animals born previous to 1967 calving season.

survey on October 4, 1967 revealed 162 bison in groups scattered over a large area (Table 2).

Account of Their Distribution

Mr. Keaster, a farm resident of an area frequented by the Delta herd, reported seeing 70 bison in late September, 1967. A short flight in a gusty 40 knot wind on October 5, 1967, failed to locate these animals.

Calf production data are presented in Tables 1, 4, 5 & 6.

Mortality Big Delta Herd

Five of the Big Delta bison herd are known to have died in 1967.

On April 21, a bull approximately two years old was found on the tank range of the Fort Greely Army Reservation. The animal had been dead quite awhile and was decomposed. The cause of death is unknown. On April 28, an adult bull was found a few feet off of a road leading to the Delta - Clearwater farming community. This animal had been dead for an undetermined period and the hind quarters were missing. Obviously it was killed for food by a human. On May 22, a cow suffering from a retained breach birth was killed with the approval of the Fish and Game Department. In July, an adult bull was killed and donated to the Chamber of Commerce in Delta Junction. On approximately December 31, an adult cow was killed near Delta Junction. It had approximately 12 bullet holes in it from a small caliber rifle, probably a .22.

Healy Lake Herd

On April 3, 62 bison were counted on Healy Lake. No young calves were observed (Table 1). One June 9, 12 bison were seen near Healy Lake, two of which were young calves. The separate calving segment at Healy Lake is very difficult to observe after the ice melts on Healy Lake, because the animals move into spruce forest during the summer months.

Copper River Herd

The Copper River herd was surveyed on June 24, without a single animal observed (Table 1). Tracks of about 20 were seen near the mouth of the Dadina River. On August 9, a survey of this herd revealed 51 bison, 14 of which were young calves. These animals were found in four separate groups scattered over a wide area.

Table 2. Big Delta Bison Herd Survey

YEARLINGS AND OLDER	CALVES	TOTAL	LOCATION
45	9	54	On bar on west side of Big Delta River across from "Bwana" Flats
15	4	19	On bar on east side of Big Delta River 1/2 miles west of Tank Range
8	1	9	On bar west side of Big Delta River in vicinity of a line running west from Donnely Inn.
11	3	14	
23	4	27	
1	-	1	
1	-	1	
10	3	13	On Jarvis Creek 8 miles up stream from the mouth of the Jarvis.
16	7	23	On 33 mile Loop Road 6 miles southeast of Big Delta Army Air Field.
1	-	1	Along Alaska Highway
Totals 131	31	162	

Percent calves - 19

Four separate groups of Copper River herd were observed.

Table 3.

Group	Yearlings or Older	Calves	Total
1	10	4	14
2	7	3	10
3	14	5	19
4	6	2	8
TOTALS	37	14	51

Percent calves = 27.5

Tracking indicated several other herds using the area.

The exact location of the groups of bison and the area covered in the census is portrayed in Figure 2.

Group 1 was found in the high country grazing on a dried up lake, south of the Dadina River.

Group 2 was found along the Chetaslina River, fairly well hidden in the trees.

Group 3 was found at the mouth of the Chetaslina River.

Group 4 was found on a mud bar in the middle of the Copper River approximately 1 mile south of the mouth of the Chetaslina River.

Farewell Lake Herd

On August 10 and 11, 1965, 18 bison were transplanted from the Big Delta herd to Farewell, (see segment report 1965 W-15-R-1). On June 26, 1967 a survey of this group revealed 16 adults and one newly born calf. This is the first observed calf born to this group.

Table 4. 1966 Calf Production Counts

Area and Herd	Method of Count	Date	Total Number Bison Observed	Yearlings or Older	Calves	Percent Calves in the Total Number Observed
Big Delta Herd - Delta River	Aircraft	April 5	93	78	15*	
"	"	July 19	138	103	35	
"	"	August 2	205	159	46	22.4
Healy Lake Herd	"	April 5	58	43	15*	
"	"	May 23	50	40	10	20
Copper River Herd	"	April 6 & 7	27	20	7*	
"	"	August 5	79	72	7	
"	"	August 31	15	10	5	
Chitina River	"	April 6 & 7	9	9	0	

* Calves born in 1965.

