ALASKA DEPARTMENT OF FISH AND GAME JUNEAU, ALASKA

STATE OF ALASKA Walter J. Hickel, Governor

DEPARTMENT OF FISH AND GAME Augie F. Reetz, Commissioner

DIVISION OF GAME Loren W. Croxton, Director Don H. Strode, Federal Aid Coordinator

REPORT ON 1967 POLAR BEAR STUDIES

by

Jack W. Lentfer Sterling H. Eide Leo H. Miller Gregory N. Bos

Volume IX

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

Persons are free to use material in these reports for educational or informational purposes. However, since most reports treat only part of continuing studies, persons intending to use this material in scientific publications should obtain prior permission from the Department of Fish and Game. In all cases tentative conclusions should be identified as such in quotation, and due credit would be appreciated.

(Printed April 1968)

DOUG JONES GAME DIVISION Adf&g Anchurage Alaska

TABLE OF CONTENTS

	PAGE
Abstract	ii
Recommendations for Management	ii i
Objectives	l
Methods	1
Findings and Discussion	5
Characteristics of Harvest	5
Breeding Biology	16
Tagging	16
Appendix	21

WORK PLAN SEGMENT REPORT

FEDERAL AID IN WILDLIFE RESTORATION

STATE :	Alaska		
PROJECT NO:	<u>W-15-R-2 and 3</u>	TITLE:	Big Game Investigations
WORK PLAN:	<u>M</u>	TITLE:	<u>Bear Studies (Polar Bear)</u>
JOBS:	1, 2, 3, 5 and 8	(W-15-R	-2); 1, 2 and 10 (W-15-R-3)
PERIOD COVER	ED: January 1, 1	967 thro	ugh <u>December 31, 1967</u>

ABSTRACT

The Alaska polar bear harvest from July 1, 1966 through June 30, 1967 was 191. Airplane hunters took 166 (87 percent) and persons hunting from the ground, nearly all natives, took 25 (13 percent).

New regulations limiting guides to six hunters per season and extremely poor ice in the Chukchi Sea depressed the harvest. The regulations may have stimulated guide selection for nonresident hunters and for male bears. The harvest was 80 percent males (non-residents, 97 percent; resident white hunters, 69 percent; and natives, 50 percent).

Most bears were taken in March and April, the period when light airplanes can best be used for hunting.

Guides furnished composition data on 533 bears: 27 percent were young, 17 percent were sows with young, and 56 percent were single bears. Average litter size was 1.62. The number of bears seen per flying hour was 0.75, and the number seen per hunting hour was 1.5.

Age determinations, based on cementum layering, were made on bears taken in 1966 and 1967. The mean age of males taken by non-residents in the Arctic Ocean in 1966 was 10.1 years and in 1967 was 7.7 years. The means for Chukchi Sea males taken by non-residents in 1966 and 1967 were 9.1 and 7.0 years, respectively.

Thirty-one bears were immobilized and marked north of Point Barrow in April 1967. Bears were immobilized with Sernylan delivered with a syringe gun from a helicopter. Composition was: 6 adult and sub-adult males, 13 adult and subadult females, 6 two-year olds, and 6 yearlings. Bears receiving an adequate first injection of Sernylan were immobilized in from 3 to 13 minutes. Observed recovery times ranged from 0.5 to 3 hours. Bears were marked with ear tags, ear markers, tattoos, and collars.

Jack Lentfer assisted a Norwegian biologist tag 29 polar bears in August 1967. Fifty-one bears were immobilized with M-99 or Sernylan and tagged on the pack ice near Spitsbergen during July and August.

RECOMMENDATIONS FOR MANAGEMENT

Continue to obtain and assess harvest information. Make a special effort to obtain teeth for age determination studies.

Determine the potential for development of dog team hunting. This should include the number of potential guides, best hunting period and locations, length of time required for hunt, chance of success, cost, hunter interest, and role of Department regarding regulation changes or other action.

Maintain contacts with other countries that have polar bears regarding management practices and characteristics of harvest.

WORK PLAN SEGMENT REPORT

FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT NO:W-15-R-2 and 3TITLE:BrowGame InvestigationsWORK PLAN:MTITLE:Bear Studies (Polar Bear)JOBS:1.2.3.5 and 8 (W-15-R-2); 1.2 and 10 (W-15-R-3)PERIOD COVERED:January 1, 1967 through December 31, 1968

OBJECTIVES

To determine magnitude, distribution, chronology, and sex, size, and age composition of the hunter harvest.

To describe breeding biology.

To develop a method for capturing and marking bears off the Alaskan coast.

METHODS

By regulation, polar bear hides and skulls must be presented to a member of the Department for examination and sealing within 30 days after the date of kill. The greatest segment of the kill, that taken with the aid of aircraft, occurs in late February, March, and April from four hunting locations. To expedite sealing, Department personnel were stationed at these locations during most of the hunting period. Information contained at time of sealing included date and location of kill, sex, hide size, and skull length, width, and condylobsal length. Specimens, including skulls, teeth, reproductive organs, blocd samples, and masseter muscle samples, were collected through contact with guides and hunters. Guides were furnished forms and asked to record number, composition, and location of bears seen on hunting flights. Personnel who conducted the sealing program were Sterling Eide at Barrow, Ben Ballenger at Kotzebue, Joe Blum at Point Hope, and Doug Jones at Teller.

Techniques were developed to section teeth and count layers in the cementum for age determination. Joe Blum, Sterling Eide, and Greg Bos developed these techniques, and Greg Bos cut most of the teeth collected in 1966 and 1967. Information relating to teeth collected in 1966 is included in this report. Teeth collected from hunter-killed bears were mainly M_3 in 1966 and one of the premolars in 1967. These were chosen because they are easy to pull, and hunters are more willing to let them be removed than other teeth since their removal does not detract from skull appearance.

The first technique tried was to cut and polish thin sections of tooth root and examine cementum under a microscope using a variety of light conditions. This technique has been used successfully by other workers for brown and black bears. Layering in the cementum was evident in the teeth of some polar bears, but for many, the number of layers could not be determined with any degree of certainty. The technique was considered unsatisfactory.

Decalcification, cutting of thin sections, and staining was then tried. Formic acid, hydrochloric acid, and Decal, a commercial solution, were tested as decalcifying agents. Hydrochloric acid was considered the best agent because it yielded good results in the shortest period of time. Teeth were decalcified in 40 dram vials of 3 percent hydrochloric acid until they became flexible or slightly rubbery to light pressure. Premolars could be decalcified in 1 day. Molars required 3 to 4 days. After decalcification, teeth were washed in running tap water for several hours to remove acid.

Cutting of decalcified teeth was first attempted with teeth that had been embedded in paraffin using standard histological techniques. Teeth were cut with a microtome. In many cases teeth were too brittle to give satisfactory sections, and sections were difficult to handle because they tended to roll. Decalcified teeth were then frozen by spraying with pressurized freon (Trade name: Cryokwik) and cut with a microtome. Satisfactory sections were obtained, but the process was time consuming. The most efficient method for sectioning was by use of an International-Harris cryostat at a temperature of -15° C. Cross sections of different thicknesses were cut; best results were obtained at 50 microns. The best portion of the tooth to examine was about one-third of the distance from the root tip to the root-crown junction. The lower one-third of the root was cut off with a razor blade and 6 to 12 sections then cut with the cryostat.

Various stains and staining techniques were tried. Best results were obtained with commercially prepared alum hematoxylin obtained from Paragon C. and C. Company, New York. Sections were placed in the alum hematoxylin stain for 10 to 15 minutes and then placed in water preparatory to examination.

Most sections were examined with a Bausch & Lomb zoom dissection microscope with 20X eyepieces and 2X objective lens attached to the normal 0.7 to 3X objective. This allowed a 28X-120X zoom range in magnification. Sections were examined with light reflected from both a concave mirror and an opaque surface. In certain cases cementum layering could be interpreted only with 120X magnification. After sections were examined and cementum layers counted, the best two or three sections were dehydrated first in 70 percent and then in absolute alcohol each for 30 minutes. After dehydration, sections were cleared in xylene and mounted on permanent slides under coverslips with Permount as the mounting medium.

Slides were examined and ages assigned by two or three people, and in the majority of cases, people were in agreement. When there was disagreement, teeth were re-read, and readers generally agreed on interpretation. One slide from a knownage zoo bear was available for comparison. There is need for more known-age material to verify interpretations.

Ten complete reproductive tracts from females killed by Alaskan hunters and 25 sets of ovaries from bears taken by professional hunters in Spitsbergen were examined. Mr. Thor Larsen of the Norwegian Polar Institute supplied the Spitsbergen specimens.

Immobilization of bears was attempted in the Bering Straits north of the Diomede Islands in March 1967, and north of Point Barrow in April 1967, in areas where bears are normally present at these times and where light aircraft can land on the ocean ice. Jack Lentfer, Lee Miller, and Joe Blum worked in the Bering Straits. Jack Lentfer and Lee Miller worked out of Point Barrow. Facilities provided by the Naval Arctic Research Laboratory at Barrow and by the Tin City Air Force Station on the Bering Straits greatly facilitated the work.

Two aircraft working in conjunction were used to search for bears. In the Bering Straits these were a four-place Hiller 12E helicopter and a four-place fixed-wing Cessna 180. The same helicopter and a six-place Cessna 185 were used in the Barrow area.