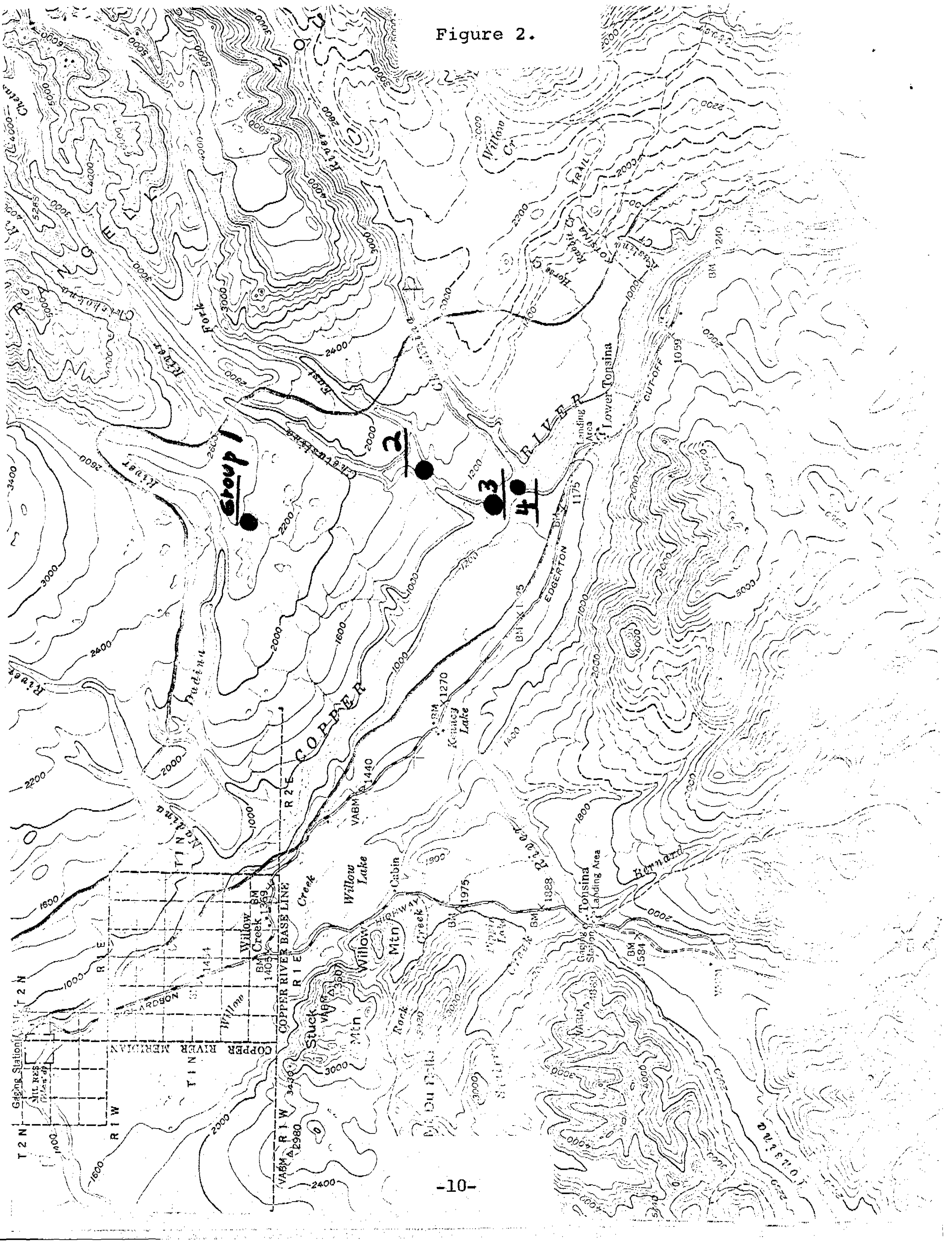
Table 5. 1965 Calf Production Counts

Area and Herd	Method of Count	Date	Bison Observed	Yearlings or Older	Calves	Percent Calves in the Total Number Observed
Big Delta Herd- Delta River	Aircraft	June 29	185	152	33	17.8
"	"	July 26	180	142	38	21.1
"	Ground	July 29	14	10	4	28.6
"	"	August 3	42	28	12	28.6
"	"	August 9	10	8	2	20.0
Copper River Herd- Dadina River	Aircraft	July 2	84	65	19	22.6
Copper River Herd- Copper River	"	September 24	71	58	13	18.3
"	Ground	July 22	6	5	1	16.7

Table 6. 1964 Calf Production Counts

Area and Herd	Date	Total Number Bison Observed	Adults	Calves	Percent Calves in the Total Number Observed
Healy Lake Herd - Tanana River	June 2	63	48	15	24
Big Delta Herd - Delta River	June 3	149	121	28	19
Big Delta Herd - Delta River and Jarvis Creek	July 28 and August	265	221	44	17
Copper River Herd - Dadina River	July 29	97	80	17	17.5
Chitina River Herd - Chitina River	July 30	12	7	5	42

Figure 2.