The helicopter functioned satisfactorily in the coldest weather experienced, about -20 degrees F. Before starting the helicopter at this temperature when it had completely cooled, it was necessary to preheat for 2 to 3 hours with a 200,000 BTU aircraft preheating unit. The helicopter cruised at 65 to 70 miles an hour. The fixed-wing planes carried gas for the helicopter so that operating time for the two planes flying together was 6 to 7 hours. Landing gear on the helicopter was skids and floats. Floats were in case of breaking through ice or a forced landing on water. One of the fixed-wing planes had skiis and one had ski-wheels; both were satisfactory. Pilots maintained radio and visual contact.

Most bears were located by searching for tracks and then following the tracks to the bears with the helicopter. The helicopter flew about 300 feet and the fixed-wing plane about 500 feet above the ice. Tracking conditions were best on days when there was a fresh snow cover, bright sun, and little or no wind. Overcast skies and wind made tracking difficult. An attempt was made to follow most tracks that appeared fresh. Many could not be followed to a bear either because they led into broken ice, were covered in places by blown snow, or became mixed with other tracks. Helicopter pilots varied in their ability to track and to put the shooter in position for a shot. This ability improved with experience.

When a bear was sighted its weight was estimated, and it was shot in the rump from the helicopter with a syringe containing Sernylan (Parke, Davis and Company, Detroit, Michigan) in a concentration of 100 mg per cc. Most bears ran in a straight line when chased with the helicopter. An attempt was made to give first injections at a dosage of approximately .75 mg per pound. Syringes were fired from a powder charge syringe gun (Cap-chur gun, Palmer Chemical Company, Douglasville, Georgia) from a range of 30 to 50 feet. The lightest powder charges were the most satisfactory at these ranges. After a bear had been hit, the helicopter circled at a distance of about 0.5 mile except when it was occasionally necessary to herd the bear away from open leads or thin ice. With experience, it became possible to judge the effects of the drug after about 10 minutes and determine if additional injections were needed. These were given from the helicopter with a syringe gun or from the ground either with a gun or by hand. The fixed-wing plane landed to conserve gas soon after a bear was hit. No attempt was made to drive bears to the fixed-wing plane's landing site.

Bears were tagged with a monel metal tag (4-1005, No. 49, National Band and Tag Company, Newport, Kentucky) in one ear and a nylon tag (Rototag, Dalton Company, Henley, England) in the other ear. All tags were numbered, and nylon tags had the legend "\$25 Reward-- Fish and Game, Anchorage, Alaska, U.S.A." Bears were tattooed on the upper lip and in the right axilla and groin with identifying numbers applied with tattoo forceps (No. 6321, Jensen Salsbery Laboratories, Kansas City, Missouri). In most cases an ear marker was fastened to one ear with the metal ear tag. Ear markers were 3 by 4-inch pieces of colored nylon (Safety Flag Company, Pawtucket, Rhode Island). To aid further in identifying individual bears, collars were fastened around the necks of fully mature animals. These were of nylon parachute webbing 1 3/4 inches wide, overlapped at the ends, and fastened around the edges of the overlap with hog rings. Colored nylon sewed to collars either as a solid cover or as short flaps permitted identification of collars. Approximately 400 mg of alizarin red S dye was injected into the body cavity of 15 of the bears to aid in determining pattern of tooth development for aging of animals from which a tooth may be obtained in the future. Bears were measured and weighed. Weights were obtained by rolling a

-4-

bear in a net, attaching scales, and hoisting with the helicopter. The location of each bear tagged was determined by the pilot of the fixed-wing plane who obtained a radar location fix by radio from the Distant Early Warning Station at Barrow.

Polar bear guides operating out of Barrow cooperated by not shooting and by reporting marked bears which they saw.

FINDINGS AND DISCUSSION

Characteristics of Harvest

From July 1, 1966 through June 30, 1967, subsistence and sport hunters took 191 polar bears.

Eskimos took 13 percent of the bears harvested by hunting along the coast. The number and sex composition was similar to that of past years. Most of the bears were taken out of Barrow, Wainwright, and Point Hope.

The harvest by guided airplane hunters (87 percent of the total) differed in several respects from the harvest of the past few years. Changes were due mainly to new game regulations and to unusual climatic conditions in the Chukchi Sea. The harvest by airplane hunters was less than the average of the past 6 years, the period for which we have reliable kill data, and was substantially less than the 1966 harvest of 399. The reduction was mainly because fewer bears were taken by guided airplane hunters. Each quide was limited for the first time to the number of hunters (six) that he could take out. Climatic conditions also affected hunting in the Chikchi Sea. Above average temperatures and persistent south winds caused ice to break up and bears to move north earlier than usual. The broken ice also made it difficult to find landing places in the vicinity of bears. Some hunters cancelled plans to hunt, and the success ratio of those who did hunt was somewhat lower than in the past (83 percent for persons not residing in Alaska as indicated by non-resident tag sales). A greater percentage of the hunters were non-residents, and a somewhat greater percentage of the bears taken were males. These changes can be attributed to the new regulation. Guides who were most restricted were those who formerly took out a large number of hunters, usually residents, for a relatively low fee with an agreement that the first legal bear that was seen would be the one that was shot.

Most of the hunting with airplanes was done out of Teller, Kotzebue, Point Hope, and Barrow. The normal pattern is for two planes to fly together; there were 25 two-pilot teams operating in 1967. There was some change from past years in areas hunted. Because of ice conditions, after about March 10, hunters from Teller had to fly to the area west of Point Hope to hunt, and hunters from Kotzebue and Point Hope went further north and west than usual to find areas with ice suitable for landing. A small amount of hunting was done out of Point Hope north and east of Cape Lisburne for the first time. Most hunting out of Barrow was in the same area north of the coast between Barrow and Wainwright as in previous years.

Kill chronology was similar to that of past years. Bears were taken from mid-October to the end of April. Native hunters took bears throughout this period. Airplane hunters took bears from the first part of February through the end of April. The period of greatest harvest out of Kotzebue, Teller, and Point Hope was the last 2 weeks of March and out of Barrow was the first 2 weeks of April.

Age composition of the 1967 harvest and also of the 1966 harvest was determined by reading cementum layers in cross sections of teeth. Layers in the cementum of polar bear teeth were not nearly as distinct as layers in brown bear teeth. Lack of distinctive layering is most noticeable in polar bear teeth during the first 4 years of life when bears are growing rapidly. Molars were easier to read than premolars. Because molars are larger, they have a larger cross section to examine for readable areas, and lines are less crowded. Molars tend to have less splitting of lines which is difficult to interpret.

The mean age of bears taken in the Chukchi Sea was somewhat younger in 1967 than in 1966. This was in agreement with skull sizes. The average skull size of males taken from Kotzebue and Point Hope was slightly smaller in 1967 than in 1966. It is not known if this indicates that the mean age of available bears was lower in 1967, or if younger bears were taken because ice conditions forced hunters to be less selective, or if the changes are not truly significant. The mean age of males taken from Barrow was less in 1967 than in 1966. Any trends in age composition of the harvest may not be evident until data have been collected for several years.

Harvest data are presented in Tables 1 through 6 and in Figure 1.

Livers, masseter muscles, and blood obtained from hunterkilled bears were examined.

Dr. R.W. Lewis, while with the Institute of Arctic Biology, University of Alaska, analyzed livers for vitamin A content from 14 bears killed north of Barrow. Vitamin A content spanned a two-fold range (15,000-30,000 units per gram of liver) and showed no correlation with age or sex. The findings were in agreement with those reported by Rodahl, an earlier worker.

		Non	-	Re	sider	it'	Res	ider	nt					To	tal 🦂	
Hunting		Res	ident Sex	Wh	ite	Sex	Nat	ive	Sex			Sex	A11	% of Total	%	% Non
Base	ď	ę	Unk	ਾ	Ŷ	Unk	o'	<u> </u>	Unk	ď	Ŷ	Unk	Bears	<u>Kill</u>	Male	Res.
Teller	26	1	-	2	1	-	-		-	28	2	-	30	16	93	90
Kotzebue	49	4	-	8	4	-	-	-	-	5 7	8	-	65	34	88	82
Pt. Hope	10	1	-	5	-	-	2	2	-	17	3	-	20	10	85	55
Barrow	22	5	-	13	7	-	6	5	-	41	17	-	58	30	71	47
Lisburne	1	-	-	1	1	-	-	-	-	2	1		3	2	67	3 3
Colville	4	1	-	-	-	-	-	-	-	4	1	-	5	3	80	100
Wainwright	-	-	·	-	-	-	3	4	2	3	4	2	9	5	33	0
Wales	-	-	-	-	-	-	1	-	-	1	-	-	1	.5	100	0
Sub Total Percent	112 97	12 3	-	29 69	13 31	-	12 50	11 50	2	153 81	36 19	2	191	100	80	65
Total	124	(65	%)	42	(22%)		25	(13%	(;)							

Table 1. 1967 Known Polar Bear Harvest by Area, Type of Hunter, and Sex of Bear.

-7-

Table 2. Distribution of Polar Bear Airplane Hunting by Hunting Base and Average Distances if Kills Offshore from Hunting Bases, 1967.