Group 1
2
3
4
COPPER
RIVER
Lower Tonsina
Tonsina
Landing Area
Gaging Station
EDGERTON
CUT-OFF
Willow Lake
Willow Creek
Willow Mtn
Kenney Lake
Stuck Mtn
Cabin
HIGHWAY
COPPER RIVER BASE LINE
COPPER RIVER MERIDIAN
RICHARDSON
Dadina
Nadina
Bernard
Horse Cr
Rabbit Cr
Willow Cr
TRAIL
Rock Creek
T 2 N
T 1 N
R 1 E
R 2 E
R 1 W

Chitina River Herd

Bush pilot, Jack Wilson of Gulkana claims to have seen approximately 12 bison, two of which were young calves on the upper Chitina River in early August.

PREPARED AND SUBMITTED BY:

William Griffin
Job Leader

WORK PLAN SEGMENT REPORT

FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT NO.: W-15-R-2 & 3

WORK PLAN: Q

JOB: 3 (W-15-R-2 & 3)

TITLE: Big Game Investigations

TITLE: Bison, Elk, Goat and Muskox Studies

TITLE: Muskox Studies

PERIOD COVERED: January 1, 1967 to June 30, 1967 (W-15-R-2)
July 1, 1967 to December 31, 1967 (W-15-R-3)

OBJECTIVES

To make an experimental release of up to 30 musk oxen on Nelson Island.

TECHNIQUES

A pretransplant trip to Nunivak Island was made in January and February 1967. The purpose of the trip was to become acquainted with physical factors involved in handling animals, and to determine drug dosages necessary for immobilizing musk oxen.

In mid-March 1967, supplies, fuel and personnel were flown to Nunivak Island where arrangements were made with local residents to provide field transportation. Animals were located, capture techniques and drug dosages confirmed, airstrips marked, fuel freighted to field, and camp established prior to arrival of the transport aircraft on March 20.

Government personnel included three State employees, two U.S. Bureau of Land Management employees and two U.S. Fish and Wildlife Service personnel. Three to seven local residents working as snow vehicle drivers were present during most of the field operation.

A BLM Cessna 180 and ADF&G Piper PA-18 aircraft were used for reconnaissance and logistics flights and Cessna T-50 Bushmaster aircraft was contracted to transport the musk oxen from Nunivak to Nelson Island. Snow planes (propeller driven sleds) with drivers, and snow machines (ski-track vehicles) with freighting sleds and drivers were rented from local residents for use in capturing the animals and providing surface transportation. Animals were strapped into collapsible wooden crates for shipment. A Palmer Chemical

Company CO_2 "Cap-Chur" gun was used as a propellant for dart syringes containing Succinylcholine Chloride, an immobilizing drug. A wooden fuel case ("Blazo box") modified to contain a small heater kept gun and drugs from freezing. Two-way radios rented from local residents were used for field communication. A Department 35 mm. camera provided photographic coverage for the operation.

The snow vehicles were used to drive animals from the dune areas to flat terrain where calves were separated from the herd. They were then immobilized with Succinylcholine Chloride using the CO_2 dart gun, or were roped. After the calves were hobbled, they were delivered via freighting sled and snow machine to the airstrip for data collection, tagging, and crating for shipment. They were then loaded into the Cessna T-50 for delivery to Nelson Island, and released. During the nonflyable weather which prevailed for all except two of the 17 days the T-50 was available, several animals were kept hobbled in readiness for transport in the event of improved weather conditions. As individuals showed distress, they were released and replaced by freshly captured animals. Some animals were captured by the Eskimo snow vehicle drivers on their own initiative, and were released immediately when they were found to be males, thus data were not collected on all animals captured.

FINDINGS

Approximately thirty animals were captured on Nunivak Island between March 20 and March 30, 1967. On March 23 and 24, five males and three female calves were released on Nelson Island. Of approximately 30 animals captured, two died from an overdose of Succinylcholine Chloride and one died of exhaustion. A dosage of .18 mg./lb. body weight appears to be sufficient to immobilize all sex and age groups except adult females for which dosages were not established. (See Tables 1, 2, and 3).

In a future operation of this type, the following should be considered:

1. Aircraft used for transporting animals should be well-instrumented, allowing flight during the marginal weather conditions that persist in this area.

2. Ideal Departmental crew size for a transplant of this nature would include two or three personnel to supervise and collect data. Since snow vehicle drivers performed capably in all other functions of the field operation except crew supervision, logistics, and data collection; the need for additional personnel is eliminated.

Table 1. Field Data on Use of Succinylcholine Chloride on Musk Oxen, Nunivak Island, January, February, 1967.