Hunting Base	No. of Airplane Teams	No. of Bears Killed	Percent of Airplane Kill	Average D: From Shore Non-Res.	istance e (Miles) Res.
Teller	6	30	18	140	130
Kotzebue	9	65	39	116	116
Pt. Hope	2	16	10	97	97
Barrow	5	47	28	72	40
Lisburne	2	3	2	4	113
Colville River	1	5	3	38	0
TOTAL	25	166	100		

Table	3.	Number	of	Polar	Bears	Seen	As	Reported	By	Airplane	Hunting	Guides,	1967.
										-			

Area	No. of Report Forms Received	Flying Time (Hours) 1/	Hunting Time (Hours) l/	Bears Seen <u>2</u> /	Bears Killed	Bears per Flying Hour	Bears per Hunting Hour
Teller	34	197.1	77.4	162	21 (13%)	0.82	2.1
Kotzebue	25	179.3	41.3	163	19 (12%)	0.91	3.9
Pt. Hope	5	26.6	20.6	14	5 (36%)	0.53	0.68
Barrow	40	139.5	106.2	105	32 (30%)	0.75	0.99
Colville	19	105.8	87.0	45	4 (9%)	0.43	0.52
TOTAL	123	648.3	333.0	489	81 (17%)	.75	1.5

 $\underline{1}$ / Flying and hunting times are for hunting teams, usually two aircraft, and not the combined flying time of both aircraft.

2/ Includes bears killed.

Table 4. Composition of Polar Bears Seen as Reported By Airplane Hunting Guides, 1967.

		Sows W/Y	oung		Other Bea	rs	Bears	
Area	l Young	2 Young	3 Young	Small	Medium	Large	Killed	Total
Teller	14	21	- 1	26	25	7	22	175
Kotzebue	12	13	0	7	62	34	23	189
Pt. Hope	1	1	0	3	1	0	5	. 14
Barrow	5	7	0	14	20	9	31	105
Colville	4	9	1	3	1	2	5	50
TOTAL	36	51	2.	53	109	52	86	533

-

. . .

f.

Composite Summary

Young	144	2.7%
Sows W/young	89	17%
Other bears		
seen includin	g	
bears killed	300	56%
	533	100%

Average litter size-1.62

Table 5. Age Composition of Polar Bears Harvested in 1966 Based on Tooth Cementum Layering (141 Bears Aged of 399 Harvested).

999			NUMBER	OF BEARS	
AGE		MALE		FEM	ALE
	Airp	lane	Ground	Airplane	Ground
	Non-Res.	Res.			
Arctic Ocean					
2 3		4	1	1	1 1
4		1	1	_	
5	2	2		1	2
7	1 1	1		1	1
8	1	-		1	-
11+	3	1 4	2	2	Ţ
	-	-	-		
Mean Age	10.1	7.2	10.6	6.6	5.0
Range	5-18	3-17	3-13	3-9	2-9
Chukchi Sea					
1					
2		_		1	
3	3	1		3	1
5	9	2		2	
6	3	2		2	
8	12	2		1	
9-10	11	1.		J	
11+	20	1		4	
Mean Age	9.1	7.0		7.2	3.0
Range	3-21	3-14		2-14	
\$ 			ا المحد يسمع من المحمد عن المحمد المحمد عن المحمد		

Table 6. Age Composition of Polar Bears Harvested in 1967 Based on Tooth Cementum Layering (96 Bears Aged of 191 Harvested).

			NUMBER	OF BEARS	
AGE		MALE	FEM	ALE	
	Air	olane	Ground	Airplane	Ground
	Non-Res.	Res			
<u>Arctic Ocean</u>					
1 2 3 4 5 6 7 8 9-10 11+	1 4 3 2 3 1 3	2 5 1 1	1 1	1 1 2 1 1 2	2
Mean Age	7.7	6.0	4.5	7.0	5.0
Range	4-16	4-14	4 - 5	3-13	6
<u>Chukchi Sea</u> 1 2 3 4 5 6 7 8 9-10 11+	2 5 7 7 4 4 6 4	1 1 4 1		1 4 1 3 3	
Mean Age	7.0	7.0		6.0	
Range	3-16	4-12		3-8	

	No	n Resi	dent		Resid	dent	- Whi	te	Tota	1
Hunting Base	Mal Size	e No. <u>2</u> /	Fema Size	le No.	Male Size	No.	Fema Size	le No.	Male Size No.	Female Size No.
Teller	25.5	26	20.8	1	23.4	2	21.4	1	25.3 28	21.1 2
Kotzebue	24.9	45	21.8	4	22.8	7	22.3	3	24.6 52	22.0 7
Pt. Hope	22.6	8	19.5	1	23.3	5	0	0	22.9 13	19.5 1
Barrow	23.6	22	20.0	5	22.6	14	19.9	7	23.2 36	19.9 12

~

Table 7. Average Skull Size 1/ In Inches of Polar Bears Taken By Airplane Hunters From Main Hunting Bases in Alaska, 1967.

Skull size is greatest length without lower jaw plus greatest width.
No. is number of skulls measured.

-13-

Table 8. Average Hide Size 1/ In Feet Of Polar Bears Taken By Airplane Hunters From Main Hunting Bases in Alaska, 1967.

	Non	Res	ident		Res	iden	t - Whi	Total				
Hunting Base	Male Size No ^{2/}		Female Size No.		Male Size	Male Size No.		le No.	Male Size	No.	Fema Size	le No.
Teller	18.2	26	15.8	1	18.2	1	16.5	1	18.2	27	16.2	2
Kotzebue	17.9	44	15.8	4	16.5	7	15.2	. 4	17.7	51	15.5	8
Pt. Hope	15.9	9	0	0	16.3	5	0	0	16.1	14	0	0
Barrow	17.0	20	14.5	6	16.2	14	13.8	5	16.8	_34	14.2	11

I/ Hide size is length from tip of nose to middle of anus plus width from claw tip to claw tip of front feet when hide is laid out flat.

2/ No. is number of hides measured.

-14-

Figure 1. Polar Bear Kill Chronology, 1967



-12-

Meat samples, mostly masseter muscle, were examined by Mr. Richard Barrett, U.S. Department of Agriculture, Palmer, Alaska, for presence of <u>Trichinae</u>. Approximately 70 samples were examined, most of which were from Kotzebue and Barrow. Of the Kotzebue samples, 67 percent were positive, and of the Barrow samples, 72 percent were positive. Further analysis and correlation with age and sex remains to be done.

Blood samples from Kotzebue and Barrow bears were examined by Mr. Thor Larsen of the Norwegian Polar Institute. Mr. Larsen examined serum using an electrophoresis technique to attempt to find racial differences between Spitsbergen and Alaskan bears. His first analysis indicates serum differences between the two areas. He could not detect differences between Barrow and Kotzebue bears. Testing of serum from more animals is needed and will be done.

Breeding Biology

Data obtained from examination of reproductive tracts will be correlated with age and reported at a later date. The specimens from Spitsbergen are of only limited value, because only ovaries were saved. Scars persist much longer in the uterus than in the ovaries. It is hoped that complete tracts can be obtained in the future from Spitsbergen bears.

Tagging

A helicopter and a fixed-wing plane each flew approximately 17 hours over the ice north of the Diomede Islands in the Bering Straits between March 14 and 19 in an attempt to tag bears. Early March had been unseasonably warm with persistent south winds. This caused the ice to break up earlier than usual, and by mid-March, both landing places and bears were difficult to find. Presumably the bears had moved north both actively in response to the ice breaking up and passively as south winds caused ice to move north. Only one bear, a large male, was found, and no attempt was made to immobilize it. The helicopter and a fixed-wing plane each flew approximately 43 hours over the ice north of Point Barrow between April 9 and 26. Thirty-one bears were successfully immobilized, marked, and tagged. Tagging and marking data are presented in Table 9.

Most bears showed first effects of Sernylan within 3 to 7 minutes after injection by an uneven gait or by sitting on the rump. Eleven bears required only single injections. Nine of these animals were completely immobilized within 3 to 13 minutes and in an average time of 8 minutes; two were never completely immobilized but could be handled. Additional lighter dosages of Sernylan were given to 20 bears not completely immobilized by a single injection. There was considerable variation in the time it took bears to become immobilized and in dosages necessary to produce immobilization. Variations did not appear to be correlated with sex or age. Dosages, both single and multiple, necessary to produce immobilization for 15 bears which were weighed ranged from .55 to 1.89 mg per pound. It appeared that dosages greater than 1.89 mg per pound were required for at least two animals, but incomplete injections prevented an accurate determination of the dosages administered (Table 10). Ethyl alcohol mixed with the Sernylan on some occasions to prevent freezing did not appear to change its effects.

When family groups were encountered, the female was drugged first, and in all cases but one, young bears stayed with their mother as she moved about before becoming immobile. The exception was a single yearling which left its mother and then could not be found for immobilizing. Young bears were not injected until the female was immobile, and they stayed with their mother as the drug took effect.

Bears were not aggressive after Sernylan started taking effect nor as they recovered from it. In several cases animals retained partial control of their front quarters and head but could be handled. After being immobilized, most single bears were observed only during the period required to mark, measure and weigh them--about 30 minutes. In most cases there was no sign of recovery during this period. Recoveries were observed for seven bears either in family groups or by returning to a tagging site. Recovery times for these seven ranged from 0.5 hours for a bear which was never completely immobilized to 3 hours. Seven bears were seen apparently fully recovered from 1 to 16 days after being immobilized (Table 10).

Eight bears experienced either one or two periods of convulsing while being handled. Average duration for a convulsion was about 45 seconds. In some cases handling or a sudden noise appeared to trigger the convulsion. In the future drugs such as Tranvet will be used with Sernylan to obtain a more desirable anesthesia. No fatalities are known to have been caused by Sernylan; the only known fatality occurred when a syringe was shot into a bear's chest cavity and penetrated the lungs.