Animal No.	Age	Sex	(Lbs.) Est. Weight	No. Mg.	Mg./Lb. Body Weight	Area Hit	Time to Drop (Min.)	Time Down (Min.)	Remarks
1	Adult	M	600	20	.03	ham	--	--	No effect. (Trouble with liquid freezing (in syringes and CO_2 gun having
2	Adult	M	600	20	.03	ham	--	--	No effect. (no power. Tried 10%, 20%, 30% (solutions (by volume) commercial (grade ethyl alcohol to prevent (freezing. 20% sufficient at (10° to -10° F., and used from (this point on.)
3	Adult	M	600	30	.05	rib cage	--	--	No effect.
4	Adult	M	600	40	.07	rump	--	--	No effect.
5	Adult	M	600	50	.08	shoulder	4	14	Head held high while down. Upon recovering, the animal charged men and equipment 50-75 ft. away. Animal was finally shot 16 ft. from nearest man.
6	Adult	M	600	50	.08	shoulder	3.5	13.5	Head held erect while down, body vertical.
7	Adult	M	600	60	.10	lwr. hind leg	15	3	Head held erect while down, body vertical.
8	Adult	M	600	70	.12	rib cage	9	5	Head held erect while down, body vertical.
9	Adult	M	600	80	.13	shoulder	7 7*	9 9*	Head held erect while down, body vertical. Dropped second time.
10	Adult	M	600	100	.17	rib cage	3	23	Lost vertical control of both head and body momentarily.
11	Juv.	M	450	70	.16	shoulder	3 1	23 4	Lost vertical control of both head and body momentarily. Dropped second time to sitting position.
12	Juv.	M	475	85	.18	rib cage	4	30	Lost vertical control of head and body for a period of several minutes.

* Time from when animal got up the first time

Table 2. Field Data on Muskoxen Caught and Released Alive, Nunivak Island, Mar - Apr. 1967

Animal No.	Ear Tag # Left	Right	Streamer Color * Left	Right	Sex	Est. Age (Mo.)	Date Capture	Est. Total Wt. (Lb)	Total Length (cm)	Half-Girth (cm)	Height Shldr. (cm)	Hind Foot (cm)	Drug**	Dose	Time to Immobilize (min.)	Release Site and Date
1-67	6849	6850	W	G	♂	10-11	23 Mar	150	200	69	104	42	None			Nelson I. 23 Mar
2-67	6847	6848	G	W	♂	10-11	23 Mar	200	189	66	105	42	None			"
3-67	6846	6845	O	Y	♂	11	20 Mar	225	186	65	104	41	S	40mg	6+	"
4-67	6844	6843	Y	O	♂	10-11	20 Mar	175	173	61	101	40	S	40mg	4.5	"
5-67	6830 Right Horn Broken off	6841	O	P	♀	10-11	23 Mar	150	162	61	102	39	A	2 cc.		"
6-67	6832	6831	P	O	♀	10-11	23 Mar	165	162	59	98	38	None			"
7-67	6833	6834	O	R	♂	10-11	23 Mar	175	185	67	101	39	None			Nelson I. 24 Mar
8-67	6835	6836	R	O	♂	10-11	23 Mar	200	196	68	111	42	None			"
9-67	6855	6856	O	W	♀	10-11	24 Mar	175	191	65	105	41	None			Nuniv-ak 2 Apr Looked Weak
10-67	6857	6858	W	O		10-11	24 Mar	175	178	58	99	39	None			Nuniv. 29 Mar Broken left hind foot
11-67	6861	6862	O	G		10-11	24 Mar	170	186	62	100	40	S	40mg	3	Nuniv. 5 Apr.

*Streamer Color: O=Orange, R=Red, G=Green, W=White, P=Pink
**Drug: S=Succinylcholine chloride; A=Azimycin

Table 3. Weights and Measurements of Dead Muskox Calves, 24 March 67, Nunivak I.

Animal No	Sex	Est. Age (Mo.)	Date	Total Wt. (lb)	Total Length (cm)	Half Girth (cm)	Height Shldr. (cm)	Hind Foot (cm)	Drug/ Dose	Time to Immobilize (min.)	Remarks
RB-1	♀	10-11	24 Mar	206	171	63	105	41	S/≅80mg	3	Weights: Hide w/hooves 25 Whole carcass 181 Total 206 Blood loss probably 2 lb or less. Blood sample taken
RB-2	♀	10-11	24 Mar	190	165	62	99	39	S/≅80mg	3	Hide+Head+Hooves 35 Viscera 55 Carcass 100 190 Blood Loss: 2 to 3 lb. estimated. Heart: 1.6 lb. moderate fat lungs: 3.0 lb. liver: 2.3 lb. spleen: 0.3 lb. Intestines: 9.5 lb. stomach: 38.5 lb. 55.2 lb. Blood sample taken

3. The handling of undrugged musk oxen is dangerous to the handlers and places considerable stress on the animals; therefore, an immobilizing drug should be employed to capture the animals whenever conditions allow.

PREPARED BY:

Howard Wood
Job Leader

APPROVED BY:

Don H. Steele
Federal Aid Coordinator

SUBMITTED BY:

Lowell W. Crowton
Director, Division of Game

Robert A. Rausch
Project Leader