The 31 bears tagged consisted of 6 adult and sub-adult males, 13 adult and sub-adult females, 6 two-year-olds, and 5 yearlings. Tracks of newborn cubs were seen, but none were found. Seventeen bears were alone, and 13 were members of family groups. One 2-year-old and one yearling were each alone; other 2-year-olds and yearlings accompanied their mother (Table 10). It is believed that in the Bering Straits the best period to work is from about February 20 to April 10. Shortness of days hinders earlier work, and ice breakup hinders later work. At Barrow the best period is March 15 to April 25. Extreme cold hinders earlier work, and poor ice hinders later work.





Bear No.	Date	Sex	Age	Ear Tags			Alizarir		Ear Markers	
				Left	Right	Tattoo 2/	Red S	Collar 3/	Left	Right
1	4-9	M	Ad	51-N	4251-M	1 -	No	Solid red	-	-
2	4-9	F	Sub-ad	52-N	4252-M	52	No	OD w/red streamers	-	Red
3	4-9	F	bA	53-N	4253-M	53	No	Solid blue		Blue
4 1	4-10	F	Sub-ad	54-N	4254-M	54	Yes	OD w/blue streamers		Blue
5	4-11	M	Ad	55-N	4255-M	53	Yes	Solid tan	-	-
6	4-12	M	. Ađ	4256-M	56-N	56	No	OD w/tan streamers	-	-
7	4-12	F	Ad	57-N	4257-M	57	No	OD w/black streamers	- '	-
8	4-14	P	Sub-ad	53-N	4258-M	58	Yes	Solid green	-	Green
9	4-14	M	Ad	59-N	4259-M	59	Yes	Solid OD	Red	Red
10	4-14	M	2	60-N	4260-M	60	Yes	-		Red
11 4/ 1	4-14	F	Ad	61-N	_	61	Yes	OD w/green streamers	Blue	-
12	4-14	M	2	62-N	63-N	62	Yes	-	-	Red
(13	4-14	F	b A	64-N	67-N	-	No	Solid OD	-	-
14	4-14	F	1	65-N	66-N	-	No	• • • • • • • • • • • • • • • • • • •		-
15	6-14	F	1	68-N	69-N	-	No	-	-	-
16	4-15	F	1	70-N	4270-M	70	No	-	-	Green
17	4-15	R	2	71-N	4271-M	71	No	-	- 1	Black
18	4-15	м	Sub-ad	4272-M	72-N	72	No	· ·	Ređ	-
10	4-16	R	1 Ad	73-N	4273-M	73	No	Solid OD	-	Green
20	6-16	F	Ad	7274-M	74-N	75	No	-	Black	-
21	4-21	F	Ad	76-N	4261-M	76	Yes	Solid OD	-	Blue
(22	4-21	T I	۵d	4262-M	77-N	-	Yes	Solid OD	Blue	-
23	4-21	м	2	4263-M	78-N	79	Yes	-	Blue	,
24	4-21	м		4264-M	79-N	79	Yes	-	Blue	· •
25	4-21	T	DA	480-N	4265-M	-	No	Solid OD	-	Green
26	4-21	F	2	4266-M	81-N	-	No	-	Green	-
27	4-25	M	1 1	82-N	4267-M	82	No	-	-	Black
128	4-25	R	Γ.A.	83-N	4143-м	83	Yes	Solid OD	-	Green
29	4-25	M	1	84-N	4269-м	84	Yes	-	-	Green
130	4-25	M	Î	85-N	4141-м	-	Yes	-		Green
27	4-26	1	Sub-ad	4144-м	87-N	87	Yes	-	- 1	Red
1/ N=ny]	on: M=me	etal				land in the second second		2/ Most bears tattooed up	oper lip, axill.	e, and groin d

Nylon tags 50 through 75 are blue

Nylon tags 76 through 87 are pink and green

Nylon tags have legend: \$25 reward - Fish and Game,

Anchorage, Alaska U.S.A.

Metal tags have legend: Dept. of Fish and Game

Most bears tattooed upper lip, axilla, and groin du right side

3/ O.D. = Olive Drab

4/ Brackets indicate family groups

No.	Sex	Age	Wt. (Lbs)	Dosage							
				Initial		Total		G		ery	-
				(mg)	(mg/ 1b)	(mg)	(mg/ 1b)	Immobilization (minutes after first injectio	Convulsions (minutes after immobilization)	Observed recover time (hours)	Resightings (days after immobilization)
1	м	Ad	-	480	-			12	-		-
2	R .	Sub-ad	-	340		-	-	8 .		2	12 16
3	R.	Ad	-	340		-		7	4 6	-	12,10
4	F	Sub-ad	355	280	.79 .	670	1.89	90	4,0	3	11
5	M	Ad	620	480	.77	1/	-	46		-	-
.6	M	bA	. 800	480	.60	590	.74	19	1	_	
7	F	Ad	-	280	-	355		27	15 30	-	-
8		Sub-ad	360	280	78	-		10 .	. 10,00	_	_
å	M	Ad	510	280	55	390	76	17	-	-7 5'	
10	M	2	270	280	1 04	570		6		-1.5	12
(11 2/	F	Ad	440	280	64			6			14
112 -	M	2	420	280	67		_	6	-	-	
(13	F	Ad .	460	280	61	500	1 00	-	20	-	-
514	F	1	+00	110		500	1.07	31	20	0.5	
115	r	1		110	_	275	-	32	20	0.5	
16	r	1	_	110	-	215	_	2	20	-	
17	r F	2		150		-	- ·	5	-	-	-
10		Cub-od		200	-	255	_	16	-		
10	PA	Sub-au	-	200	- ·	1/	-	72 .	26	-	
20	r D	Ad	-	1/200	-	1/	-	12	20		-
20	r	DA	610	1/		1/		15	22		5
(22	r	Ad	410	==/		÷,		45	26 69	2 5	
122	r	2	295	1/200	- 0.0	1/255	1 25	20	50,00	2.5	
61	F1	2	205	1/	. 70	1/	1.23	1/	-	_	
25	m	2	. 295	· +/	-	÷,	-	+/	-	- E	-
25	r D	Ad	-	1/	-	1/		1/	-	-	
20	Ľ	2	1/5	200	. 1 0	430	2 06	10	-	-5	-
120	M	1	145	200	1.9	200	3.00	00	10	1	1
20	F	Ad	200	280	-	820	-	2/	10	1	1
129	М	1	200	110	. >>	-	-	2	-	2	1
60	М	1		110	-	220	1.1.5	20	-	T	Ι.
31	M	Sub-ad	355	300	.85	410	1.15	1/		-	-

Table 10. Polar bears immobilized and dosages and effects of Sernylan, Point Barrow area, Alaska, April 1967.

1/ Incomplete injections, data not obtained

2/ Brackets indicate family groups

3/ Never completely immobilized

APPENDIX

Jack Lentfer was in Norway and Spitsbergen from August 1 to September 5 to participate in a Norwegian program to capture and mark polar bears in Spitsbergen waters. Three persons representing two institutions, the Norwegian Polar Institute and the University of Oslo, are working actively on bears in Spitsbergen. Thor Larsen is working on distribution, movements, harvest, and racial separation by serum protein analysis. Nils Øristland is working on physiology, primarily heat regulating mechanisms and effects of immobilizing drugs. Magnar Norderhaug is concerned with recommending a bear management program as part of a broad program for various birds and mammals on Spitsbergen.

Thor Larsen conducted bear capturing work from a chartered 97-foot wooden sealing vessel with a sealing crew experienced in traveling in pack ice. The vessel made two trips into the pack, one in July and one in August. Lentfer made the August trip.

In July, the ice was quite solid without much open water. Bears often had to be stalked or chased by foot on the ice and then immobilized with "Cap-Chur" equipment. In August there was more open water. The most productive areas for bears in August and where the boat could operate had pans of ice approximately 1 to 20 acres in size separated by leads of varying widths. Bears were spotted with the aid of binoculers from the crow's nest. If possible, the bear was forced into the water by approaching with the boat or on foot. Some bears were shot from the boat with a syringe gun while they were swimming. The best method for immobilizing, however, was to pursue a bear with a small skiff and shoot it with a syringe gun as it climbed onto a piece of ice.

After immobilization, bears were lifted on board the large boat, weighed, measured, tagged, tattooed, and had a blood sample taken. Most were held in a cage and not released until they had recovered. This permitted observation of the animals and, in some cases, a measure of respiration, heart beat, and temperature during recovery. Also, family groups could be released together after all had recovered.

M-99 and Sernalyn were used as immobilizing agents. Both took about the same amount of time to immobilize. A bear drugged with M-99 loses control of its head more rapidly than one drugged with Sernylan, and in the water is somewhat more subject to drowning. An advantage of M-99 is that an antagonist can be given which gets the bear on its feet immediately after processing. Bears recovered from Sernalyn in from 2 to 5 hours. Tranvet was given with Sernalyn and controlled convulsions. Sernalyn with a tranquilizer such as Tranvet appears to be satisfactory for polar bears; it is much easier to obtain than M-99.

In the first period (July) 57 bears were seen and 22 were captured. In the second period (August), 48 bears were seen and 29 captured. Cubs, yearlings, and older bears of both sexes were captured. More bears could be tagged by using a helicopter based on a ship.

PREPARED BY:

APPROVED BY:

Jack W. Lentfer Study Leader

my an w 11

Federal Aid Coordinator

SUBMITTED BY:

Robert A. Rausch Project Leader

Director, Division of Game